

HB

108

(FILE 3)

SUPERIOR COURT FOR THE STATE OF ALASKA

FIRST JUDICIAL DISTRICT AT JUNEAU

WILDERNESS ACQUISITIONS, INC.,)
an Alaska corporation,)

Appellant,)

vs.)

ALASKA DEPARTMENT OF NATURAL)
RESOURCES,)

Appellee.)

No. 1 JU 86-2429 Civ.

BRIEF OF APPELLANT

Appeal from the Decision of the Department
of Natural Resources Denying the Application
of Wilderness Acquisitions, Inc. for a Water
Use Permit

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Department of Law

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Text (Summary) of Statutes, Regulations, Etc.

AS 46.15.133(e). A person aggrieved by the action of the commissioner or by the failure of the commissioner to grant, deny, or condition an application in accordance with (c) of this section may appeal to the superior court.

AS 44.62.560. Judicial review.

This statute is the portion of the Administrative Procedure Act which sets forth the procedure for obtaining judicial review of final agency action. Subsection (e) is most significant in this appeal. It provides:

(e) The superior court may enjoin agency action in excess of constitutional or statutory authority at any stage of an agency proceeding. If agency action is unlawfully withheld or unreasonably withheld, the superior court may compel the agency to initiate action.

AS 16.05.940(12). "fish or game farming" means the business of propagating, breeding, raising, or producing fish or game in captivity for the purpose of marketing the fish or game or their products, and "captivity" means having the fish or game under positive control as in a pen, pond, or an area of land or water which is completely enclosed by a generally escape-proof barrier;

AS 46.15.145. Reservation of water.

This statute sets forth the procedure for obtaining an instream flow reservation, who may apply for such a reservation, under what circumstances it may be granted, its duration and the effect which it has on prior appropriation.

AS 46.15.050. Priority. (a) Priority of appropriation gives prior right. Priority of appropriation does not include the right to prevent changes in the condition of water occurrence, such as the increase or decrease of stream flow, or the lowering of a water table, artesian pressure, or water level, by later appropriators, if the prior appropriator can reasonably acquire his water under the changed conditions.

(b) Priority of appropriation made under this chapter dates from the filing of an application with the commissioner.

(c) Priority of appropriation perfected before July 1, 1966, shall be determined as provided in AS 46.15.065.

5 AAC 41.005 - 100. Transportation, Possession, and Release of Live Fish.

These are the regulations which establish the fish transport permit system. They set forth uniform application procedures, provide for inspection of brood stock, describe the circumstances under which a permit can be denied, prohibit importation or release of fish without a permit, require reporting of enumerated diseases and define certain terms used therein.

5 AAC 41.030(a). Permit Issuance or Denial.

See above.

5ACC 40.220(b)(2). Review and Determination.

This regulation provides for review of an application for a private non-profit hatchery permit. The relevant portion of it is set forth in the text of the brief.

5 AAC 41.010. Uniform Application Procedures.

See above.

Appellate Rules 601 - 607.

These rules set forth the procedure for appealing final agency action to the Superior Court. They supercede contrary or inconsistent provisions contained in the Administrative Procedure Act.

STATEMENT OF JURISDICTION

This jurisdiction of this court to hear and decide all matters presented by this appeal from the decision of the Commissioner dated October 14, 1986 is based upon AS 46.15.133(e), AS 44.62.560 et. seq. and Appellate Rules 601 through 607.

STATEMENT OF ISSUES

The only issue presented for review by this appeal is whether the Commissioner of the Department of Natural Resources acted in an unreasonable, arbitrary or capricious manner, contrary to law or beyond the scope of administrative authority when she denied the application of Wilderness Acquisitions, Inc. for a water use permit.

STATEMENT OF THE CASE

Early in the spring of 1985 Wilderness Acquisitions, Inc. (WAI) became interested in property offered for sale in Warm Springs Bay on Baranof Island. The property, in the estimation of WAI, was well suited for the development of an aquaculture business primarily because it was located close to the Baranof River and contained patented tidelands. Prior to submitting an offer to purchase the property, WAI contacted the Division of Land and Water Management (DLWM) to determine the amount of water in the river which was subject to prior appropriation. It learned that with the exception of several small prior claims, the water

was available for appropriation under AS 46.15. It also learned that a permit to appropriate water which had been issued to the Alaska Department of Fish and Game (ADF&G) to use water for hatchery purposes on May 24, 1978 had lapsed on November 18, 1983 because ADF&G had failed to build the required improvements and begin beneficially using water within the required time period. On September 23, 1985, WAI purchased the property for \$350,000 and began planning the development of an aquaculture facility that would produce salmon smolt for ocean ranching and ocean farming¹ and other sea farm products (R, 028-044;098-100).

On October 26, 1985, as part of this planning process, WAI requested ADF&G to undertake a management feasibility analysis under the private non-profit (PNP) hatchery regulations to determine the benefits and detriments of developing a PNP hatchery at Warm Springs Bay (R, 005).

On November 14, 1985, ADF&G advised Northern Southeast

¹The difference between ocean ranching and ocean farming is explained by William R. Heard and Thomas Kron in the article Salmon Farming which appeared in the May-June 1986 issue of the Alaska Fish & Game magazine:

...The spawning, incubation and rearing (freshwater-fry to seawater-smolt stage) of salmon is well understood and successfully practiced throughout Alaska in state and private non-profit hatcheries. Alaska's hatcheries are currently involved in "salmon ranching", aquaculture which is designed for producing anadromous returns of adult salmon (similar to wild stocks) from hatchery releases of fry and smolt. In salmon farming, smolts that are ready for life in the ocean are held captive in cages and netpens which are anchored in protected inlets and coves where there is good circulation of pristine water. Farmed salmon are fed nutritious prepared diets over a one to four-year period in netpens while growing to either marketable size or maturity.

Regional Aquaculture Association (NSRAA) that such an analysis had been requested and advised the association that it could exercise a preference right to the site for hatchery purposes (R, 008-009).

On November 18, 1985, WAI filed an application for water rights with DNR requesting a permit to appropriate 50 cfs of water from the Baranof River for the purpose of rearing Chinook salmon and generation of electrical power. This application was file stamped by the Southeast Regional Office of DNR but was never serialized, assigned a case number or acted upon by it, apparently being treated as superseded by the subsequent application (R, 009-015).

On December 12, 1986, ADF&G received notice that NSRAA had elected to exercise the preference right (R, 022).

On December 19, 1985, Dale Young, acting for WAI, received a license from the Department of Revenue to operate a fish farm at Warm Springs Bay (R-025).

On December 20, 1985, WAI filed an additional application requesting a permit to appropriate 200 cfs of water from the same river for the purpose of building an aquaculture facility designed to produce 7 to 10 million smolts annually for ocean ranching and ocean farming and other sea farm products including mature pen-raised chinook salmon (R, 023-044).

On January 17, 1986, Commissioner Collingsworth requested an opinion from the Department of Law on the ability of the State to develop a hatchery at a location which was the subject

of a preference right exercised by a regional agriculture association (R, 049-051).

On January 20, 1986, ADF&G filed an application to appropriate for itself the same quantity of water requested by WAI. (This specific information appears to be absent from the record although it is obliquely referred to at 137 as one of four competing applications and at 077 where ADF&G requests "issuance of [their] water rights".)

On May 6, 1986, the Department of Law issued an opinion indicating that ADF&G could, in effect, override the preference right and develop its own hatchery at Warm Springs Bay.

On May 19, 1986, Deputy Commissioner Pennoyer advised WAI that ADF&G intended to "develop the Baranof Warm Spring site to its highest potential" (R, 075).

On May 30, 1986, ADF&G informed DLWM of this intention and requested that water rights be awarded to ADF&G instead of WAI (R, 077).

On June 12, 1986, DLWM issued a decision denying WAI's application for the requested water use permit and advising WAI of its right to appeal the decision (R, 085-086).

On July 3, 1986, WAI appealed this decision to the Commissioner (R, 087). The point on appeal before the Superior Court was raised in the appeal to the Commissioner in the brief filed by WAI (R, 089-100).

On October 14, 1986, DNR Commissioner Munnicke affirmed the decision of DLWM (R, 107-113).

WAI appeals to the Superior Court from this determination.

STATEMENT OF STANDARD OF REVIEW

The appropriate standard of review to be applied in this proceeding is the substitution of judgment test set forth in Jager v. State, 537 P. 2d 1100 (Alaska 1975) because this appeal does not ask the Superior Court to reweigh facts or review policy choices involving agency expertise. The appellant, WAI, contends only that DNR acted contrary to the statutes and applicable administrative regulations when it denied the water use permit.

ARGUMENT

When WAI purchased the Warm Springs Bay property and applied for the right to appropriate 200 cfs of water from the Baranof River, it contemplated a multi-purpose aquaculture operation. One purpose was ocean ranching which, in this case, would have involved the production of Chinook smolts for release into the common property fishery; WAI had originally hoped to contract with the State to do this on the State's behalf as part of the mitigation effort authorized by the recent treaty with Canada. Another purpose was the production of Chinook smolts for sale to a fledgling salmon farming industry. Still another was pen raising salmon and possibly other species for sale for human consumption. The protected location of the property and the

close availability of an abundant supply of unappropriated fresh water under a sufficient head of pressure made all of the contemplated purposes realistic.

When DLWM Director Hawkins denied the application for the water use permit requested by WAI he stated:

...the Department of Fish and Game has determined that there will be no permit issued to Wilderness Acquisitions, Inc. for development of an aquaculture facility at Warm Springs Bay. Now that it is clear that no permit will be issued, Wilderness Acquisitions, Inc. does not have the ability to complete the appropriation of water applied for under LAS #4068. Therefore, pursuant to AS 46.15.08)(b) (7), application number LAS #4068 is found to be not in the public interest and therefore the issuance of a water use permit is denied and the casefile closed this 12th day of June, 1986. (R, 086)

In its effort to reverse or modify this decision, WAI divided its argument into two main components:²

The first argument, in essence, was that with respect to the ocean ranching aspect of its planned operation, WAI should have a reasonable period of time in which to secure a private non-profit hatchery (PNP) permit and that the public interest under the Water Use Act, AS 46.15, could be protected by conditioning the water use permit on the ability of WAI to secure the PNP permit within a reasonable period of time. Although the statutes and regulations, give the Commissioner ample authority to issue

²A third argument dealing with administrative discretion and the political realities of aquaculture in Alaska was also addressed to the Commissioner. Since the argument was political in nature, it is not a proper subject for judicial review and is not raised on this appeal.

such a conditioned permit, she chose not to do so believing, on the basis of statements made to her by ADF&G personnel, that WAI would not be able to obtain a PNP permit. This choice appears to have been made within the scope of the administrative authority delegated to her and could not successfully be appealed to this court. Since WAI cannot engage in ocean ranching without a PNP permit from ADF&G and ADF&G has indicated that no such permit is forthcoming, WAI does not contend that it can complete the appropriation by beneficially using water to rear fish that will be released into the common property fishery.

The second argument, which is the one pursued in this appeal, is that WAI does not, at this time, need a permit from ADF&G to engage in ocean farming, that it is in position to immediately begin building the improvements which will enable it to beneficially use the water for which it has applied and that WAI is entitled by law to receive a water use permit. In addressing this argument, the Commissioner stated:

Clearly the operation of a fish farm without release into the common-property fishery does not meet the highest and best use determination of ADF&G Commissioner Collingsworth. In order to operate a fish farm, it is necessary to obtain a fish transport permit from ADF&G. Since that department intends to develop the site itself, and since fish farming without releasing the fish does not meet the highest and best use determination, it is clear that WAI does not at this time have the ability to complete the proposed water appropriation by means of fish farming.
(R, 108)

It therefore appears that the logic BNR followed in denying WAI's application for a water use permit can be restated as

the following manner: Since fish farming is not the highest and best use of the Warm Springs Bay site, ADF&G will not give WAI a fish transport permit. Without that permit, WAI cannot farm fish. If WAI cannot farm fish, it cannot complete the appropriation. If it cannot complete the appropriation, the proposed appropriation is not in the public interest. If the proposed appropriation is not in the public interest, DNR is not required to issue the water use permit. WAI, for the reasons appearing below, disagrees.

Fish farming is an activity which has been specifically contemplated by the legislature. AS 16.05.940(12) defines fish or game farming as:

... the business of propogating, breeding, raising or producing fish or game in captivity for the purpose of marketing the fish or game or their products, and "captivity" means having the fish or game under positive control, as in a pen, pond or area of land or water which is completely enclosed by a generally escape-proof barrier.

ADF&G has finally and reluctantly agreed that fish farming is a legal activity. In a memorandum to Assistant Attorney General Larri Spengler dated February 6, 1987, ADF&G Commissioner Collingsworth states:

The staff has reviewed existing Title 16 statutes and regulations dealing with fish farming, commercial fisheries, salmon hatcheries, research, and fish importation, transplantation and holding. That review indicates that some fish farming activities are legal, although the route one must follow through the law to reach that conclusion is complex. Other matters are not so clear. Set out below are the results of the review...

Since it appears that fish farming, in general, is a legal activity, we must then look at the legal means of obtaining the fish to be farmed....

A question that many find perplexing is how does one obtain, other than by importation, fish for placement in a farm? It seems clear to us that, at the present time, one must do this through commercial fishing operations. Since fish farming and the sale of fish to farms as brood stock are commercial operations, the taking of those fish cannot be done under sport, subsistence or personal use regulations. If one has all the proper permits and licenses, the season is open, and legal gear is used, the fish may be harvested and subsequently farmed....

Since fish farming is an authorized activity, the question becomes how and to what extent is ADF&G able to regulate such farming? In the same memorandum, Collingsworth goes on to state:

Once a brood stock is available, the Department of Revenue (DOR) licensing and DF&G permitting processes for the fish farmer are relatively simple. The farmer would apply to DF&G, under 5 AAC 41, for a permit to transport and hold live fish. We would review the proposed operation for compliance with AS 16 and 5 AAC. Upon issuance of the permit, we would then recommend that DOR issue a fish farming license.

It is therefore the apparent intention of ADF&G to use the fish transport permit as the mechanism to regulate fish farming.

The regulations which create the fish transport permit system are set forth in 5 AAC 41.005 through 100. It is immediately apparent from a reading of these regulations that their primary, if not only, purpose is to protect against the transmission of disease from one fish population to another. These regulations specifically provide that the Commissioner will issue a permit

if ADF&G determines that the proposed transport, possession & release of fish will not adversely affect the continued health and perpetuation of native, wild, or hatchery stocks of fish. 5 AAC 41.030(a). The regulations do not authorize the Commissioner to deny a fish transport permit to an applicant because ADF&G has determined that it needs for its own project the water which the applicant is in the process of acquiring. In other words, the fish transport permit system has absolutely nothing to do with hatchery site identification and reservation; it is designed to protect existing fish stocks from disease. If WAI is able to show that it can carry forward with its operations without adversely affecting existing fish stocks, it is entitled by law to have a fish transport permit issued to it.

Commissioner Wunnicke, in denying the water use permit appeal, implied that ADF&G had the authority to determine the highest and best use of a proposed site and issue or deny a fish transport permit accordingly. More specifically, she indicated that if ADF&G determined that a proposed project did not meet ADF&G's idea of what constituted the highest and best use of a particular site, it could deny an application for such a fish transport permit. This "highest and best use" test originated in an attorney general's opinion³ which dealt with the relationship between ADF&G and regional aquaculture associations when such an association had exercised a preference right to a hatchery site which ADF&G desired to develop. The opinion concluded:

³Op. Atty. Gen. No. 661-66-0282; May 6, 1986

that in deciding between a private non-profit applicant for a hatchery site and itself, ADF&G was to consider which of the two would make the best use of the site's potential. This conclusion derived from the language in 5 AAC 40.220(b)(2) which states:

The operation of the proposed hatchery must make the best use of the site's potential to benefit the common property fishery. In order to achieve optimum public benefit from the state's private non-profit hatchery program and insure that the proposed hatchery is in the best interest of the public, enhancement sites must be developed to their fullest potential, with consideration to appropriate species and technological uses of the site. (emphasis added).

This regulation and the best use standard which, according to an assistant attorney general, arises in its language have absolutely nothing to do with fish farming projects. They are, by the terms of the regulation itself, limited to sites where there is competition among applicants who wish to operate private non-profit hatcheries designed to enhance the common property fishery. If Wunnicke's reasoning is carried to its logical end, ADF&G could prohibit private development of any aquaculture project in Alaska merely by determining that the highest and best use required the site to be reserved for state use. This result is not only absurd from a practical standpoint, it is entirely without legal foundation. There is no evidence that the legislature intended to confer such plenipotent power over aquaculture on ADF&G.

There exists, however, two methods by which ADF&G, when it has identified a site which it intend to develop in the future,

can act to insure that the water supply needed for the development will not be subject to private appropriation. First, it can apply for an instream reservation under AS 46.15.145. That statute authorizes DNR to reserve a specified instream flow or level of water at a particular point for purposes such as fish propagation. The reservation can be revoked when ADF&G commences enhancement at the site. A reservation will tie up the water for a minimum of 10 years. Second, ADF&G can apply for a water use permit just like anyone else. In fact, ADF&G did so in this situation not once, but twice.⁴ In other words, ADF&G had plenty of opportunity to protect its interest in the site prior to the application by WAI if it desired to do so without relying on some convoluted notion of highest and best use to sweep aside the rights of persons or organizations such as WAI who had a higher priority to the water under AS 46.15.050.

⁴The first application for water for a hatchery at Warm Springs Bay was received by DNR on May 24, 1978. It was terminated on November 18, 1983 because ADF&G failed to build the improvements necessary to begin beneficial use of the water. The second application was filed on January 14, 1986, approximately three weeks after WAI applied for the same water. Under AS 46.15.050, priority of appropriation gives prior right and priority of appropriation dates from the filing of an application for a water use permit. If, as indicated in the letter to Greg Young from Deputy Commissioner Pennoyer dated May 6, 1986 (R, 070-072), this site was identified "over ten years ago, even prior to the comprehensive planning effort in the region" as a "world class hatchery site for the production of chinook, coho and chum salmon", one wonders what form of egregious bureaucratic malfeasance allowed water rights initially dating from May 24, 1978 to revert to common property. If ADF&G had been diligent in protecting its interest in the site, WAI would have known that the water was unavailable and would not have invested \$350,000 in the property.

The only question remaining is whether WAI must obtain a fish transport permit before the water use permit can be issued. It is immediately obvious from a reading of the regulations set forth in 5 AAC 41.005 through 100, that it would be premature and meaningless for DNR to require WAI or any other water use permit applicant at a similar stage of project development to obtain a fish transport permit before issuing the water use permit. For example, the regulation governing the content of the application for a fish transport permit, 5 AAC 41.010, requires the applicant to submit, among other information, identification of the stock to be transported or possessed, the number of fish and their life history, stage or age and a statement on the health or condition of the fish, including a disease history of the stock, any hatchery through which they may have passed and, possibly, a brood stock inspection certificate. It is going to be at least two years from the date the water use permit is granted before WAI's facility will be ready for operation. WAI has no way of being able to know what brood stock will be available at that time (particularly where, as here, the gametes will probably be acquired through commercial fishing) and if it did, the disease history of the stock could change before the facility is operable. Acquisition of a fish transport permit should be one of the last things a fish farmer does before beginning operation. DNR has no reasonable interest in and, in fact, would be proceeding in a counterproductive manner by requiring that the fish transport permit be obtained before issuing the

water use permit.

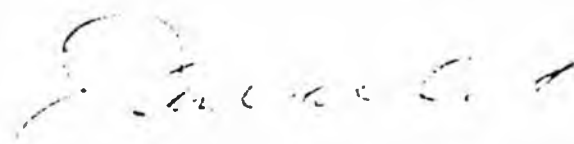
CONCLUSION

DNR denied WAI's application for a water use permit because it concluded that WAI would not be able to complete the appropriation. In so doing, it reasoned that WAI could not complete the appropriation because it would not be able to obtain a fish transport permit.

WAI is the owner of patented tidelands and an easement for a pipeline to the Baranof River. The necessary water is available for appropriation. In order to develop the planned fish farming facility, WAI must acquire a water use permit. In order to operate the facility, it must acquire a fish farm license from the Department of Revenue and a fish transport permit from ADF&G. It already has the license and will be entitled to receive the fish transport permit after the facility is completed and an acceptable brood stock is identified. WAI has done everything which it is able to do and which can be legally required of it at this time. WAI has the intent and the ability to complete the appropriation. WAI is therefore entitled to receive a water use permit from DNR.

This court should therefore reverse the decision of Commissioner Wunnicke and, under the authority of AS 44.62.560(e), order DNR to issue to WAI the water use permit for which it applied.

Respectfully submitted this 23rd day of February, 1987.

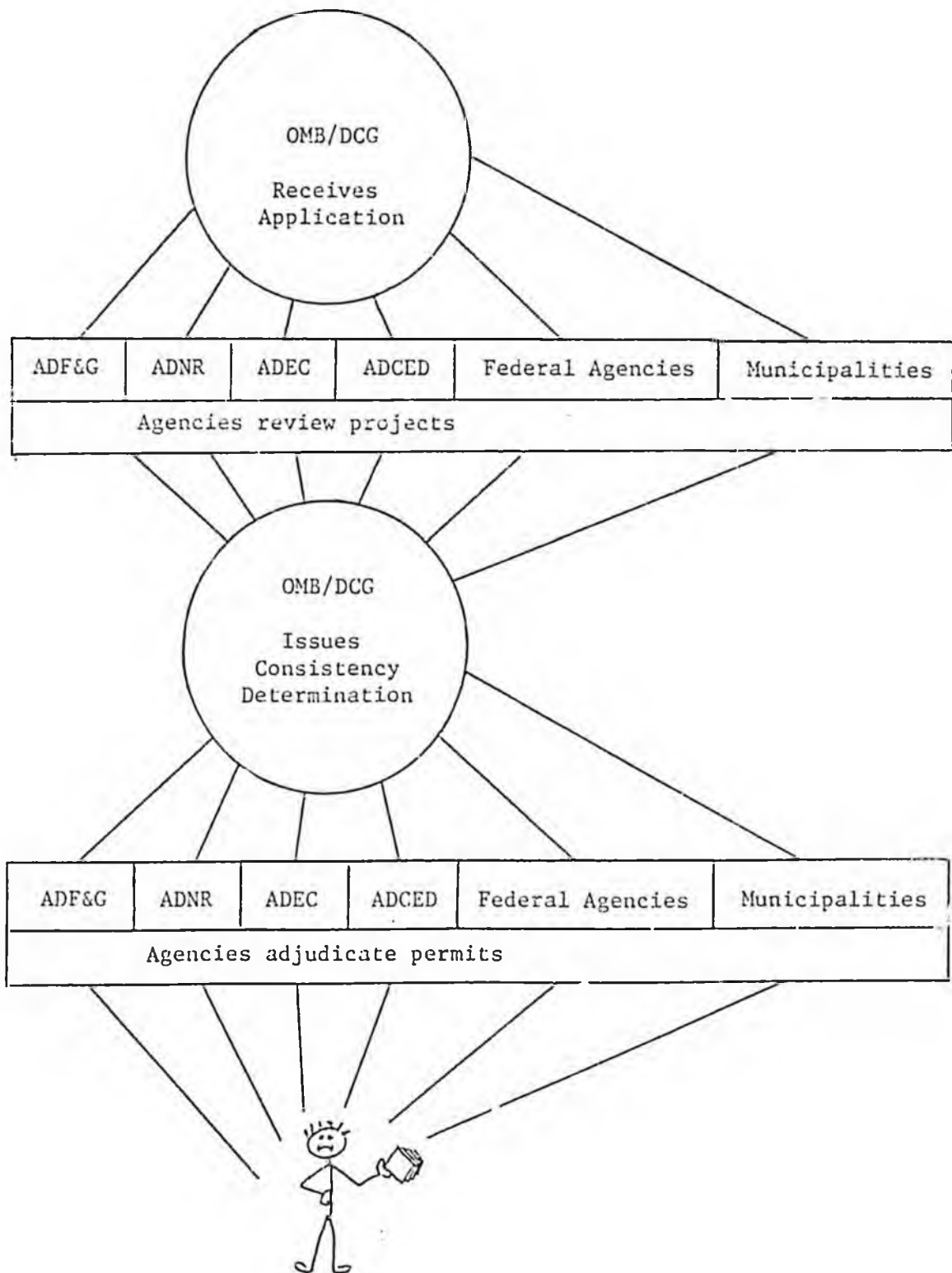


Jan Van Dort
Attorney For Appellant

I hereby certify that a true and correct copy of the foregoing Brief of Appellant was served on the State of Alaska by delivery thereof to the office of Assistant Attorney General Joseph W. Geldhof on February 23, 1987.

Jan Van Dort

EXISTING PERMIT STRUCTURE
for
RESOURCE AGENCIES





Alaska Department of **NATURAL RESOURCES**

LEASING OF STATE LANDS AND TIDELANDS

A.S. 38.05.070

State land, including tide, submerged and shore land is available to lease by any member of the public, business or organization that can demonstrate a need for appropriate development. Leases may be offered competitively through public auction or negotiated directly with the applicant. If the fair market annual rental is determined to be less than \$5000.00, the law allows the State to negotiate that lease directly with the applicant for 10 years or less. However, if it is determined that a competitive interest exists or if the annual rental is greater than \$5000, the lease will be offered at a public auction to the highest bidder. The minimum bid will be the appraised fair market value annual rental.

Competitive leases can be issued for a term not to exceed 55 years, while negotiated leases can only be issued for a term of 10 years or less. Within those parameters, the determining factors are the estimated life of the project or the estimated time that the applicant thinks the land will be needed and the extent of the improvements. Land leases that are offered by competitive bid are renewable at the director's discretion. The renewal must be applied for in a timely manner. Leases negotiated under A.S. 38.05.070(b) are not eligible for renewal.

The owner or lessee of land that fronts on tide or submerged land is entitled to acquire a negotiated lease for the tide and submerged land if the requirements of A.S. 38.05.075(c) are met.

Negotiated leases may also be requested by: 1) commercial operators of fishing or hunting camps within an exclusive or joint use guiding area, 2) commercial operators of duck shacks, and 3) shore fishery setnetters seeking an upland lease for use in conjunction with their fishing sites. Parcel size should be limited to the minimum acreage needed. In the case of setnetters, they must provide evidence that they have necessary limited entry permit to participate in the local fishery and the term of the upland lease should coincide with the term of their shore fishery lease. If they do not have a shore fishery lease, they should apply during the filing period.

Leases may be transferred by assignment with the approval of the chief of Contract Administration. Before approving an assignment of lease, the individual receiving the lease must be determined eligible to participate in the program under which the lease was created and the lease must be in good standing.

It is the responsibility of the applicant to arrange and pay for survey, appraisal and legal notice publication, and to see that these tasks are carried out in a timely manner when directed to do so by the State. Depending on the time of year, these tasks could be time consuming. If the lease is negotiated, the decision on whether or not to require a survey will be made on a case by case basis and will depend on the type and extent of existing monumentation, the existing uses of the surrounding land, the likelihood that the surrounding land will be developed during the lease term and any other pertinent factors which may apply to a particular parcel of state land.

The following is a general time table for processing a lease:

1. Application received, serialized and photo copied.	*30 days
2. In-house and agency review	20 days
3. Preliminary decision	30 days
4. .945 notice letters (AS 38.05.945(c))	30 days
5. .945 public notice (newspaper ad) (AS 38.05.945(b))	30 days
6. Survey and appraisal (11 AAC 58.400 - .410)	60 days
7. Final decision	10 days
8. .945 notice letters (if competitive offerings)	30 days
9. .945 public notice (if competitive)	30 days
10. Lease offering	10 days

In addition to the above mentioned times, applicants must take into consideration delays that may occur if the land is not classified or needs to be reclassified (approximately 90 days - 11 AAC 55). If the land is located within an organized borough, the survey plat must be approved by the local platting authority which requires additional time (11 AAC 53). Applications are processed in the order received and there is currently a backlog of over 2000 casefiles.

Applicants should include the following information with their completed application form:

- Filing fee.
- USGS map 1:63,360 scale with the location marked.
- Development plan and time schedule.
- A clear statement of the intended use of the property.
- Any applicable licenses.

* Some upland leases and all tideland leases are within the "coastal zone" and other permits may be required from other agencies. These go through another review for consistency with the Alaska Coastal Management Plan or approved local coastal plans. Normal review period is 50 days.

The development plan should contain the following information:

- A description of the type and location of the temporary and/or permanent structures and a scale drawing depicting all proposed structures.
- The intended access to the site.
- An explanation of any clearing or cutting of trees.
- A description of the intended power source and fuel storage area.
- An explanation of the intended solid waste and waste water disposal method.

Applicable statutes for reference:

- A.S. 38.05.035 -- Powers and duties of the director.
- A.S. 38.05.070-.105 -- Leasing of lands other than for the extraction of natural resources.
- A.S. 38.05.840 -- Appraisal
- A.S. 38.05.920 -- Assignment
- A.S. 38.05.945 -- Notice

Additional information may be obtained from the local office of the Division of Land and Water Management, Department of Natural Resources.

Southcentral Regional Office
OFFICE LOCATION:
3601 "C" Street, Tenth Floor
Anchorage, Alaska
Phone: (907) 762-2202
MAILING ADDRESS:
P.O. Box 7005
Anchorage, Alaska 99510-7005

Mat-Su Area Office
OFFICE LOCATION:
Century Plaza, Suite 202
Mile .5 Knik Road
Wasilla, Alaska
Phone: (907) 376-4595
MAILING ADDRESS:
P.O. Box 874008
Wasilla, Alaska 99687

Northern Regional Office
OFFICE LOCATION:
4420 Airport Way
Fairbanks, Alaska
Phone: (907) 479-2243
MAILING ADDRESS:
4420 Airport Way
Fairbanks, Alaska 99709

Southeast Regional Office
OFFICE LOCATION:
400 Willoughby Avenue,
Suite 400
Juneau, Alaska
Phone: (907) 465-3400
MAILING ADDRESS:
400 Willoughby Avenue,
Suite 400
Juneau, Alaska 99801



Alaska Department of

NATURAL RESOURCES

FACT SHEET - LAND USE PERMITS ON STATE LAND

Division of Land and Water Management
Southeast Regional Office
400 Willoughby Ave., Suite 400
Juneau, Alaska 99801
Tel. No. 465-3400

WHAT IS A LAND USE PERMIT?

A land use permit is authorization for the temporary use of state land, tideland or resources. It conveys no right in the land and is essentially a guarantee that so long as the activity is conducted under the terms of the permit the holder is immune from prosecution for trespass. All permits are revocable immediately with cause, and they are revocable without cause upon a thirty day notice. Permits are not transferable. Permanent structures are prohibited on a permit area. Therefore, any structure placed on the permit area must be readily removable.

FOR HOW LONG IS A PERMIT ISSUED?

It is division policy that a permit may not exceed one year in length. A permit may not be renewed, but it may be re-issued by submitting a new application.

HOW DO I OBTAIN A LAND USE PERMIT?

A permit may be obtained by making application to the Southeast Regional Office at the address listed above. The applicant must submit a completed land use permit application, a filing fee, a sketch map and a completed coastal project questionnaire.

WHAT COSTS ARE INVOLVED?

An applicant must pay a fifty dollar filing fee. There are no user fees for non-exclusive permits, however, user fees of fifty dollars per acre per year with a one-hundred dollar minimum will be charged for all permits for exclusive use or commercial use.

WHAT IS THE PROCESSING TIME?

Normally the processing time is about thirty days. This allows time for review of the application by other state agencies and for a determination of consistency with coastal zone management statutes.

WHAT ARE GENERALLY PERMITTED ACTIVITIES?

Regulations specify certain activities which will be allowed on state lands without the issuance of a written permit. These are called generally permitted activities. A list of generally permitted activities is on the attached page.

The following constitutes the list of generally permitted activities on state lands:

- A. Hiking and backpacking, horse and dog team travel, cross-country skiing and snowmachining, camping and warming fires, mountain climbing.
- B. Light plane and helicopter landing; use of water equipment such as boats, rafts and canoes.
- C. Hunting, fishing and trapping; use of state land for setting up fish camps or hunting camps when such camps are for the individual's own temporary use and do not constitute a preference right. Placement of crab and shrimp pots in accord with fish and game regulations is allowed.
- D. Harvesting small number of wild plants for personal use; securing dead or down firewood for personal use; harvesting mushrooms, berries and other plant materials for personal use as food.
- E. Non-exclusive recreational use or other use that is temporary and has no noticeable effect on vegetation, drainage or soil stability nor involves any harassment of wildlife other than lawful hunting, trapping and fishing.
- F. Recreational gold panning.

Although the following activities are generally permitted on the state public domain, a written permit is required for surface uses of lands designated as part of the state park system, fish and game sanctuaries, refuges, and critical habitat areas, or areas where use is limited by classification or special use designation including university grant lands:

- A. Mineral prospecting using pick and shovel; hard rock prospecting by backpacking; gold or other mineral recovery utilizing small hand held or floating suction dredging apparatus.
 - B. Brushing survey lines or trails less than three feet wide where there is no disturbance of the root system and when such trails do not constitute a right-of-way.
 - C. A livestock drive of less than 100 animals.
 - D. Anchoring of mooring buoys or construction of private floats and docks by the upland owner for his own personal noncommercial use on state tide or shore lands.
-
- E. Use of vehicles such as 4-wheel drive vehicles, pickups and all-terrain vehicles (wheeled and tracked) off established right-of-way easements.

DEPARTMENT OF FISH AND GAME

1416 NINTH STREET
SACRAMENTO, CALIFORNIA 95814
(916) 445-8386



March 3, 1987

Mr. Bob Palmer
Department of Natural Resources
Division of Land and Water Management
400 Willoughby Avenue, Suite 400
Juneau, Alaska 99801

Dear Mr. Palmer:

This is in response to your request for information pertaining to the leasing of state water bottoms in California for aquaculture purposes.

Enclosed is a copy of our "Marine Aquaculture Leaflet" and a list of our registered marine aquaculturists. Also enclosed is an article on SB 1917, 1982, the legislation that led to our current aquaculture regulations. The provisions of SB 1917 are incorporated into the California Fish and Game Code, specifically Sections 15000-15908, pages 27-38 of the leaflet.

The authority for the leasing of state water bottoms for aquaculture purposes are contained in Sections 15400-15415, pages 30-33. Fish and Game Commission regulations that implement the aquaculture laws contained in the Fish and Game Code are contained in Title 14, California Administrative Code, Sections 235-245, pages 39-61.

The state's marine aquaculture laws and regulations also provide for revenue to support the Department's aquaculture program. This revenue comes from a registration fee for all aquaculturists (Section 15101), rental rates for tideland acreage (Section 15406.5) and royalty fees for products produced on the leases (Section 8045 pages 25 and 26, and Section 15406.7, page 32).

I hope this information will be useful to you. If I can provide additional assistance, please let me know.

Sincerely,

Emil J. Smith, Jr.
Emil J. Smith, Jr.
Marine Resources Supervisor
Marine Resources Division

EJS:gs

Enclosures

The bag limit on such clams is 50 per day, in the aggregate. Not more than one daily bag limit of such clams may be possessed by any person during one day.

Clams of the species herein designated, when legally taken outside the state and brought within the state pursuant to this code, may be possessed, transported and sold without restrictions, except that all shipments of such clams into this state shall be accompanied by a bill of lading, or invoice, showing the species, total number or weight, and the origin of the clams.

8345. It is unlawful for any person to sell or purchase any rock scallops (Hinnites multirugosus) or scallops (Pecten circularis), except that scallops cultivated pursuant to Division 12 (commencing with Section 15000) which may be sold or purchased subject to regulations of the commission.

DIVISION 9. FINES AND PENALTIES

Chapter 1. GENERAL PROVISIONS

12000. The violation of any provision of this code, other than Sections 3009 and 12001, or of any rule, regulation, or order made or adopted under this code, is a misdemeanor.
12002. The maximum punishment for a violation constituting a misdemeanor is a fine of one thousand dollars (\$1,000) or imprisonment in the county jail for six months, or both, except as follows:
12010. Notwithstanding Section 12000, the maximum penalty for a violation of Sections 15202 or 15509 is a fine of two thousand dollars (\$2,000) or imprisonment in the county jail for one year, or both the fine and imprisonment.

DIVISION 12. AQUACULTURE

Chapter 1. GENERAL PROVISIONS

15000. The business of aquaculture is governed by this division. Aquaculture and its products are exempt from those provisions of this code dealing with commercial fishing and harvesting.
15001. The cultured progeny of wild plants and animals lawfully obtained under Section 15300 are the exclusive property of that person who cultured them or that person's successor in interest.
15002. Any person who takes aquaculture products without lawful entitlement is subject to prosecution for theft.
15003. (a) The department may assess a fee on persons growing aquaculture products on public lands and in public waters based on the price per pound of the products sold. the fees, if imposed, shall be

set at amounts necessary to defray the costs of the commission the department in administering this division. however, the fees if any, may not exceed the privilege taxes as provided in section 8045.

- (b) the price per pound for these taxation purposes shall be based on the whole product weight or its equivalent as taken by the lessee.
- (c) the privilege tax imposed by this section shall be paid monthly to the department within 30 days after the close of each month. if not paid within 60 days after the close of the month in which it is due, a 10 percent penalty shall be paid.

15004. aquaculturists operating under this division shall pay all costs incurred by the department when conducting any inspections of plants, animals, facilities, or culture areas required by this division, or by regulations made pursuant to it, when requested by the aquaculturists.

15005. (a) When necessary for the protection of native wildlife, the commission may regulate the transportation, purchase, possession, and sale of specific aquaculture products as provided for in this section.

(b) The commission may determine that aquaculture products shall be accompanied by a document containing any of the following information:

- (1) The name, address and registration number of the aquaculture producer.
- (2) The species.
- (3) The weight, volume or count within the container.
- (4) The date of the shipment.
- (5) The name and address of the intended receiver.

(c) The commission may require that certain aquaculture products shall be additionally identified as being aquaculture produced, except for the following:

- (1) Trout.
- (2) Catfish.
- (3) Kelp and aquatic plants.
- (4) Frogs and amphibians.
- (5) All bivalve mollusks (except littleneck clams).
- (6) All members of the family Centrarchidae.
- (7) Crayfish.
- (8) Sea urchins.
- (9) Shrimp and freshwater prawns.
- (10) Crab.

15006. Nothing in this division applies to authorized species of ornamental marine or freshwater plants and animals not utilized for human consumption or bait purposes that are maintained in closed systems for personal, pet industry, or hobby purposes.

15007. Except as specifically authorized in Chapter 10 (commencing with Section 15900), nothing in this division permits ocean ranching.

Chapter 2. AQUACULTURE DEVELOPMENT SECTION

15100. There is within the department the Aquaculture Development Section. The Aquaculture Development Section shall perform all of the following duties:

- (a) Promote understanding of aquaculture among public agencies and the general public.
- (b) Propose methods of reducing the negative impact of public regulation at all levels of government on the aquaculture industry.
- (c) Provide information on all aspects of regulatory compliance to the various sectors of the aquaculture industry.
- (d) Provide such advice to aquaculturists on project siting and facility design that may be needed to comply with regulatory requirements.

15101. The owner of each aquaculture facility shall register all of the following information with the department by March 1 of each year.

- (a) The owner's name.
- (b) The species grown.
- (c) The location or locations of each operation or operations. The department may provide registration forms for this purpose and may impose a registration fee not to exceed ~~any~~ ^{one hundred} dollars ~~(=)~~ ⁽⁼⁾ (\$100). Anyone failing to register under this section shall be operating unlawfully.

15102. The department may prohibit an aquaculture operation or the culturing of any species at any location where it is determined it would be detrimental to adjacent native wildlife.

Chapter 3. STOCKING AQUATIC ORGANISMS

15200. The commission may regulate the placing of aquatic plants and animals in waters of the state. Movement of live fish between two registered aquaculturists who are registered for those species does not require a permit.

15201. A permit is required to place fish on public or private land or water in any watershed above an established public or private fish hatchery. The department shall deny the permit if there is evidence that water quality and potential disease transfers will be adverse to the established hatchery.

15202. The commission may prohibit the placement of specific species of aquatic plants or animals in designated waters of the state. The prohibition may not include species that are found to be native or that are stocked by the state in a location where prohibition is contemplated.

Chapter 4. BROOD STOCK ACQUISITION

15300. Aquatic plants or animals may be legally obtained for use as brood stock from all of the following sources:
- (a) A holder of a commercial fishing license.
 - (b) A registered aquaculturist.
 - (c) The department.
 - (d) Imported sources authorized by Chapter 7 (commencing with Section 15600).
15301. (a) The department may sell wild aquatic plants or animals, except rare, endangered, or fully protected species, for aquaculture use at a price approximating the administrative cost to the department for collection or sale of the plants or animals. The commission shall set this price.
- (b) Aquatic plants and animals may be collected by a registered aquaculturist only with the written approval of the department. The department may specify the time, place, and manner of collection and may collect a fee from the aquaculturist in an amount sufficient to cover the cost of processing the approval.

Chapter 5. LEASING OF STATE WATER BOTTOMS

15400. The commission may lease state water bottoms to any person for aquaculture. The commission may adopt regulations governing the terms of the leases. No state water bottoms shall be leased, unless the commission determines that the lease is in the public interest.
15401. Areas used by the public for digging clams shall not be leased. The department shall designate those areas.
15402. A lessee of a state water bottom owns all lawfully cultivated organisms that are described in the application for the lease and produced in the area leased. The lessee has the exclusive right to cultivate and harvest the aquatic organisms in the area leased.
15403. Persons wishing to lease a state water bottom shall make a written application to the commission. An application shall contain all of the following information:
- (a) A map showing the area to be leased, its general vicinity, and all

ownership and boundary lines in the vicinity.

- (b) A description of the organisms to be grown and the culture techniques to be used.
- (c) An estimate of the acreage to be leased.
- (d) A nonrefundable one hundred dollar (\$100) filing fee.

The lessee shall assume responsibility for any infringement on privately owned water bottoms, or water bottoms owned by, or under the jurisdiction of any city, county, or district.

15404. (a) If the commission finds that the area applied for is available for lease and that the lease would be in the public interest, it shall publish a notice that the area is being considered for leasing.

- (b) The commission shall have legal notices published in a newspaper of general circulation in each county where the water bottom, or any part thereof, is located, describing the area to be leased and the type of operation to be conducted. The publication shall comply with Sections 6060 and 6066 of the Government code.

15405. No initial term of a state water bottom lease shall exceed 25 years.

15406. (a) Each state water bottom lease shall specify a period prior to expiration when renewal of the lease may be requested by the lessee. If during this period the lessee is still actively engaged in aquaculture, as determined by the commission, the lessee shall have a prior right to renew the lease on terms agreed upon between the commission and the lessee. If terms are not agreed upon, the commission shall advertise for bids on the lease. If a request for renewal is not made by the lessee, the commission shall advertise for bids on the lease. The commission shall consider bids only from aquaculturists registered pursuant to Section 15101.

- (b) Notwithstanding subdivision (a), with respect to any lease of state water bottoms in effect on January 1, 1983, the lessee shall have a prior right to renew the lease. If the lessee does not renew the lease, the commission shall advertise for bids on the lease. The commission shall consider bids only from aquaculturists registered pursuant to Section 15101.

- (c) A lease may be renewed for additional periods not to exceed 25 years each.

15406.5 The commission shall award water bottom leases to the highest responsible bidder, if the bid meets or exceeds the minimum annual rent established by the commission, which shall not be less than two dollars (\$2) per acre, for all species cultivated, unless the acreage applied for is 10 acres or less, in which case the minimum acceptable rent shall be ten dollars (\$10) per acre. The annual rent for any lease in effect on January 1, 1983, for the cultivation of oysters

shall be one dollar (\$1) per acre until the expiration thereof. commission may reject any or all bids for the lease of state water bottoms if it deems the rejection to be in the public interest.

15406.7 In addition to the rent provided for in Section 15406.5, every person operating under an oyster lease shall pay a privilege tax of two cents (\$0.02) per packed gallon or fraction thereof of shucked oysters harvested by the lessee.

If the oysters are marketed in the shell, the tax shall be based on the equivalent yield of shucked oyster meat. In determining the yield of oysters, it shall be deemed that 100 oysters are equivalent to one packed gallon of shucked oyster meat.

The tax imposed by this section is the exclusive privilege tax that shall be imposed on lessees of state water bottoms for oyster cultivation, notwithstanding subdivision (a) of Section 15003.

15407. The annual rent shall be paid to the department within 30 days of the commencement of the lease and within 30 days of the anniversary thereof. The commission may establish penalty fees for late payment and may cancel the lease if rent is not paid within 90 days of the commencement of the lease or within 90 days of any anniversary thereof.

15408. The commission shall promulgate regulations governing the termination of leases due to failure to pay rent or improper use of the leasehold.

15409. Upon termination of a lease, for any reason, all structures will be removed at the lessee's expense from the leasehold, and the area shall be restored to its original condition. If the lessee fails to remove the structures, the state may remove them and the lessee shall pay the removal costs so incurred.

15410. All leases shall be subject to the power of the Legislature to increase or decrease the rents, fees, taxes, and other charges relating to the lease, but no increase in rent shall be applicable to an existing lease until it is renewed.

15411. Lessees under a state water bottom lease may not unreasonably impede public access to state waters for purpose of fishing, navigation, commerce, or recreation. The lessee may, however, limit public access to the extent necessary to avoid damage to the leasehold and the aquatic life culture therein.

The commission may prohibit any recreational activity in any aquaculture area subject to a state water bottom lease if it determines that the activity is detrimental to the enhancement of the resource.

15412. No water bottom lease may be assigned without the prior approval of the commission. Application for approval of a lease assignment shall comply with all of the requirements for an original lease.

15413. No person may enter upon any area subject to a water bottom lease in which aquatic life is cultivated, or remove the aquatic life therefrom without the consent of the lessee, or willfully destroy the cultivated aquatic life or any markers intended to designate the boundaries and limits of the leased area.
15414. A water bottom lease may require periodic reports that the commission deems necessary for the proper administration of the state's water bottoms.
15415. The department shall notify the State Lands Commission of all applications for water bottom leases.

The department shall inform the State Lands Commission of all leases executed, renewed, or assigned pursuant to this chapter, and shall furnish the State Lands Commission with such information concerning these leases that it may require.

Chapter 6. DISEASE CONTROL

15500. Upon the recommendation of the department and after consultation with the Aquaculture Disease Committee created pursuant to this chapter, the commission shall compile a list of diseases and parasites and the aquatic plants and animals they are known to infect or parasitize. All government activities relating to aquaculture disease detection, control, and eradication that do not affect human health and safety are the responsibility of the department.
15501. The department may enter, under an inspection warrant issued pursuant to Title 5 (commencing with Section 1822.50) of Part 3 of the Code of Civil Procedure, at any time, any car, warehouse, depot, ship, or growing area where any aquatic plants or animals are held or stored, for the purpose of making an examination to ascertain whether the aquatic plants or animals are infected, diseased, or parasitized.
15502. The director, in consultation with the Aquaculture Industry Advisory Committee and the Interagency committee for Aquaculture Development, shall appoint an 11-member Aquaculture Disease Committee consisting of at least six industry producers selected to represent geographic, species, and other diverse aspects of the industry; two to represent the department; one to represent the Department of Food and Agriculture; and academic scientist who is an expert in aquatic diseases; and one representative of the University of California Cooperative Extension. Members of the committee shall serve without compensation, but shall be paid their necessary expenses.
15503. The Aquaculture Disease Committee may recommend regulations to the commission designed to safeguard wild and cultured organisms from the list of harmful organisms compiled pursuant to Section 15500.
15504. Regulations recommended under Section 15503 and adopted by the commission may include all of the following:

- (a) Routine monitoring procedures.
- (b) Standardized diagnostic procedures.
- (c) A requirement for the confirmation of the diagnosis by the state through at least one other independent and qualified laboratory.
- (d) Criteria for ordering quarantine, condemnation, or destruction.
- (e) A stated maximum time period between diagnosis and destruction.
- (f) Methods to be employed in animal destruction and facility cleanup.
- (g) Procedures for determining fair and rapid compensation.
- (h) Any other related procedures that the commission may determine are necessary.

15505. If any of the diseases or parasites listed pursuant to Section 15500 is found to exist which the director, in consultation with the Aquaculture Disease Committee and consistent with the regulations adopted under Section 15504, deems to be detrimental to the aquaculture industry or to wild stocks of aquatic plants and animals, the director may do any of the following:

- (a) Establish the area to be quarantined and list the aquatic plants and animals affected by it.
- (b) Post notices describing, as nearly as possible, the boundaries of an area within which specific disease or parasite infestations are found. Notices posted pursuant to this subdivision shall be published once a week for four successive weeks in a newspaper of general circulation in the county in which the infected area is located. If there is no newspaper of general circulation in that county, then the notice shall be published in a newspaper of general circulation published in an adjoining county.
- (c) Hold and impound diseased or parasitized plants and animals.
- (d) Forbid, prevent, or restrict the movement of all plants and animals subject to the disease or parasite from or into the area, or from place to place within it, during the existence of the quarantine.
- (e) Order the destruction and disposal of diseased or parasitized plants and animals consistent with Section 15504.

15506. Except for those diseases in the list compiled pursuant to Section 15500, infected plants or animals shall not be quarantined or destroyed, unless the director, in consultation with the Aquaculture Disease Committee, finds that an outbreak of aquatic disease among privately cultured plants or animals presents a threat to the aquaculture industry or to fish life or plant life.

15507. If the director, in consultation with the Aquaculture Disease Committee, finds that a disease is present in a nearby government operated facility or in nearby wild stocks, infected plants or animals in a private aquaculture facility shall not be quarantined or destroyed unless similar action is taken with respect to the government facility and wild stocks.

15508. Reports of those diseases and parasites compiled pursuant to Section 15500 shall be immediately forwarded by the director to the Aquaculture Disease Committee and shall be promptly investigated by the department.

15509. No person may move, or allow to be moved, any of the aquatic plants or animals which are subject to a quarantine established pursuant to Section 15505 across the quarantine line which is established, unless the person has first obtained a permit from the director authorizing the movement.

The director may issue a permit after inspection, if the aquatic plants or animals, premises, transportation vehicles, and equipment which are subject to the quarantine established pursuant to Section 15505 are properly cleaned and disinfected.

15510. If the director determines that any disease designated pursuant to Section 15500 exists among domestic aquatic plants and animals, or that aquatic plants and animals have been exposed, or may have been exposed, to the disease, or to the vectors of the disease, in any other state or territory in the United States or in any foreign country, and the importation of aquatic plants or animals from the state, territory, or foreign country may transmit, carry, or disseminate the disease to domestic plants and animals within this state, the director shall notify the commission which may, after consulting the State Department of Health Services and the Department of Food and Agriculture, issue a regulation restricting or prohibiting the importation of the diseased or infected aquatic plants or animals into this state from any other state, territory, or foreign country.

15512. (a) If aquatic plants or animals are destroyed pursuant to subdivision (e) of Section 15505, the owner shall be promptly paid from the General Fund an amount equal to 75 percent of the replacement value of the plants or animals, less the value determined by the department of any replacement stock provided by the department under subdivision (b) if the claim is submitted pursuant to Section 15513. If the replacement value is not settled between the owner and the department, the replacement value shall be determined by an appraiser appointed by the director and an appraiser appointed by the owner. Appraiser's fees shall be paid by the appointing party. Disputes between these two appraisers shall be submitted to arbitration under the commercial Arbitration Rules of the American Arbitration Association.

(b) If the department provides replacement stock to an aquaculturist whose plants or animals are destroyed pursuant to subdivision (e) of Section 15505, the amount to be paid to the aquaculturist

pursuant to this section shall be reduced by the value of the replacement stock, as determined by the department.

- (c) The result of the arbitration or the amount settled between the owner and the department, reduced by the value determined by the department of any replacement stock provided under subdivision (b), may be submitted as a claim by the owner to the Board of Control pursuant to Section 15513.

- 15513. Claims against the department arising under this chapter may be submitted pursuant to Section 905.2 of the Government Code.
- 15514. No claim arising under this chapter shall be paid where the director, in consultation with the Aquaculture Disease Committee, finds that the claimant's management practices were negligent or in violation of law, and that the negligence or violation was the proximate cause of the disease or infection prompting the order of destruction or finds the claimant willfully violated any provision of Section 15505.
- 15516. The owner of an aquaculture product who does not diligently pursue the eradication of a disease from its facility when ordered to do so by the director shall be responsible for paying to the director the full costs of the department for all disease eradication efforts conducted by the department to eradicate the disease. Payment of the costs under this section shall not excuse compliance with the provisions of law, regulations of the commission, and orders of the director, nor be a defense in any criminal or civil proceedings.

Chapter 7. IMPORTATION OF AQUATIC PLANTS AND ANIMALS

- 15600. No live aquatic plant or animal may be imported into this state by a registered aquaculturist without the prior written approval of the department pursuant to the regulations adopted by the commission.
- 15601. A written application for the importation submitted in conformance with the procedural requirements established by the commission is deemed to be approved where it has not been denied within 60 days.

Chapter 10. OCEAN RANCHING

- 15900. A registered aquaculturist may be granted a permit by the commission, under any terms and conditions that the commission may prescribe, to release and capture anadromous fish in state waters which have been reared in an aquaculture facility.
- 15901. Prior to the issuance of any permit by the commission, a public hearing shall be held in the county or counties affected. Notice of the hearing shall be published at least once, and at least 10 days prior to the hearing, in a newspaper of general circulation in each of the counties in which the hearing is to be held, or if no such newspaper is published in that county or counties then in such a newspaper in an adjoining county. The hearing shall be conducted by



Fisheries
and Oceans

Pêches
et Océans

Fisheries - Pacific Region
1090 West Pender Street
Vancouver, B.C.
V6E 2P1

Pêches - Région du Pacifique
1090 rue Pender ouest
Vancouver (C.B.)
V6E 2P1

March 2, 1987

Vous filez votre référence

C'est file Notre référence

Mr. Brent Paine
Representative, Steve Rieger
Alaska State Legislature
Pouch V
Juneau, Alaska 99811

Dear Mr. Paine:

In response to your telephone request, attached please find a draft copy of the Department of Fisheries and Oceans Guidelines. As I mentioned over the telephone, you must be cautioned that these guidelines are indeed draft and may as yet be changed, especially with respect to distances between farms.

As I mentioned to you, the Department of Fisheries and Oceans has not yet enacted any specific aquaculture regulations for Pacific Region, however, the Department does plan to do so in the near future.

Yours truly,

Frances Dickson
Shellfish Coordinator
Fisheries Branch

Encl:

CONFIDENTIAL

JANUARY 9, 1987

FINAL DRAFT

DEPARTMENT OF FISHERIES AND OCEANS
GUIDELINES
FOR DEVELOPMENT AND OPERATION OF AQUACULTURE FACILITIES

The Department of Fisheries and Oceans Canada
Pacific Region

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I INTRODUCTION

1.1 PURPOSE AND SCOPE

Aquaculture - the farming and husbandry of marine and freshwater plants and animals is a rapidly expanding industry in B.C. The recent growth in the industry has placed new demands on both freshwater and marine environments which may be incompatible with existing resource uses. The characteristics which make sites attractive for aquaculture purposes are often the same characteristics that make these areas productive fish habitat or important fishery areas; with the increased demand for aquaculture sites and the potentially significant impacts which can result from intensive culturing and processing activities, the likelihood of resource conflicts and impacts increases.

The Department of Fisheries and Oceans maintains that an aquaculture industry can be developed in British Columbia in conjunction with continued maintenance of wild fisheries provided that great care is taken to ensure that aquaculture facilities are properly sited. These guidelines have been developed by the Department of Fisheries and Oceans (DFO) to prevent or minimize impacts to wild fish and fish habitats and to avoid conflicts between aquaculture and fishery activities by outlining requirements for siting, development, operation, and abandonment of freshwater and marine salmon culture and processing operations.

While these guidelines pertain specifically to hatcheries, seapens, and processing facilities, other culture activities (Table 1) also may have significant impacts, and individuals are therefore advised to contact the local DFO offices for information regarding requirements which pertain to their proposed operation.

TABLE 1 - Culture Techniques and Facilities for Shellfish, Finfish and Marine Plants

<u>Molluscs/Crustaceans/Marine Plants</u>	<u>Finfish</u>
- bottom culture	- freshwater hatcheries
- offbottom line or raft culture	- freshwater impoundments
- impoundments (pens or cages)	- instream incubation
- marine hatcheries	- land based seawater rearing facilities
	- marine impoundments

1.2 ENVIRONMENTAL IMPACTS

The Department of Fisheries and Oceans is concerned that salmon culture and processing operations proceed in such a manner that they do not negatively impact on other fisheries resources or fish habitats.

Hatcheries and other land-based operations have the potential to restrict and pollute streamflows and elevate waste concentrations and numbers of disease organisms in the marine environment adjacent to effluent discharges.

Salmon net pens, unless located properly, may cause smothering of valuable fish habitats such as herring spawning substrates, geoduck beds or intertidal clam or oyster beds. Net pens may attract juvenile wild salmon and herring in the vicinity of migration routes resulting in predation on the small fish by penned stocks or disease transfer between wild and cultured fish. Salmon in pens may also attract predators such as otters, seals or sealions and birds; these animals are often harassed, injured and sometimes illegally destroyed by salmon farmers anxious to protect their fish.

Less obvious, but also potentially harmful are the effects of antifoulants used on nets on adjacent shellfish and fish resources. Although research on this topic is still preliminary, initial indications are that oysters accumulate chemicals used to treat the nets with the result that their rate of growth is reduced and their flesh is rendered poisonous or unpalatable. No research on antifoulant accumulation in farm fish flesh is available yet, but this may also be of concern to potential farmers.

Finally, when antibiotics are administered to cultured fish, what effects do the often major additions of disease treatment chemicals have on the surrounding environment? Could the antibiotics eventually result in treatment-resistant strains of certain pathogens previously not encountered by wild fish stocks in the vicinity? This may be a very real and dangerous possibility.

It is for these reasons that the following guidelines have been developed. Many of these concerns and impacts can be minimized or avoided by: carefully selecting sites, mitigating or preventing impacts associated with site development and adopting appropriate operational or abandonment procedures.

1.3 LEGISLATIVE MANDATES AND RESPONSIBILITIES

The Department of Fisheries and Oceans (DFO) has jurisdictional responsibility for management of coastal and inland fisheries, fish health protection, product quality for exported fish and fish products, and protection of fish and marine mammals and their associated habitats.

The Department of the Environment, Conservation and Protection, Environmental Protection (EP) shares responsibility with DFO for Section 33 of the Fisheries Act which deals with water quality. In addition, EP is also responsible for classifying shellfish growing waters on the basis of sanitary quality.

The legislative mandates of DFO and EP which pertain to aquaculture are based on a number of federal statutes, regulations and international agreements which have been listed in Appendix I.

The guidelines presented herein have been developed pursuant to these legislative mandates and reflect DFO and EP requirements for protection of existing fish and shellfish resources, their habitats and the fisheries they support.

These guidelines are not, however, intended to address requirements of other federal, provincial and municipal agencies who also have jurisdiction for aspects of aquaculture development.

II AQUACULTURE LICENCE

An Aquaculture Licence will be issued to an applicant when, in the opinion of the Director General, Fisheries and Oceans, the facility does not violate or constitute a potential violation of federal regulations respecting (i) conservation and protection of fish, (ii) obstruction and pollution of waters frequented by fish, (iii) conservation and protection of spawning grounds and fish habitat and (iv) fish health protection.

The conditions of the Aquaculture Licence try to anticipate environmental and disease problems which might negatively affect both the wild fishery resource and habitat and the aquaculture venture, and they are structured to prevent or minimize such negative affects. The Aquaculture Licence signifies that a preliminary review of the site suggests that culture of fish, as proposed at the site, should result in minimal problems unless specified. The Aquaculture Licence is not a site certification; the Department of Fisheries and Oceans accepts no liability. An Aquaculture Licence may be modified, suspended or cancelled at any time when (a) the licence holder fails to comply with the terms and conditions of that licence, (b) aquaculture facilities under licence are found to have significant adverse effect on fish stock or fish habitat, or (c) any disease or disease organism that poses a hazard to fish stocks or adjacent aquaculture facilities is not reported to the Director General of Fisheries and Oceans. The licence is issued by the Department of Fisheries and Oceans for a one year term and it is renewable upon application. Currently there is no fee attached to the licence.

2.1 LICENCING PROCEDURES

- : the applicant must submit an application for an Aquaculture Licence and a document establishing that all requisite approvals for a licence have been obtained or that the terms and conditions of the aquaculture licence held by the applicant in the preceding licence year have been complied with.

2.2 LICENCE ELIGIBILITY

- : persons who

- (a) obtain approval from the Department of Fisheries and Oceans for the net pen site or the hatchery site. - Note: approval would depend on meeting current Department of Fisheries and Oceans guidelines - See Sections III and IV, Siting Criteria.

- (b) obtain, where applicable, the following from the Province - For salmon net pens:
 - approval of a farm production plan for an aquaculture enterprise (Ministry of Environment and Parks);
 - Crown Land tenure (Ministry of Forests and Lands);
- For hatcheries:
 - a water licence (Ministry of Environment and Parks);
 - a waste management permit (Ministry of Environment and Parks);
 - a provincial Commercial Fish Culture Permit (Ministry of Environment and Parks).
- (c) receive Navigation Compliance from Department of Transport under Navigable Waters Protection Act

2.3 TERMS AND CONDITIONS

The following terms and conditions are presently included in the Aquaculture Licence issued by the Department of Fisheries and Oceans:

- (a) the area and location of the aquaculture facility;
- (b) the species of fish or eggs cultured
- (c) the manner of disposing of any ailing or dead fish from the aquaculture enterprise;
- (d) the reporting of fish diseases, drugs used and mortalities incurred;
- (e) the transporting of live eggs or fish;
- (f) the submission of commercial fish farm annual reports;
- (g) compliance with Fish Health Protection Regulations;
- (k) other terms or considerations that may be deemed necessary for the facility being licenced.

The following terms and conditions may be included in Aquaculture Licences:

- (a) capture of brood stock;
- (b) reporting of chemicals utilized;
- (c) The size of and/or number of net pens, rafts or hatcheries being licenced.

2.4 LICENCE FEATURES

- : the licence may be issued to an individual, company or corporation (referred to as the licensee) - in the case of a company or corporation, documents establishing company or corporate status must be provided together with a list of signing officers and specimen signatures (annually).
- : the licensee is responsible for ensuring compliance with all terms and conditions of the licence.
- : an aquaculture enterprise licence shall be valid from date of issue to December 31 of the licence year.
- : a person may be issued a renewal licence annually, upon application.

- : eligibility for a licence may be revoked or the licence cancelled for failure to comply with the terms and conditions of the licence or for failure to comply with the Fisheries Act and regulations made thereunder.
- : a licence may not be transferred to another person without prior approval of the Department of Fisheries and Oceans

III MARINE FISH REARING FACILITIES

3.1 ENVIRONMENTAL ASSESSMENT

An environmental assessment must be completed for every potential net pen site as outlined in the Department of Fisheries and Oceans Aquaculture Licence Application to assess sensitivity and suitability of sites. Additional information may be required including descriptions of current patterns, sub-tidal vegetation mapping, invertebrate surveys and pre-installation water quality. Where sites are deeper than 20 metres, a SCUBA assessment would not normally be required. A complete description of information required for the purpose of evaluating marine aquaculture facility proposals appears in Appendix II.

3.2 SITING CRITERIA

- (i) A finfish pen farm will be located no closer than a 1 km radius from the mouth of a stream populated by anadromous fish, to minimize disease transmission concerns and to protect highly sensitive estuarine fish habitat. Coastal areas adjacent to stream mouths and their estuaries are considered to be sensitive because of the concentrations of juvenile and adult salmon in their vicinity at various times of the year, the possible susceptibility to disease during saltwater/freshwater acclimation periods, and potential for disruption of residency, holding or migration behaviour patterns. The chemical storage characteristics of estuary deltas are documented and mechanisms may also exist for pathogen cycling. Isolation of pen sites from stream mouths may also protect farmed stock from river water transported disease arising out of the decay of wild stock carcasses. Distances may be increased depending on wild fish populations.

Facilities within a 5 km radius of such streams must have prior approval of the Federal/Provincial Transplant Committee and may require additional specific studies as per Appendix II.

The zero tideline will be the start of the stream mouth for measurement purposes. A net pen farm is an operation under a single licence of occupation or a foreshore lease issued under the Provincial Lands Act.

- (ii) A finfish net pen must be located so as to provide a minimum of 30 metres clearance from the edge of the approach channel to a Small Craft Harbour, Department of Fisheries and Oceans wharf or dock.
- (iii) Net pens shall not be located within 125 metres of molluscan beds where there may be recreational, native food-fish or commercial harvests or within 125 metres of existing molluscan culture operations. This restriction is to prevent

contamination of molluscs and is to safeguard health to humans. Salmon farms have the potential to transfer pathogenic organisms and chemicals to shellfish.

- (iv) Net pen facilities must have a minimum of 5 km distance between the lease boundaries, to minimize risk of disease transfer. Maximizing distances between facilities is also advisable to minimize potential cumulative water quality impacts.
- (v) Net pens shall not be located over or near areas of sensitive fish habitat as defined by Section 31(5) of the Fisheries Act. This includes spawning, rearing, food supply and migration areas upon which fish and shellfish depend directly or indirectly to carry out their life processes.

The rapid expansion of salmon farms and other mariculture operations on the Pacific coast has raised concerns about possible environmental impacts on herring spawning areas. There are also concerns about impacts on herring roe-fishery sites which occur mainly in the vicinity of spawning areas. Salmon farms and herring could interact in several ways. Organic waste from netpens could contaminate nearby spawning locations and force herring to spawn in other secondary locations or it could jeopardize egg survival after spawning. Alternately, herring will spawn on fishing nets and netpens, and heavy egg deposition on salmon netpens could be deleterious to fish farm operators. Some diseases may be transmitted between wild herring stocks and salmon in farms. Further, if netpens were located in the vicinity of near-shore herring gillnet fisheries, there could be mutual gear interference during the fishing season.

- (vi) Net pens shall not be located or anchored in an area with a depth less than 10 metres at zero tide to minimize impacts on sensitive, productive littoral fish habitats. In addition, there must be a minimum of two metres between bottom of net pen and sea bottom.
- (vii) Net pens or fish rearing facilities will not be located in areas where they would directly interfere with important commercial, recreational or native food-fish fisheries. These fisheries include seine tie-up spots, gillnet drift areas, trap fishing areas, traditional trawl sites, bivalve shellfish beaches and areas of sport fish activity.

3.3 OPERATIONAL REQUIREMENTS

- (i) Monitoring of Approved Net Pen Operations

Pursuant to Section 33.1(i) of the Fisheries Act authorized net pen operators may be required to provide the Department with

information on substrate quality, water quality, amount of feed used or other information on a site specific basis. Appendix II Section 2 identifies operational information requirements for all net pen operations, whereas Section 3 outlines information which may be required in a monitoring program.

(ii) Clean-up of Substrate and Disposal of Dead Fish

- a. Waste deposits under net pens cannot be discharged from the site without review and approval from the Department of Fisheries and Oceans and the Environmental Protection Service, Department of Environment.
- b. No dead cultured fish or offal may be disposed of at sea. All dead cultured fish or offal must be disposed in a manner acceptable to the Waste Management Branch and the Department of Fisheries and Oceans e.g., landfill site and incineration. This regulation is for disease control purposes.

(iii) Predator Control

No person shall destroy seals or sea lions without a special permit issued by the Minister of Fisheries and Oceans. In addition, other predators such as herons, kingfishers, gulls, terns, mink and otters which are attracted to fish farms may not be indiscriminately shot or trapped; they are protected species.

(iv) Feed

No person shall collect marine plants or animals (including euphausiids) for fish food by any means unless the appropriate permits or licences have been obtained.

(v) Herring Spawn on Net Pens

In accordance with Section 30 of the Fisheries Act, any net upon which herring have spawned may be removed from the pen but it must remain suspended in the water column until such time as hatching of eggs is completed.

(vi) Reporting on Fish Mortalities and Treatments Used

Refer to Pacific Region Fish Health Policy, Section 6.3.

(vii) Fish Health Report

Annual health report shall be submitted by January 31st to the Transplant Committee - refer to Pacific Region Fish Health Policy, Section 6.3.

(viii) Fish Escapements

No fish shall be released deliberately from the licensed facility into Canadian waters. Any inadvertent release of fish shall be immediately reported by the Licencee to the appropriate Area Manager, Fisheries Operations Branch, Department of Fisheries and Oceans, followed by the full written account of the inadvertent release. Any fish that escape the net pens or are released become part of the common property resources. Fish releases will be considered cause for non-renewal of the Aquaculture Licence.

(ix) Movement of Fish

The transport of live seawater-reared salmonids, their eggs or milt must be approved by the Transplant Committee. A copy of the Committee's Transplant permit must accompany each shipment. No fish shall be allowed to escape during transport and no dumping of dead fish en route is permitted. All dead fish must be disposed of in an approved manner.

3.4 ABANDONMENT REQUIREMENTS

All nets, in-water structures, fuel tanks or chemical storage containers must be removed from the site immediately upon cessation of the operation. Any live fish must be moved to a location or facility that has received prior approval from the Transplant Committee.

IV LAND BASED FACILITIES

4.1 ENVIRONMENTAL ASSESSMENT

- (i) Applicants for hatcheries must provide information pursuant to Section 33.1(1) of the Fisheries Act. This will require that the applicant provide information on water supply requirements, anticipated effluent quality and quantity, location of intakes, outlets and sanitary facilities and any filling, dyking or stream bank protection work required as outlined in the Department of Fisheries and Oceans Licence Application. A complete description of information required for the purposes of evaluating proposed hatchery facilities appears in Appendix II.

4.2 SITING CRITERIA

- (i) No privately operated freshwater fishculture facility may discharge effluent within a 5 km radius of the mouth of a stream supporting anadromous species unless prior approval of the Transplant Committee has been received.
- (ii) Water intakes should not be located within wild stock salmon and trout spawning beds, and must meet all current requirements for screening as described in the most recent revision of the Departmental Screening Guidelines. Special siting and screening provision may be specified for marine intakes.
- (iii) No new facility for culture of chinook, steelhead or rainbow trout may be established where sockeye or kokanee are present in the hatchery water supply for disease prevention reasons.
- (iv) No outfall from a private hatchery will be allowed within an upstream distance of 5 km of a publicly funded fish culture operation unless effluent is treated in a manner acceptable to the Department of Fisheries and Oceans.
- (v) No private hatchery will be allowed upstream of a publicly funded hatchery designated as a major facility.
- (vi) It is recommended that a 10 m natural vegetation leave strip be maintained adjacent to all streams and flood channels as it is recognized as important fish habitat and may also serve to protect the site from erosion.

4.3 OPERATIONAL GUIDELINES

- (i) Monitoring of approved Hatchery operations
Pursuant to Section 33.1 of the Fisheries Act, hatchery operations may be required to conduct routine effluent and receiving water monitoring programs. Appendix III Section 2 identifies operational requirements for all hatchery facilities,

whereas Section 3 outlines information which may be required in a monitoring program for information which may be required.

- (ii) No effluent may be discharged directly onto salmonid spawning grounds. Effluent discharged to salmonid streams must be treated in a manner acceptable to the Department of Fisheries and Oceans. Settling ponds with sludge removal provision or isolation of tank cleaning wastes will normally be required for direct discharges.
- (iii) No facility shall culture sockeye with any other salmonid species.
- (iv) No modifications may be made to intake or discharge facilities or volumes without prior review and approval by the Department of Fisheries and Oceans.
- (v) All discharges must be screened to prevent escapes or entries of fish.
- (vi) No dead fish may be disposed of in the aquatic environment. All dead fish must be disposed of in a manner acceptable to the Waste Management Branch and Department of Fisheries and Oceans. e.g. landfill site, incineration.
- (vii) All fish mortalities, drugs, chemicals and vaccines used must be reported.

Refer to Pacific Region Fish Health Policy, Section 6.3 and operational reporting requirement sections of Appendix II and III.

- (viii) An annual fish health report shall be submitted by January 31st to the Transplant Committee. Refer to Pacific Region Fish Health Policy, Section 6.3.

(ix) Reporting of Fish Escapements

No fish shall be released deliberately from the licenced facility into Canadian waters and any release of salmon shall be immediately reported by the Licencee to the Appropriate Area Manager, Fisheries Operation Branch, Department of Fisheries and Oceans, followed by a full written account of the inadvertent release. Fish releases will be considered cause for non-renewal of the Aquaculture Licence.

(x) Movement of Fish

The transport of live freshwater reared salmonids or eggs must be approved by the Transplant Committee. A copy of the Committee's Transplant permit must accompany each shipment. No

replenishing or discharge of water is permitted. All dead fish must be disposed of in an approved manner. No dumping of dead fish en route is permitted.

(xi) Fish Eggs Used

Fish eggs utilized in this licenced facility or location shall be obtained from broodstock determined to be free of the following diseases by techniques acceptable to the Department of Fisheries and Oceans:

a) Chinook salmon and rainbow trout

- any filterable replicating agent capable of causing cytopathological effects in tissue culture cells
- bacterial kidney disease (BKD)
- any infectious agent which may be deemed to be a threat to wild stocks or other cultured stocks.

b) Coho salmon

- bacterial kidney disease (BKD)
- any infectious agent which may be deemed to be a threat to wild stocks or other cultured stocks.

c) Atlantic salmon

- refer to Federal-Provincial Policy for Importation of Live Salmonids into British Columbia. Section VII.

(xii) Surplus eggs from federal hatcheries may only be distributed to approved hatcheries with current licences. Approvals and licenses must be in place by September 30 of any given year.

(xiii) Private hatcheries which do not meet current guideline requirements may be requested to achieve compliance in those areas that are deficient within a one year period from date of notification. If compliance is not achieved, licenses may be suspended which would affect future access to surplus eggs from federal hatcheries.

(xiv) No person may sell surplus eggs originally received from federal hatcheries to a private hatchery that is not currently licensed, at risk of suspension of their own license.

4.4 ABANDONMENT REQUIREMENTS

All intakes and outlets must be sealed and all fuel tanks, feed supplies, pharmaceuticals and toxic chemicals must be removed from the site upon cessation of the operation.

V FISH INSPECTION AND PROCESSING

5.1 ENVIRONMENTAL ASSESSMENT

An environmental assessment may be required for proposed facilities. A complete description of information required for the purpose of evaluating marine fish processing proposals appears in Appendix II.

5.2 SITING CRITERIA

Processing facilities shall not be located over or near areas of sensitive fish habitat as defined by Section 31(5) of the Fisheries Act. This includes spawning, rearing, food supply and migration areas upon which fish and shellfish depend directly or indirectly to carry out their life processes.

5.3 FISH HANDLING AND PROCESSING REQUIREMENTS

Farm fish and wild fish are treated equally under the processing requirements of both the Federal and Provincial Fish Inspection Regulations. Due to a higher incidence of diseases in farmed fish it is proposed that this be changed and farmed fish be processed separately with effluent treatment to reduce disease risks to wild fish. Processing includes cleaning, filleting, icing, packing, canning, freezing, smoking, salting, cooking, pickling, drying or preparing fish for market in any other manner.

When handling or processing farmed fish, the requirements of the Fish Health Protection Regulations must also be met. Section 4 of these regulations state that live and fresh cultured salmonids crossing a provincial boundary must be from a facility inspected and found to be free of certain named diseases.

- (i) Bleeding of live fish on site: The fish farmer may stun and bleed his own fish by cutting the gills prior to delivery for processing. The fish must, however, not be dressed or otherwise cut. There must be no direct discharge of liquid effluent (e.g. blood and slime) or disposal of solid waste (e.g. gills, dead fish) into the marine or freshwater environment. Direct discharges may become a fish disease vector.
- (ii) Processing of fish for interprovincial sales: If the fish are marketed within the province only, the fish must be processed in a provincially registered plant pursuant to Section 14 of the Fish Inspection Regulations of B.C.. Under the fresh and frozen category, processing would include holding, washing, dressing, grading, freezing and packing.
- (iii) Processing of fish for interprovincial or export sales: All fish must be processed in an establishment registered pursuant to Section 15 of the Federal Inspection Regulations. Federal

inspection officers will carry out inspection duties at federally registered facilities only.

Schedules I and II of the Fish Inspection Regulations contain requirements dealing with construction, equipment and operation of registered processing and packing plants. For further information concerning the requirements, you may wish to contact the nearest Field Inspection Office.

5.4 OPERATIONAL REQUIREMENTS

(i) Processing Plant Effluents

A permit from the Waste Management Branch, Ministry of Environment and Parks, is required for any discharge of liquid effluents from processing plants. The quality of processing plant effluents will be determined pursuant to Waste Management Branch pollution control objectives and Environment Canada Fish Processing Guidelines. In addition, the Department of Fisheries and Oceans may require that no effluent water from plant handling cultured fish may be discharged unless effluent is treated in an approved manner to kill infectious agents.

5.5 LIVE TRANSPORT OF FISH

At the present time the Department of Fisheries and Oceans is prepared to authorize live transport of fish from marine net pen facilities to land based processing plants in open or RSW systems. Written approval from the Department must be received.

VI PACIFIC REGION FISH HEALTH POLICY

The Pacific Region Fish Health Policy is an extension of the Fish Health Protection Regulations which are established under the Fisheries Act.

6.1 REASONS FOR FISH HEALTH POLICY

- (1) For the protection of the fisheries resource and the aquatic environment.
- (2) Possibility of quick spread of infectious agents in aquatic environment.
- (3) Development of aquaculture industry.
- (4) Primitive state of knowledge of infectious diseases.

This policy will be in addition to the Fisheries Act and other fisheries laws.

The Transplant Committee which is a combined Federal/Provincial fisheries body, is responsible for coordinating fish disease control in the Pacific Region.

This section of the Pacific Region Fish Health Policy applies to finfish only and their transplants as well as the control of fish diseases in all holding, culture and processing facilities in the Pacific Region of Canada (British Columbia and Yukon).

6.2 OBJECTIVES OF FISH HEALTH POLICY

- (1) To provide guidelines to managers of fisheries resource and to the aquaculture industry for the control of infectious diseases of fish.
- (2) To prevent the introduction of new diseases into the Region.
- (3) To protect wild stocks of fish from serious infectious disease and to prevent the spread of infectious diseases among both cultured and wild stocks.
- (4) To prevent the escape or release of seriously infected fish and to discourage and finally eliminate the culture of seriously diseased fish.
- (5) To improve the health of fish cultured in this Region.

6.3 DISEASES

There are two categories of diseases depending on their seriousness and potential threat.

A. Emergency diseases

These diseases are not treatable and/or are not known to occur in this area.

- a) Infectious hematopoietic necrosis (IHN)
- b) Infectious pancreatic necrosis (IPN)
- c) Viral hemorrhagic septicemia (VHS)

- d) Herpes virus salmonis
- e) Spring viremia of carp (SVC)
- f) Oncorhynchus masou virus (OMV)
- g) Any filtrable agent causing cytopathic effects in tissue culture (other than above)
- h) Whirling disease
- i) Hitra disease
- j) Any infectious agent causing losses in excess of 1%/day for 4 consecutive days

Action:

When any emergency disease or its causative agent is encountered, the Transplant Committee must be informed immediately by telephone.

It is the Transplant Committee's responsibility to spell out actions to be taken which may include destruction of the stock (at the expense of the owner). The Transplant Committee will undertake confirmation of the disease/agent encountered.

For the following diseases, depopulation and sanitation of the facility are mandatory: VHS, IPN, OMV, Herpes virus, Whirling disease and any disease of sufficient seriousness as designated by the Director General (DFO) or Director, Fisheries Branch (B.C. Ministry of the Environment and Parks).

(ii) Serious diseases

- a) Bacterial Kidney Disease (BKD)
- b) Furunculosis
- c) Vibriosis
- d) Enteric Redmouth Disease
- e) Sea Lice
- f) Diseases caused by the Flexibacter/Myxobacterial group
- g) Other infectious agents designated by DFO/MOE staff

Action:

When a serious disease is identified in fish, movement and distribution of these fish shall be restricted to the geographic zone in which the disease occurred. Fish can be moved between zones only when found free of causative agent after appropriate sampling by a person approved by the Transplant Committee. Zones in which fish can move freely will be designated and mapped. In addition, all operators of finfish culture facilities must report the occurrences of these diseases/agents to the Transplant Committee annually on a fish health report.

6.4 INTRODUCTION OF SALMONIDS INTO THE PACIFIC REGION

Refer to Section VII Federal Provincial Policy for Importation of Live Salmonids into British Columbia - Section VII.

6.5 TRANSPLANTS OF FINFISH WITHIN B.C.

- (i) There may be no movement or release of fish from a facility or site with a past record of VHS, IPN, whirling disease or any disease with no previous occurrence in the Pacific Region.
- (ii) No movement of live fish between zones (see above) is permitted without a permit issued by the Transplant Committee.
- (iii) No live fish may be transferred from a population suffering an estimated loss of more than 3%/week.
- (iv) Screening of eggs (salmonids only): All eggs for the private industry must be derived from fish that have been screened for diseases in a manner approved by DFO and Ministry of Environment.
- (v) Treatment of eggs (salmonids only): All eggs must be surface disinfected before they are moved from the site at which they were collected.

6.6 SITING OF FISH CULTURE FACILITIES

Definition of facility: All fish culture units/containers on a single land use permit, or site as defined in a private or commercial fish culture permit or foreshore lease. (refer Sections 3.2 and 4.2)

(i) General:

No privately operated fish culture facility may be established within a 1 km radius of the mouth of a stream containing anadromous species to minimize disease transmission concerns and to protect highly sensitive estuarine fish habitat.

Coastal areas adjacent to stream mouths and their estuaries are considered to be sensitive because of the concentrations of juvenile and adult salmon in their vicinity at various times of the year, the possible susceptibility to disease during saltwater/freshwater acclimation periods, and potential for disruption of residency, holding or migration behaviour patterns. The chemical storage characteristics of estuary deltas are documented and mechanisms may also exist for pathogen cycling.

(ii) Freshwater:

- 1) No privately operated facility may discharge effluent into the water supply of a publicly funded facility.
- 2) Any facility discharging effluent into a stream must be located a minimum of 5 km upstream of a privately owned facility using river water and must demonstrate that such

effluent will not pose a risk to fish of downstream operations.

- 3) For lake based netpens: there must be a minimum distance of 2 km between facilities or between a facility and any wild salmonid spawning and migrating areas. (Note: this may be revised depending on MOE policy.)

(iii) Seawater:

- 1) No fish culture facility will be permitted within a 5 km distance (by water) of another operation.

6.7 PROCESSING PLANTS

No effluent from a plant handling cultured fish may be discharged unless effluent is treated in an approved manner to kill infectious agents.

6.8 DISPOSAL OF DEAD FISH AND OFFAL

No dead cultured fish or offal may be discharged into the aquatic environment. All dead fish and offal must be treated in a manner acceptable to the Department of Fisheries and Oceans e.g., land fill site, incineration, etc.

6.9 DIET OF FISH

No unprocessed fish products of the same family should be used in the diet of cultured fish e.g., dead salmon should not be fed to cultured salmon.

6.10 CO-CULTURE OF SPECIES

- (i) No facility shall culture sockeye and kokanee with any other salmonid species. This prohibition is necessary to prevent spread of IHN to other species in a culture situation.
- (ii) No new facility for culture of chinook, steelhead or rainbow trout may be established where sockeye or kokanee are present in the hatchery water supply.

6.11 REPORTING OF FISH DISEASES

An annual fish health report must be completed listing all diseases encountered and treatments utilized.

VII FEDERAL-PROVINCIAL POLICY FOR THE IMPORTATION OF LIVE SALMONIDS INTO BRITISH COLUMBIA

In recognition of the commercial and recreational value of wild and cultured native salmonid stocks in British Columbia and the Yukon Territory, it is essential to protect their genetic integrity and freedom from exotic diseases.

Therefore, no importations of fish belonging to the family Salmonidae will be authorized by Federal or Provincial fisheries management agents which are not in compliance with this policy, effective on date of signing.

7.1 GENERAL

- (i) Approved importation of live salmonids must comply with the Canadian Fish Health Protection Regulations (CFHPR).
- (ii) Only surface-disinfected, fertilized eggs will be imported. No live fish or unfertilized eggs or milt will be allowed.
- (iii) Only Atlantic salmon (Salmo salar) and non-anadromous rainbow trout (Salmo gairdneri) will be considered for importation.
- (iv) Importation of rainbow trout will be considered only from Canada and continental U.S.A.
- (v) As of April 1, 1987, egg imports will be limited to 100,000 eggs per year per licence and allowed only from brood stock that has been held at the source facility (hatchery and sea pen), separate from other stocks for one full generation.

7.2 ATLANTIC SALMON

- (i) No direct importation of Atlantic salmon eggs will be permitted from continental Europe, from the southern hemisphere, or from countries where viral hemorrhagic septicemia (VHS) is known or suspected to occur. Importation will be considered only from sites that (i) a Canadian Local Fish Health Officer has approved after a site inspection; (ii) can demonstrate a thorough record of disease history to the satisfaction of Canadian Local Fish Health Officer; (iii) can document and demonstrate a fish-free water supply system; and (iv) can document and demonstrate the capability of the physical plant to isolate stocks and prevent disease transfer between stocks.
- (ii) Importation of Atlantic salmon eggs will be for the purpose of developing aquaculture brood stocks in British Columbia. Importers must propose a number or percent of fish to be held to maturity for reproduction and collection of sex products and demonstrate progress and intent to establish brood stocks.
- (iii) Consideration for import will be given particularly to stocks that are demonstrably adapted for commercial aquaculture pen rearing, assuming that all other conditions are met.

- (iv) After March 31, 1989, no further imports of Atlantic salmon eggs will be permitted.
- (v) All Atlantic salmon must be held under strict quarantine (see 7.4).

7.3 LIVE SALMONIDS RESEARCH

- (i) Notwithstanding sections 7.1 and 7.2, exceptions may be permitted for such activities as research or brood stock development and improvement when work is to be conducted under strict supervision of government fisheries agencies. Approval for exceptions must be obtained from the Director General, Pacific Region, Department of Fisheries and Oceans and the Director, Fisheries Branch, British Columbia Ministry of Environment and Parks.

7.4 ATLANTIC SALMON QUARANTINE CONDITIONS

- (i) Prior to the arrival of any eggs, a quarantine facility must be inspected and approved by designated government personnel according to the following conditions as judged by the designated Fish Health Officer.

The quarantine facility must:
 - a) be an adequately enclosed area, physically separated from any other hatchery operation;
 - b) have restricted access;
 - c) have approved facilities for disinfection of effluent
- (ii) All eggs and resultant fish must be held in quarantine for a minimum of 12 months after arrival.
- (iii) All stocks in the initial year and thereafter all stock kept for brood stock must be inspected and sampled according to the CFHPR Manual of Compliance. Fish must be sampled 3 times in their quarantine and once just after transfer to salt water. Brood stock must be sampled at maturity.
- (iv) Destruction of the stock by prescribed means will be required if any disease listed in Schedule II of the CFHPR is detected. Also detection of any other disease designated by Federal and Provincial fisheries management agencies may lead to the same requirement for stock destruction or to further quarantine of stock.
- (v) Failure to comply with importation or quarantine conditions will result in suspension of the Commercial Fish Farm Licence of the facility.

7.5 MARINE REARING OF FIRST GENERATION ATLANTIC SALMON

- (i) First generation Atlantic salmon hatched from imported eggs shall be confined to marine net pens:
 - a) at the Pacific Biological Station
 - b) in Jervis Inlet and associated bays and inlets east of its mouth; and,
 - c) coastal waters between Latitudes 50° and 51° EXCEPT Broughton and Johnstone Straits and Discovery Passage and waters within 5 km of them.

Such movements from hatchery to salt water will be by Federal-Provincial Transplant Committee approval only.

- (ii) Second generation Atlantic salmon, whose parents are disease free, may be transplanted to marine net pens anywhere along the British Columbia coast with standard Federal-Provincial Transplant Committee approval.

The precautions taken above are designed to maximize the chances for detection of any exotic fish diseases that may be carried by the stock. It therefore follows that the first generation transplants to saltwater should be localized to ensure that all salmon stocks in British Columbia are not exposed and also to simplify the logistics of the rigorous sampling program that is scheduled under Section 7.4(iii).

7.6 PROCEDURES

- (i) All requests for permission to import live salmonids are to be addressed to the Canada-British Columbia Transplant Committee, c/o Fish Health Officer, Pacific Biological Station, Hammond Bay Road, Nanaimo, British Columbia V9R 5K6.
- (ii) In recognition of the importance of managing fish disease upon the orderly development of aquaculture in British Columbia; and recognizing the lead role of the Ministry of Agriculture and Fisheries and Oceans in aquaculture, the Department of Fisheries and Oceans and the Ministry of Environment and Parks will confer with the Ministry of Agriculture and Fisheries:
 - a) prior to any decision being made by the parties regarding item II requests;
 - b) prior to any amendments to the policy under item 20;
- (iii) at least semi-annually regarding the nature and status of requests to the Canada-British Columbia Transplant Committee to import live salmonids to British Columbia.

APPENDIX I
FEDERAL LEGISLATIVE MANDATES PERTAINING TO AQUACULTURE

FISHERIES ACT

FISHERIES DEVELOPMENT ACT

FISH INSPECTION ACT

FISH HEALTH PROTECTION REGULATIONS

SEAL PROTECTION REGULATIONS

SANITARY CONTROL OF SHELLFISH FISHERIES REGULATIONS

FISH PROCESSING OPERATIONS - LIQUID EFFLUENT GUIDELINES
1975 DEPARTMENT OF ENVIRONMENT

APPENDIX II

DFO INFORMATION REQUIREMENTS FOR EVALUATING PROPOSED MARINE AQUACULTURE FACILITIES

1.0 PRE-DEVELOPMENT INFORMATION REQUIREMENTS

This information is required for the purposes of evaluating marine aquaculture or processing proposals. On the basis of its evaluation of this information, the Department will decide whether to approve a proposal and issue an Aquaculture Licence. The following information must be provided for all proposed marine aquaculture and proposed fish processing facilities and must accompany all Aquaculture Licence applications for marine aquaculture facilities.

- 1.1 A marine chart copy and a site plan showing the general location and boundaries of the proposed fish farm including depth contours within the lease area and the numbers, size and configuration of rearing pens expected at full production.
- 1.2 A scuba survey of all portions of the lease area shallower than a depth of 20 meters, describing substrate, vegetation and faunal presence as required on the scuba survey form that will accompany the license application (example following).
- 1.3 A description of all foreshore construction or beach alteration works that are being considered. Note that such works must be in compliance with Section 31 of the Fisheries Act that prohibits harmful alteration of fish habitat. Review and approval is required before such works are initiated.
- 1.4 A production plan of numbers, species and size of fish to be reared estimated on a monthly basis through one complete representative production cycle, at maximum production. Include estimates of monthly food use.
- 1.5 A description of associated activities being considered for this site including bleeding, processing, hatcheries or acclimation tanks.
- 1.6 A description of the freshwater supply system, if one will be developed. A description of sites or methods that will be used to dispose of dead fish, offal, refuse and sewage.
- 1.7 In areas deemed sensitive, additional information requirements of the prospective fish farmer may include seasonal assessment of oceanographic characteristics, identification of other effluent discharges in the same area, measurements of background water quality and sediment quality characteristics, vegetation mapping, and compilation of fisheries resource information for the site. Requests

for such information may be made under authority of Section 33.1(1) of the Fisheries Act.

2.0 OPERATIONAL INFORMATION REQUIREMENTS

Annual reporting of operational information may also be required as a condition of the Aquaculture License. This may be expected for sites exceeding 200 tonnes average annual production, and also for smaller operations located in areas deemed environmentally sensitive by this Department. Operational information reporting requirements may include but are not limited to the following:

- 2.1 An operational log including monthly or quarterly production figures and feed supply use figures, identifying the use of antifouling preparations on nets, and describing local environmental events such as plankton blooms, incidence of herring spawn on nets, predator control problems, and accidental fish releases.
- 2.2 A water quality monitoring program with sampling measures, replicates and frequency to be specified on a site specific basis by this Department, sufficient to demonstrate distribution of dissolved and suspended solids, nutrients, pathogens, bacteria, antibiotics and chemicals including antifouling treatment contaminants, as may be considered warranted and to the satisfaction of this Department. In most cases this will require sample analysis by an independent laboratory. Such programs would continue until completion of one full maximum production cycle, or longer as required to characterize operational impacts and absence of negative effects.
- 2.3 Monitoring programs describing accumulation patterns of organic deposits under pens sites, alterations in vegetation distribution patterns in the vicinity of pen sites, or changes in benthic invertebrate community structure.
- 2.4 Once a site has been operational for some time, information reporting requirements may be required if the site has increased production, appears to be negatively affecting the environment, or if it is selected to be part of a more general coastwide aquaculture impact assessment program.

APPENDIX III

DFO INFORMATION REQUIREMENTS FOR EVALUATING PROPOSED LAND BASED FACILITIES

1.0 PRE-DEVELOPMENT INFORMATION REQUIREMENTS

This information is required for the purpose of evaluating hatchery proposals. On the basis of its evaluation of this information, the Department will decide whether to approve the proposal and issue an Aquaculture Enterprise Licence.

APPLICATION INFORMATION

The following information must accompany all applications for an Aquaculture Enterprise Licence.

- 1.1 A topographical map or equivalent, with scale, showing the general site location. If the facility will discharge to the marine environment, including a nautical chart, photocopy or equivalent with scale.
- 1.2 A scale drawing or engineering plan of the site showing the location of adjacent streams, floodchannels, location of water supply structures, and location of water discharges. If the facility is at a river mouth, show the high water and low water lines, and the 20m below low water depth contour. (This will bear on marine outfall placement requirements.)
- 1.3 For sites on floodplains, prepare a site elevation survey to show ground elevations relative to historic flood levels. Identify areas that will be filled and the source of fill materials. Gravel removal from streams is generally not acceptable.
- 1.4 A production plan estimating the maximum stock density at full production in terms of the numbers of fish, species and expected average weight that will be achieved before off site transfer. This will permit assessment of wastewater characteristics.
- 1.5 For all proposed stream intakes or infiltration galleries including emergency water supplies and saltwater intakes, provide drawings including full engineering specifications and descriptions of intake structures and screens. Estimate maximum withdrawals for each month. Provide information on the streamflow volume available both during low flow periods and during periods of maximum water withdrawal for hatchery use. If this information is not available or cannot be reasonably estimated from existing records, then hatchery development may be delayed until low flow studies can be completed.

- 1.6 Provide a description of the intended treatment system and point of discharge of the hatchery and rearing effluent. Include retention time and cleaning procedures for settling basins, or alternately describe control and disposal measures that will be taken to isolate tank cleaning wastes from the general effluent. Identify the location and describe the screens that will be used to prevent accidental escapements.
- 1.7 Provide a description of the other waste facilities, structures and disposal procedures for sewage, lab wastewater, refuse, dead fish and offal.
- 1.8 For marine effluent discharges, estimate the distance if net pens will be located nearby. State if fish processing is also being considered for this site.
- 1.9 Provide a proposed construction schedule. This Department may require modification of scheduling in respect to critical periods for wild fish stocks that may be affected by instream works. In stream construction is generally limited to summer low flow periods.

2.0 OPERATIONAL INFORMATION REQUIREMENTS

Annual reporting of operational information may also be required as a condition of the Aquaculture License. This may be expected for hatcheries exceeding 1,000,000 smolts average annual production, and also for smaller operations located in areas deemed environmentally sensitive by this Department. Operational information reporting requirements may include but are not limited to the following:

- 2.1 An operational log including monthly or quarterly production figures, feeding rates, weights, survival rates, water flow volumes extracted from supply streams, quantities and types of chemicals or disinfectants used by date, and occurrence of accidental fish releases.
- 2.2 A water quality monitoring program with sampling measures, replicates and frequency to be specified on a site specific basis by this Department, sufficient to demonstrate distribution of dissolved and suspended solids, nutrients, pathogens, bacteria, antibiotics and chemicals, as may be considered warranted and to the satisfaction of this Department. In most cases this will require sample analysis by an independent laboratory. Such programs would continue until completion of one full maximum production cycle, or longer as required to characterize operational impacts and absence of negative effects.
- 2.3 Monitoring programs describing accumulation patterns of organic deposits, bacterial growths, periphyton or algal mat growths, changes in the benthic invertebrate community and changes in interstitial water characteristics downstream of freshwater discharges, as compared to upstream control sites; or for hatchery discharges to marine

environments, monitoring programs describing accumulation patterns of organic deposits and changes in vegetation and benthic invertebrate communities in the vicinity of the marine outfall.

- 2.4 Operational information and monitoring programs may be required of hatcheries that have been licensed and operating for some time, if they have expanded smolt production capabilities, are perceived to be negatively affecting fish habitat, have demonstrated poor husbandry or site operational practices, are out of compliance with current guidelines or if they are requested to take part in a more general survey of aquaculture industry impacts.

3.0 COMPLIANCE

A compliance schedule may be established for existing licenced freshwater facilities that are presently licenced but whose current operation fails to meet current Departmental standards as published in these guidelines.

Appendix IV

RECOMMENDATIONS RESPECTING SITING AND OPERATION OF AQUACULTURE FACILITIES

- (i) Net pens should be located in areas of good circulation and tidal flushing.
- (ii) Net pens should not be located in traditional anchorage areas or safe harbours or within one kilometer of major shipping lanes i.e., B.C. Ferry routes or oceanliner routes,
- (iii) There should be no direct sewage discharge from living quarters on the lease site.
- (iv) Net pens should not be located in an area adjacent to a facility which is routinely dredged in order to protect cultured fish from dredgate.
- (v) No unprocessed fish products of the same family should be used in the diet of cultured fish to minimize disease transfer.

Appendix V

DEPARTMENT OF FISHERIES AND OCEANS KEY CONTACTS

- A. Regional Aquaculture Coordinator (research, training, egg supply)
Fisheries Research Branch
Pacific Biological Station
Nanaimo, B.C. V9R 5K5 756-7046
- B. Chief, Aquaculture Division (licencing, general information)
Fisheries Operations
1090 West Pender Street
Vancouver, B.C. V6E 2P1 Ron Ginetz
- C. Area Managers
- South Coast
Department of Fisheries and Oceans, Field Services Branch
(Port Alberni, Campbell River, Victoria & Nanaimo Districts)
3225 Stephenson Point Road
Nanaimo, B.C. V9T 1K3 Larry Duke 756-7280
- North Coast
(Kitimat, Prince Rupert, Queen Charlotte City Districts)
114-417 2nd Avenue West
Prince Rupert, B.C. V8J 1G8 Paul Sprout 624-0416
- Fraser River, Northern B.C. and Yukon Division
(Kamloops, New Westminster, Whitehorse Districts)
Room 32380 6th Street
New Westminster, B.C. V3L 5B3 Fred Fraser 666-6478
- D. Transplant Committee
Fisheries Research Branch
Pacific Biological Station
Nanaimo, B.C. V9R 5K6 Dorothee Kieser 756-7069
- E. Diagnostics Service, Fish Health Section
Fisheries Research Branch
Pacific Biological Station 756-7069
Nanaimo, B.C. V9R 5K6 756-7062

DEPARTMENT OF FISHERIES AND OCEANS KEY CONTACTS CONT'D

C. Inspection Division Offices

Fraser River, Northern B.C. and Yukon Division
2250 South Boundary Road
Burnaby, B.C.
V5M 4L9

Dale Paterson 298-4114

South Coast Division
Ste 5 - 1537 Hillside Ave
Victoria, B.C.
V8T 4Y2

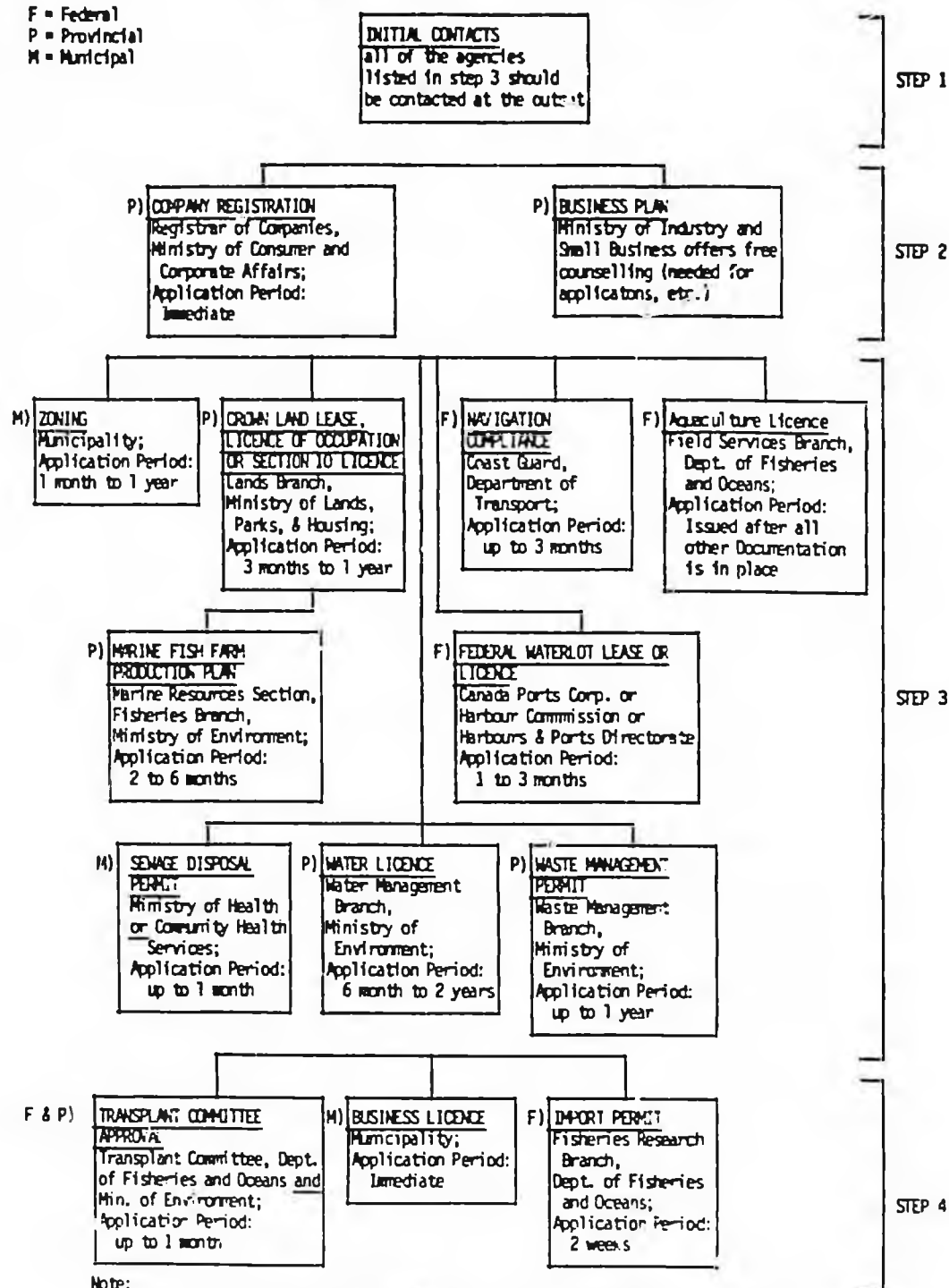
Wayne Holmes 388-3455

North Coast
Room 224 - 417 2nd Ave. West
Prince Rupert, B.C.
V8J 1G8

Leslie Pozer 624-0439

PERMIT AND LICENCE STRUCTURE FOR MARINE FINFISH CULTURE

F = Federal
P = Provincial
M = Municipal



Note:

- 1) Attached are contact names, addresses, and telephone numbers along with brief explanations of each permit or licence.
- 2) Permits or licences listed are not required in all instances.
Contact the agencies indicated to determine the individual requirements for specific farms.
- 3) Marine Fish Farm Production Plan was previously called Salmon Farm Management Plan.

PERMIT AND LICENCE STRUCTURE FOR MARINE FINFISH FARMING

Permit/Licence	Agency
STEP 1	
<u>Initial Contacts</u> - all of the agencies that will be approached for approvals should be contacted at the outset to determine what concerns they may have with regard to the location of a particular proposal. <u>In particular, the agencies listed in step 3 should be contacted prior to submitting applications.</u> NOTE: Only the Department of Transport, Ministry of Lands, Parks, and Housing, and Municipal (Zoning) governments have authority to allow or disallow a fish farm at a particular site.	
STEP 2	
<u>Business Plan</u> - needed when making application for loans, etc. This agency offers free counselling throughout the province, for business plan development.	Small Business Counselling Section Ministry of Industry & Small Business Development 4th Floor 1405 Douglas St. Victoria, British Columbia V8W 3C1 Telephone: 383-1612 or Suite 140 Robson Square 800 Hornby St. Vancouver, British Columbia V6Z 2C5 Telephone: 666-3900
<u>Company Registration</u> - all applications should be submitted under the same name. Crown Land applications and Marine Fish Farm Production Plans (previously called Salmon Farm Management Plan) <u>must</u> be under the same name.	Registrar of Companies Ministry of Consumer and Corporate Affairs 940 Blanshard St. Victoria, British Columbia Telephone: 387-4471

Permit/Licence	Agency
<u>Federal Waterlot Lease or Licence</u> - foreshore and offshore tenures are usually administered by the Provincial Ministry of Lands, Parks, and Housing but public harbours and ports are administered by Federal regulatory agencies and Harbour Commissions. Application for a lease or licence in a public harbour or port must be made to the agency in charge.	a) Canada Ports Corporation Vancouver Port Corporation Manager of Real Estate 1900 - 200 Granville St. Vancouver, British Columbia V6C 2P9 Telephone: 666-6785 Prince Rupert Port Corporation Manager of Finance and Administration 110 - 3rd Avenue W. Prince Rupert, British Columbia V8J 1K8 Telephone: 627-7545 b) Harbour Commissions Port Alberni Harbour Commission Property Manager P.O. Box 99, 2750 Harbour Rd. Port Alberni, British Columbia Telephone: 723-5312 Nanaimo Harbour Commission Port Manager 104 Front St. Nanaimo, British Columbia V9R 5K4 Telephone: 753-4146 Fraser River Harbour Commission 505 - 713 Columbia St. New Westminster, British Columbia V3M 1B2 Telephone: 524-6655 North Fraser Harbour Commission 2020 Airport Rd. Richmond, British Columbia V7B 1C6 Telephone: 273-1866

Permit/Licence	Agency

STEP 3

NOTE: If your proposed site is in the vicinity of a shellfish growing area, either wild or cultured, contact Environment Canada before submitting applications to the agencies listed below. This agency has the responsibility for monitoring water quality standards for shellfish harvesting.

Environmental Protection
Agency
Environment Canada
Room 8, 1801 Welch St.
North Vancouver, B.C.
V7P 1B7
Telephone: 985-6723
Bruce Kay
Bert Kooi

Aquaculture Licence - all marine commercial aquaculture facilities must annually obtain a licence from this agency. Application should be made at the same time other applications are submitted, however, a licence will not be issued until all other approvals are in place.

Field Services Branch
Dept. of Fisheries
and Oceans
1090 West Pender St.
Vancouver, British Columbia
V6E 2P1
Telephone: 666-0519 x
Francis Dickson

Crown Land Lease, Licence of Occupation or Section 10 Licence - stipulates the use to which Crown Land can be put. The water lot that will house the net pens is usually "Crown Land". Approval of a Marine Fish Farm Production Plan (MFFPP) (previously called a Salmon Farm Management Plan) by the Marine Resources Section, Fisheries Branch, Ministry of Environment, is required before a Lease or Licence of Occupation will be issued. These two forms of tenure allow for improvements (net pen construction, etc.) to the leased or licenced area. A one year Section 10 Licence may be issued without an approved Production Plan; however, little or no improvements may be made to the licenced area. This licence allows the applicant time to study the site to determine locational and biophysical suitability. An application for Crown Land must be on file at the Lands Branch before a Marine Fish Farm Production Plan will be accepted for review by the Marine Resources Section. A separate MFFPP is required for each proposed site.

Land Administration
Ministry of Lands, Parks
and Housing

Vancouver Island Region
851 Yates St.
Victoria, British Columbia
V8W 1M1
Telephone: 387-5011

Lower Mainland Region
210 - 4240 Manor St.
Burnaby, British Columbia
V5G 1B2
Telephone: 660-5500

North Coast Region
Bag 5000, 3793 Alfred Ave.
Smithers, British Columbia
V0J 2N0
Telephone: 847-7334

Permit/Licence

Agency

c) Harbours & Ports
Directorate

Property Manager
Harbours & Ports
Directorate
Transport Canada, Marine
224 West Esplanade
North Vancouver, British
Columbia
V7M 3J7
Telephone: 984-3803

Marine Fish Farm Production Plan (Salmon Farm Mangement Plan) - this plan becomes a legal part of the Crown Land Lease or Licence of Occupation, and sets out the production strategies and improvements schedule for the prospective farm. Approval is required before a Lease or Licence of Occupation will be issued. This plan must be submitted to the Marine Resources Section, Fisheries Branch after an application for Crown Land has been filed.

Marine Resources Section
Fisheries Branch
Ministry of Environment
780 Blanshard St.
Victoria, British Columbia
V8V 1X5
Telephone: 387-4573

Navigation Compliance - all structures or "improvements" that may interfere with navigation in Canadian waters must be approved by the Coast Guard. Often applicants are required to mark structures to make them more visible or install lights and/or buoys.

Ministry of Transport
Coast Guard
224 West Esplanade
North Vancouver
British Columbia
V7M 3J7
Telephone: 984-3731
John Duduman
Herb Adrian

Sewage Disposal Permit - may be required if septic wastes are to be disposed of on land.

Ministry of Health (or)
Community Health Services
(call Community Health Services for the area in which the farm is to be located. If the farm is to be outside community boundaries, call the Provincial Health Services Branch.)

Permit/Licence	Agency
<u>Waste Management Permit</u> - required if septic waste will be disposed of in a body of water (fresh or marine).	Waste Management Branch Ministry of Environment Lower Mainland 15326 - 103A Avenue Surrey, British Columbia V3R 7A2 Telephone: 584-8822 North Coast Region 3726 Alfred St. Smithers, British Columbia V0J 2N0 Telephone: 847-7250 Central Coast Region 540 Borland St. Williams Lake V2G 1R8 Telephone: 398-4532 Vancouver Island Region 2569 Kenworth Rd. Nanaimo, British Columbia V9T 4P7 Telephone: 758-3951
<u>Water Licence</u> - required if water is to be diverted from a stream, river or lake, e.g. for hatchery operation or domestic use.	Licencing Section Ministry of Environment Water Management Branch Lower Mainland 15326 - 103A Avenue Surrey, British Columbia V3R 7A2 Telephone: 584-8822 North Coast Region 3726 Alfred St. Smithers, British Columbia V0J 2N0 Telephone: 847-7250 Central Coast Region 540 Borland St. Williams Lake V2G 1R8 Telephone: 398-4532

Permit/Licence	Agency
	Vancouver Island Region 2569 Kenworth Rd. Nanaimo, British Columbia V9T 4P7 Telephone: 758-3951
<u>Zoning</u> - required when a farm is to be located within a Municipality or Regional District. Where zoning bylaws are in place, check to ensure that the zoning provides for aquaculture as a designated use. Many areas of the coast are not zoned.	Municipality, Regional District or Island Trust responsible for zoning bylaws.
STEP 4	
<u>Business Licence</u> - required in order to operate a commercial enterprise in British Columbia.	Depending upon the location of the farm this is issued by the Municipality or Regional District.
<u>Import Permit</u> - live cultured salmonid eggs, smolts or fish imported into British Columbia must come from a certified facility approved by a Fish Health Officer. Customs requires presentation of an Import Permit before the goods are permitted into Canada.	Fisheries Research Branch Dept. of Fisheries and Oceans Pacific Biological Station P.O. Box 100 Nanaimo, British Columbia V9R 5K6 Telephone: 756-7000 Gary Hoskins
<u>Transplant Permit</u> - required to move live eggs, smolts or fish to or from the farm site if the distance of transfer is greater than 50 kilometers.	(Federal) Dept. of Fisheries and Oceans and (Provincial) Ministry of Environment Telephnone: Leif Sunde 387-4573 Dorothy Keiser 756-7000 Robin Harrison 666-6478

NEW PROCEDURE FOR OBTAINING A MARINE LANDS LEASE OR LICENCE FOR AQUACULTURE PURPOSES

In December, 1985, the Ministries of Environment and Lands, Parks and Housing agreed to a change in the procedure for obtaining a marine lands lease or licence for aquaculture purposes.

OPTIONS FOR TENURE

The Ministry of Lands, Parks and Housing may accept applications for a Section 10 licence, licence of occupation or lease (see attached flowchart). Receipt of a management plan approved by the Ministry of Environment is not a prerequisite to acceptance of an application for tenure.

USE OF TENURES

- (a) A lease is no longer the primary form of tenure. The Ministry of Lands, Parks and Housing may issue either a lease or licence of occupation upon completion of a management plan for production which has been approved by the Ministry of Environment.
- (b) A Section 10 licence may be used when studies or additional data are needed in order for a management plan to be approved or when the Ministry of Environment indicates, in the initial referral process, that it will require more than 60 days to approve a management plan being prepared by the applicant.
- (c) The Section 10 licence is not to be used to authorize the commercial culture of harvesting of aquatic plants or animals, nor permanent residential habitation.
- (d) The Ministry of Lands, Parks and Housing will not issue any other Land Act lease or licence (S.10, S.35 or S.36) over the subject area for any purpose while a Section 10 licence term is in effect.
- (e) The applicant for a Section 10 licence shall provide a \$25 application fee, \$25 documentation fee, an outline of proposed operations, including a sketch plan showing the location and size of the area, and a description of any activities including temporary improvements necessary for the development of a management plan. The annual rental is \$100, payable in advance.
- (f) The Section 10 licence is non-assignable. The term is for a maximum of one year.
- (g) When the Section 10 licensee has completed a management plan for production endorsed by the Ministry of Environment, the licensee may submit an application to convert the licence to a licence of occupation or lease for production purposes to be processed in accordance with normal procedures.

AQUACULTURE TENURE PROCESS

Application for Crown Land made to
Ministry of Lands, Parks and Housing
(Lease, Lic. of Occup., Section 10 Licence)

Referral to Other Agencies
(normally 30 days)

Unfavourable

Disallowance

Favourable —
(Lease, Lic. of Occup.)

Ministry of Environment (MOE)
MOE has approved Management
Plan in referral process

Favourable
(Section 10 Licence)

MOE requests
more than 60
days to approve
Mgmt. Plan

MOE can approve
Mgmt. Plan within
60 days

Issue Section 10
Licence for
Mgmt. Plan
preparation
principles

Converted to
Lease or Lic. of Occup.
when Mgmt. Plan completed
and approved by MOE

Issue Letter of Commitment
for lease or Lic. of Occup.
subject to provision of MOE -
approved Mgmt. Plan with
60 days

Approved Mgmt. Plan Received

Issue Lease or Lic. of Occup.

SALMON EGGS AND SMOLT SUPPLY

Persons planning to initiate a salmon farm should thoroughly investigate the availability of eggs and/or smolts as a part of their business planning and development of their Marine Fish Farm Production Plans (formerly Salmon Farm Management Plans).

Applicants should be aware that limited quantities of salmon eggs are produced each year. Egg supplies originate as surplus production from the Federal Department of Fisheries and Oceans hatcheries and from commercial salmon farmers. To date virtually all coho and the majority of chinook eggs have come from D.F.O. hatcheries. Over the next 3-4 years, D.F.O. will likely be able to supply coho eggs to meet the demand but chinook eggs will continue to be in short supply. Over the next decade it is expected that commercial suppliers will provide an increasing proportion of eggs which will leave D.F.O. as a supplier of last resort. Applicants should be prepared to make down payments on egg supplies about ten months prior to placing smolts in net pen; i.e. in September 1986 for a projected June, 1987 start date. Unless they have their own hatchery, most applicants will also have to make arrangements to have these eggs reared in a commercial hatchery to the smolt stage and their subsequent transfer to the net pen site.

For more information contact:

Mr. Bob Nelles, Manager
B.C. Salmon Farmers' Association
201 - 1760 Marine Drive
West Vancouver, B.C.
V7V 1J4
Phone: 922-4525

Department of Fisheries and Oceans
Fisheries Research Branch
Pacific Biological Station
Nanaimo, B.C.
Phone 756-7000

(revised 15/04/85)

INFORMATION FOR FISH FARMERS

BASIC REFERENCES ON SALMON CULTURE

- 1. Kennedy, W.A. 1978.
A handbook on rearing pan-size Pacific salmon using floating seapens. Fish. Mar. Serv. Ind. Rep. 107. 111p.
- 2. Leitritz, E., and Lewis, R.C. 1976.
Trout and Salmon Culture (Hatchery Methods). State of California Dept. of Fish and Game Bulletin 164. 197p.
- 3. McNeil, W.J., and Bailey, J.E. 1975.
Salmon Rancher's manual. NOAA, Northwest Fisheries Center, National Marine Fisheries Service, Auke Bay. 95p.

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- 1. Edwards, D.J. 1978.
Salmon and trout farming in Norway. Fishing News Books Ltd. Farnham.
- 2. Brett, J.R., W., and Solmie, A. 1978.
The 1977 crop of salmon reared on the Pacific Biological Station Experimental Fishfarm. Fish. Mar. Serv. Tech. Rep. 845. 17p.
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Norwegian salmonid farming. Fish. Mar. Serv. Tech. Rep. 779. 47p.
- 4. Ayles, G.B., and Brett, J.R. 1978.
Workshop on aquaculture research and development in Canada. Fish. Mar. Serv. Tech. Rep. 750. 14p.
- 5. Sedgwick, S.D. 1973.
Trout farming handbook. Seeley Service and Co., London. 157p.
- 6. Stickney, R. R. 1979.
Principles of warmwater aquaculture. John Wiley and sons, N.Y. and Toronto, 375p.

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- 7. Allen, L.J., and Kinney, E.C., eds. 1981. Proceedings of the Bio-Engineering Symposium for Fish Culture. Fish Culture Section, American Fisheries Society, Bethesda. 307p.
- 8. Mahnken, C.V.W., and Waknitz, F.W. 1979. Factors affecting growth and survival of coho salmon (*Oncorhynchus kisutch*) and chinook salmon (*O. tshawytscha*) in saltwater net-pens in Puget Sound. Proc. World Maricul. Soc. 10. pp 280-305.
- 9. Melteff, B.R., and Neve, R.A. eds. 1982. Proceedings of the North Pacific Aquaculture Symposium. Univ. of Alaska, Alaska Sea Grant Report 82-2. 379p.
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- 11. Thorpe, J. (ed.) 1980. Salmon Ranching. Academic Press, London and New York. 441p.
- 12. Stevenson, J.P. 1980. Trout farming manual. Fishing News Books Ltd., Farnham, Surrey, England. 186p.
- 13. Milne, P.H. 1972. Fish and Shellfish Farming in Coastal Waters. Fishing News Books Ltd., Farnham, Surrey, 208p.
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- 15. Bennett, G.W. 1962. Management of artificial lakes and ponds. Reinhold Publ. Corp. New York.
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CONTACTS

MARICULTURE ASSOCIATION OF BRITISH COLUMBIA

Contact: Mariculture Association of B.C.
Secretary
P.O. Box 74
Bamfield, B.C.
V0R 1B0

B. C. SALMON FARMERS' ASSOCIATION

Contact: Ray Sharpe, Secretary-Treasurer
Room 1, 912 Island Highway
Campbell River, B. C.
V9W 2C3
Phone: 287-3889

MARINE RESOURCES BRANCH

Contact: Marine Resources Branch
780 Blanshard Street
Victoria, B.C.
V8W 2H1
Phone: 387-4573

AQUACULTURE LICENCES:

Contact: Frances Dickson
Fisheries & Oceans Canada
1090 W. Pender Street
Vancouver, B.C.
V6E 2P1
Phone: 666-0519

AQUACULTURE COORDINATOR

Contact: Department of Fisheries and Oceans
George Hunter
Pacific Biological Station
Nanaimo, B.C.
V9R 5K6
Phone: 756-7150

MALASPINA COLLEGE

Contact: Aquaculture and Fisheries
Technology
900 Fifth Street
Nanaimo, B.C.
V9R 5S5
Phone: 753-3245

Summer extension courses for Growers:

- A. Culture of salmonids
- B. Culture of molluscs (oysters, mussels, clams, scallops, abalone)

Contact: Bill Pennell or Eunice Lam
Phone: 753-3245

•Available for study at Pacific Biological Station (not for loan)

••Copies available on request to:

Aquaculture Program
Attention: B. Damon
Pacific Biological Station
Department of Fisheries and Oceans
Nanaimo, B.C.
V9R 5K6
Phone: 756-7012



MARINE FISH FARM SITE EVALUATION CRITERIA

<u>BIOPHYSICAL CAPABILITY</u>	<u>HIGH</u>	<u>MEDIUM</u>	<u>LOW</u>
1. Water temperature (single incident)	Summer < 16°C Winter > 7°C	Summer 17-20°C Winter 5-6°C	Summer > 21°C Winter < 4°C
2. Salinity	> 24‰/oo	15-23‰/oo	< 15‰/o
3. Circulation in seapen @ 8-10/m ³ stocking density	> 2 cm/sec	2 cm/sec	< 2 cm/sec
4. Protection	well protected < 2' wave	moderate protection < 3' wave	risky > 3' wave
5. Predators	no known obser- vations; seals, otters, sea lions, mink	observations noted	known haul-out or colony nearby
6. Depth below seapen bottom at 0'	> 10 m	2-10 m	< 2 m
7. Pollution	no known sources; future impacts unlikely	no sources at present; some future impact possible	industrial or septic pollution nearby
8. Plankton	no record of chaetocerus or heavy plankton blooms	location suspect	known plankton blooms

.../2

Modified Jan./86

<u>LOCATIONAL SUITABILITY</u>	<u>HIGH</u>	<u>MEDIUM</u>	<u>LOW</u>
9. Hydro	B.C. hydro available on site	potential small hydro	generator only option
10. Road access	to - site	nearby with potential to connect	no access
11. Boat access	protected waters to nearest road	mostly protected waters to nearest road	exposed waters to nearest road
12. Proximity to markets total travel time by boat or vehicle	< 5 hrs. i.e. there and back in one day	5-10 hrs. there in time to ship same day	> 10 hrs. ship day following
13. Proximity to labour pool	employees drive to work	employer provides daily boat transport	employee housing provided
14. Communication	B.C. telephone	radiotelephone	single side band
15. Freshwater	sufficient for all salmon farm requirements such as drinking water, equipment cleaning, etc.	partially sufficient for salmon farm operation	insufficient for salmon operation

SALMON FARM MANAGEMENT PLAN

NAME

ADDRESS

POSTAL CODE

TELEPHONE

(604)

OFFICE USE ONLY

Land File _____

Our File _____

Date Received _____

January 10, 1985

SALMON FARM MANAGEMENT PLAN

All persons at the time of making application to the Ministry of Lands, Parks and Housing to lease/licence Crown land for Salmon mariculture purposes must submit a completed "SALMON FARM MANAGEMENT PLAN" which has been approved by the Fisheries Branch, Ministry of Environment.

The purposes of the SALMON FARM MANAGEMENT PLAN are to ensure that:

- All applicants have fully thought out and developed their proposed operations with consideration of the funds and the commitment in time required.
- All applicants have the major role in establishing management guidelines for their proposed operation.
- Once an application for Crown land has been made the processing time is decreased.
- Both the Ministries of Lands, Parks and Housing and Environment, Fisheries Branch, understand and have a documented guideline for the proposed mariculture operation.

The SALMON FARM MANAGEMENT PLAN requires the applicant to detail the physical and environmental characteristics of his farm site. This information will be used to evaluate the biophysical capability, and area suitability of the proposed site and to assign lease rental fees. A diagram of the planned site utilization (including location and configuration of seapens, buildings, docks etc.), facility completion schedule and estimates of expenditures are also required. An evaluation of the economic viability of the proposed development will be based on this information.

Various examples of what is expected are included with this "Plan". Please complete in full and return within 30 days to:

Ministry of Environment
Fisheries Branch
Marine Resources Section
Parliament Buildings
Victoria, B.C. V8V 1X5

All financial information which is submitted will be considered confidential. Further information as may be required by the Fisheries Branch may be requested during the future development of the farm.

Before you begin the task of completing your Management Plan a check should be made on the (1) status and availability of the desired waterlot, and (2) the status of the adjacent upland. This enquiry can be made at the regional office of the Ministry of Lands, Parks and Housing. If the adjacent upland is privately owned, the upland owner's consent must be obtained.

BIOPHYSICAL CAPABILITY - MARINE SITE

Location of Site: Latitude _____ Longitude _____

Name and description of site: _____

Legal Description (if any) e.g. lease #: _____

Approximate size of foreshore lease applied for: _____ ha

Marine site exposure to winds and waves:

- _____ distance _____ direction Magnetic

- maximum wave height anticipated: _____ meters

- prevailing winds: spring _____ summer _____
 fall _____ winter _____

Water depth below seapen at an average low tide: _____
 Annual tidal range: mean _____; minimum _____; maximum _____

Water circulation at seapens: ebb tide: _____ cm/second -1

(see note 1) flood tide: _____ cm/second -1

Annual water temperature: mean _____ °C

(see note 1) minimum _____ °C

maximum _____ °C

Salinity and temperature profiles - quarterly:

Depth m	Spring: Date:		Summer: Date:		Fall: Date:		Winter: Date:	
	Temp.	Sal.	Temp.	Sal.	Temp.	Sal.	Temp.	Sal.
0	°C	°/oo	°C	°/oo	°C	°/oo	°C	°/oo
1								
2								
3								
4								
5								
10								

Salinity Meter Make _____ Model _____

or

Source(s) of temperature and salinity data: _____

BIOPHYSICAL CAPABILITY - FRESHWATER SITE

Location of hatchery site: Latitude _____ Longitude _____

Legal Description: _____

Freshwater supply: surface (i.e. lake/stream) _____

or groundwater (i.e. well) _____

- if surface water name source: _____, and;
- describe watershed development including present or potential activities (e.g. logging, mining, recreation, subdivision etc.) present: _____

potential: _____

- water licence application filed: Yes _____ No _____
- Volume requested: _____

Water chemistry:	date tested
pH	_____
Dissolved Oxygen (DO)	_____
Heavy metal scan (give details)	_____

MARINE SITE SUITABILITY

- give details of upland ownership: _____

- distance to nearest road link: _____ km
- distance from market or shipping point: _____ km
- other available transport systems (e.g. ferries, coastal freighters, air service)

- hydro service available: Yes _____ No _____
- potential small hydro development: Yes _____ No _____
if yes, give generation estimate _____ kw
- communications: telephone Yes _____ No _____
radiotelephone Yes _____ No _____

PRODUCTION INFORMATION

Briefly describe your production plans from the initial pilot phase to full production. Include the following pieces of information in your description: species to be reared, egg requirements, egg to smolt survival, smolt source if you plan on buying smolts, sterilization or feminization strategies, plans for brood stock, rearing densities both in fresh water and in sea water, seapen survival rates, size of fish at harvest and feed type to be used. ALSO complete the PRODUCTION STRATEGIES AND TARGET LEVELS table on the following page. An example to follow can be found in Figure 5.

PRODUCTION STRATEGIES AND TARGET LEVELS

Time(Months) Product	0 Eggs	8 Smolts	17 Pan-Size	25 3 lb+	37 8 lb+	48-60 Brood Stock	<u>Smolt</u> to Harvest Survival Rate
Cycle A _____ Brood							
Cycle B _____ Brood							
Cycle C _____ Brood							
Cycle D _____ Brood							

REARING FACILITIES AND SITE LAY-OUT

The following information is required as per the fictitious sample diagrams attached.

- 1- a map showing the location of your proposed site in relation to the surrounding coastal area (see Figure 1).
- 2- a lay-out of your site showing the location and configuration of the facilities including seapens, hatchery, processing plant, housing, docks, and any other improvements which will be incorporated into your farm. Prevailing winds, current patterns and water depths should also be displayed (see Figure 2).
- 3- a detailed diagram of your floats and seapens (top and side views) showing anchoring system, predator nets, seapens, etc. (see Figures 3 and 4).

- 4- describe hatchery and freshwater rearing facilities indicating number of hatch trays, number of ponds or troughs etc., rearing densities, primary and back-up water systems, total volume of the freshwater rearing facility and water flow rates required for the facility at maximum capacity.

MANAGEMENT PLAN SCHEDULE

Complete the following MANAGEMENT PLAN SCHEDULE. An example is shown in Figure 6. Please keep in mind that this Schedule is an integral part of the SALMON FARM MANAGEMENT PLAN and that you are expected to abide by it. Some flexibility is expected though major variations from the schedule must be approved.

MANAGEMENT PLAN SCHEDULE

Nature of Improvement	Total area	Completion Date

FISH PROCESSING AND MARKETS

Do you have your own processing facilities? Yes _____ No _____

Will processing facilities be established? Yes _____ No _____

If yes, please attach a detailed large scale plan of the facilities.

If you do not have or plan to have processing facilities what distance is the seapen site from the intended point of processing? _____ km.

Name of processing firm _____

Does it have provincial _____ federal _____ licence or registration?

What is your intended product type and market? _____

Do you have any market contracts? Give details _____

COST ESTIMATES AND FINANCING

Give the following capital cost estimates associated with your farm at full production.

Freshwater facilities \$ _____

Seapen facilities \$ _____

Equipment \$ _____

Give estimates of the following operating costs:

Wages/yr. \$ _____

Feed/yr.(see Note 2.) \$ _____

Overhead (fuel, administration,
utilities, etc.) \$ _____

Disease treatment/yr. \$ _____

Financial Outline-Start-up Costs

Amount of own capital \$ _____

Amount of loan capital \$ _____

Total Estimated Expenditures \$ _____

CONCLUSION

You have now completed your SALMON FARM MANAGEMENT PLAN. The information which was required was only that which you should have already gathered or thought about. You will require a much more detailed plan if your farm is to succeed. Please sign your "PLAN", have your signature witnessed (p. 12), and submit it for evaluation.

This SALMON FARM MANAGEMENT PLAN must be approved and signed by Fisheries Branch staff before submission of an application for the lease site to the Ministry of Lands, Parks and Housing. Once it is approved, it will be returned to you so that you can submit it along with your formal lease application to the Ministry of Lands, Parks and Housing.

After a lease/licence application has been made and the Lands Branch referral system is complete, modification to the site or shape of the lease/licence may require changes in your SALMON FARM MANAGEMENT PLAN. If this is so, notations of correction will be made on your "PLAN" and you will be notified in writing. Once a final approval of your lease/licence has been made, a copy of your "PLAN" will be sent to you for your records. A copy is also attached to, and becomes part of, your lease contract.

As was stated previously, you are expected to abide by your plan. Some flexibility is expected though major variations from the plan must be approved. Written notification of major changes shall be made to the Fisheries Branch, Marine Resources Section. Amendments to the SALMON FARM MANAGEMENT PLAN shall be made following a consultative process with the proponent.

IMPORTANT: Under the new lease/licence policy an area showing diligent use will be allowed extended tenure when renewal is due. Leases/licences not showing diligent use will not be renewed and reassignment to a third party will not be allowed.

FINAL APPROVAL: _____ Applicant's signature

_____ Witness

_____ Date

_____ Signed on behalf of the
Fisheries Branch

_____ Witness

_____ Date

NOTES

- 1) Currents and temperature/salinity profiles should be measured during both spring and neap tide conditions at the middle of the tide period. It is recommended that salinity/temperature profiles be recorded quarterly and including the peak rain/runoff period in winter and the warmest period in summer. The more profiles, the better.
- 2) Based on established growth rates and conversion ratios, and with an average feed cost of \$.88/kg it will cost approximately \$1.00-\$1.10 to raise one (!) fish for the pan-size market and approximately \$2.30 to raise one (1) fish to a size of 1 kg.

PERMITS AND LICENCES - CONTACT PEOPLE

SALMON FARM MANAGEMENT PLAN

Mr. L. Michael Coon
Fisheries Branch
Marine Resources Section
229 - 780 Blanshard Street
Victoria, B.C. V8V 1X5

Phone: 387-4573 - local 213

APPLICATION FOR CROWN LAND (FORESHORE LEASE/LICENCE)

Regional Director
Ministry of Lands, Parks and Housing
Regional Office

COMMERCIAL FISH FARM LICENCE

Mr. Leif Sunde
Fisheries Branch
229 - 780 Blanshard Street
Victoria, B.C. V8V 1X5

Phone: 387-4573 - local 222

NAVIGATION COMPLIANCE

COAST GUARD - WESTERN REGION
Attn: John Duduman
Senior Navigation Protection Officer
224 - West Esplanade
North Vancouver, B.C.
V7M 3J7

Phone: 984-3730

TRANPLANT APPROVAL - TRANSPLANT COMMITTEE

Mr. Leif Sunde
Fisheries Management Branch
229 - 780 Blanshard Street
Victoria, B.C. V8V 1X5
V8V 1X5

or

Mrs. Dorothee Keiser
Pacific Biological Station
P.O. Box 100
Nanaimo, B.C. V9R 5J6
V9R 5J6

Phone: 387-4573

Phone: 756-7051

EGG AQUISITION

Mr. Ted Perry
Dept. of Fisheries and Oceans
1090 West Pender Street
Vancouver, B.C.
V6E 2P1

Phone: 666-0287

WATER LICENCE

Regional Water Manager
Ministry of Environment
Regional Office

AQUACULTURE PERMIT

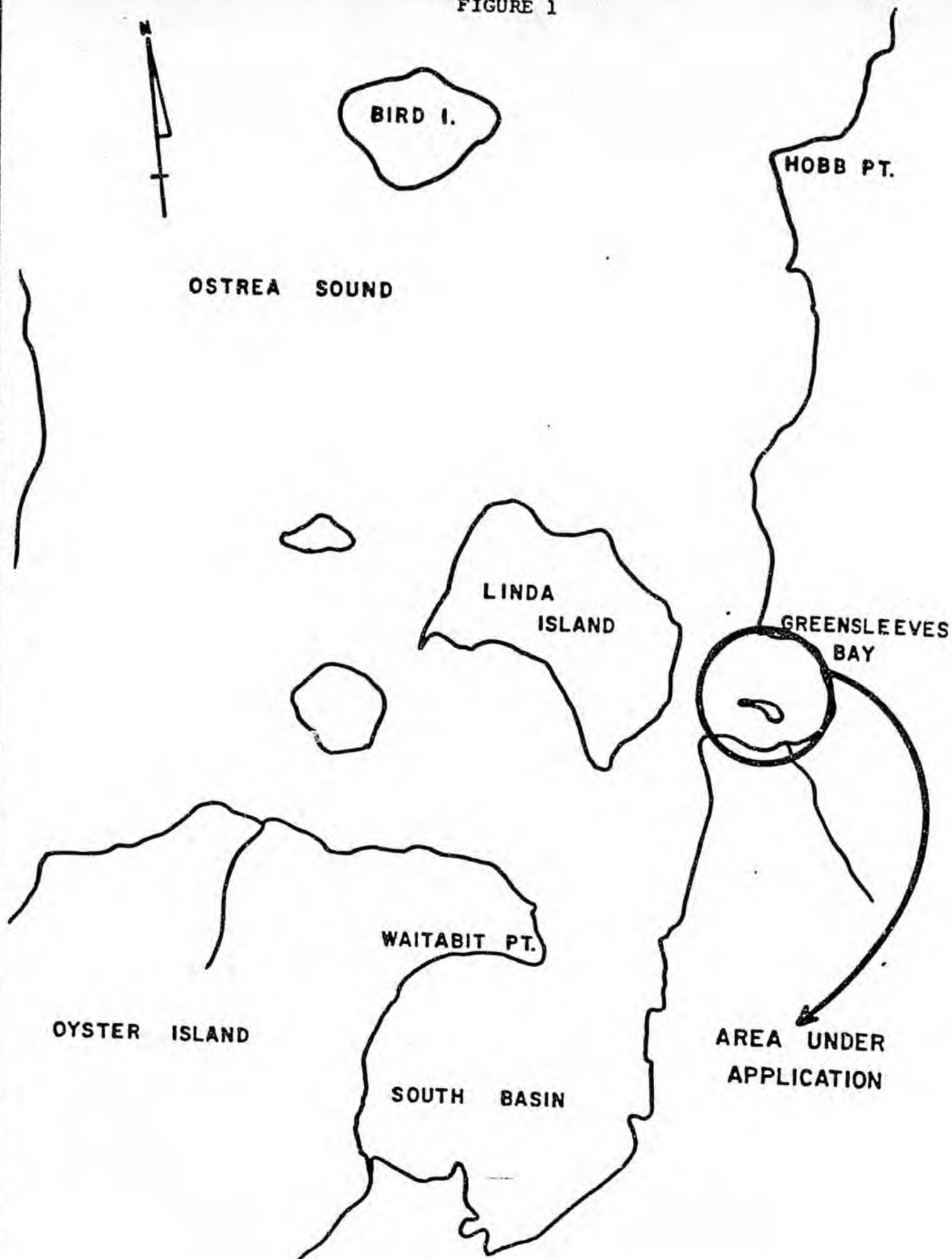
Ms. Frances Dickson
Dept. of Fisheries & Oceans
1090 W. Pender Street
Vancouver, B.C.
V6E 2P1

Phone: 754-0255

POLLUTION CONTROL PERMIT

Waste Management Branch
Ministry of Environment
Regional Office
(Hatchery effluents only)

FIGURE 1



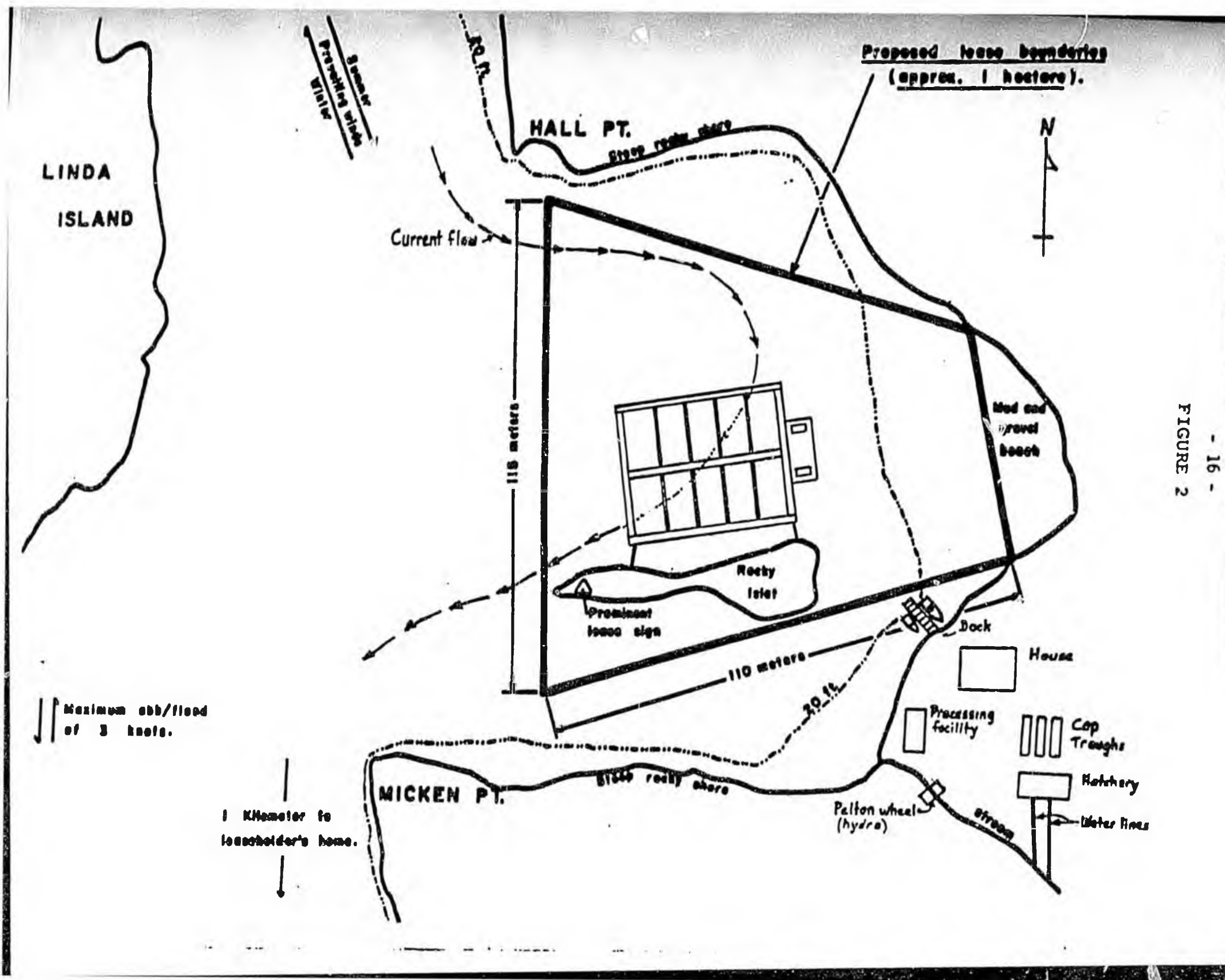
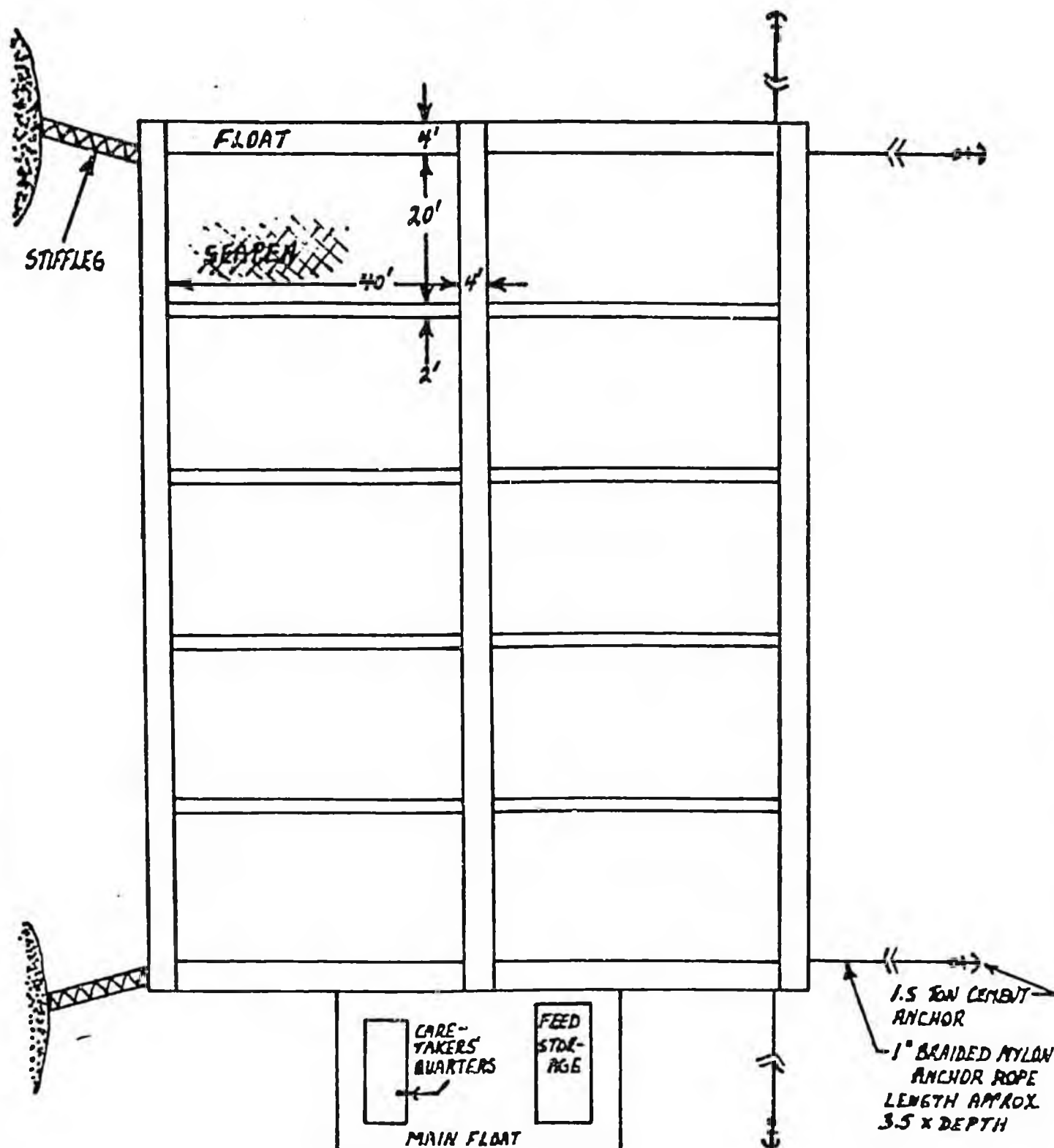


FIGURE 2

SEAPENS - TOP VIEW



SCALE: 20'

FIGURE 4

SEAPENS - SIDE VIEW

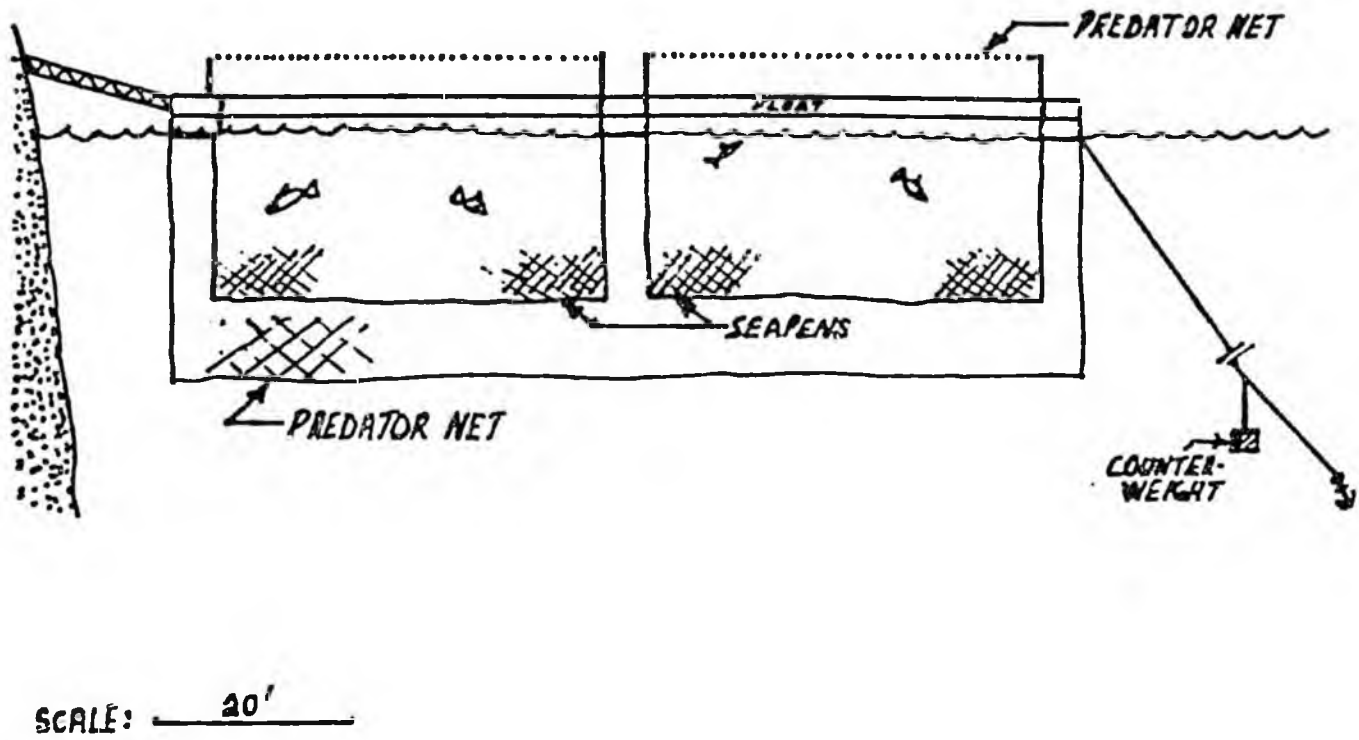


Figure 5

PRODUCTION STRATEGY AND TARGET LEVELS

Time(Months) Product	0 Eggs	8 Smolts	17 Pan-Size	25 3 lb+	37 8 lb+	48-60 Brood Stock	Smolt-Harvest Survival Rate Rate
Cycle A 1985 Brood	23,000	20,000	n.a.	10,000	1,700	300	60%
Cycle B 1986 Brood	44,000	40,000	n.a.	20,000	5,500	500	65%
Cycle C 1987 Brood	90,000	80,000	n.a.	40,000	11,500	500	65%

Figure 6

MANAGEMENT PLAN SCHEDULE

Nature of Improvement	Total Area	Completion Date for Improvement
Hatchery building, primary and back-up water supplies	400 ft ²	October, 1985
3 Capilano Troughs		January, 1986
Power House with Pelton Wheel delivering 15kw		February, 1986
House	800 ft ²	April, 1986
20'x40' Main Float (Topper Design) with Caretakers trailer and Feed Storage Shed	800 ft ²	May, 1986
2-20'x20'x20' 1/2" mesh Seapens and Walkways	400 ft ²	May, 1986
2-20'x40'x20' 3/4" mesh Seapens and Walkways	1600 ft ²	August, 1986
Dock		September, 1986
4-20'x40'x20' 3/4" mesh Seapens and Walkways	3200 ft ²	May, 1987
Fish Processing Facility	600 ft ²	May, 1987
3-20'x40'x20' 1" mesh Seapens and Walkways	2400 ft ²	May, 1988
etc - to full production	etc.	etc.



Fisheries
and Oceans

Pêches
et Océans

Fisheries - Pacific Region
1090 West Pender Street
Vancouver, B.C.
V6E 2P1

Pêches - Région du Pacifique
1090 rue Pender ouest
Vancouver (C.B.)
V6E 2P1

Your file / votre référence

Our file / notre référence

APPLICATION FOR AQUACULTURE LICENCE

The following application must be completed prior to the issuance of an Aquaculture Licence. While a separate licence is issued for each seapen site or hatchery, it is possible to apply for more than one site on this application form.

1. APPLICANT

Name of Company/Person _____

2. ADDRESS

Street/Postal Box _____

City _____ Postal Code _____

Telephone _____ (Home) _____ (Business)

3. AQUACULTURE SITE(S)

(i) Name of Location

Legal Description

Name of Facility Manager (if known) _____

Telephone _____ (Home) _____ (Business)

Freshwater Hatchery _____ Seapen Operation _____

.../2

(ii) Name of Location

Legal Description

Name of Facility Manager (if known) _____

Telephone _____ (Home) _____ (Business)

Freshwater Hatchery _____ Seapen Operation _____

4. ATTACHMENTS REQUIRED:

- (i) Site drawing must be attached giving scale, which will show location of facilities, depth of water at low tide, below seapens if applicable (seapens should not be located or anchored in an area with less than 30 feet of depth at low water, and a minimum of 10 feet of water must be available at low tide between the net and the sea bottom).
- (ii) For a seapen site, an identification of sub-tidal flora and fauna in the proposed use area by means of SCUBA inspection must accompany this application - complete FISH HABITAT CHARACTERISTICS OF PROPOSED SEAPEN SITES, APPENDIX I. Also attach a copy of the Ministry of Environment Salmon Farm Management Plan; it is not necessary to include financial information.
- (iii) For a hatchery, complete HATCHERY INFORMATION SHEET, APPENDIX II. Also include a copy of Ministry of Environment, Fish and Wildlife Branch, application for a commercial fish farm licence.

Signature _____ Date _____

Once your licence application has been approved, please indicate which Department of Fisheries and Oceans office you would like to go to, to sign for your licence: (i) 1090 West Pender Street, Vancouver, B.C. or (ii) other _____

Note: This form is an application only and completion of it does not guarantee issuance of an Aquaculture Licence. Before a Department of Fisheries and Oceans Aquaculture Licence will be issued, the applicant must show that he has received approval for his Salmon Fish Farm Management Plan from Ministry of Environment, that a Foreshore Lease has been granted by Ministry of Lands, Parks and Housing and that navigation compliance has been granted by Canadian Coast Guard.

*Completed form to be returned to: Aquaculture Co-ordinator
Field Services Branch
1090 West Pender Street
Vancouver, B.C. V6E 2P1
666-0519

APPENDIX I

FISH HABITAT CHARACTERISTICS OF PROPOSED SEAPEN SITES

LOCATION _____

DATE _____ TIME _____ TIDE _____

DIVER'S NAME _____ TELEPHONE # _____

WHAT IS MINIMUM DEPTH BELOW SEAPEN ANCHORAGE AREA? _____

SUBSTRATE CHARACTERISTICS (RECORD % SILT, SAND, GRAVEL, ROCK)

i IMMEDIATELY BELOW PROPOSED PENS _____

ii BETWEEN PROPOSED PEN SITE AND SHORELINE _____

VEGETATION CHARACTERISTICS (RECORD % COVER BY BULLKELP, OTHER KELPS, ROCKWEED, SEAGRASS, JAPWEED, SEA LETTUCE, IRRIDESCENT SEAWEED, RED FILAMENTOUS SEAWEED)

i IMMEDIATELY BELOW PROPOSED PENS _____

ii BETWEEN PROPOSED PEN SITE AND SHORELINE _____

INVERTEBRATES (RECORD NUMBERS AND SPECIES OF CRABS AND VISIBLE BIVALVES, EG GEODUCK SYPHONS, CLAMS ON SURFACE, PRESENCE OF URCHINS, SEA CUCUMBERS AND OTHERS)

i IMMEDIATELY BELOW PROPOSED PENS _____

ii BETWEEN PROPOSED PEN SITE AND SHORELINE _____

FISH (RECORD NUMBERS AND SPECIES SEEN DURING INSPECTION) _____

IS THIS A KNOWN HERRING SPAWN AREA? _____

IS THERE A SALMON SPAWNING STREAM NEARBY? _____

DESCRIBE ANY BEACH CONSTRUCTION REQUIRED _____

Using Aquatic Land For
A Q U A C U L T U R E

Policy Branch
Ministry of Lands, Parks and Housing

October, 1985

Note: This handout provides information on Crown land tenures for aquaculture. Contact the Ministry of Agriculture and Food for information pertaining to all other matters related to aquaculture.

1. The water supply will be groundwater or streamwater? _____
 - 1.1 If the supply will be a water intake or infiltration gallery in or adjacent to a stream, the total withdrawal required is _____ CFS.
 - 1.2 If the supply requirement is variable throughout the year, specify for periods of the year _____
 - 1.3 During summer low flow periods, the stream flow rate is _____ CFS. The source of this information is _____
 - 1.4 Attach plans showing location and design of intake structure or infiltration gallery. Intake structures require a minimum unobstructed screen area of 10 sq.ft. per CFS. below minimum water level. In-stream construction is normally limited to low flow periods.
2. Describe any filling, dyking or stream bank protection works that will be required to establish the hatchery site. Submit plan. A 10 metre leave strip is required adjacent to streams.

3. The hatchery effluent discharge will be to ground (infiltration field), a septic field, to a freshwater stream, or to the marine environment?

 - 3.1 For discharges to streams or the ocean, provide a drawing showing discharge location. Construction timing restrictions may be required.
4. Will the site also include washroom facilities or kitchen facilities? If so, specify the means of disposal.

SALMON FARMING IN BRITISH COLUMBIA

Prepared by the B.C. Salmon Farmers Association

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WHAT IS THE B.C. SALMON FARMERS ASSOCIATION?

The B.C. Salmon Farmers Association was incorporated July 11, 1984 under the Societies Act of British Columbia to serve as a producers' organization dedicated to furthering the salmon farming industry and the interests of its members.

Starting with nine charter members, the Association's membership now totals 75, which represents some 95% of active salmon farmers in British Columbia. A ten member Board of Directors, representing a cross-section of members with respect to size of operation and geographic location, establishes policy. A full-time staff of six implements policy and administers the affairs of the Association.

To broaden the range of services delivered to members, the Association has recruited a Director of Communications, a Director of Research and a Director of Marketing. Comprehensive programs will be developed in each of those areas and implemented early in 1987.

The Association has initiated and now operates active programs in the following areas:

- disease screening
- egg allocation
- brood stock development
- marketing studies
- education

Disease Screening

A program to halt the vertical transmission of disease from parent salmon to offspring was initiated by the Association in 1985. Screening techniques and protocols were developed in conjunction with Malaspina College, Nanaimo, and with the staff of the Pacific Biological Research Station, Department of Fisheries and Oceans, Nanaimo. The program ensures that all diseased eggs are destroyed and only disease-free eggs are distributed to salmon farmers.

Disease screening is not utilized on eggs used in the Department of Fisheries and Oceans' Salmonid Enhancement Program (SEP), thus increasing the risk of disease being introduced into the wild salmon stock.

Program costs of \$250,000 in 1985 and \$600,000 in 1986 were paid by farmer members of the Association. In addition, salmon farmers paid for some \$100,000 worth of laboratory and other equipment required by Malaspina College to conduct the disease screening program.

In 1986, the Ministry of Agriculture and Fisheries provided \$60,000 to fund development of a comparative method analysis for disease screening. This method is expected to increase screening effectiveness at reduced cost in future years.

Egg Allocation

One of the Association's principal functions is to allocate eggs to farmer members, a role the Association accepted in 1985 at the request of the Department of Fisheries and Oceans. Up until that time, a salmon farmer ordered eggs direct from the Department. But as the number of farms increased, the Department found it increasingly difficult to satisfy demand on an equitable basis, and asked the Association to develop and administer an equitable egg allocation system.

The Association's present allocation system is based on three main principles:

1. New farms are assured enough eggs to start their own brood stock.
2. Existing farms expanding their capacity have the same egg rights as new farms, to the extent of the expansion.
3. Farms with product in the water get first right to egg quantities equivalent to those received in the past, provided that total industry needs are considered.

Historically, all eggs have been purchased from the Department of Fisheries and Oceans hatcheries. These eggs are from fish returning to Salmon Enhancement Program hatcheries and are surplus to S.E.P. management needs. Any of these returning fish not used by B.C. Salmon Farmers Association members for eggs are sold to processors; thus, any eggs not used by the industry are wasted.

As domestic brood stocks develop, reliance on S.E.P. sources will decrease over time. The point at which the industry achieves self sufficiency in egg supply will depend on its rate of growth, but the advantages of domestic versus wild stock should ensure relatively rapid development.

By the end of 1986, the Association allocated some 30 million eggs to 85 farms; in 1985, 11 million eggs were distributed to 45 farms.

Brood Stock Development

With the ultimate goal of achieving industry self sufficiency in egg supply the B.C. Salmon Farmers Association launched, in 1985, a two-year \$650,000 program to develop domestic Chinook salmon brood stock.

Participating farms contributed \$400,000 of the cost and the National Research Council \$250,000 through the Program for Industry/Laboratory Projects.

Five salmon farms are participating in the program, which produced some 6 million domestic Chinook eggs in 1986. The program will produce new technological applications that will help to improve domestic egg production in future years.

Marketing Studies

Early in 1986 the B.C. Salmon Farmers Association commissioned a \$50,000 marketing study as a first step toward developing a comprehensive marketing plan for the farmed salmon industry. Ten percent of the cost was borne by the Association with the remaining 90% funded through a joint federal-provincial agreement.

The study has three primary objectives:

1. to examine post-production industrial linkages affecting market access and penetration;
2. to detail strategies and methods in production, distribution and promotion with a view to maximizing returns to farmed salmon producers;
3. to examine Association organization and by-laws in relation to market development targets.

Quality Control and Processing

As an integral part of its marketing strategy, the Association is now developing a "superior" grade standard for farmed salmon, together with quality control and processing regulations to enable continuous monitoring of product quality.

Working in conjunction with representatives of the processing, distribution, transportation and packaging industries, and with regulatory authorities, the Association has developed detailed quality and processing guidelines.

Education

The Association has, since its inception, taken an active role in disseminating information about aquaculture to its members and to interested groups and individuals outside the salmon farming industry. In 1986, for example, the Association, utilizing scientists, expert consultants and experienced salmon farmers, conducted four two-day workshops for farmer members. These comprehensive working sessions dealt with fish nutrition, production strategies, phyto-plankton hazards, processing and quality control.

In addition, Association directors and staff spoke at some fifteen different information seminars organized by groups and individuals interested in aquaculture.

A major responsibility of the newly recruited Director of Information is to increase the Association's information/education activities in 1987 and beyond.

A "TYPICAL" SALMON FARM IN BRITISH COLUMBIA

Experience has shown that to be economically viable as a full-time aquaculture business, a salmon farmer requires the capacity to produce 50,000 fish annually.

To achieve that capacity, the farmer will require a capital investment of approximately \$1 million during the first two years of operation. No revenue from product sales will be generated until the third year of operation.

The farmer would have to place an initial order of 100,000 eggs to ensure production of 50,000 fish. He would require eight 50-foot by 50-foot net pens the first year and an additional eight pens of the same size the second year, plus another 100,000 eggs to start the second crop.

Some 8,000 square feet of surface area (approximately one-fifth of an acre) is required to accommodate the 16 pens. On-shore facilities for housing, feed and equipment storage require perhaps a half-acre of space.

From three to six on-site and management employees are required to operate the farm efficiently.

Expenditures for feed and supplies, excluding pens, salmon eggs or smolts, and on-shore facilities would average approximately \$60,000 in the first year and \$200,000 in the second year of operation.

In British Columbia today, the size of operating salmon farms ranges from some 40,000 fish produced annually to the large integrated operations that produce upwards of 1 million fish per year.

THE ECONOMIC IMPACT OF SALMON FARMING IN BRITISH COLUMBIA

The Association has not yet had an opportunity to develop detailed data on the economic and financial contribution generated by salmon farming in British Columbia. This matter will be addressed as part of the Association's expanding service capability in 1987. We have, however, canvassed industry members, financial institutions and investors and have developed order of magnitude numbers that we feel accurately describe the scope of the industry in today's economy.

The 75 farms now in operation represent a direct capital investment of some \$75 million. Upwards of 40% of that total has been provided by foreign investors, largely from Norwegian banks, where understanding of the salmon farming industry is more highly developed than among Canadian financial institutions.

Operating farms now provide direct employment for some 375 people and spend an estimated \$50 million on services and supplies annually.

Of particular note is the fact that many of the farms now established and planned are near coastal and island communities that have relied historically on one primary economic generator, such as logging, fishing, tourism, etc. The advent of aquaculture broadens the economic base and growth potential of such communities.

If the industry continues to grow at current rates salmon farming will, within two years, develop into a major component of the provincial economy and contribute positively to Canada's balance of payments through export sales.

Based on egg orders now in hand and on the number of licence applications now in process and pending, the industry will by 1988:

- have capital investment in excess of \$200 million;
- employ 2,000 people directly;
- generate some \$250 million in product export sales.

Indirect Benefits

A full economic impact model would be required to identify all of the indirect economic benefits generated by salmon farming industry activity. Some indirect benefits are already evident.

1. Every new job created by direct employment in salmon farming generates at least two additional new jobs in related service industries.
2. The growth of British Columbia's salmon farming industry is directly responsible for the emergence of a strong fish feed industry in the province: two new mills commenced manufacturing during 1986 and two major European manufacturers purchased existing suppliers and are broadening their range of product supplies.
3. Manufacturers and suppliers of nets, pens, construction materials and other related equipment and supplies report significant increases in sales.

One benefit of particular note will be the increased activity for fish processing plants when farmed salmon product moves to market in larger volume in 1987 and 1988.

Salmon farmers typically process and market their product in the period December 1 through May 31, a time when the commercial fishery is largely idle and processing plants have little or no volume.

Increasing volumes of farmed salmon will contribute strongly to higher activity levels in the processing sector.

ENVIRONMENTAL IMPACTS OF SALMON FARMING

The farming of salmon, like any other type of farming, unavoidably impacts to some degree on its immediate environment. However, if the pen sites are properly selected, and the farmer utilizes sound management and production techniques, negative environmental impacts will be minimal. This fact is not widely known in the public mind, which tends to view the concentration of fish in pens as a source of pollution and/or disease.

The primary responsibility of any farmer, whether land or water based, is to prevent and/or control so far as is possible any negative risk to his crop, and thus his livelihood, and to ensure that his activities pose minimal or no risk to the environment shared with others.

One of the principal thrusts of the B.C. Salmon Farmers Association is to increase public understanding and awareness of the real environmental facts of salmon farming.

All of the material in this Environmental Section has been developed in conjunction with members of the scientific community, who are credited for their work in each case.

Fish Disease Transference

Claims have been made that fish disease originating in salmon farm pens transfers to and infects wild salmon stock.

At the request of the Association, Dr. Stephen G. Newman, a microbiology consultant with Microtek Research and Development Limited, Sidney, B.C. examined the question of disease transference. Dr. Newman obtained his Ph.D. in Microbiology from the University of Miami, Miami, Florida; served for seven years as Director of Microbiology Research and Development for Biomed Research Laboratories in Seattle, Washington and has extensive industry experience in fish pathology, immunology, physiology and culture.

Dr. Newman has the following comments on disease transference:

"The following excerpt was taken from Aquaculture Digest, a monthly report on Fish and Shellfish Farming, December 1986 issue.

'Some concern has been expressed that the culture environment may serve as a reservoir for those diseases which are present in the environment but demonstrating no clinical symptoms in wild fish. There is a fear that the disease organism may proliferate among the cultured fish, become more virulent and

re-infect the wild stocks. However, there is no evidence to indicate that this scenario has ever occurred. The outbreak of a disease is often associated with some form of stress. In the culture environment, fish may be stressed by overcrowding, undernourishment, poor water quality and physical damage associated with handling and confinement. Thus, while fish held in culture are likely to show more frequent appearance of disease than wild fish, disease does not appear to be transmitted to the wild populations.'

(Abstracted from a study entitled "The Environmental Effects of Floating Mariculture on Puget Sound" prepared for the Washington Department of Fisheries and the Washington Department of Ecology by the University of Washington.)

One of the conclusions reached by this study was that the capacity of a mariculture operation to serve as a disease reservoir for the infection of wild organisms has never been demonstrated and that the existence of such an effect remains largely speculative. There are a number of very good reasons why the spread of disease from cultured fish to wild fish has not been observed and why it is unlikely to occur.

Infectious disease in all animals, including fish, is a result of an interaction between the host, the organism that has the ability to produce the disease and the environment that the animal (fish) is being reared in. How these factors interplay determines the type, severity and incidence of the disease.

For disease to occur, the disease producing organism must have a susceptible host. This susceptibility is determined by many factors and can vary considerably even within a single population of fish. There must also be some means for the pathogen to be transmitted from fish to fish either through intermediate vectors (parasites), the environment, feed, etc. Finally, assuming that the host is susceptible to the disease, then the environmental conditions must be such that a disease process can occur. Each component of this interactive process must be just right for the disease process to occur.

For fish, the single most important component in disease appears to be the environment. Fish can tolerate narrow ranges of environmental fluctuations (such as temperature variations, loading densities, handling, etc.) without becoming stressed. All net pen reared fish are stressed at various times during their growth cycles.

Continual stress is a normal part of the process in some net pen operations. The presence of stress and the subsequent physiological effects on the fish are directly responsible for most of the disease that occurs in net pen operations. Unlike wild fish populations, net pen reared fish don't have the option of thinning themselves out or avoiding excessively warm water temperatures or poor water quality. Since the stresses that correlate strongly with the onset of disease in commercially reared fish don't affect wild populations, wild populations are much less susceptible to disease.

Two of the organisms that can cause a problem to aquaculturists, the etiologic agents of Bacterial Kidney Disease and Infectious Hematopoietic Necrosis, are transmitted principally from adult carriers to fry through infected eggs. Thus transmission of the diseases via these routes of infection to wild stocks is not likely. Screening programs on brood fish, as currently practiced, can significantly minimize the impact of these organisms on commercial stocks.

These disease organisms can be transmitted by other routes though these are not usually significant sources of disease. Since neither organism survives very long in the environment outside of the host, the chances of them being transmitted to wild fish that come in proximity to net pens during disease outbreaks is minimal.

It is noteworthy that these organisms are endemic in wild stocks, though at very low levels. As both of these pathogens require the fish for survival in the environment, the wild stocks are likely the source of these diseases in commercial stocks. These organisms proliferated in wild fish long before the advent of aquaculture. Since wild stocks are often the source of eggs and milt for the initiation of commercial broodstock programs, commercially reared fish (using improperly screened eggs and milt from wild stocks) will continue to have problems with these disease organisms.

Two of the other diseases that cause problems in net pen reared fish are due to bacteria that cause disease primarily in stressed animals. These organisms, responsible for vibriosis and furunculosis, may be present in the fish without ever producing disease. They are not normally found in adult wild animals. It is only when the fish are stressed that the disease process occurs. Sick fish may shed organisms into their immediate environment from lesions and infected fecal material, increasing the chances that fish in close proximity to sick fish will contract a high enough level of pathogens to produce disease.

These pathogens must be present in net pens at very high levels to initiate disease. There is usually a threshold level of micro-organisms below which disease is unlikely to occur. As one moves away from the environment of the net pen, the level of potential pathogens present diminishes rapidly. In fact, it is not uncommon for disease outbreaks to occur in a single net pen and net pens that are right next to this net pen to have no disease outbreak. Thus the possibility of the disease being transmitted to wild stocks in close proximity to the net pens during a disease outbreak is very small. Even if wild stocks were to encounter a sufficiently high enough level of organisms capable of producing disease in stressed commercial stocks, there are so many factors involved that affect susceptibility, including the presence of stress, that the chances of the disease occurring in the wild stocks is very small.

A final point to consider is the fact that wild fish stocks do not usually congregate around net pens. They may be in contact with waters that have net pens in them, but generally only for very short periods of time during migrations. This usually would occur only if the net pens are situated such that the fish must pass near to them to migrate to the open ocean or to return to spawn. These migrations do not occur at times of the year when environmental conditions are such that the fish in net pens are predisposed to becoming diseased.

To summarize, the transmission of disease from cultured to wild stocks in sufficient magnitude to adversely affect wild stocks is highly unlikely. The nature of the disease organisms, the role of stress in the increased susceptibility of commercial stocks to disease and the migration patterns of wild stocks all substantiate this. Furthermore, the lack of any direct evidence that disease transmission from commercial to wild stocks has ever occurred suggests that this is an issue of little or no concern when considering the potential impact of commercial aquaculture on 'natural' populations."

Stephen G. Newman, Ph.D.

Use of Pharmaceuticals in Salmon Farming

Some concern has been expressed about the environmental impacts of pharmaceutical products used in salmon farming.

Two factual statements address this concern:

1. No scientific evidence has yet been presented to indicate that pharmaceuticals used in salmon farming create risk or threat to human health, or diminish in any way the nutritional value, appearance or taste of the salmon product.
2. No scientific evidence has yet been presented to demonstrate that pharmaceuticals used in salmon farming are harmful to or pose any threat to proximate marine life or foreshore environments.

These and other environmental facts notwithstanding, the B.C. Salmon Farmers Association fully supports the principle of continuous, scientifically sound monitoring of, and action on, the environmental impacts of all ocean and foreshore based seeding, nurturing and harvesting of ocean resources.

Impact of Salmon Farming on Marine Water Quality

One of the most commonly expressed concerns about salmon farming is its potentially negative impact on water quality. Early in 1987, the Ministry of Agriculture and Fisheries released the results of a scientific study conducted in March 1986 in the Sechelt Inlet. The following abstract is reprinted from Fisheries Development Paper Number 11, by E.A. Black and B.L. Carswell.

"Considerable development of mariculture in Sechelt Inlet is projected for the next few years. Salmon farms having a total capacity of at least 4,500 tonnes have been proposed for Sechelt Inlet.

A study was conducted to determine if the present level of salmon farming activity was having any effect on water quality in the Inlet and to establish baseline levels for future water quality assessments. Samples were collected during March 1986 at salmon farm sites and compared with those taken from nearshore and mid-channel stations.

Water quality parameters measured included ammonia, nitrite and nitrate nitrogen, orthophosphate, total phosphorus, oxygen, 5 day biochemical and chemical oxygen demands, total coliforms, temperature, salinity, pH and non-filterable residue. While most parameters were comparable to historical ranges for Sechelt Inlet or the Strait of Georgia, two parameters, ammonia and total coliforms, were significantly higher at farm sites than at other sample locations.

Although salmonid excretion must contribute to the elevated ammonia levels, observations suggest that bivalve fouling may make a more significant contribution to the observed ammonia levels. The data also indicates that contaminated salmon feed may not be responsible for the elevated coliform levels near the pens. Proposed sources for the elevated coliforms

are marine birds or mammals. These findings are consistent with data available on other sites.

Water circulation patterns in Sechelt Inlet are inferred from available physical and chemical oceanographic data. They indicate longer retention times of water in certain areas, particularly the southernmost portion of Sechelt Inlet from Nine Mile Point to Porpoise Bay.

Available evidence thus suggests that at present production levels the existing salmon farms have little effect on surrounding water quality. The data collected may reasonably be used as a baseline for comparison for future studies."

Importation of Live Salmonids

Since 1919 the Department of Fisheries and Oceans has made several unsuccessful attempts to transplant Atlantic salmon into Pacific waters.

For the salmon farmer, Atlantic salmon may have advantages over Pacific species: there are indications that Atlantics have faster growth rates than Pacific Chinook and Coho and Atlantics are more docile and thus less subject to stress and related disease.

Atlantic salmon have been actively cultivated in Puget Sound, Washington state, for a number of years. The first successful transplantation into B.C. waters occurred in 1985 at D.F.O.'s Pacific Biological Station at Nanaimo and at one salmon farm. Three B.C. farms are now growing-out Atlantic salmon.

Concern has been expressed about possible negative environmental impacts resulting from the importation of Atlantic salmon. The Association shares some of those concerns and is monitoring closely the development and behavior of the Atlantic salmon that have been brought into Pacific waters.

The federal Department of Fisheries and Oceans has developed a set of stringent guidelines governing such importations. The guidelines will become formal policy and practice when signed by D.F.O. and by the B.C. Ministry of Environment.

It is worth noting that Atlantic salmonid imported to date have been governed by the guidelines established.

LICENCE APPLICATION PROCEDURES

The licence application process is long and cumbersome, requiring from nine to twelve months from site selection to issuance of the final permits.

A total of eight regulatory authorities from three governmental jurisdictions are involved in the process, as summarized below.

<u>Licence/Permit</u>	<u>Jurisdiction</u>
Section 10 Licence	Ministry of Agriculture & Fisheries (Prov)
Foreshore Lease or Licence of Occupation	Ministry of Forests & Lands (Prov)
Bona Fide Aquaculturist Certificate	Ministry of Agriculture & Fisheries (Prov)
Aquaculture Permit	Department of Fisheries and Oceans (Fed)
Navigation Compliance Permit	Transport Canada (Fed)
Fish Transfer Licence	Inter-Departmental Committee
Business Licence	Municipal or Regional District
Local Building, Sewage, etc. Permits	Municipal or Regional District

Applications for foreshore leases or licences of occupation are advertised to the public. Municipal or regional governments may also advertise applications for business licences, building permits, etc.

An applicant will pay some \$2,000 in licence and permit fees to the various levels of government involved.

MARKETS FOR FARMED SALMON AND WILD SALMON

Some segments of the commercial fishing industry have expressed fears that salmon farming threatens the future viability of commercial salmon fishing. The following excerpts from the independent study commissioned by B.C.S.F.A. addresses these fears.

"The traditional Pacific salmon industry has been increasingly concerned about potential competition from pen-reared salmon in British Columbia and other parts of the world. Industry members are concerned with, among other things, how imports will affect existing markets for wild Pacific salmon. A considerable body of evidence supports two important conclusions:

1. B.C. pen-reared salmon will compete only minimally with B.C. wild salmon production;

2. increasing consumption of fresh (and frozen) seafood generally means that increased consumption of farmed salmon will not be at the expense of wild-caught salmon.

The supporting evidence for these conclusions is provided in the paragraphs that follow.

Total production of salmon in British Columbia for 1984 and 1985 is shown in the following table.

Production of Wild Salmon in British Columbia
(tonnes)

	<u>1985</u>	<u>1984</u>
Chinook	5,469	6,254
Coho	8,977	10,089
Sockeye	31,569	12,877
Pink	37,700	12,059
Chum	23,646	9,003
Steelhead	<u>202</u>	<u>150</u>
Total	<u>107,563</u>	<u>50,432</u>

Source: B.C. Ministry of Environment

As the table above illustrates, the majority of production in B.C. is sockeye, pink and chum. Combined chinook and coho production was 13% in 1985 and 32% in 1984. These two species are the predominant farmed varieties.

Salmon markets can be distinguished on the basis of product form, season and, to some extent, species. There is considerable evidence that the various product forms of salmon do not compete with each other.

Canned salmon competes with other canned products like tuna. Similarly, fresh B.C. salmon competes with fresh salmon from other sources and other forms of fresh seafood. Fresh and frozen salmon do not generally compete with each other in most markets. A restaurant that cannot purchase fresh salmon will seek other forms of fresh seafood, not frozen salmon, as a substitute.

Product form is important for an understanding of salmon markets. The following table provides a breakdown of production by product form for 1984 and 1985.

Production of Salmon by Product Form in British Columbia
(round weight equivalents in tonnes)

	<u>1985</u>	<u>1984</u>
Canned*	60,344	21,168
Fresh†	3,078	2,975
Frozen†	38,312	24,824
Other Forms	<u>5,829</u>	<u>1,465</u>
Total	<u>107,563</u>	<u>50,432</u>

* Canned salmon is converted to round weights @ 70 lbs/case.

† Fresh and frozen dressed salmon is converted to round weight assuming a 90% yield.

Source: B.C. Ministry of Environment

As shown in the table above, a significant proportion of salmon is canned. Canned salmon typically utilizes lower grades of pink and sockeye salmon and sells for considerably less than fresh and frozen salmon. In contrast, the majority of chinook, coho and chum is sold in fresh or frozen form. Farmed chinook and coho compete in the fresh/frozen salmon market. The markets for fresh/frozen salmon in B.C. in 1985 are shown in the following table.

Markets for B.C. Fresh/Frozen Salmon Production in 1985
(tonnes)

		<u>Fresh</u>	<u>Frozen</u>	<u>Total</u>
<u>Domestic</u> ¹		1,180	9,191	10,371
<u>Exports</u> ²	U.S.A.	1,675	3,530	5,205
	Europe	-	14,059	14,059
	Japan	-	11,365	11,365
	Other	<u>223</u>	<u>167</u>	<u>390</u>
Subtotal		1,898	29,121	31,019
Total		<u>3,078</u>	<u>38,312</u>	<u>41,390</u>
		7%	93%	100%

Source: ¹ B.C. Ministry of Environment; ² Statistics Canada

The table above highlights the following factors important to an understanding of the markets for fresh and frozen salmon:

- frozen salmon comprises 93% of total fresh/frozen production, the majority of which is exported to Europe and Japan;
- fresh salmon production comprises 7% of total fresh/frozen production, the majority of which is exported to the U.S.A.

The table illustrates that fresh sales of B.C. wild salmon constitute a very small proportion of total salmon production. Moreover, there is considerable evidence that this fresh production alone is, by and large, the only portion of B.C. catch that will compete with B.C. farmed salmon.

The conclusions of a major study conducted by the University of Alaska and completed in September, 1986 reinforces this finding. The study, which included a survey of 127 wholesalers in the major salmon markets of Los Angeles, San Francisco, Seattle, Chicago, New York and Boston, was commissioned because of concern about the impacts of U.S. imports of fresh Atlantic salmon from Norway on markets for wild-caught Pacific salmon. One of the important findings of the survey was that the majority of wholesalers and distributors who handle pen-raised salmon feel their product competes only with fresh wild Pacifics.¹

Seventy-five percent of respondents contended that pen-raised salmon were not a legitimate substitute for frozen wild Pacific salmon, (i.e., did not compete with) while 80% felt that fresh wild Pacific salmon and pen-raised salmon were substitutes.

Given the fact that only 3% of Alaskan catch is marketed fresh, the authors concluded, on the basis of the survey evidence, that "some of the concern about pen-raised salmon imports shown by Alaskan commercial salmon fishermen may be somewhat unwarranted".

This viewpoint is further reinforced in a recent article contained in a leading seafood industry journal.² Based on interviews with brokers and producers, the authors concluded that competition at current price levels was minimal. It was contended that most restaurants that handled a fresh cultured product would be unlikely to offer salmon if they had to resort to frozen fish. Some industry observers quoted in the article conceded that farmed fish expanded the market "by keeping fresh salmon on consumers' minds during the off-season".

Other factors, listed as follows, lead to the same conclusion.

- fresh wild caught exports to the U.S.A. have not decreased since the introduction of farmed salmon into British Columbia (see below);
- the vast majority of British Columbia farmed salmon is and will be sold in the months when fresh wild-caught salmon is not available;

- most farmed salmon is priced above fresh and frozen wild-caught salmon, suggesting that there is minimal price competition.

Furthermore, with respect to prices, there is no indication that the introduction of farmed salmon has had an impact on prices for wild-caught salmon. Average wholesale prices for fresh and frozen chinook and coho for the period 1981-1985 are shown in the following table.

Average Wholesale Prices
of Fresh and Frozen Chinook and Coho
1981 - 1985
(\$/kg)

	Fresh		Frozen	
	Chinook	Coho	Chinook	Coho
1981	6.46	5.68	8.30	6.41
1982	6.92	4.78	8.33	6.17
1983	6.29	4.49	7.51	4.91
1984	8.03	6.24	9.31	7.12
1985	7.89	5.79	9.78	6.84

Source: B.C. Ministry of the Environment

The prices indicated in the table above suggest that demand for fresh and frozen wild-caught salmon remains strong. Some industry observers suggest that the introduction of farmed salmon has had a positive impact on prices for wild-caught salmon.

The vagaries of the export market, in particular exchange rates, present a much greater challenge to traditional salmon producers in B.C. than incursions on their markets by B.C. farmed salmon. Where wild B.C. Pacific salmon stands to lose a substantial market share is in the smoking markets in Europe where farmed Atlantic salmon production from Norway and Scotland has recently eroded market shares held by Canadian and American frozen Pacific salmon.

It is unlikely that B.C. farmed salmon will be exported to Europe because of the transportation disadvantages. Rather, B.C. farmed salmon sales will likely be mostly in the U.S.A.

The U.S.A., in spite of having large domestic supplies and being the dominant exporter, is also the world's largest importer of fresh salmon. A comparison of American imports of fresh and frozen wild and farmed salmon in 1981 and 1984 is shown in the following table.

U.S.A. Imports of Fresh Wild and Farmed Salmon *
(tonnes)

	Fresh		Frozen	
	1981	1984	1981	1984
Canada	591	2,522	1,946	2,542
Norway	5	3,888	8	80
U.K.	-	104	-	-
Chile	-	32	-	-
Others	2	279	44	122
Total	598	6,825	1,998	2,744

* excludes fresh fillets

Source: U.S. Department of Commerce

As indicated in the table above, both fresh and frozen imports have increased. As well, Norway has replaced Canada as the leading exporter of fresh salmon to the U.S.A. With the exception of Canada, imports were mostly farmed salmon.

So, while the size of the fresh salmon market has grown dramatically since 1981, it has not been at the expense of fresh or frozen wild-caught production from British Columbia whose exports also increased. Demand for fresh salmon has increased in the U.S.A. because: more outlets have increased availability; demand has been stimulated by greater consumer awareness; and real incomes have been rising.

Most industry observers expect American demand to continue to grow. Suppliers of pen-reared salmon from countries like Canada, Norway, Chile and New Zealand are also rising dramatically.

As a result, the real marketing battle in the future will be fought between various suppliers of farmed salmon, not between farmed and wild sources. And that international competition will exist whether or not B.C. develops a strong salmon farming industry."

FOOTNOTES

- 1 Ronald V. Rogress and Bing-Hwan Lin, The Marketing Relationship Between Pacific and Pen-Raised Salmon: A Survey of U.S. Seafood Wholesalers, University of Alaska, Alaska Sea Grant Report 86-3, September, 1986.
- 2 Richard Bard, Salmon: An Ever-Changing Supply, in Seafood Business Report, March/April, 1985.

PROVINCIAL GOVERNMENT SUPPORT OF SALMON FARMING

The Government of the Province of British Columbia has been an active and high-profile proponent of the desirability of developing a vibrant salmon farming/aquaculture industry in this province.

Creation and staffing of aquaculture administrative divisions in appropriate Ministries, supportive advertising programs and other activities all attest to the Provincial Government's positive view of and support for this industry.

Of particular note are the foreign trade missions sponsored and organized by government Ministries in each of the past three years. These missions, composed of industry and government representatives, were designed specifically to obtain first-hand information about salmon farming/aquaculture in other countries and to encourage investment in the developing industry in British Columbia.

In response to some stated concerns about the rapid development of salmon farming in B.C., the provincial government imposed in late 1986 a moratorium on the issuance of salmon farm licences and appointed Mr. David Gillespie to head a 30-day public inquiry into finfish aquaculture in the province.

The B.C. Salmon Farmers Association supported the Inquiry and prepared a major submission to Mr. Gillespie. His report and recommendations were released on December 16, 1986 and the licence moratorium was lifted three days later.

The Association supports the major recommendations of the Gillespie Report and looks forward to assisting government in implementing those recommendations and associated programs.

January 1987

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§ 6072. Research and aquaculture leases

1. **Authority.** The commissioner may lease areas in, on and under the coastal waters including the public lands beneath those waters and portions of the intertidal zone for scientific research or for aquaculture of marine organisms. The commissioner may grant a lease to any person. Except as provided in this Part, the commissioner's power to lease lands under this section shall be exclusive. For the purposes of this section, the deputy commissioner may serve in the place of the commissioner.

2. **Limitations of lease.** The commissioner shall determine the provisions of each lease, provided:

- A. A lease shall not exceed a term of 10 years;
- B. A lease may be granted for tracts not to exceed 5 acres in area. The commissioner may grant contiguous lease tracts to a single applicant; and
- C. No applicant shall be permitted to lease more than 200 acres; and
- D. A lease shall not be transferable to any other person.

3. **Municipal approval.** In any municipality with a shellfish conservation program under section 6671, the commissioner may not lease more than 2 acres of the intertidal zone within the municipality without the consent of the municipal officers.

4. **Applications.** The application shall:

- A. Be written on forms supplied by the commissioner;
- B. Describe the location of the proposed lease tract by coordinates or metes and bounds;
- C. Identify the species to be cultivated;
- D. Describe the impact of the project on existing or potential uses of the area;
- E. Describe the degree of exclusive use required by the project;
- F. Include written permission of every riparian owner whose land to the low water mark will be actually used; and
- G. Include a map of the lease area and its adjoining waters and shorelands, with the names and addresses of the known riparian owners.

5. **Application review.** The commissioner shall review the application and set a hearing date if he is satisfied that the written application is complete and the application indicates that the lease could be granted.

6. **Hearing procedure.** Prior to granting a lease, the commissioner shall hold a hearing. The hearing shall be an adjudicatory proceeding and shall be held in the manner provided under the Maine Administrative Procedure Act, Title 5, chapter 375, subchapter IV and the specific procedures of this section.

- A. Notwithstanding the provisions of Title 5, section 9052, subsection 1, paragraph A, personal notice of the hearing shall be required to be given only to the lessee and the known riparian owners.
- B. Under the provisions of Title 5, section 9052, the leasing procedure shall require notice to the general public.

7. **Decision.** The commissioner may grant the lease, if he is satisfied that the proposed project will not unreasonably interfere with the ingress and egress of riparian owners, navigation, fishing or other uses of the area and is not in conflict with applicable coastal zoning statutes or ordinances. The commissioner may establish conditions that govern the use of the leased area and the limitations on the aquaculture activities. These conditions shall encourage the greatest multiple, compatible uses of the leased area, but shall also preserve the exclusive rights of the lessee to the extent necessary to carry out the lease purpose.

8. **Preference.** If more than one person applies to lease an area, preference shall be given as follows:

- A. First, to the department;
- B. Second, to the riparian owner of the intertidal zone within the leased area;
- C. Third, to fishermen who have traditionally fished in or near the proposed lease area; and
- D. Fourth, to the riparian owner within 100 feet of leased coastal waters.

9. **Rents.** After consulting with the Director of the Bureau of Public Lands, the commissioner shall determine the rent which shall be paid under each lease. The rent shall represent a fair value based upon the use of the leased area.

10. **Lessee's actions.** After being granted a lease, each lessee shall:

- A. Record the lease in the registry of deeds of each county in which the leased area is located;
- B. Publish a notice in the newspaper in which the commissioner published notice or would have published notice of any public hearing. The notice shall describe the area leased and enumerate any restrictions in the leased area; and
- C. Mark the leased area in a manner prescribed by the commissioner.

11. **Revocation.** If substantially no research or aquaculture has been conducted within the preceding year, or if it has been conducted in a manner substantially injurious to marine organisms, or if any other condition of the lease has been violated, the commissioner may revoke the lease. A lease revocation shall be an adjudicatory proceeding under the Maine Administrative Procedure Act, Title 5, chapter 375, subchapter IV. A hearing with public notice shall be held prior to revoking any lease.

12. **Renewal.** The commissioner shall grant a lease renewal unless the prior lessee has not complied with the lease agreement during its term, substantially no research or aquaculture has been conducted, or the commissioner finds that it is not in the best interest of the State to renew the lease. Renewals may be granted if applied for no later than 30 days after the lapse of the prior lease. A lease renewal shall be an adjudicatory proceeding under the Maine Administrative Procedure Act, Title 5, chapter 375, subchapter IV. Public notice shall be given as required under subsection 6 of this section and a hearing shall be held if it is requested by an interested person.

12-A. **Transferability.** A lease may be transferred to another person for the remaining portion of its term subject to the following conditions.

- A. Lease transfers shall be subject to the same procedural requirements as initial applications, except that a public hearing is not mandatory unless requested by an interested person.
- B. The commissioner may grant lease transfers if he determines that:
 - (1) The change in lessee does not violate any of the standards in subsection 7;
 - (2) The transfer is not intended to circumvent the intent of subsection 8; and
 - (3) The transfer is not for speculative purposes.

13. **Regulations.** The commissioner may adopt or amend regulations:

- A. Establishing minimum standards for maintaining leases;
- B. For procedures to issue, transfer, review or revoke leases; and
- C. For notices and hearings to the extent that those procedures are not established by this section or the Maine Administrative Procedure Act, Title 5, chapter 375.

14. **Conflicts.** Whenever a project described in a pending aquaculture lease conflicts or could conflict with a project described in a pending submerged lands act lease, the commissioner and the Commissioner of Conservation shall determine which project is in the best interests of the State.

1982, c. 609, §§§§1, 2, 3, & 4; 1983, c. 301, §§§§1, 2, 3, & 4.

§ 6073. Exclusivity; prohibition on interference

1. **Exclusivity.** Each lease for aquaculture shall be exclusive for the species and to the extent provided by the commissioner in the lease.

2. **Prohibition on interference.** It shall be unlawful to interfere with the rights provided in a lease.

DEPARTMENT OF MARINE RESOURCES REGULATIONS

CHAPTER 2 Aquaculture Lease Regulations

Summary:

These regulations prescribe the procedures and substantive criteria governing consideration of aquaculture lease applications submitted to the Commissioner of Marine Resources pursuant to 12 M.R.S.A. § 6072 and Department administration of leases. The regulations set forth procedural requirements for all aspects of the adjudicatory aquaculture lease application and administration process, consistent with the requirements of 12 M.R.S.A. § 6072 and the Maine Administrative Procedures Act, 5 M.R.S.A. § 9051 et seq.

2.01 Purpose

This chapter establishes procedures and explains criteria governing consideration of aquaculture lease applications submitted to the Commissioner pursuant to 12 M.R.S.A. § 6072 and prescribes procedures and criteria for subsequent annual lease review, lease renewal, lease revocation and lease transfer.

2.05 Definitions

- A. The definitions set forth in section 6001 of Title 12, Maine Revised Statutes, shall apply to the terms used in this chapter.
- B. Aquaculture. "Aquaculture" means the culture or husbandry of marine organisms by any person. Storage or any other form of impounding or holding wild marine organisms, without more, shall not qualify as aquaculture. In order to qualify as aquaculture, a project must involve affirmative action by the lessee to improve the growth rate or quality of the marine organism.
- C. Commissioner. "Commissioner" means the Commissioner or Deputy Commissioner of Marine Resources.
- D. Culture or Husbandry. "Culture or husbandry" means the production, development or improvement of a marine organism.
- E. Riparian owner. "Riparian owner" means a shorefront property owner whose property boundaries are within 1000 feet of the proposed lease boundaries.

2.10 Application requirements

A. Form.

Aquaculture lease applications shall be submitted on forms prescribed by the Commissioner and shall contain all information required by the Commissioner in order to obtain information relevant to the aquaculture project. Applications should be submitted at least 80 days in advance of any desired hearing date.

B.

1. Within 15 working days of receipt of a written application, the Commissioner shall
 - a. determine whether the application is complete, containing sufficient information on which a decision regarding the granting of the application may be taken; and
 - b. notify the applicant of his determination.
 2. If the application is complete, the Commissioner shall schedule a hearing on the application, if he determines that the application could be granted.
 3. If the application is incomplete, it shall be returned to the applicant with a written explanation of the additional information required in order to be complete.
- C. Within 60 days after hearing on an application, the Commissioner shall render a final decision, unless the applicant agrees to a longer time.

2.12 Multiple ownership

A. Corporate applicants. Corporate applicants for aquaculture leases shall include information in their application concerning:

1. Date and state in which incorporated;
2. Names, addresses and titles of all officers;
3. Names and addresses of all directors;

4. Names and addresses of stockholders, directors or officers owning an interest, either directly or beneficially, in any other Maine aquaculture leases, as well as the quantity of acreage attributed to each such person under paragraph C below.
5. Whether the corporation, any stockholder, director or officer has applied for an aquaculture lease for Maine lands in the past;
6. Whether any officer or director has ever been arrested, indicted or convicted of any violation of any marine resources law, whether State or federal.

B. Partnership applicant. Partnership applicants for aquaculture lease shall include information concerning:

1. The names, addresses and ownership shares of all partners;
2. Whether the partnership or any partner has applied for an aquaculture lease for Maine lands in the past;
3. Whether the partnership or any partner owns an interest, either directly or beneficially, in any Maine aquaculture leases as well as the quantity of acreage attributed to the partnership or partner under paragraph C below.
4. Whether any partner has been arrested, indicted or convicted of any violation of marine resources law, whether State or federal.

C. Aquaculture lease acreage.

Any person, whether an individual, partnership or corporation, will be credited as owning the number of aquaculture lease acres held either directly or beneficially by that person. Thus, the shareholders in a corporation or partners in a partnership will be credited with a number of acres equal to their proportional ownership share in the corporation or partnership. Therefore if a person owns a 50% stock interest in a corporation which holds an aquaculture lease of 100 acres, that person shall be credited as holding 50 aquaculture lease acres.

2.15. Notice of Lease Application and Hearing.

A. Personal notice.

At least 30 days prior to the dates of the hearing, the Department shall mail a copy of the notice of hearing, lease application and chart describing the lease area to the following persons:

1. riparian owners;
2. officers of the town(s) in which the lease area is located;
3. the applicant, except that the applicant shall receive only a notice of hearing; and
4. any public agency the Department determines should be notified, including but not limited to, State Planning Office, Department of Environmental Protection, Department of Conservation, Regional Planning Office, Municipal Officials, United States Coast Guard and United States Army Corps of Engineers.

B. Public notice.

The Department shall publish notice of the lease hearings at least twice in a newspaper of general circulation in the area affected unless otherwise prescribed by the Maine Administrative Procedure Act. Notice of the hearing shall be published once at least 20 days prior to the hearing and a second time at least 10 days prior to the hearing. Notice shall also be published in a trade, industry or interest group publication which the Department deems effective in reaching persons who would be entitled to intervene. Public notice shall include the following information:

1. A statement of the legal authority under which the proceedings are being conducted, including references to the adjudicatory proceedings procedures of the Administrative Procedures Act, 5 M.R.S.A. § 9051 et seq. and the aquaculture lease provisions of 12 M.R.S.A. § 6072;
2. a short, plain statement of the nature and purpose of the proceeding and the nature of the aquaculture lease application;
3. a statement of the time and place of the hearing; and
4. a statement of the manner and time within which applications for intervention may be filed.

2.20 Intervention

A. Forms.

The Commissioner shall supply application forms for intervenor status and require the submission of the following information:

1. identity of intervenor applicant;
2. specific description of the manner in which the intervenor applicant may be substantially and directly affected by the granting of an application. This description shall include information describing the intervenor applicant's existing use of the proposed lease area, (whether recreational or commercial.) In the event that the applicant is not a member of the class which may be substantially and directly affected by the proceeding, the applicant shall describe any other interest he may have in the lease proceeding which merits Department approval of his intervenor status; and
3. a specific description of intervenor applicant's objections, if any, to the proposed aquaculture lease.

B. Filing of applications.

Any application for intervenor status must be filed in writing and received by the Department at least 15 days prior to the hearing. The Commissioner may waive the 15 day deadline for good cause shown.

C. Participation limited or denied.

At least 5 days prior to the hearing, the Commissioner shall decide whether to allow or refuse intervenor applications. The Commissioner shall provide written or oral notice of his decision to the intervenor applicants. When participation of any intervenor is limited or denied the Commissioner shall include in the hearing record an entry noting his decision and the reasons therefore.

1. Full participation. The Commissioner shall approve intervenor status for any person who is substantially and directly affected by the granting of an aquacultural lease application, and for any other agency of federal, state, or local government.
2. Limited participation. The Commissioner may grant limited intervenor status to an intervenor applicant where the Commissioner determines that the applicant has an interest in the proceeding and that the applicant's testimony or interest are repetitive or cumulative when viewed in the context of the interest represented or evidence to be offered by other intervenors.

D. Correspondence of parties.

Once admitted as an intervenor, whether full or limited, the intervenor applicant shall be considered a party to the proceeding. Each party shall provide copies of all correspondence with the Department to all other parties and will be notified of all communications between the Department and other parties to the aquaculture lease proceedings.

2.25. Agency file

- A. Upon receipt of an aquaculture lease application, the Commissioner shall open an agency file, which file shall include all written correspondence from parties and non-parties concerning the application and memoranda of oral communications between the department and parties and non-parties concerning the lease application.

B. Public inspection.

The agency file shall be open for public inspection by prior appointment during normal business hours. The Department will supply copies of the file contents to any person for a charge according to the Department schedule.

2.29. Prehearing Conference.

The Commissioner may require parties to attend a prehearing conference if the complexity of the issues or volume of evidence indicate a prehearing conference would aid in the determination of issues raised by the application.

2.30. Aquaculture Lease Hearing Procedures.

A. Presiding Officer

1. The presiding officer at any aquaculture lease hearing shall be either the Commissioner or a Department employee or representative designated by the Commissioner to act as hearing officer.
2. The presiding officer shall have the authority to:
 - a. rule upon issues of evidence and procedure;
 - b. regulate the course of the hearing;
 - c. certify questions to the Commissioner for his determination;
 - d. administer oaths;
 - e. take such other action as may be necessary for the efficient and orderly conduct of the hearing, consistent with these regulations and applicable statutes.
3. The presiding officer may permit deviation from these procedural regulations for good cause shown, in so far as compliance is found to be impracticable or unnecessary.

B. General Conduct.

1. Opening statement. The presiding officer shall open the hearing by describing in general terms the purpose of the hearing and the general procedure governing its conduct.
2. Record of testimony. All testimony at aquaculture lease hearings shall be recorded and, if necessary for judicial review, transcribed.
3. Witnesses. All witnesses must be sworn and will be required to state their names, residence, and whom they represent, if anyone, for the purpose of the hearing.
4. Testimony in written form. At any time prior to or during the course of the hearing, the presiding officer may require that all or part of

the testimony to be offered at such a hearing be filed with the Department in a prescribed form. All persons offering testimony in written form must be present at the hearing and subject to examination. This subsection shall not be construed to prevent oral testimony at a scheduled hearing by any member of the public.

C. Continuance.

All hearings conducted pursuant to these regulations may be continued for reasonable cause and reconvened from time to time and place to place by the presiding officer. All orders for continuance shall specify the time and place at which such hearing shall be reconvened. The presiding officer shall provide reasonable notice to interested persons and the public of the time and place of such reconvened hearing.

D. Regulations of cameras and microphones.

The placement and use of television cameras, still cameras, motion picture cameras, microphones and other recording devices may be regulated by the presiding officer to ensure the orderly conduct of the hearings.

2.31 Evidence.

- A. Evidence which is relevant and material to the subject matter of the hearing, and is of the type commonly relied upon by reasonably prudent persons in the conduct of their affairs shall be admissible. Evidence which is irrelevant, immaterial or unduly repetitious shall be excluded. The Department's experience, technical competence and specialized knowledge may be utilized in the evaluation of all evidence submitted.
- B. The presiding officer may take official notice of any facts of which judicial notice could be taken, and in addition may take official notice of general, technical, or scientific matters within its specialized knowledge as well as statutes, regulations and non-confidential agency records. When facts are noticed officially, the presiding officer shall notify all parties and they shall be afforded an opportunity to contest the substance or materiality of the facts noticed. Facts officially noticed shall be included and indicated as such in the hearing record.

C. Documentary and real evidence.

1. All documents, materials and objects offered and accepted as evidence shall be numbered or otherwise identified and included in the record. Documentary evidence may be received in the form of copies or excerpts if the original is not readily available. The presiding officer may require any person offering documents or photographs as exhibits to submit a specified number of copies, unless the document or photograph is determined to be unsuitable for reproduction.
2. All written testimony and documents, materials and objects submitted into evidence shall be made available during the course of the hearing for public examination. All hearing evidence shall also be available for public examination upon prior appointment at the Department of Marine Resources in Hallowell during normal business hours.
3. The agency file containing the application and agency correspondence shall be submitted as documentary evidence in the hearing record.

D. Objections.

All objections to rulings of the presiding officer concerning evidence or procedure and the grounds therefore shall be timely stated during the course of the hearing. During the course of the hearing or after the close of the hearing, the Commissioner may determine that the ruling of the presiding officer was in error and order the hearing reopened or take any other action he deems appropriate to correct the error.

E. Offer of proof.

An offer of proof may be made in connection with an objection to a ruling of the presiding officer excluding or objecting any testimony or question on cross-examination. Such offer of proof shall consist of a statement of the substance of the proffered evidence.

F. Public participation.

Any person may participate in a hearing by making oral or written statements explaining his position on the issues, and may submit written or oral questions to the parties through the presiding officer, within such limits and upon such terms and conditions as may be fixed by the presiding officer.

G. Testimony at hearings.

1. Order of presentation. Unless varied by the presiding officer, hearing testimony shall be offered in the following order:
 - a. Direct evidence by applicant and applicant's witnesses in support of the application.
 - b. Testimony by department, staff and consultants.
 - c. Testimony by members of federal, state and local agencies.
 - d. Direct evidence by intervenors supporting the application.
 - e. Direct evidence by intervenors opposing the application.
 - f. Testimony by members of the public.
2. Questions. At the conclusion of their testimony each witness may be questioned in the order described below.. The presiding officer may require that questioning of witnesses be conducted only after the conclusion of testimony by an entire category of witnesses, for the purposes of efficiency or clarity of record.
 - a. The presiding officer, legal counsel and department staff may question witnesses at any time.
 - b. The applicant.
 - c. Intervenor parties.

- d. Federal, state and local agency representatives.
- e. All other members of the public may have the opportunity to question witnesses by oral or written questions through the presiding officer.

H. Conclusion of hearing.

Subsequent to the conclusion of the hearing, no other evidence or testimony will be allowed into the record, except by stipulation of the parties or as specified by the presiding officer.

I. Record.

A full and complete record shall be kept for each aquaculture lease application proceeding. The record shall include, but shall not be limited to, the application, supporting documents, all exhibits, proposed findings of facts and conclusions of the presiding officer, if any, staff documents, the Commissioner's findings of facts and conclusions, and a recording or transcript of the hearing.

2.35. Hearing Officer Report.

- A. In the event that an aquaculture lease hearing is conducted by a hearing officer other than the Commissioner, the hearing officer may prepare a report, including proposed findings of fact, conclusions of law and, at the Commissioner's request, a recommended decision. A copy of the hearing officer's report shall be provided to each party and each party shall have an opportunity to file responses or exceptions to the report within 10 days following receipt of the report.
 - 1. In submitting responses and exceptions, parties may submit a petition to the hearing officer to correct mis-statements of fact in the report. The hearing officer may correct any mis-statements of fact in his report prior to submission of the report to the Commissioner.
 - a. The report shall be submitted to the commissioner with the parties' responses and exceptions.

- B. Nothing in this section shall prevent the Commissioner from reaching his decision based solely on the record, after review of the hearing, tape or transcript and after review of the hearing record.
- C. Whenever a presiding officer other than the Commissioner conducts an aquaculture lease hearing, the Commissioner shall not confer with the presiding officer concerning the aquaculture lease application at issue outside the presence of the parties, whether or not a hearing officer report has been prepared.

2.37 Decision.

- A. After review of the agency record, the Commissioner shall issue a written decision, complete with findings of fact and conclusions of law.
 - 1. The Commissioner may grant an aquaculture lease, if he is satisfied that the proposed project will not unreasonably interfere with the ingress and egress of riparian owners, navigation, fishing or other uses of the area and is not in conflict with applicable coastal zoning statutes or ordinances. The commissioner may establish conditions that govern the use of the leased area and the limitations on the aquaculture activities. These conditions shall encourage the greatest multiple, compatible uses of the leased area, but shall also preserve the exclusive rights of the lessee to the extent necessary to carry out the lease purpose.
 - 2. If the Commissioner denies a lease application, his denial shall be considered "final agency action" for purposes of judicial review.
- B. The final decision of the Commissioner shall be mailed within 10 days to all parties.

2.40 Lease issuance.

- A. Prior to issuing a lease, the Department shall send a draft lease for review to the applicant.
- B. Applicant responsibilities. Within 30 days of the Commissioner's decision and prior to issuance of the lease the applicant must complete the following requirements:

1. establish an escrow account or secure a performance bond in the amount required by the Department in the draft lease; and
 2. pay the rental fee due for the first year of the lease term.
- C. Immediately following, but not before, signing of the lease by the Department and the applicant, the lessee must complete the following requirements:
1. file the lease or a memorandum of lease in the Registry of Deeds of the County in which the lease tracts are located, and
 2. publish notice of the lease issuance in the newspapers in which the aquaculture lease hearing notices originally appeared following Department approval of the notice.
- D. Compliance. Failure to maintain an escrow account or performance bond, to pay rental fees in a timely manner, to file the lease in the Registry of Deeds or to publish notice of the lease shall be grounds for lease revocation under 2.42.
- E. Lease term and validity. The term of the lease shall run from the date of the Commissioner's decision, but no aquaculture rights shall accrue in the lease area until the lease is signed.
- 2.41 Competing aquaculture lease applications.
- A. In the event the Department receives more than one application for a lease site, the Department shall give preference in granting a lease as follows:
1. first to the Department;
 2. second to the riparian owner of the intertidal zone within the leased area;
 3. third, to fishermen who have traditionally fished in or near the proposed lease area; and
 4. fourth, to the riparian owner within 100 feet of leased coastal waters.

- B. To qualify for preference under Section A. an application must be accepted by to the Department prior to the publication of the first public notice of hearing to consider a previously filed lease application for identical or overlapping lease areas.
- C. When the Department receives competing applications, it shall schedule one hearing to consider the applications concurrently.

2.42 Annual lease review and revocation.

The Commissioner may conduct an annual review of each aquaculture lease.

- A. If the Commissioner determines following an annual review or at any other time that the applicant has conducted substantially no research or aquaculture within the preceding year, that the aquaculture or research within the aquaculture lease area has been conducted in a manner substantially injurious to marine organisms, or that any other lease condition has been violated, he may revoke the lease.
- B. The Commissioner shall hold an adjudicatory hearing to consider revocation of a lease, subject to the notice and hearing procedures set forth in these regulations.

2.45 Lease renewal.

- A. A lessee must file with the Department an application to renew a lease no later than 30 days following the lapse of the prior lease.
- B. Renewal of a lease shall be an adjudicatory proceeding with notice as provided by these regulations, except that no hearing is required unless it is requested by an interested person.
- C. The Commissioner shall grant a lease renewal unless:
 - 1. the prior lessee has not complied with the lease agreement during its term;
 - 2. the prior lessee has conducted substantially no research or aquaculture in the lease areas during the lease term; or

3. The Commissioner finds that it is not in the best interest of the state to renew the lease. Considerations of the best interest of the state may include, but shall not be limited to, conflict with other new or existing uses of the area.

2.60 Lease transfer.

- A. Application. A lessee may apply for Department approval of the transfer of his aquaculture lease to another person for the remaining portion of the lease term on a form supplied by the Commissioner.
- B. Procedure. A lease transfer shall be an adjudicatory proceeding subject to the notice, hearing and decision requirements, as set forth for initial lease application in these regulations, except that no hearing is required unless requested by an interested person.
- C. Decision. The Commissioner may grant the lease transfer if he determines that:
 1. the change in lessee's identity does not violate any of the lease issuance criteria set forth in 12 M.R.S.A. § 6072(7);
 2. the lease transfer is not intended to circumvent the preference guidelines for treatment of competing applications as set forth in 12 M.R.S.A. § 6072(8); and
 3. the lease transfer is not for speculative purposes. "Speculative purposes" shall be found to exist whenever the owner of the lease to be transferred has not conducted any substantial aquaculture on the lease sites, including but not limited to seeding, cultivation or harvest of organisms.

2.75 Minimum lease maintenance standards.

- A. Each lessee shall mark the lease tracts in a manner prescribed by the Commissioner in the lease.
- B. Each lessee shall maintain his aquaculture lease tracts in such a manner as to avoid the creation of a public or private nuisance and to avoid substantial injury to marine organisms.

M A R I C U L T U R E I N A L A S K A

An Examination of Government Programs
by the Alaska Mariculture Technical Work Group
December 1986

STATE OF ALASKA /

STEVE COWPER, GOVERNOR

December 16, 1986

Mr. Rodger Painter
Alaska Mariculture Association
P.O. Box 020704
Juneau, AK 99802-0704

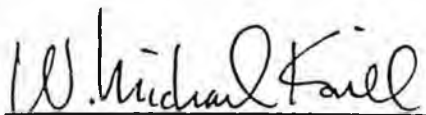
Dear Mr. Painter:

As chairmen of our respective technical subcommittees, we are pleased to present the enclosed documents representing the product of our committee's deliberation on a variety of topics relating to development of a mariculture industry in Alaska.

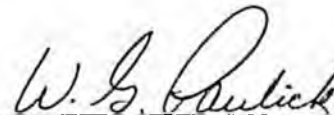
Our purpose is to provide, to the extent possible, an unbiased and accurate analysis of issues relating to a potential mariculture industry in Alaska. We recognize that final decisions must be made by the people of Alaska working through the public process. Because of the complexity and uncertainty of these often new issues, decision makers should find the enclosed documents very useful.

On behalf of the entire technical committee, we would like to thank you for your role in this important effort. We expect that the educational process will continue as Alaska moves forward into this new area of resource development. Hopefully, the information provided here will be of continuing use.

In the interest of public education, we would appreciate the widest possible dissemination of this information.



Michael Kaill, Ph.D.
Alaska Department of Fish & Game
Co-Chair, Siting and
Operations Subcommittee



William G. Paulick
Alaska Department of Commerce
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Co-Chair, Development and
Research Subcommittee

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Enclosure

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Reference Materials

Alaska Mariculture Technical Work Group

Broodstock Development--Bill Heard, NMFS

Feed Development & Research Facilities--Ole Mathisen, UAJ

Investment Incentives/Financing--Kellus Sewell, Nordic Alaska

(These discussion papers are available through the Alaska Mariculture Association, P.O. Box 020704, Juneau, AK 99802-0704.)

The Environmental Effects of Floating Mariculture in Puget Sound

Donald P. Weston, School of Oceanography, University of Washington
August 1986

Marine Net Pen Salmon Rearing

Larri Spengler, Alaska Department of Law, Memo, 1/31/85

DNR Tideland Permit for Shellfish Culture

Bob Palmer, Alaska Department of Natural Resources, Memo, 9/19/86

US Forest Service Permitting of Uplands Use for Alaska Oyster Farmers

Michael Barton, U.S. Forest Service Regional Forester, Letter,
7/25/86

A Philosophy for Aquaculture Development in Alaska

Governor Sheffield's Aquaculture Advisory Committee, Memo, 1/20/86

I N T R O D U C T I O N

Mariculture--or sea farming--is the for-profit captive culture of shellfish, finfish and sea vegetables in the marine environment. This is distinct from Alaska's existing salmon ranching program which involves the release of juvenile fish into the ocean to intermingle with wild stocks. The latter also is non-profit and returning fish are a common property resource.

Food products from sea culturing operations are becoming increasingly important throughout the world as seafood consumption climbs and wild fisheries landings remain relatively static. The world aquaculture production (fresh water and marine culture) was estimated at 22 billion pounds in 1983, and is expected to reach 48 billion pounds by the turn of the century.

The productive, unpolluted waters of Alaska's many sheltered bays and fjords are considered ideal for mariculture operations.

The first mariculture operations in Alaska involved the experimental culturing of oysters near Ketchikan in the early 1900s. Several oyster and mussel farms are now in operation and other farms are underway or are under consideration in Southeast, Southcentral and Southwest Alaska.

The State of Alaska recently began a joint project with Japan to test the feasibility of growing scallops in Kodiak and giant kelp (Macrocystis) in Sitka. The National Marine Fisheries Service also is cooperating with the state in an experimental research station in Southeast dealing with problems related to salmon farming.

A general need for policy and issue clarification was recognized by state and federal agencies, potential fish farmers and industry. The Alaska Mariculture Technical Work Group was formed at the invitation of the Alaska Mariculture Association. This cooperative effort represented here could assist in meeting the need for an information base to be used by policy makers.

EXECUTIVE SUMMARY

Legal Status--The legal status of mariculture in Alaska is unclear. While there is recognition of sea farming in statutes, clear regulatory processes are not available to guide individuals wishing to engage in many mariculture activities.

The Department of Law has said that technically the only species for which an applicant can presently receive a fish farming permit is oysters, a non-indigenous shellfish. However, there are mechanisms that allow individuals to harvest some undersized species and hold the animals in a farming environment until they reach salable size.

Specific regulations must be passed by the Board of Fisheries and Department of Fish and Game before sea farmers can obtain permits to collect and hold most native species of shellfish and finfish. Current statutes do not allow state or nonprofit salmon hatcheries to sell or transfer surplus eggs to private farmers.

Siting--The environmental impacts of mariculture operations are site- and species-specific. When siting mariculture facilities, it is important to consider the water circulation in the area and flushing action in the immediate vicinity. Concerns that water quality would be degraded beyond the immediate vicinity of mariculture operations are generally unwarranted. Such conditions would exist only in areas of extremely limited flushing or if culture density was very great.

Mariculture is one of many potential uses of Alaska's tidelands and adjacent uplands. The current decision-making process for these land use decisions involves weighing mariculture against a host of other potential uses.

Permitting--Mariculture is likely to become a significant use of Alaska's tidelands and adjacent uplands. This has prompted the Department of Natural Resources to work on a new tideland permitting process for shellfish operations that would require permittees to meet certain benchmarks to ensure project viability. The new permitting process also provides the mariculture developer greater security than the present system.

Disease and Genetics--Alaska's existing disease and genetics policies appear to provide adequate safeguards for the protection of native and cultured stocks. Endemic disease agents are ubiquitous in wild stocks and the marine environment. Many are opportunistic, causing disease in fish primarily when they are crowded or stressed. Although it is possible for such disease to be transmitted from cultured to wild stocks, catastrophic mortalities from indigenous pathogens would not be expected because of the lack of stress factors in the receiving populations and the wide environmental dispersion of host animals. Mariculture would produce no further risk to wild stocks than the current salmon ranching program provided state disease and genetic policies are followed.

Public Health--Growth of a mariculture industry presents no special public health concerns as existing state regulatory programs governing sanitary practices and seafood product wholesomeness appear to be adequate to provide proper protections.

Brood Stocks--The availability of brood and seed sources will be a major factor in shaping the initial growth of a mariculture industry in Alaska. Orderly development of mariculture would be enhanced by a policy of allowing access to necessary seed and brood sources from wild stocks, but sea farmers should develop captive brood sources for many species over a period of time. Acquisition of brood stocks for salmon and some other fully allocated species may require changes in statutes and regulations. Proper protection of Alaska's wild fisheries resources will require the cautious development of mariculture brood sources. Brood stock programs for captive culture populations should follow appropriate policy guidelines for disease, genetic and exotic species issues.

Research and Development--The success of mariculture throughout the world is largely due to government research in disease prevention and control, broodstock development, and nutritional requirements, including use of local fish meals. The industry is likely to look at government to continue fulfilling these functions.

Training and Education--One of the best methods for the State of Alaska to encourage a strong resident involvement in mariculture is through training, education and extension service programs. Particularly important to local involvement in mariculture operations is the availability of these programs to residents of rural areas. Education and training programs should (1) provide a novice with enough knowledge to allow him or her to start a mariculture business with a reasonable chance of success and (2) train Alaskans to work as technicians at sea farms or hatchery operations.

Taxes--The Department of Revenue was seeking at the time of this report legal clarification of the applicability of the Fisheries Business Tax on cultured seafood. This issue also is important to municipalities, however, since half of the tax is shared with local governments.

Investment Incentives--There appears to be a number of strategies available to the State of Alaska to encourage mariculture development or to influence the composition of the industry. A clear state policy supportive of mariculture is perceived to be a vital factor, while incentives such as credits on the Fisheries Business Tax may influence growth. Resident participation in mariculture could be encouraged through state loans and other non-conventional financing.

Market Development--Although overall consumer demand for high quality seafood is strong and growing, a critical factor to development of a strong mariculture industry is establishment of specific market channels. Early development could help farmers avoid holding products for which there are no markets. It would be helpful to gather market information in an easily accessible format.

Policy and Administration--Selection of a lead state agency has been recommended by a leading mariculture expert, but much more important is development of a strong and clearly articulated state policy regarding mariculture.

I. SITING

A. Species Requirement Criteria

Each species of cultured plant or animal has a unique and specific set of environmental needs. Consideration of the environmental requirements of the species targeted for a sea farm will help assure that the site will be suitable for the proposed operation. Conditions, such as salinity, temperature, flushing action, depth of water at the site and other factors may vary from species to species. For example, oysters are tolerant of salinity changes and exposure to air, while scallops are quite sensitive to those factors.

This procedure could allow for evaluation of permit applications to assure that the site is suitable for the proposed farming operation.

B. Requirements for Aquatic Environmental Protection

Mariculture facilities have several possible environmental impacts on areas adjacent to their location. These effects include changes in water current circulation, an increase in sedimentation and various changes in water quality. These environmental impacts are species- and site-specific, depending on the size of the operation.

When siting mariculture facilities, it is important to consider the water circulation in the area and flushing ability in the immediate vicinity. The placement of mariculture facilities in the water (either rafts with suspended mesh bags or trays for shellfish, or net pens for finfish) will alter the water-current patterns. These structures will decrease water movement which may in turn result in an increase in sedimentation from food particles, feces, and shell debris. The concentration of ammonia-related compounds generated from decomposing organic material may increase, and the amount of dissolved oxygen may decrease. All of these factors may combine to effect the quality of the seafood product being cultured.

Generally, floating facilities have less problems with sedimentation than bottom-culture operations. One way to alleviate a water circulation problem is to place multiple net pens or rafts in a line parallel to the direction of water flow. Proper spacing between nets or rafts should be maintained to allow adequate water circulation. Choosing a site with adequate flushing capabilities will eliminate much of the sedimentation problem. The culture structure should be far enough off of the bottom to allow normal water flow beneath it.

The effects of finfish culture and shellfish culture on water quality of surrounding areas are quite different. Shellfish cultures feed on indigenous phytoplankton and so do not introduce any 'new' nutrients into the area. As much as 40% of the total nutrients can be removed from the water column by these shellfish. Shellfish excrete relatively small amounts of ammonia and related compounds. Finfish cultures may increase the concentrations of ammonia, organic and total nitrogen, phosphate, and total phosphorous and Biological Oxygen Demand (BOD) in the surrounding area. Surrounding concentrations of dissolved oxygen may decrease. Generally, this phenomena is not a problem in culture areas with good water circulation because the metabolic wastes are diluted over a short distance.

The culture of finfish and shellfish results in the release of nutrients and the consumption of dissolved oxygen. A net increase in environmental nutrient levels may be expected in salmonid culture because of nutrient input in the form of feed. Culturing molluscs requires no addition of feed, so no input of "new" nutrients to the marine ecosystem results. However, molluscs do enhance the recycling of nutrients in the water column as they ingest phytoplankton and return a portion of the nutrients to the water column and sediments, making those nutrients available to primary producers again. The filter-feeding activities of the molluscs also serve to concentrate nutrients from a wide area into the area of the sea farm.

Concerns that water quality would be degraded beyond the immediate vicinity of mariculture operations are generally unwarranted. Such conditions would be anticipated only in areas of extremely limited flushing or if culture density was very great. In the few cases where measurable water-quality changes have been noted, the effects have been largely confined within the culture structure.

C. Site-Use Determination

Mariculture is one potential use among many of Alaska's tidelands and the uplands. The current decision-making process for these land-use decisions involve weighing mariculture against a host of other potential uses, including recreation, subsistence, personal use, log transfer sites, commercial fishing, and wilderness, as well as social, political, and economic factors associated with these uses. The most logical procedure to determine site usage is to have potential mariculture locations identified (using a set of predetermined, proven site criteria) and then included in the State Land Use Plans, such as the Prince of Wales Island area and

the Prince William Sound area plan. These plans attempt to balance many disparate and sometimes competing interests. If the potential mariculture sites were included in such a plan, site decisions would be straightforward and timely. While these area plans would be developing mariculture policies within the planning areas, statewide mariculture policies could result from these efforts. Another option is the development of a new plan similar to the ones generated by the Private Nonprofit Hatchery Program, which are presently working quite well. The development of a new plan does not seem currently possible because of the time and resources needed to develop such a plan. The inclusion of potential sites into state plans also seems unlikely due to the present lack of state funding for future plans. Thus, it seems that the present and future basis for the site decision making will be made on a case-by-case basis by all state and federal agencies involved with either permitting or resource review. These decisions will involve, for example, on federal public lands, wilderness capability analyses using the Alaska National Interest Lands Conservation Act (ANILCA) Sections 507(a) and 1315(b and d), and subsistence evaluations using ANILCA Section 810. Subsistence, as defined by ANILCA, provides for the customary and traditional consumptive uses of fish, wildlife, and other wild renewable resources by rural Alaska residents on federal public lands. It does not preclude the use of other resources but requires that an evaluation of effects be made. In Section 804, the nonwasteful subsistence uses of fish and wildlife shall be accorded a priority over the taking of fish and wildlife on public lands for other purposes. Another determination, which may be and probably will be required, is a cumulative effects analysis. This determination will probably be the result of legal actions and the expected large number of mariculture sites. These two determinations, and especially the case-by-case determinations, will necessitate more work by all the agencies involved as well as time delays for the applicants.

II. PERMITTING

A. Statutory/Regulatory Status

The legal status of mariculture in Alaska is unclear. While there is legal recognition of sea farming in statute, clear regulatory processes are not available for applicants to engage in many mariculture activities. Unclear are issues such as the ability of individuals to gather brood stock in limited fisheries, use of gear not authorized in the commercial fishery, and the harvesting of juveniles for culturing in fisheries with size limitations.

The Department of Law has determined that private, for-profit mariculture is covered by existing statutes. However, the department said, the Board of Fisheries and ADF&G must enact specific regulations before sea farmers can obtain permits to hold live fish or shellfish. To date the board has approved the farming of a non-indigenous species--oysters. Current statutes do not allow state or private nonprofit hatcheries to sell surplus salmon eggs to private salmon farmers.

There is no clear regulatory structure supportive of the development of a mariculture industry, although there are mechanisms to allow some activities. For instance, it is legally possible to obtain a permit to commercially harvest some undersized species and to hold the animals in a farming environment until they reach salable size. This method would appear to be most suitable in fisheries where there are no size and sex restrictions and little competition for the resource, such as mussels. There also is provision in law (AS 16.05.050 (11)) under which the Commissioner of ADF&G can authorize interim-use permit holders to engage in the experimental taking of fisheries resources. This statute may be a vehicle to allow the collection of brood stock for farming purposes in some fisheries.

ADF&G and the Department of Commerce and Economic Development are conducting a joint project with Japan to test the feasibility of culturing scallops in Kodiak. Local "cooperators" participating in the experiment have been issued scientific/educational permits for the collection of spat, and will be allowed to hold scallops for experimental purposes. However, the cooperators are not allowed to engage in "commercial" activities such as the sale of spat, juvenile or adult scallops.

B. Agency Coordination

Oyster farmers follow the established permitting path for use of state tidelands, and production and sale of shellfish products. The most critical permitting process is physical aquatic siting. This generally involves the Departments of Natural Resources, Fish and Game, and Environmental Conservation, the Army Corps of Engineers, and the Environmental Protection Agency. Permits for uplands usage at individual sites may require the additional involvement of the U.S. Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Management, National Park Service, or other federal agencies.

Coordination of state and federal agency responses to the physical siting process is handled by the Division of Governmental Coordination (DGC) in the Office of Management and Budget. The DGC's review process is designed to

coordinate federal, state, and local review of projects in the coastal areas of the state. It is oriented to address any land management or resource regulatory issue related to physical siting and design of proposed projects. A key component of the process is review of the "consistency" of the proposed project with the standards of the Alaska Coastal Management Plan. Mariculture projects will be reviewed for their consistency with recreation, subsistence, habitat, and with air, land, and water quality standards. Applications for mariculture projects are reviewed on a 50-day schedule, which means the DGC will complete its review within 50 days unless non-consistency or other problems are raised.

New permitting systems required for mariculture development should fit within the existing DGC review process and timetable.

C. Project Development

Based on the growing interest in sea farming, mariculture is likely to become a significant use of Alaska's tidelands and adjacent uplands. As such, land managers and upland owners are interested in ensuring that sites are utilized for permitted activities and do not result in speculation. At the same time, these land managers have interest in developing a system that responds to the needs of the individual grower and results in a strong, diverse mariculture industry. ADNOR currently is working on a new tidelands permitting process for shellfish operations that would require permittees to meet certain benchmarks to ensure project viability, while providing greater security for the mariculture developer than the present permitting system.

The characteristics and the scope of a mariculture project will be determined during the permit process. The applicant's development plan will become a part of the permits and they will describe: (1) what species will be raised; (2) size and location of the project; (3) type of structures used for growing; (4) whether upland support facilities will be allowed; (5) environmental safeguards that will be implemented; and (6) a timetable that will be used to monitor the progress during construction and development.

During the early stages of development, ADNOR will be using these permits and develop a plan to monitor the progress of a project. ADNOR will be emphasizing the need to use the land for its intended purpose within a specified period of time. The intent of this monitoring is to ensure the land speculation is not occurring and that approved sites are available to create a land base large enough to support a self-sustaining industry.

As the project gets into the production phase, the monitoring by ADNR will become less important and the roles of ADF&G and ADEC will become more important in regulating water quality, protecting public health, and certifying brood sources.

To ensure mariculture develops into a self-sustaining industry, ADNR is considering modification of land-use permits and leases to meet the need of a grower. At the present time, there is no guarantee for the grower that starts out with a land-use permit and then requests a lease with a term of more than ten years. The site will be put up for bid at a public auction and the grower may lose the site if he is outbid. A lease term of less than ten years may be negotiated if the director finds it in the best interest of the state.

III. FIN/SHELLFISH HEALTH AND GENETICS

A. Fin/Shellfish Health

1. Importation of exotic diseases

Current regulations (5AAC 41.070) prohibit importation of exotic finfish or shellfish species into Alaska except Pacific Northwest-cultured, Japanese oysters and ornamental fish for non-release only. Oysters can be imported only after disease certification by the ADF&G, Division of Fisheries Rehabilitation, Enhancement and Development's Fish Pathology Section and only after the importing party obtains a Fish Transport Permit (5AAC 41.005), which must also be evaluated by the Fish Pathology Section. Adequate control to prevent importation of exotic diseases is in effect.

2. Potential dissemination of indigenous aquatic animal diseases within the State of Alaska by movement of mariculture species

Possession or transport of any live fish or gametes thereof requires a Fish Transport Permit, as above, the application of which is evaluated regarding various concerns, including finfish or shellfish disease within the stock or brood source on which the permit is approved or denied (5AAC 41.020; 41.030). The definition of a fish includes all invertebrates and amphibians (AS 16.05.940). In addition, disease control is required at hatchery or rearing facilities (5AAC 41.080) through disinfection procedures and yearly hatchery inspections by a qualified fish pathologist. Disease outbreaks must be reported to the Fish Pathology Section which is governed by these

regulations in recommending to the Commissioner the disposition of said diseased fish. Current regulations appear adequate to control movement of finfish and shellfish diseases affecting mariculture practices.

3. Transmission of diseases from cultured finfish or shellfish species to wild stocks

Future mariculture practices would produce no further risk to wild stocks than practices currently employed. Certain disease agents are already ubiquitous in the environment and opportunistic, infecting fish only when they are crowded or stressed artificially by aquaculture practices. Other disease agents which are obligate pathogens could possibly transmit from cultured finfish/shellfish to wild stocks. Although this would be undesirable, most generally clinical disease or catastrophic mortalities do not result in the receiving wild populations due to the lack of stress factors and wide environmental dispersion of host animals.

Although some risk is present now and will be present in future mariculture endeavors, there are adequate, current regulations cited previously for monitoring cultured fish/shellfish stocks for disease, and control of such diseases to protect both wild and other cultured stocks.

4. Environmental contamination by therapeutic drugs or chemicals used in mariculture practices

There are no data on which to evaluate this possibility. However, certain premises suggest that this is an unlikely concern: (1) The great magnitude of dilution of such drugs in the water column would make the final exposure concentration so far below efficacious levels that natural fauna and flora should be unaffected; (2) the infrequency of use would prevent chronic exposure of natural flora; (3) in most instances, a systemic chemotherapeutant is the only practical method to treat a disease affecting thousands of captive fish. Consequently, the drug is administered in the diet and metabolized with very little of the medicated feed left to allow leaching of the drug into ambient water.

Circumstantial information suggests that drugs used in mariculture operations present a negligible risk to the environment.

5. The increasing demand on state pathology laboratories to conduct disease surveillance for private enterprise

will incur additional costs that must be borne by the state in order to maintain control of disease occurrence within cultured and wild stocks of finfish and shellfish.

B. Genetics

ADF&G has a detailed policy statement developed dealing with the issue of genetics, including transportation of stocks and importation of non-indigenous species. Exceptions to this genetics policy will be made on a case-by-case basis. While it appears that there is considerable opportunity for genetic engineering as part of mariculture activities, that field is largely unknown.

IV. PUBLIC HEALTH

The Alaska Department of Environmental Conservation (ADEC) is responsible for ensuring sanitary control and product wholesomeness of all phases of the seafood industry. This responsibility is addressed in 18 AAC 34, the Fish Inspection Regulations.

With regard to the shellfish industry, ADEC certifies all shellfish waters for harvesting on the basis of sanitary quality and public health safety, regulates the harvesting of shellfish, makes laboratory examinations of shellfish and shellfish waters, and restricts the harvesting of shellfish from particular areas in public health emergencies.

Processing of other mariculture products also would be dealt with through existing ADEC regulations to protect the sanitary quality and public health safety of the particular mariculture product.

A. Water Quality

Water quality of a shellfish growing area must meet minimum standards established by the federal Food and Drug Administration, "National Shellfish Sanitation Program (NSSP)." Prior to harvesting a shellfish growing area, ADEC conducts a sanitary and biological survey of the area before approving it to allow shellfish harvesting for sale for human consumption.

The examination is verified by laboratory findings when needed to indicate that pathogenic microorganisms, radio-nuclides, pesticide chemicals, harmful industrial wastes, and sewage wastes do not reach the area in dangerous concentrations and do not pollute the shellfish in the area.

Laboratory water samples from the sanitary survey are analyzed by the ADEC Palmer Laboratory to ensure that the samples do not exceed standards established by the NSSP.

Factors which may affect water quality are location of nearby pollutant sources, other users of the growing site, vessel traffic, freshwater streams, float houses, human habitation, and point source pollution.

The use of nets treated with tri-n-butyl tin (TBT) has been extensive in Norway and other countries involved in sea farming. This compound is used as an antifoulant to reduce labor costs associated with cleaning nets. Public health concerns have been raised over the use of TBT, a heavy metal.

However, the use of TBT in connection with mariculture in Alaska is not likely to be a problem since the ADEC presently is not approving permit applications for aquaculture operations using TBT-treated nets.

For information on requirements of the "National Shellfish Sanitation Program", refer to the program's Manual of Operations, Part 1. Sanitation of Shellfish Growing Areas, U.S. Department of Health and Human Services, Food and Drug Administration, 1986 Revision.

B. Food Quality of Mariculture Products

ADEC is responsible for ensuring that all seafood products intended for human consumption are wholesome and uncontaminated.

Shellfish (clams, mussels, and oysters) possess the ability to filter and concentrate pathogenic microorganisms and toxic substances from the water. Furthermore, shellfish are packed whole and alive and are often consumed raw or lightly cooked. For these reasons, the public health significance of consuming shellfish for food is very important.

Other mariculture products intended for sale for human consumption would need to be evaluated and protected from potential contamination or adulteration that could result from pathogenic microorganisms and toxic substances.

1. Paralytic shellfish poisoning

Paralytic shellfish poisoning, or "PSP", is a very serious illness caused by poisons concentrated in some varieties of dinoflagellates, a kind of microorganism. Since shellfish feed on these organisms, they can absorb and store the PSP toxin. The presence of PSP in Alaska has been well documented, and shellfish intended for commercial markets must be quarantined and tested for the toxin before being released for sale for human consumption.

Currently, testing for PSP is done through the ADEC laboratory in Palmer. The only test currently certified by the Food and Drug Administration is a mouse bioassay. Research is ongoing at several universities to establish other testing methods for PSP, but none have been certified to date.

2. Coliform testing

The National Shellfish Sanitation Program has minimum coliform standards for shellfish meat that must be met before shellfish can be commercially marketed. The need for actual coliform testing of the meat is determined by an ADEC review of the sanitary survey to see if actual or potential pollution may be present.

3. Sanitation

Harvesting and processing areas must meet state and federal regulations currently in existence to guarantee proper sanitation and product wholesomeness. This includes, for example, separation of raw and finished product, transporting under refrigeration, and holding shellfish during PSP and/or bacterial testing.

V. BROOD STOCKS

Development of dependable, high quality brood stock sources in sufficient quantity to meet initial and long-term needs will be a critical step in providing a strong foundation for mariculture. During the initial phases of growth, general availability of brood and seed sources will likely be a major factor in deciding which species are developed and where development occurs.

Proper protection of Alaska's wild fisheries resources will require the cautious development of mariculture brood sources. Brood stock programs for captive culture for profit populations should follow specific policy guidelines for disease, genetic, indigenous and non-indigenous species issues.

Orderly development of mariculture would be enhanced by adoption of a policy by the State of Alaska to assist in initial access to necessary seed and brood sources from appropriate wild stocks. Over the long term, however, sea farmers should develop captive brood sources for many species. This will be particularly important in brood sources secured from fully allocated common property resources.

Acquisition of brood stocks and seeds also may require changes in statutes and regulations. For instance, the sale of surplus eggs from existing hatcheries to private farmers appears to be prohibited by state law. Legal issues also are raised by the capture of under-sized juveniles, use of gear not authorized in the commercial fishery, captures when the commercial fishery is closed and ability to capture wild brood sources in limited fisheries.

A. Salmon

Most interest in salmon farming in Alaska revolves around chinook and coho stocks. Alaska now has well developed public and private hatchery programs releasing large numbers of smolts of these species. Many of these programs achieve large enough returns to satisfy brood needs, provide catches to common property fisheries and allow terminal area cost recovery harvests. Present performance and estimates of survival rates and other factors suggest that these hatchery programs could provide large enough surpluses of chinook and coho eggs to satisfy the initial needs of a salmon farming industry in Alaska.

The food quality of returning hatchery salmon deteriorates rapidly, and many fish harvested in terminal areas for cost recovery would be more valuable as egg sources for salmon farming. A higher value for cost recovery catches could mean more fish are made available to the common property fisheries. It is estimated that 10 to 20 million surplus chinook and coho eggs per year could be made available for farming purposes under a strategy of allowing cost recovery

egg sales. Statutes would have to be amended to allow surplus egg sales from private or public hatcheries for salmon farming.

B. Trout, Char, Steelhead

There are no current brood stock surpluses in Alaska's hatchery programs for these species. Farming brood stock development for these species probably would be modeled after the conservative, carefully controlled egg take schedules from wild stocks taken already for our existing salmon ranching programs. These salmon egg takes are conducted on the healthiest wild stocks on varied schedules to ensure protection to the donor populations.

C. Non-indigenous Salmonids

Atlantic salmon is the most intensely farmed salmonid in the world. Some British Columbia and Washington State farms are now growing Atlantic salmon, partially because of limited sources of Pacific salmon brood stocks. The State of Alaska's disease and genetics policies and regulations currently prohibit the importation of live salmon or eggs.

D. Black Cod

Present interest in black cod (sablefish) farming is based upon the concept of capturing early life-stage juveniles from wild populations, and growing the fish to marketable size. Farming of black cod is being conducted on an experimental basis in British Columbia. High market prices have created strong competition for Alaska's black cod, and the state's only in-shore fishery already has been limited. Knowledge of this species is somewhat limited, suggesting that black cod farming should proceed cautiously.

E. Oysters

Several oyster farms are presently operating in Southeast with seed spat being imported primarily from Washington. Logistical problems in importing this spat have resulted in significant losses to many operators and remain a primary concern of existing farmers. While it may be necessary to develop an oyster seed hatchery in Alaska to ensure continuous dependable supplies, present sources of spat appear adequate to meet foreseeable demand.

F. Mussels

Mussel farming is based upon the collection of wild spat. In this case, Alaska has an abundant, widely distributed and unutilized resource, and there does not appear to be any biological need for constraints upon collection of wild spat.

G. Scallops

Interest in scallop farming has grown rapidly, particularly in the Kodiak area where a feasibility study is being conducted on collection of weathervane scallop spat using Japanese techniques. The distribution of natural populations is limited, but scallops produce enormous quantities of gametes and continuous collection of wild spat for farming probably won't pose biological or allocation problems.

H. Abalone

Abalone farming in Alaska probably would follow the development of culturing programs in Japan and California where hatcheries are used to produce spat for brood purposes. Competition is strong for Alaska's relatively small abalone resource open to commercial harvest.

VI. RESEARCH AND DEVELOPMENT

The success of mariculture is largely due to progress in three areas: (1) controlled breeding of domesticated broodstock; (2) understanding of the nutritional requirements of cultured organisms; and (3) control and prevention of disease. All three elements are involved in development of any mariculture operation, including shellfish, finfish and sea vegetables. Even if mariculture development is industry-driven in Alaska, there's a major role for government to play in research and development.

A. Broodstock Development

The biggest initial problem facing shellfish farmers in Alaska is location of dependable sources of spat. Indeed, the collection of spat is a major concern of established shellfish farming industries throughout the world. For the short term, the farming of indigeneous shellfish probably will rely upon the capture of wild spat or juvenile animals. Hatchery production of shellfish spat is an option for development of dependable sources for farming operations, but technical obstacles must first be overcome for some species.

The Norwegian success in salmon farming can be partially linked to the establishment of an experimental government genetics laboratory. A variety of salmon stocks were tested for growth characteristics, food conversion, fecundity, disease resistance, maturity schedules and other desired characteristics. The few stocks selected form the basis of an ongoing selection program. The University of British Columbia is undertaking a similar broodstock development program for Canadian farmers using coho hatchery stocks.

Development of salmon farming in Alaska would pose similar needs involving chinook and coho. Broodstock development using hatchery stocks would help guide farmers to the most suitable brood stock sources. Selection of the right broodstock could be critical to the success of fish farming.

B. Fish Nutrition and Dietary Requirements

Since about 60 percent of the production cost of farmed fish is procurement of food and feeding, a successful fish farming industry creates a demand for local production of food. An important research need is experimental work to develop the proper diet for Alaska conditions using ingredients that can be procured locally. While there is substantial agreement to the ratio of fish meal, dry ingredients and the fresh fish components of a diet, it is desirable to utilize stocks of local fish which aren't currently harvested in a commercial fishery. This would create new fishing opportunities and provide raw product to feed mills at low cost. Some waste products from processing plants also can be utilized in fish food.

C. Experimental Facility

A variety of fisheries research programs exist in Alaska, but no single agency has the resources to undertake the research outlined in this document. One potential solution is a coordinated approach to mariculture research involving a number of state and federal programs, resulting in a pooling of talent and financial resources under a single program. An important potential source of operating funds for such an experimental facility could be proprietary research for individuals and companies.

D. Database

Orderly development of a mariculture industry will be assisted by the gathering and organization of solid statistical data on the growth and performance of the industry. This database will be particularly helpful in market development and the growth of in-state support industries. The state could incorporate reporting requirements for quantities of brood or seed, production and product on hand into licensing programs.

VII. TRAINING AND EDUCATION

One of the best methods available to the State of Alaska to encourage a strong resident involvement in mariculture is through education, training and extension service programs. A special effort should be undertaken to make these programs available to residents of coastal communities to ensure local involvement.

Education and training programs should focus on two separate objectives: (1) provide a novice with enough knowledge to allow him or her to embark upon a mariculture business with a reasonable chance of success; and (2) train Alaskans to work as technicians at sea farms or hatchery operations.

A. Components of a Comprehensive Program

The most effective program would provide education and training at all levels: high school, post-secondary, vocational and extension services. High school technical training will serve to inform young Alaskans about jobs and career opportunities in mariculture. Post-secondary mariculture education helps ensure a resident pool of expertise, while vocational-technical courses provide focused education aimed at providing local residents with operational job skills needed by the industry. Extension services are particularly important to residents desiring to develop small scale mariculture operations and support services.

B. Coordination

Components of this comprehensive program are likely to be located throughout Alaska's diverse educational system, including local school districts, University of Alaska, Marine Advisory Program, community colleges, private institutions (Sheldon Jackson College), vocational education programs, and services offered by various governmental agencies (Office of Commercial Fisheries Development, FRED Division). Coordination of these programs could help avoid duplications and identify gaps in programs.

C. Training Areas

Education and training should cover the spectrum of planning, operational and regulatory concerns, including but not limited to physical operations, biological operations, economics, regulatory programs and technology.

1. Physical operations--site selection, physical plant design, equipment, utilities, support services, chemicals, transportation, processing, product quality
2. Biological operations--brood stock acquisition and development, disease management, nutrition, environmental quality
3. Economics--business management, operational costs, supply and demand, marketing, cash flow, financing, short- and long-term financial and operational planning
4. Regulatory--explanation of the regulatory process involving training and applicant manuals, helpful agencies and nonprofit organizations

5. Technology--dispersal of information regarding technological advances in equipment, nutrition, disease and other operational concerns

VIII. TAXES

Development of a clear and stable taxing policy is an important ingredient of governmental response to a developing industry such as mariculture. While municipal taxing authority over locally raised mariculture products appears clear, the applicability of existing seafood taxes levied by the state is uncertain. Clarification of this issue will be important to the state, local governments and prospective farmers alike.

A. Fisheries Business Tax

The Fisheries Business Tax currently imposed on commercially processed or exported seafoods ranges from one to six per cent of the product value at its first point of sale or export. Except for limited circumstances, the tax is based upon the amount paid a harvester by a processing company or broker. If mariculture products were to be taxed under the current structure, most mariculture farmers would be taxed at three per cent of the export product value. In-state sales of fresh product probably would not be taxed.

After studying the statutes and regulations, the Department of Revenue decided it should seek a legal advice from the Department of Law concerning the applicability of the Fisheries Business Tax on mariculture products. The Department is uncertain whether the tax was designed as a severance or product tax. Since state law provides municipalities with 50 percent of the collections of the Fisheries Business Tax within their jurisdiction, the issue is important to local governments.

B. Local Taxing Authority

Recent revisions to Title 29 broadened the taxing authority of local governments. All municipalities appear to have the authority to impose local sales taxes on seafood products purchased or sold within their taxing jurisdictions. Several local governments currently levy such taxes ranging from one to three percent of the initial purchase value.

C. Seafood Marketing Assessment

The Alaska Seafood Marketing Institute is partially funded through the Seafood Marketing Assessment which is a tax applied to processing operations and round fish exports or in limited cases to seafood brokers or distributors. This tax currently is fixed at .2 percent of the initial purchase

or export value. It appears to be applicable to mariculture products.

IX. INVESTMENT INCENTIVES

There appear to be a number of strategies available to the State of Alaska to encourage mariculture investments or influence the composition of the industry. In crafting these strategies, social and economic objectives should be carefully weighed. For instance, local employment and resident ownership may be achieved through divergent policies, and economic stability may come through involvement of a blend of corporate and family farming operations.

Large corporations or companies desiring to develop mariculture operations generally have access to venture capital through existing collateral bases or established relationships with financial institutions. These investors also can afford to hire experienced professionals to craft a financial prospectus, deal with difficult regulatory processes or manage a farm. Individual Alaskans interested in small to moderate farms generally lack the collateral base, trust of financial institutions and operational experience. These competitive disadvantages can be partially offset through non-conventional financing and other incentives designed to encourage resident investment.

Important to note is that other countries with developed mariculture industries have used combinations of incentives and regulatory devices to achieve socio-economic goals. Examples can be found in Norway where the government has restricted production size of salmon farms and extended licensing preference to local residents to encourage small operations in rural locations. These policies are directed at reversing population migrations to urban areas. The Japanese government has actively encouraged the development of cooperative farms involving local residents of coastal communities who often combine fishing and farming activities.

A. Regulatory/Political Climate

A clear policy supporting and encouraging mariculture development throughout the state's regulatory structure is perceived to be extremely vital to the growth of sea farming. A strong governmental policy supporting salmon farming has been critical to the rapid development of pen-rearing operations in British Columbia. This also has been true in Hawaii, Japan and Norway. Conversely, the growth of salmon farming in Washington State has been hampered by confusing and conflicting policies between various state agencies and county governments.

B. Taxes

A major attraction to venture capital in the British Columbia salmon farming industry has been a government program allowing tax-free profits up to \$500,000 (Canadian currency) from qualified farming investments. This policy helped attract millions of dollars in investment capital. This avenue would be open to the State of Alaska through amendments to its corporate tax laws.

If the Fisheries Business Tax is applied to mariculture products, another potential incentive available to the state would be tax credits or a temporary moratorium on Fisheries Business Taxes on new facilities. A model for a tax credit program could be found in legislation approved by the 1986 Legislature. The legislation (House Bill 58) was designed to encourage the building of new shore-based processing facilities, expansion of existing plants, diversification of product lines, and improvement of product quality. This incentive also could be accomplished by a moratorium on the Fisheries Business Tax during the first years of production of a new farming operation.

C. Non-conventional Financing

The state could encourage resident involvement in mariculture through establishment of a state loan program or loan guarantee fund. These non-conventional financing arrangements could be geared toward small to medium sized projects to qualified Alaskans. This program could potentially be targeted to assist residents of economically depressed rural communities. Non-conventional financing could be particularly important to family-sized mariculture operations.

Another option could be to focus on amendments to national agricultural loan funds to include financing for small-scale mariculture projects.

D. Non-cash Incentives

Another method to entice investment capital is through long term tideland leases, water rights and lease or grants of state-owned uplands for staging facilities. These non-cash incentives and tax advantages could be offered to firms which meet certain state objectives, such as employment of residents from areas of high unemployment or with commercial fishing backgrounds, or providing equity participation by Alaskans.

X. MARKET DEVELOPMENT

Although overall consumer demand for high quality seafood is

strong and growing, a critical factor to development of a strong, diversified mariculture industry is establishment of specific market channels. This market development ideally occurs before farms reach the production stage, so farmers don't end up with products at the marketing stage that cannot be sold. Failure rates in mariculture can be affected by the early establishment of market development programs.

A. Market Information

A large body of knowledge exists concerning seafood quality and marketing of Alaska products. While most is directed at products of wild origin, much of the information also will be applicable to cultured seafood. The information has not been gathered in an easily accessible format that could benefit prospective sellers of cultured--or wild--seafood products. Consequently, each interested individual must invest significant amounts of time and energy into essentially duplicative research.

B. Market Research

A good market research program would focus on development of specific market-related information on target species prior to commercial production. Critical market problems and opportunities should be identified for each species on a priority basis.

C. Alternative Markets

Cultured seafood products may not follow existing marketing channels, forcing farmers to focus on development of specialty or select markets. In analogous situations this need has led to the creation of private marketing entities conducting common promotion and assuming direct involvement in the sales process.

D. Quality

A primary benefit of cultured seafood is the relative ease of providing consistently high quality products. The early development of minimum and target quality standards for each product would benefit pioneering farmers and prevent problems as the industry grows and operational patterns are developed.

E. Transportation

The cost of moving product to market will play a significant role in siting of farms and market price of the finished product. Concentration of Alaska's mariculture activities or development of innovative transportation systems will help allow economies of scale in shipping and make Alaska cultured seafood price competitive.

F. Generic Promotion

The Alaska Seafood Marketing Institute's programs are designed to promote the benefits of all Alaska seafood products and do not make such distinctions as "troll-caught" or "net-caught," and "wild" or "cultured." However, some differentiations are possible under ASMI's enabling statutes but must not create competitive advantages for specific companies or regions of the state. ASMI promotions are determined by its industry board of directors which generally allocates the promotional budget in proportion to the value of Alaska's seafood production sold in U.S. markets. These amounts are adjusted to reflect market conditions and other factors.

XI. POLICY AND ADMINISTRATION

As outlined in this document, government will play a major role in the development of an Alaska mariculture industry. The specific roles of state agencies in that process will be determined through policy direction from the governor and legislature. One critical policy decision will be the determination of how the various agencies involved should interact, and whether a lead agency for mariculture should be designated. In determining the appropriate government structure, it might be useful to view the primary functions of agencies in terms of development advocacy and regulatory functions.

A. Lead Agency

A leading U.S. aquaculture law specialist brought to Alaska in early 1986 to discuss mariculture development strongly recommended the designation of a lead agency. The lead agency should be a development advocate with the ability to pull together state, local, federal and private resources to ensure success. The goal for this lead agency would be to streamline the permitting process and strengthen advocacy programs, while the objective would be to put Alaskans to work and create new wealth with the sale of a finished product.

While this concept is sound, the present structure of state agencies do not easily facilitate a lead agency with both advocacy and regulatory functions. The Department of Commerce and Economic Development has a strong advocacy program, but lacks regulatory jurisdiction and staffing. This also is the case with the Department of Community and Regional Affairs. At the same time, the resource agencies (DNR, ADEC and ADF&G) and the Division of Governmental Coordination in the Office of Management and Budget have strong regulatory and permitting functions but lack economic development staffs.

The present structure of state government might be more easily adapted to a cooperative approach with lead advocacy and permitting agencies. This concept would have prospective farmers making initial contacts at the lead advocacy agency which would in turn provide permitting road maps directing applicants to the proper lead permitting agency.

B. Policy Development

Regardless of which agency is considered lead, the parade should be led by a strong, clearly articulated state policy regarding mariculture development. This policy should give clear guidance to the agencies for making such value judgments as:

- (1) The balance between creation of jobs and the maximum amount of industrial capital.
- (2) Balance of environmental protection and economic development.
- (3) The importance of mariculture as a use of state tidelands and uplands.
- (4) Role of mariculture in efforts to diversify Alaska's economy.
- (5) Weight of specific social objectives (local employment, Alaska equity, tax revenues, etc.).
- (6) Recovery of private wealth created from common property resources.

THE ENVIRONMENTAL EFFECTS OF
FLOATING MARICULTURE
IN PUGET SOUND

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August 1986



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changes will occur with salmon net-pen culture than with mussel culture, given the relative production capacities of typical Puget Sound facilities.

The concentrations of nutrients and BOD in the water passing through a mariculture structure are generally very dilute compared to most other discharges to the marine environment. Field studies have typically observed little or no changes in water quality outside the culture structure in well-flushed areas. Adverse effects would be anticipated only in areas of extremely limited flushing or very intensive culturing activity.

Phytoplankton - Floating mariculture is unlikely to have a measurable effect on phytoplankton standing stock or productivity in most of Puget Sound. In the Main Basin of Puget Sound nutrients are not limiting to phytoplankton growth. Thus, additional nutrient input attributable to mariculture should have no effect on productivity. Nutrients may be periodically limiting in some vertically stratified area (e.g., Saratoga Passage), however, in many of these areas the dilution of nutrients which would occur prior to their utilization by phytoplankton would probably make any effect on productivity unmeasurable. A localized and measurable effect on productivity would be expected only in highly stratified and poorly flushed areas (e.g., some embayments of the southern Sound) in which the water passing through a culture structure could maintain its integrity with minimal dilution.

Sedimentation - Floating mariculture generates large amounts of solid wastes in the form of feces and unutilized feed (salmon culture) or feces, pseudofeces and shell debris (shellfish culture). These materials are generally deposited in the immediate vicinity of the culture structure. This deposition results in physical and chemical changes to the natural sediments including decreased redox potential, increased sediment oxygen consumption and increased concentrations of total volatile solids, total organic carbon, sulfides, nitrogenous compounds, and phosphates. While there are profound effects on sediment chemistry, and consequently the sediment biota, these effects are very localized. Visible accumulation of solids and the alteration of sediment chemistry typically extends no more than 30 m from the culture structure.

Accumulation of organic-rich sediments occurred around most culture facilities reviewed. The depth of this accumulation depends for the most part upon water depth and current velocity. In general, accumulation of sediments can be

expected beneath any culture facility when less than 15 m exists between the bottom of the structure and the sea floor. Sediment accumulation is possible at even greater depths, but little data are available since few culture operations have been sited in deeper waters.

Benthic macroinvertebrates - The accumulation of organic-rich sediments beneath culture facilities and the consequent depletion of oxygen in the pore waters results in changes in the infaunal invertebrate community. Loss of species intolerant of organic enrichment (typically echinoderms, crustaceans and molluscs) often occurs. A few opportunistic species, most frequently polychaetes, attain numeric dominance in the community. In cases of extreme organic enrichment, there may be a total absence of benthic macroinvertebrates. Benthic community changes have been typically observed to be limited to an area within about 30 m of the culture structure. These changes can be expected to persist for the duration of culture activities and for at least several years following their cessation.

Fish and megafauna - Accumulation of organic material in the vicinity of a mariculture operation may result in the loss of nonmotile megafauna (e.g., geoducks) living in intimate contact with the sediments. However, fish and motile megafauna (e.g., crabs) living on or above the sediment surface are typically found in higher densities around floating mariculture structures than in the surrounding area. The attraction of fish and megafauna to the culture area is probably due to increased availability of food in the form of feed unutilized by the cultured fish, the high abundances of opportunistic macroinvertebrates, and epifaunal organisms living on the culture structure or which fall to the bottom.

Introduction of exotic species - If culture operations require the importation of live material into the state, the potential introduction of exotic species probably represents the greatest environmental threat posed by mariculture. Introduced species may establish self-sustaining wild populations, potentially becoming pests or eliminating native species. While there appears to be little risk of this occurring for those species currently being deliberately introduced for culture in Puget Sound, requests for future introductions should be carefully evaluated in this regard.

Accidental introduction of pests, parasites and diseases associated with imported organisms may also occur. Because of this risk the state has placed many restrictions on the type of organisms which may be imported and the steps which must be taken before live material destined for aquaculture may be placed in state waters. The adequacy of these regulations is currently being evaluated.

Diseases - Some concern has been expressed that the culture environment may serve as a reservoir for those diseases which are present in an environment, but demonstrating no clinical symptoms in wild fish. There is a fear that the disease organism may proliferate among the cultured fish, become more virulent, and reinfect the wild stocks. However, there is no evidence to indicate that this scenario has ever occurred. The outbreak of a disease is often associated with some form of stress. In the culture environment, fish may be stressed by overcrowding, undernourishment, poor water quality and physical damage associated with handling and confinement. Thus, while fish held in culture are likely to show more frequent appearance of disease than wild fish, disease does not appear to be transmitted to the wild populations.

The bacterial diseases of salmonids in mariculture are not transmissible to humans. However, some investigators have questioned whether the organic enrichment of bottom sediments caused by mariculture could promote the growth of those species pathogenic to humans. Consumption of shellfish collected in the vicinity could then serve as a route for human infection. This is an issue where available scientific evidence is very meager, but experience to date has failed to show cause for concern. Increased bacterial abundance in sediments beneath a mariculture facility is quite probable, but it has not been demonstrated that this increased abundance is of any significance in terms of human health.

Genetic effects - The issue of the genetic effects of mariculture is largely speculative. Cultured organisms may be at a competitive disadvantage with respect to wild individuals. Thus, if escapes and interbreeding with the wild population occur, there may be some temporary loss of reproductive capacity in the wild population resulting from the production of less fit genotypes. The potential magnitude of this effect is dependent upon the proportion of the breeding population comprised of escaped animals.

The potential consequences of the interbreeding of escaped and wild organisms, if any at all; are unclear. However, for salmonids at least, the potential magnitude of the problem would seem minimal. For decades fisheries management agencies have routinely been transferring hatchery-reared salmonids between river systems to improve commercial and recreational fisheries. The number of fish which might escape from mariculture is negligible in comparison.

Toxicants - Salmon net-pen culture in Puget Sound requires the occasional usage of antibiotics, most frequently oxytetracycline. The potential environmental effects of this usage are minimized by the high water solubility of the compound, rapid dilution with the surrounding water and the infrequency of its use. Although, there is very little information available, the use of oxytetracycline does not appear to be a major problem at the present level of mariculture development in Puget Sound.

Modeling of Environmental Effects

Mathematical models are not yet available which provide reliable a priori estimates of the effect of mariculture on the receiving water body. As a short-term solution, a model is proposed to predict the changes in dissolved oxygen or metabolite concentration only in that parcel of water which passes directly through a culture structure. Since the model neglects the role of dilution by the surrounding water mass, it does not provide a definitive solution to modeling water quality. However, the model may have applications to site evaluation or the determination of maximum allowable culture intensity in a given area.

Sedimentation models would be valuable in predicting the depth and spatial extent of the accumulation of organic-rich sediments around a culture structure. Analytical models which predict this accumulation based entirely on properties of the settling particles and the moving fluid are beyond the current state-of-the-art. Empirical models are limited by site-specificity, but they represent the only modeling approach of immediate utility. A simple empirical model originally developed for net-pen culture of yellowtail in Japan is described. Given field measurements of particle settling velocity and current regime, the model is able to predict the depth of sediment accumulation as a function of distance from the culture structure.

Environmental Regulation of Mariculture

A review of environmental regulations pertaining to mariculture indicates that the policies of Washington State are generally comparable to those of many of the other states and countries surveyed. In general, the potential environmental consequences of mariculture are assessed on a site-specific and case-by-case basis. Applications for mariculture permits are usually subject to a review process which includes an opportunity for the responsible government agencies to evaluate potential environmental effects. There are typically few, if any, formalized criteria with regards to siting and operation.

Importation of eggs or live animals typically requires a permit from the responsible government agency. The permit will carry with it certain conditions which, depending on the particular state or country, may include restrictions on the country of origin, visual and/or pathological inspections, periods of quarantine, or disinfection requirements. Policies governing importation are tending to become more restrictive, and in several countries there is a total ban on the importation of eggs and/or live animals.

MARICULTURE
ISSUES AND PROPOSED GOALS AND GUIDELINES

PLANNING TEAM DRAFT

PRINCE WILLIAM SOUND AREA PLAN
PRINCE OF WALES ISLAND AREA PLAN

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INTRODUCTION TO MARICULTURE IN ALASKA

The headlines of the Southeastern Log on August 25, 1986 read, "Mariculture, a boom about to happen." In recent months, with the state economy on the skids and people taking a fresh look at options for finding viable and stable economic projects in the state, the subject of mariculture has been receiving increased interest. In just this year alone, DNR has issued a total of XXXXXX permits for mariculture. An additional XXXXXX applications are currently waiting to be processed. Along with the increase in the number of permits issued there also has been an increase in the number of voices that are identifying problems with mariculture. User groups, local residents, native corporations and federal agencies are identifying conflicts that have not been clearly articulated to date since up until recently mariculture received only minor interest in the state. The department does not have a clear policy or set of guidelines for dealing with mariculture.

This paper is intended to be a starting point for discussions that will result in DNR policy. The paper first outlines the department's proposed goals for mariculture. Then, issues that have been identified are presented and recommendations made. Those recommendations that are accepted will be included in the Prince William Sound and Prince of Wales Island Area Plan Agency Review drafts as area wide policies and guidelines for mariculture. The plans may also identify areas where mariculture is a designated use or a prohibited use based on its compatibility or incompatibility with other important uses of state tidelands.

Proposed Definition of Mariculture. The culture and husbandry of marine aquatic organisms, including but not limited to fish,* shellfish, mollusks, crustaceans, kelp and other algae. This does not include fish hatcheries.

*Note: At this time, rearing salmon is not legal in Alaska. Two identical bills were introduced in the legislature on February 4, 1987 (HB 108 and SB 106) that would enable finfish mariculture to be allowed through a change in regulations by the Department of Commerce and Economic Development.

Issue 1: DNR Goals

Description of the Issue

Mariculture is a new industry in Alaska and has potential to play a role in a diversified state economy. For these reasons the Department of Natural Resources supports mariculture development along with other uses of state lands.

The competition between mariculture and other uses is the subject of the rest of this paper. At this point, it is important to

establish the department's goals for mariculture. The proposed goals are as follows.

Proposed Goals for Mariculture

- GOAL #1 Economic Opportunities and Community Development.
Opportunities to increase income and diversify the state's economy through the use of state tide and submerged lands for mariculture.
- GOAL #2 Optimum Use of Areas. The optimum use of the most suitable mariculture areas.

Issue 2: Competition Between Mariculture and Other Commercial and Industrial Uses of State Tide and Submerged lands.

Description of the Issue

The best sites for mariculture facilities may often be the best sites for other uses such as mineral or timber transfer and support facilities, log storage, commercial fishing anchorages, or commercial recreation development. Although mariculture is a new industry in Alaska, experiences in British Columbia and Washington have demonstrated there can be conflicts with other uses.

Timber and Mineral Development. Besides the need for space, water quality standards for mariculture may preclude the use of favored sites for other commercial or industrial facilities. Forcing more stringent mitigation measures or alternative siting for timber or mineral transfer or tailings disposal could reduce or eliminate the economic viability of the resource extraction industry in a given area.

Conversely, mineral or timber transfer, log storage, and floating camps associated with resource development activities may limit the space available or degrade water quality for mariculture facilities, thus making mariculture development more difficult and less likely.

In Washington State mariculture sites have created navigational hazards. Log rafts towed by tugboats need ample space to navigate and may be effectively blocked by a mariculture facility.

Commercial Fishing. Mariculture sites are often located in good anchorages for protection from the weather. Though operations may initially be small (1-3 acres), mariculture sites can grow to be, or even start, quite large (over 20 acres). Use of bays as important anchorages by the fishing fleet and associated operations, such as fish buyers, could slowly be displaced as the

mariculture facility expanded. A fishing boat at anchor requires considerable room to allow for changing tides, winds and currents. Although permits retain legal public access outside of improvements, the area remaining may not be sufficient to allow for adequate anchoring in smaller coves with expanding mariculture facilities. There is also the potential for commercial setnet sites, purse seine hook-offs, and other commercial harvest areas to be blocked by mariculture facilities.

Recreation. As a result of human waste, high coliform develops in the vicinity of high recreational boat use, wharves and marinas. Commercial fishing operations (tenders, seiners, etc.) experience similar coliform counts. Washington prohibits mariculture within one-quarter mile of state parks, popular recreation areas and anchorages, and primary navigational routes. There is also the potential for toxic effects from bottom paints on boats.

Mariculture. Mariculture operations may compete with other mariculture operations for space and for food carried by the tidal currents. They may also impact each other by transmitting disease or lowering down-current water quality. Separation guidelines in British Columbia and Washington require 0.8 kilometer (proposed to be increased to 3 km) and 2 miles respectively between most operations.

Current Process for Addressing the Issues

The department has no policy to guide adjudicators when potentially conflicting uses are proposed for the same area. Some of the issues raised above are addressed under the current permit review process. The Army Corps of Engineers and the Department of Environmental Conservation do a public notice for concerns related to navigation, wetlands, and water quality. Adjacent upland owners who might be planning mineral or timber development are notified of the proposed project by DNR adjudicators.

However, the DNR permitting process does not require public notice (a lease does), so concerns of competing tideland users are not specifically sought through a public process. This can make it difficult to assess the potential conflicts between proposed mariculture facilities and other uses such as existing mariculture facilities, anchorages used by the commercial fishing fleet, or potential timber or mineral development sites.

Recommendations

There are several fundamental assumptions underlying the policies and designations proposed as the means to address the issues raised here. First, it is assumed that there are enough suitable tideland sites to avoid potential conflicts and accommodate all potentially competing uses somewhere without having to unreasonably restrict any use. Fortunately, Prince William Sound has a

long, 3,200-mile, coastline with many capable mariculture sites. There is only a small portion of that coastline where developed uses are planned that could preclude mariculture. Therefore, an appropriate method for accommodating and encouraging the mariculture industry in the Prince William Sound will be to allow mariculture in most areas and rely on siting guidelines to resolve potential conflicts.

* A second assumption is that some uses may be restricted in some areas in order to avoid conflict. The general approach is to only restrict uses where there is an absolute conflict that cannot otherwise be reasonably mitigated. Where a choice has to be made, the use with the greater public benefit and fewer options for alternative siting will be favored. The Prince of Wales Island Area Plan proposes alternative approaches to designations for mariculture while the Prince William Sound Plan will deal with the issue primarily through guidelines.

The third assumption is that, unlike some uses such as mineral and timber transfer and support facilities, it is doubtful that there will be adequate data to allow the identification and designation of many areas for mariculture.

The following guidelines are intended to help managers fairly balance potentially competing uses when they make tideland allocation decisions the plans do not have the information to make now.

For Prince of Wales Island Area Plan Guideline A below should be reviewed under the assumption that the alternative that does not prohibit mariculture in any areas is chosen.

Guidelines for competing commercial uses

- A. Mariculture and Competing Uses. Mariculture is encouraged on all state tidelands where there is not a significant competing use. The siting of mariculture facilities is discouraged on all tidelands designated for log transfer or storage, mineral transfer or access, or other commercial activities. These areas will be available for mariculture (a) if the land manager determines that it is possible to site, design, and operate the two or more uses compatibly in the area, or (b) there is no feasible and prudent alternative for mariculture while one exists for the competing use. In no case will mariculture be allowed to foreclose access to mineral, timber, or developed recreation resources unless a feasible or prudent alternative assessment exists. In some cases it may be in the public interest to concentrate uses in one bay, (i.e. pen-reared salmon and timber transfer) rather than allowing the proliferation of uses in many bays.
- B. Separation Between Facilities. Mariculture operations will be sited to avoid the risk of disease transmission and competition for food from existing mariculture developments.

Permitted mariculturists that may be affected by a proposed operation should be notified and given an opportunity to comment. Generally, a two mile separation should exist between finfish operations. Other types of mariculture, such as shellfish may be more closely grouped together.

Issue 3. Mariculture and Upland Management.

Description of the Issue

Mariculture may affect activities on adjacent and nearby uplands. Resource extraction on the uplands, even without associated support facilities on the tidelands, may, for instance, affect water quality or reduce wind protection. Forcing mitigation on the upland manager to protect mariculture facilities could reduce or eliminate economic viability of upland resource development.

Mariculture generally requires a caretaker for feeding and security purposes. At this time, DNR permits for mariculture are generally only for the actual mariculture facilities. Caretaker facilities require a separate permit. Upland managers (primarily the USFS) are reluctant to issue permits for caretaker cabins because of the implied permanence and the potential for abandonment. Therefore, where caretaker facilities are not addressed in the tidelands permit and where decisions on the tidelands are not coordinated with the upland owner, floathouses or upland cabins are likely to be placed in trespass.

The economic viability of the mariculture operation may be in jeopardy if the upland owner does not grant the operator the right to use the uplands for needed support facilities, thus forcing the operator to develop more expensive floating facilities.

Because of access to transportation systems and commercial support services, mariculturists may find it economical to locate near communities. However, mariculture may also be incompatible with residential uses on adjacent uplands. Sewage disposal, theft, the potential for trespass, aesthetic concerns, and competition for tideland space by upland residents can make mariculture undesirable directly adjacent to residential areas.

Current Process for Addressing the Issues

Under the current DNR permit review process, the immediately adjacent upland owner is notified during the coastal consistency process. Nearby upland owners whose activities may be impacted by the stringent water quality standards of mariculture are notified only in the DEC/COE public notice. By procedure, DNR permittees in the southeast region request applicants to submit applications or identify the method of caretaking. The department does not have a policy on what to do if upland owners object to mariculture facilities.

Recommendations

Proposed guidelines for upland owner concerns

- C. Coordination with the Upland Manager. The department will try to coordinate its management of the tidelands with the needs of the upland owner. While the department can neither put a moratorium on permitting mariculture facilities adjacent to private or federal uplands nor close those areas to mariculture, it will endeavor to coordinate its tideland management with the upland needs. On the other hand, upland owners are encouraged to locate areas where mariculture (including upland facilities) should be encouraged and to communicate their conclusions to the department and to the mariculture industry.
- D. Upland Owner Objections. An application for mariculture facilities adjacent to private or federal land will be approved if the application meets the other guidelines of this plan, and either the applicant has the approval of the upland owner or the department receives no objection from the upland owner. If the upland owner does object and suggests a feasible alternative site (one that is both physically suitable, meets both the guidelines of this plan and other permit requirements, and has the approval of that upland owner), the department will uphold the upland owner's objection. If the objection is not accompanied by the suggestion of a feasible alternative site, the department will adjudicate the permit or lease application considering at least the following:
- (1) the feasibility of using site design and/or operating stipulations to minimize or eliminate the objection;
 - (2) the presence or absence of feasible alternative sites where there would be no conflict between upland management and mariculture facilities; and
 - (3) the cost to the public or the upland owner of approving the facility.
- E. Permission of Upland Owner. Permits/leases will not be granted for applications that show support facilities, including shoreties, on the adjacent uplands unless there is a demonstrable agreement between the applicant and the upland owner. The term of the lease/permit will not be longer than the term of the agreement between the applicant and the upland owner. If the applicant has not made arrangements for the use of the adjacent uplands, the application must show how all necessary housing, warehousing, processing and other associated uses will be accommodated on the tidelands.

- F. Consistency with State Upland Management. Mariculture facilities adjacent to state uplands will be consistent with the upland management intent.

** See also guideline V for coordinated permitting proposal.

Issue 4: Mariculture and Public Use

Description of the Issue

Mariculture sites may effectively block or inhibit public access to important recreation and subsistence use areas. The expectation and desire for seclusion when recreating in rural Alaska is highly valued by residents and visitors. If the sense of seclusion is lost an important part of the aesthetics of many bays is lost and the recreational experience is less valuable. A mariculture facility, particularly with caretaker facilities and in a smaller cove, will essentially eliminate that sense of seclusion for recreation users other than the permit holder. The tendency will be for traditional recreational users of the cove to find other, secluded and aesthetically pleasing areas. This is a significant problem in Washington, British Columbia and California. The Washington Department of Ecology has documented the aesthetic impacts of mariculture in Puget Sound. British Columbia placed a moratorium on issuing permits partly because of aesthetic effects.

These experiences, plus some here in Alaska, demonstrate that activities affecting the natural and scenic features of an area may cause controversy. Interestingly, AS 41.21.302 specifically allows aquaculture facilities in the State Marine Park system. The Division of Parks and Outdoor Recreation interprets aquaculture in this statute to mean only facilities operated by the Department of Fish and Game.

In order to protect their investment from sewage discharge, theft, etc., mariculturists may discourage recreationists from using the area. In other states and in Canada bays have been roped off and shots fired to discourage public use of areas with mariculture facilities.

The noise and general effects of local habitation associated with mariculture will also tend to displace wildlife. Mariculture employees will increase competition for resources such as beach logs, berries, and wildlife. Facilities may also bar access to or directly impact traditional harvest areas.

Current Process for Addressing the Issue

Land Use Permits technically allow public access to all but the actual physical improvements covered under the permit. Thus, some of the problems are primarily ones of perception and enforcement and not legality. Access is addressed through the Coastal Consistency process, but public notice for area users to

comment is not included in the DNR permit review process. Besides the coastal standards, DNR only has the general policy that legal public access be maintained along state tidelands.

Recommendations

In general, mariculture facilities are compatible with dispersed recreation. However, in chapter 3 of the Prince William Sound Area Plan mariculture will be discouraged from high use areas where the amount of recreation currently exceeds or is projected to exceed the capacity of the available anchorages or campsites. In addition, mariculture -- especially the caretaker facilities -- are discouraged in Prince William Sound in areas proposed for wilderness, tourist attractions (like the Columbia Glacier), and adjacent to developed recreating facilities. In both plans access will be maintained to resources such as campsites, fishing/hunting areas, anchorages, and trails.

For Prince of Wales Island Area Plan the following guidelines should be reviewed under the assumption that the alternative which does not prohibit mariculture in any areas is chosen.

Proposed Guidelines for recreation and public use conflicts

G. Use of Anchorages and Recreation Areas. Mariculture is discouraged from designated or other important anchorages, campsites, or high use recreation areas where the land manager finds that mariculture will significantly diminish the remote, secluded nature of the anchorage or would significantly diminish its capacity. These areas are delineated in the management intent discussions or on the maps in Chapter 3 of the plans.

H. (Prince William Sound only) Developed Recreation Facilities. Mariculture is not allowed adjacent to designated recreation sites or developed recreation facilities unless the facility manager or the land manager determines that the two uses can be made compatible by design, siting, or operating guidelines.

I. Mariculture Caretaker Facilities. Floating caretaker facilities for mariculture operations are encouraged in areas where there is no significant competing use. Floating caretaker facilities for mariculture operations will not be allowed in designated recreation or personal use areas unless the regional manager determines that there is no feasible or prudent alternative. The determination will be made available for public comment.

J. Access to trails and other public access points. Mariculture will not foreclose public access to important

clamming areas, trails, public beaches or other similar public resources.

Issue 5: Mariculture Facilities in Crucial and Prime Habitat Areas

Description of the Issue

In his 1986 report entitled, "The Environmental Effects of Floating Mariculture in Puget Sound," Dr. Donald P. Weston, of the University of Washington School of Oceanography, found that few negative impacts from mariculture operations on fish and wildlife or their habitats have been substantiated. However, there is the possibility that significant habitats, such as eel grass beds, and species such as geoducks could be buried by debris and lost. Furthermore, mariculture facilities, like any other floating facility, can block fish passage if placed in the mouth of a fish stream they can compact productive substrates if allowed to ground.

Marine mammals are attracted to the concentration of delectable food contained within mariculture facilities. The presence and "trespass" of marine mammals can be a nuisance to mariculturists. Unfortunately, they not only cause the mariculturists grief but also put themselves at risk by becoming entangled in the nets and occasionally drowning. In Washington state, some mariculturists have received exclusion to the Marine Mammal Protection Act and are allowed to kill marine mammals that are a nuisance to their operation.

Petroleum spills may cause long term degradation of the habitat value of public tidelands and may impact adjacent mariculture facilities. The impacts are worse where currents and flushing are minimal.

Current Process for Addressing the Issue

Agency review of leases and permits is the process now used to identify potential conflicts between mariculture and habitat areas. DNR permits do not receive public review nor are adjacent mariculturists or some nearby upland managers asked to comment (the directly adjacent upland owner is given notice), therefore, many potential conflicts may not be identified at the time the permit decision is made. The Corps of Engineers and Department of Environmental Conservation issue public notices and copy any comments to DNR.

DEC does not regulate oil and gas storage below XXXXXX gallons, so there is no formal method of addressing this potentially significant issue. ADNR has in the past required stipulations on its land use permits that address petroleum storage below amounts covered under DEC regulations.

Recommendations

Outlined below are guidelines that will be used to help managers decide how to avoid potential conflicts between Mariculture facilities and crucial or prime habitats.

Proposed guidelines for mariculture in significant habitats

- K. (Prince of Wales only) Siting in Certain Habitats. Mariculture facilities should not be sited on or within 300 feet of extensive kelp or eelgrass beds; seaweed harvest areas; or shellfish concentration areas (as identified in the ADF&G Regional Guides or determined by ADF&G) unless the manager determines after consultation with ADF&G that there is no feasible and prudent alternative.
- L. Siting Near Anadromous Fish Streams. Mariculture facilities will not be sited within 300' of the mouth of a catalogued anadromous fish stream at Mean Lower Low Water without the approval of ADF&G.
- M. (Prince of Wales only) Siting Near Marine Mammals and Seabirds. Mariculture facilities will be at least one-half mile from marine mammal and seabird concentration areas (as identified in the ADF&G Regional Guides or determined by ADF&G).
- N. Designing to Prevent Marine Mammal Entanglement. Mariculture facilities should be designed to prevent entanglement of marine mammals.
- O. Dissolved Oxygen Depletion. Pens will not be sited where respiration and biochemical oxygen demand will significantly depress dissolved oxygen concentrations or where nutrient input attributable to net-pen culture will affect the frequency, extent, intensity or duration of phytoplankton blooms.
- P. Tri-n-butyltin. Tri-n-butyltin should not be used as an antifouling agent on nets.
- Q. Water Circulation. In order to maintain water circulation and flushing action which disperses pollutants, net-pens should occupy no more than one-third the water column depth.
- R. Storage of Petroleum Products. Petroleum products will be stored in a manner that will prevent spillage onto the tidelands or aquatic waters.
- ** See also Guideline X2 for policy on grounding at mean lower low water.

Issue 6: Floathomes and Mariculture

Description of the Issue

There is potential for coliform pollution of mariculture sites from nearby floathome waste water discharge. The waste of one person requires 8 million cubic feet of water to dilute to acceptable standards. Greywater presents related problems. These concerns are the same for floating mariculture caretaker facilities.

While few floathouses exist in Prince William Sound, there are up to 100 unauthorized floathomes on Prince of Wales Island. These may not conform to DEC wastewater standards. They occupy potential sites for mariculture development. Refer to the issue papers and proposed guidelines for floating settlement facilities under Floathomes in the Draft Plan.

Current Process for Addressing the Issue

The current permit process does not require DNR public notice for floathomes (although the COE and DEC do a joint notice) so mariculture permit holders do not get a chance to comment on proposed floathome permits. Since most floathome owners do not bother to get permits it is almost impossible to control the problem before it occurs and a complaint is filed.

Proposed guidelines for floathome conflicts

S. Highest Economic Benefits. Where there are conflicts between floathomes and other uses, the department generally will decide in favor of the applicant with the greatest economic benefit to the state. Except for areas designated for floathome settlement, competing applications between floathomes and mariculture will favor economically viable mariculture unless the regional manager determines it is in the state's interest to permit the floathome or there are more reasonable and prudent alternatives for the mariculturist. Where a floathome is already permitted at a site proposed for a mariculture facility, the regional manager will determine if there are feasible and prudent alternatives for the mariculture operation and weigh the impacts on the permitted floathome resident. Unpermitted floathomes will not be given any standing in the permit adjudication process. This guideline also applies to floating caretaker facilities for mariculture.

** See also Guideline I for policy on floating caretaker facilities.

** See also Guideline W for policy on public notice.

** See also Guidelines on Floathomes.

Issue 7: Speculation and Economic Viability

Description of the Issue

Aquaculture permits do not require proof of economic viability or intent. A non-existent or perennially non-profitable operation may continue to occupy a favorite bay to the detriment of other public benefits or uses and other mariculture operations. There is concern that permits are secured for speculation purposes, making the area unavailable to legitimate applicants. For example, only a small percentage of existing mariculture permits in Southeast actually have development on them, let alone produce seafood.

Mariculture permits may be used as a front for acquiring a private secluded residence or vacation home on public lands. A small oyster raft next to a floathouse might grease the wheels for getting the right to use a particular bay for an exclusive private residence. The mariculture permit may provide a loophole for obtaining a USFS Special Use Cabin Permit.

Current Process for Addressing the Issue

Economic viability is currently not addressed in ADNR permitting. The USFS requires an Environmental Assessment and economic prospectus in order to issue a "Special Use Permit" for commercial upland facilities, this includes support facilities or caretaker cabins for aquaculture sites. The USFS is not inclined to issue "Special Use Permits" for aquaculture support facilities until an operation is proven to be successful.

Proposed guidelines for speculation and economic viability

- T. Performance Standards. The Regional Manager will attach reasonable performance standards to the permit or lease for project development and operation. The performance standards are to ensure the permitted area is used for the approved activity, the proposal is economically viable, and the permit is not held for speculation or removal of a land base from competition. In all cases the approved development plan must be adhered to. If the performance standards are not met, the permit or lease may be cancelled.
- U. Clean-up Bonds. A clean-up bond may be required to protect existing resources for future use.

Issue 8: Permit Procedures

Description of the Issue

Agencies requiring permits related to siting of mariculture facilities include the Departments of Natural Resources, Environmental Conservation, possibly Fish and Game, and the Army Corps of Engineers. The upland land owner/manager may also require permits. Separate applications are required from each agency. The Division of Governmental Coordination coordinates review of

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these permits plus makes a determination of consistency with the Alaska Coastal Management Plan. Applicants are burdened with competing redundant application information while agencies have difficulty acquiring the necessary information to make good permitting decisions.

The issues of competing uses (Issues 2, 3, 4, 5 and 6) can only be resolved in the public's best interest if all available information is used in making the decision. To ensure that all available information is applied to the permitting/leasing decision, it is proposed that a coordinated permitting/leasing process be developed so that all potentially competing interests and all affected agencies be given a chance to review, comment on and make decisions on a proposal at the same time. A coordinated process like the "Tri-agency Permit" used for mining could have the added advantage of making both the applicant's and the agencies' task simpler and more efficient, thus encouraging the development of the mariculture industry without foreclosing other valuable uses of state tide and submerged lands.

This process would have to include all of the agencies involved in reviewing and permitting mariculture activities and upland owners and be coordinated with other permitting procedures such as the ACMP consistency review process.

Proposed guidelines for mariculture permitting and leasing

- V. Coordinated Permitting. The Department of Natural Resources will support development of a coordinated permitting/leasing process with other agencies if it will meet the following objectives: 1) the process will lessen the application complexity for prospective mariculturists; 2) the process will provide for better agency decision making; and 3) each agency maintains its' own decision making authority.
- W. Public Notice for Mariculture Facilities. Public notice of a proposed permit or lease for mariculture facilities will be given under AS 38.05.945 or its equivalent. Permits will be treated as a lease for public notice purposes, including notification in a local newspaper. However, joint DNR notification with the DEC/DGC public notice is encouraged if practical. Copies of the public notice should be sent to adjacent upland land owners such as U.S. Forest Service and native corporations and other mariculturists within affected waters and communities (such as the postmaster) or 25 people or more within 6 miles of the proposed activity. If it is known, the public notice should mention that the proposed activity may impact resource development, commercial fishing, or recreation use and anchorages in the vicinity.
- X. Development Plans. A development plan will be required before a lease or permit application for mariculture facilities is approved. The preferred approach is for the application and development plan requirements to serve (at the

minimum) as the basis for DNR, ADF&G, DEC, ACMP, and upland owner review approval.

The application and development plan will require the applicant to provide the following information. The application form will give the applicant policy guidance on several issues. Any changes to the development plan after authorization is given will be submitted to the Regional Manager for a determination if project review will be reinitiated.

1. Describe the species to be raised. A permit or lease will be issued for a specified species. Raising a different species will require a new permit or lease.
2. Describe the size and type and map the location of all floating and shore-based mariculture facilities needed over the life of the project. The map should include the general location of the facility on a 1:63,360 or equivalent map. The development plan map should be of a size and scale that will readily indicate the location and size of all facilities with reasonable proportion and scale and relation to the shoreline.

Facilities such as rafts or pens should be indicated with size, location, and configuration. Fresh water sources and access to roads or markets should also be shown. The map will also indicate mean high water, mean lower low water, depths below the facilities, and water circulation patterns. Except where specifically allowed, facilities may not ground at mean lower low water. All facilities will be reviewed and authorized at one time.

Other plan guidelines and the Alaska Coastal Management Plan Standards should be used for guidance in designing an acceptable development plan.

3. Describe the size and map the location of areas to be used for temporary storage of equipment, supplies or shellfish pending paralytic shellfish poisoning test results and shipping. Because they are less biologically productive than saltmarshes and tideflats, gravel and sand beaches are generally the preferred sites for on-shore storage of shellfish while waiting for PSP test results and shipment.
4. Describe the method of anchoring floating mariculture facilities. Anchoring must be adequate to keep the facility from breaking loose and creating a hazard to other users or habitats. When siting mariculture facilities, public access will be maintained to and along public tidelands. Shoreties will not be used for anchoring mariculture facilities in significant

recreation or personal use areas or where public access or navigation would be adversely impacted unless doing so decreases the conflict between the mariculture facility and public access.

5. Describe the size and map the location of caretaker facilities. If floating or upland facilities are not shown, the method of housing persons responsible for caretaking and operating the facility must be described.
 6. Describe methods of wastewater treatment and disposal. (Only include if this is a cooperative process. DEC will want to insert standards here.)
 7. Describe methods of solid waste disposal. (Ibid)
 8. Describe the method of fuel storage.
 9. A schedule of development should be outlined for all facilities. Significant stages of development should be projected such as when the first young will be placed for growing and the first anticipated date of marketing the product.
 10. For fin fish operations producing more than 20,000 pound annually a site characterization survey should be submitted that includes: 1) a bathymetric survey of depth, range, and distribution of water and marine life (including predators); 2) a hydrographic survey of ebb and flood currents, temperatures, salinity, potential or existing sources of pollution, and level of storm protection; and 3) a diver survey of the biological resources during April to September including the level of plankton.
- Y. Coast Guard Approval. Permits or leases will not be given until the U.S. Coast Guard has certified that the proposed facility will not be a significant navigational hazard.

APPENDIX D

COMPILATION OF PROPOSED GOALS AND GUIDELINES FOR MARICULTURE

Proposed Goals for Mariculture

- GOAL #1 Economic Opportunities and Community Development.
Opportunities to increase income and diversify the state's economy through the use of state tide and submerged lands for mariculture.
- GOAL #2 Optimum Use of Areas. The optimum use of the most suitable mariculture areas.

Proposed Guidelines for Mariculture

- A. Mariculture and Competing Uses. Mariculture is encouraged on all state tidelands where there is not a significant competing use. The siting of mariculture facilities is discouraged on all tidelands designated for log transfer or storage, mineral transfer or access, or other commercial activities. These areas will be available for mariculture (a) if the land manager determines that it is possible to site, design, and operate the two or more uses compatibly in the area, or (b) there is no feasible and prudent alternative for mariculture while one exists for the competing use. In no case will mariculture be allowed to foreclose access to mineral, timber, or developed recreation resources unless a feasible or prudent alternative assessment exists. In some cases it may be in the public interest to concentrate uses in one bay, (i.e. pen-reared salmon and timber transfer) rather than allowing the proliferation of uses in many bays.
- B. Separation Between Facilities. Mariculture operations will be sited to avoid the risk of disease transmission and competition for food from existing mariculture developments. Permitted mariculturists that may be affected by a proposed operation should be notified and given an opportunity to comment. Generally, a two mile separation should exist between finfish operations. Other types of mariculture, such as shellfish may be more closely grouped together.
- C. Coordination with the Upland Manager. The department will try to coordinate its management of the tidelands with the needs of the upland owner. While the department can neither put a moratorium on permitting mariculture facilities adjacent to private or federal uplands nor close those areas to mariculture, it will endeavor to coordinate its tideland management with the upland needs. On the other hand, upland owners are encouraged to locate areas where mariculture (including upland facilities) should be encouraged and to

communicate their conclusions to the department and to the mariculture industry.

- D. Upland Owner Objections. An application for mariculture facilities adjacent to private or federal land will be approved if the application meets the other guidelines of this plan, and either the applicant has the approval of the upland owner or the department receives no objection from the upland owner. If the upland owner does object and suggests a feasible alternative site (one that is both physically suitable, meets both the guidelines of this plan and other permit requirements, and has the approval of that upland owner), the department will uphold the upland owner's objection. If the objection is not accompanied by the suggestion of a feasible alternative site, the department will adjudicate the permit or lease application considering at least the following:

(1) the feasibility of using site design and/or operating stipulations to minimize or eliminate the objection;

(2) the presence or absence of feasible alternative sites where there would be no conflict between upland management and mariculture facilities; and

(3) the cost to the public or the upland owner of approving the facility.

- E. Permission of Upland Owner. Permits/leases will not be granted for applications that show support facilities, including shoreties, on the adjacent uplands unless there is a demonstrable agreement between the applicant and the upland owner. The term of the lease/permit will not be longer than the term of the agreement between the applicant and the upland owner. If the applicant has not made arrangements for the use of the adjacent uplands, the application must show how all necessary housing, warehousing, processing and other associated uses will be accommodated on the tidelands.
- F. Consistency with State Upland Management. Mariculture facilities adjacent to state uplands will be consistent with the upland management intent.
- G. Use of Anchorages and Recreation Areas. Mariculture is discouraged from designated or other important anchorages, campsites, or high use recreation areas where the land manager finds that mariculture will significantly diminish the remote, secluded nature of the anchorage or would significantly diminish its capacity. These areas are delineated in the management intent discussions or on the maps in Chapter 3 of the plans.

- H. (Prince William Sound only) Developed Recreation Facilities. Mariculture is not allowed adjacent to designated recreation sites or developed recreation facilities unless the facility manager or the land manager determines that the two uses can be made compatible by design, siting, or operating guidelines.
- I. Mariculture Caretaker Facilities. Floating caretaker facilities for mariculture operations are encouraged in areas where there is no significant competing use. Floating caretaker facilities for mariculture operations will not be allowed in designated recreation or personal use areas unless the regional manager determines that there is no feasible or prudent alternative. The determination will be made available for public comment.
- J. Access to trails and other public access points. Mariculture will not foreclose public access to important clamming areas, trails, public beaches or other similar public resources.
- K. (Prince of Wales only) Siting in Certain Habitats. Mariculture facilities should not be sited on or within 300 feet of extensive kelp or eelgrass beds; seaweed harvest areas; or shellfish concentration areas (as identified in the ADF&G Regional Guides or determined by ADF&G) unless the manager determines after consultation with ADF&G that there is no feasible and prudent alternative.
- L. Siting Near Anadromous Fish Streams. Mariculture facilities will not be sited within 300' of the mouth of a catalogued anadromous fish stream at Mean Lower Low Water without the approval of ADF&G.
- M. (Prince of Wales only) Siting Near Marine Mammals and Seabirds. Mariculture facilities will be at least one-half mile from marine mammal and seabird concentration areas (as identified in the ADF&G Regional Guides or determined by ADF&G).
- N. Designing to Prevent Marine Mammal Entanglement. Mariculture facilities should be designed to prevent entanglement of marine mammals.
- O. Dissolved Oxygen Depletion. Pens will not be sited where respiration and biochemical oxygen demand will significantly depress dissolved oxygen concentrations or where nutrient input attributable to net-pen culture will affect the frequency, extent, intensity or duration of phytoplankton blooms.
- P. Tri-n-butyltin. Tri-n-butyltin should not be used as an antifouling agent on nets.

- Q. Water Circulation. In order to maintain water circulation and flushing action which disperses pollutants, net-pens should occupy no more than one-third the water column depth.
- R. Storage of Petroleum Products. Petroleum products will be stored in a manner that will prevent spillage onto the tidelands or aquatic waters.
- S. Highest Economic Benefits. Where there are conflicts between floathomes and other uses, the department generally will decide in favor of the applicant with the greatest economic benefit to the state. Except for areas designated for floathome settlement, competing applications between floathomes and mariculture will favor economically viable mariculture unless the regional manager determines it is in the state's interest to permit the floathome or there are more reasonable and prudent alternatives for the mariculturist. Where a floathome is already permitted at a site proposal for a mariculture facility, the regional manager will determine if there are feasible and prudent alternatives for the mariculture operation and weigh the impacts on the permitted floathome resident. Unpermitted floathomes will not be given any standing in the permit adjudication process. This guideline also applies to floating caretaker facilities for mariculture.
- T. Performance Standards. The Regional Manager will attach reasonable performance standards to the permit or lease for project development and operation. The performance standards are to ensure the permitted area is used for the approved activity, the proposal is economically viable, and the permit is not held for speculation or removal of a land base from competition. In all cases the approved development plan must be adhered to. If the performance standards are not met, the permit or lease may be cancelled.
- U. Clean-up Bonds. A clean-up bond may be required to protect existing resources for future use.
- V. Coordinated Permitting. The Department of Natural Resources will support development of a coordinated permitting/leasing process with other agencies if it will meet the following objectives: 1) the process will lessen the application complexity for prospective mariculturists; 2) the process will provide for better agency decision making; and 3) each agency maintains its' own decision making authority.
- W. Public Notice for Mariculture Facilities. Public notice of a proposed permit or lease for mariculture facilities will be given under AS 38.05.945 or its equivalent. Permits will be treated as a lease for public notice purposes, including notification in a local newspaper. However, joint DNR notification with the DEC/DGC public notice is encouraged if practical. Copies of the public notice should be sent to

adjacent upland land owners such as U.S. Forest Service and native corporations and other mariculturists within affected waters and communities (such as the postmaster) of 25 people or more within 6 miles of the proposed activity. If it is known, the public notice should mention that the proposed activity may impact resource development, commercial fishing, or recreation use and anchorages in the vicinity.

- X. Development Plans. A development plan will be required before a lease or permit application for mariculture facilities is approved. The preferred approach is for the application and development plan requirements to serve (at the minimum) as the basis for DNR, ADF&G, DEC, ACMP, and upland owner review approval.

The application and development plan will require the applicant to provide the following information. The application form will give the applicant policy guidance on several issues. Any changes to the development plan after authorization is given will be submitted to the Regional Manager for a determination if project review will be reinitiated.

1. Describe the species to be raised. A permit or lease will be issued for a specified species. Raising a different species will require a new permit or lease.
2. Describe the size and type and map the location of all floating and shore-based mariculture facilities needed over the life of the project. The map should include the general location of the facility on a 1:63,360 or equivalent map. The development plan map should be of a size and scale that will readily indicate the location and size of all facilities with reasonable proportion and scale and relation to the shoreline.

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Other plan guidelines and the Alaska Coastal Management Plan Standards should be used for guidance in designing an acceptable development plan.

3. Describe the size and map the location of areas to be used for temporary storage of equipment, supplies or shellfish pending paralytic shellfish poisoning test results and shipping. Because they are less

biologically productive than saltmarshes and tideflats, gravel and sand beaches are generally the preferred sites for on-shore storage of shellfish while waiting for PSP test results and shipment.

4. Describe the method of anchoring floating mariculture facilities. Anchoring must be adequate to keep the facility from breaking loose and creating a hazard to other users or habitats. When siting mariculture facilities, public access will be maintained to and along public tidelands. Shorelines will not be used for anchoring mariculture facilities in significant recreation or personal use areas or where public access or navigation would be adversely impacted unless doing so decreases the conflict between the mariculture facility and public access.
5. Describe the size and map the location of caretaker facilities. If floating or upland facilities are not shown, the method of housing persons responsible for caretaking and operating the facility must be described.
6. Describe methods of wastewater treatment and disposal. (Only include if this is a cooperative process. DEC will want to insert standards here.)
7. Describe methods of solid waste disposal. (Ibid)
8. Describe the method of fuel storage.
9. A schedule of development should be outlined for all facilities. Significant stages of development should be projected such as when the first young will be placed for growing and the first anticipated date of marketing the product.
10. For fin fish operations producing more than 20,000 pound annually a site characterization survey should be submitted that includes: 1) a bathymetric survey of depth, range, and distribution of water and marine life (including predators); 2) a hydrographic survey of ebb and flood currents, temperatures, salinity, potential or existing sources of pollution, and level of storm protection; and 3) a diver survey of the biological resources during April to September including the level of plankton.

Y. Coast Guard Approval. Permits or leases will not be given until the U.S. Coast Guard has certified that the proposed facility will not be a significant navigational hazard.

RECOMMENDED
INTERIM GUIDELINES
FOR THE
MANAGEMENT OF SALMON
NET-PEN CULTURE IN PUGET SOUND

Prepared for:

Washington Department of Ecology in conjunction
with the Departments of Fisheries,
Agriculture and Natural Resources

Prepared by:

Science Applications International Corporation

DECEMBER 1986

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FINAL REPORT

RECOMMENDED INTERIM GUIDELINES
FOR THE MANAGEMENT OF SALMON NET-PEN
CULTURE IN PUGET SOUND

December 30, 1986

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Director



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DEPARTMENT OF ECOLOGY

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February, 1987

To Local Government, State Agencies, Citizens, Culturists and Others Concerned with Salmon Pen Siting:

The Department of Ecology is pleased to release the final report "Recommended Interim Guidelines for the Management of Salmon Net Pen Culture". The guidelines and procedures were developed by Dr. Donald Weston of Science Applications International Corporation in close consultation with staff and management of the Department of Fisheries, the Department of Natural Resources, and the Department of Agriculture. The guidelines are based on a previous study by Dr. Weston entitled "The Environmental Effects of Floating Mariculture in Puget Sound". In order to best apply the information from that work, Ecology contracted for the current report to identify siting and operational guidelines for use in reviewing salmon net pen proposals in Puget Sound.

In addition to consultations among the four state agencies, input was solicited and received from numerous scientific authorities, environmental groups, tribes, industry representatives, local government, and other interested groups and individuals. Ecology believes these siting and operational guidelines are based on the best information currently available. The guidelines provide criteria for selection of culture sites, husbandry practices, monitoring programs and state reporting requirements, which mitigate most anticipated adverse environmental effects. Projects that meet these guidelines are expected to result in minimal impacts to water quality, bottom sediments and critical habitats. The guidelines do not address issues such as aesthetic impacts or navigation conflicts that also must be considered during the permitting process.

The guidelines are not designed to be adopted state regulations. They are intended to be used by decision-making agencies as guidance for the interpretation and application of existing policy and regulations. As such, they will be valuable to culturists, local government, state agencies, citizens and all those with interest in the net pen culture industry. The department appreciates the concern and effort of all those who contributed to these recommendations.

Sincerely,

A handwritten signature in cursive script that reads "Andrea Beatty Riniker".

Andrea Beatty Riniker
Director

ABR:bh

Enclosure

cc: Joseph J. Blum, Director
Department of Fisheries
Brian Boyle, Commissioner
Department of Natural Resources
C. Allan Pettibone, Director
Department of Agriculture

Acknowledgments

The interim guidelines for the management of salmon net-pen culture were prepared by Donald P. Weston of Science Applications International Corporation in conjunction with the following agency staff:

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GUIDELINE SUMMARY

PURPOSE AND SCOPE

The recommended interim guidelines are intended to provide a basis for a coordinated agency approach to the management of salmon net-pen culture in Puget Sound until completion of the programmatic Environmental Impact Statement (EIS). The goal of the guidelines is to avoid significant adverse environmental effects from net-pen operations permitted prior to completion of the programmatic EIS. This objective is pursued through a combination of recommendations for project siting, operational practices, and an annual monitoring program. It is the opinion of state agencies that those facilities sited and operated in accordance with these guidelines will result in little or no adverse environmental effects within those areas of potential impact addressed by the guidelines. It is anticipated that both state environmental managers and local authorities will rely heavily upon these guidelines in their review of culture applications and in their assessment of the potential environmental effects of these operations. The guidelines are not intended to replace existing regulations, master programs or local ordinances. The Department of Natural Resources Commissioner's Order of September 9, 1986 will be reviewed by DNR in light of these guidelines, and modification of the order will be given consideration.

These guidelines address net-pen operations which have not yet been permitted. They do not apply to projects already in operation or permitted unless these facilities undergo significant expansion or modification of their original permit specifications. In this case the expansion or modification may be evaluated for consistency with these guidelines.

The guidelines address all net-pen operations in which salmon are grown with the intent to harvest and market the fish upon attainment of sufficient size. The guidelines do not apply to net-pen operations in which salmon are held exclusively for delayed release to enhance wild stocks.

The geographic areas in which these guidelines apply include Puget Sound, the Strait of Juan de Fuca, the Strait of Georgia.

These guidelines are intended to provide siting and operational criteria until a programmatic EIS for salmon net-pen culture can be completed. These recommendations will then be reviewed for adequacy, revised as necessary, and adopted as part of a state management plan for the salmon net-pen industry.

The interim guidelines are generic in nature. It has not been possible to consider all potential site-specific variables, thus, the guidelines are intended to be flexible and do not eliminate the need for careful case-by-case review of permit applications. It is anticipated that site-specific conditions may require the guidelines to be made more restrictive or relaxed on a case-by-case basis. If a given project is made subject to restrictions or requirements not specified in these guidelines, state and/or local officials, if requested, should provide the applicant with an explanation of the environmental reasons for doing so. If relaxation of these guidelines is requested, it should be the responsibility of the applicant to demonstrate that deviation from these guidelines can be made with minimal environmental effect.

The guidelines have been developed entirely with the goal of environmental protection, and do not address social, economic, aesthetic or water/land use conflicts which must also be given consideration on a case-by-case basis.

GUIDELINES

1. Accumulation of feed and feces under the net-pens is minimized by guidelines which consider the size of the operation, the depth of water beneath the net-pens and the mean current velocity as measured mid-way between the bottom of the net-pens and the sea floor. Net-pen operations have been divided into size classes I through III. Depending on the size class of the operation, the minimum depth recommended beneath the net-pens ranges from 20 to 60 feet (Figure 1).
2. The habitats listed in Table 1 are considered to be of special significance and are therefore afforded an additional margin of protection from the potential accumulation of feed and feces. If these habitats are present in depths of 75 feet or less, net-pens should not be located over these habitats, within 300 feet in the direction(s) of prevailing tidal currents, or within 150 feet in any other direction. The Washington Department of Fisheries will have responsibility for the designation of and assessment of impacts on plant, invertebrate and fish habitats of special significance.

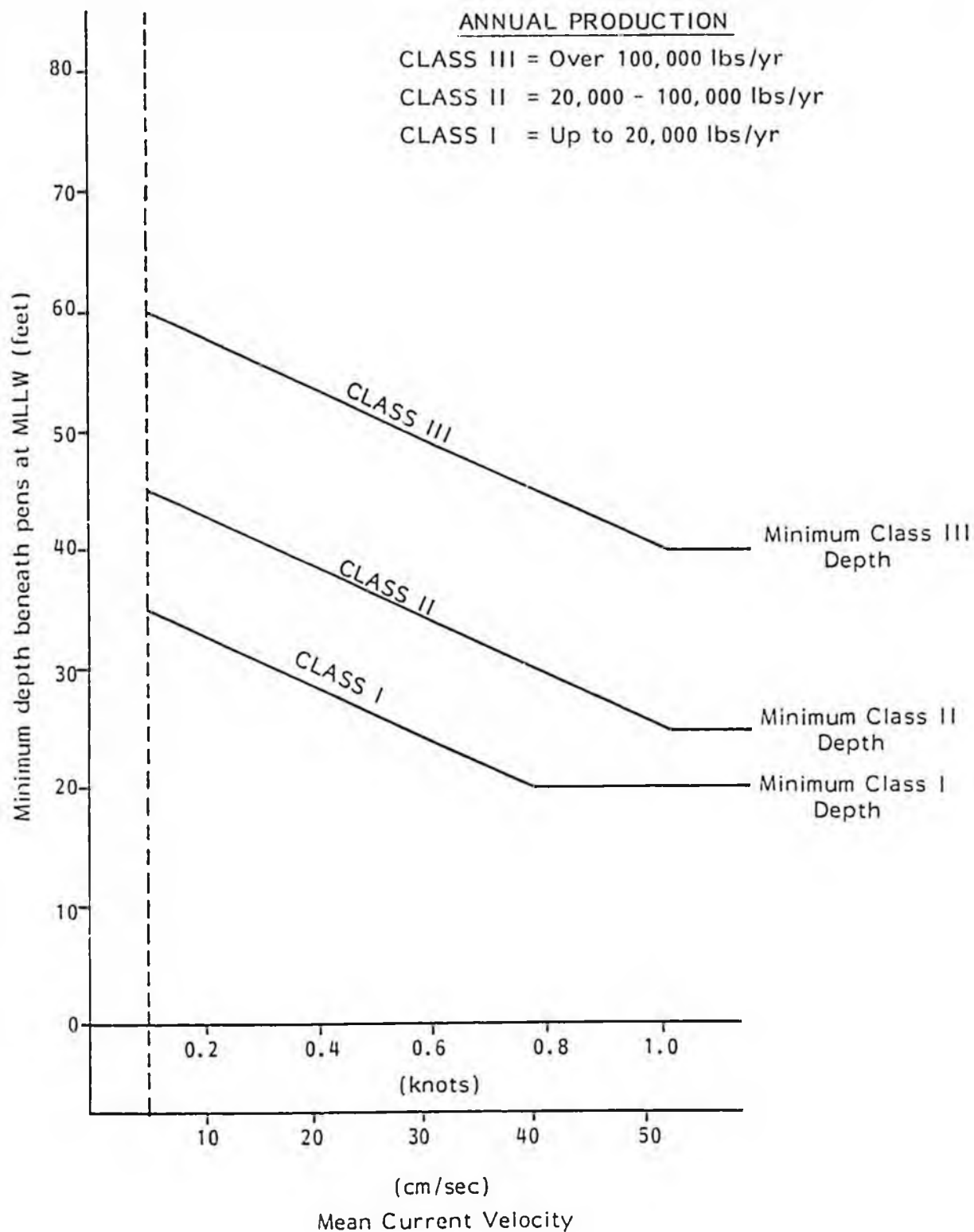


Figure 1

MINIMUM DEPTH AND CURRENT GUIDELINES
FOR NET-PEN SITING

Table 1

HABITATS OF SPECIAL SIGNIFICANCE

- Eelgrass (Zostera marina) beds having densities exceeding 13 turions (i.e., "shoots") per 0.25 m² in summer or 10 turions per 0.25 m² in winter. These densities should be based on 20 random 0.25 m² quadrat samples taken in the eelgrass bed. In addition to the density criteria above, culture should not be permissible if more than 10% of the samples exceed 20 turions per 0.25 m². These guidelines are those used by the Washington Department of Fisheries (WDF) in defining areas unacceptable for hardshell clam harvesting (DNR/WDF, 1981).
- Kelp beds (i.e., dense beds of attached macroalgae, especially bull kelp, Nereocystis luetkeana).
- Rocky reef habitats (high profile rock outcrops colonized by organisms such as hydroids, macroalgae, abalone, sea urchins, sea anemones, starfish, and other attached organisms).
- Geoduck (Panope abrupta) populations with densities exceeding 0.4 animals per m². This density is the criterion used by state agencies to define major geoduck beds (DNR/WDF, 1985).
- Hardshell clam populations with densities exceeding 1.2 kg (2.5 lbs) per m². This density is that required for hardshell clam harvest (DNR/WDF, 1981).
- Habitats having significant populations of, or which are important to the feeding, reproduction or other life stages of Dungeness crabs (Cancer magister), herring (Clupea), lingcod/greenling (Hexagrammidae), true cod (Gadidae), soles and flounders (Pleuronectiformes), rock fishes (Scorpaenidae), cabezone and other large sculpins (Cottidae), or sea perch (Embiotocidae). The occurrence of these species in a potential culture area does not necessarily exclude it from development. The determination of whether the site is of special significance to these species will be determined by WDF on a case-by-case basis.
- Wildlife refuges and habitats of endangered or threatened species. (A 300 foot separation from net-pens is recommended regardless of current direction).
- Other habitats of special significance, regardless of depth, as determined on a case-by-case basis.

3. Net-pens should not be located within 1500 feet of bird and mammalian habitats of special significance including seal and sea lion haulout area, seabird nesting sites or colonies, and areas specifically identified as critical for feeding or migration of birds and mammals. The Washington Department of Game will be responsible for the designation of habitats of special significance for birds and mammals.
4. Siting guidelines have been developed to minimize the likelihood that net-pen culture will adversely affect water quality or contribute significantly to phytoplankton productivity in any given area. Culture is not recommended in areas with chronic water quality problems. On the basis of this approach guidelines have been developed as shown in Figure 2 and Table 2 and as summarized below:
 - Recommended limits are placed on the maximum fish production within specified geographic areas for most of southern Puget Sound, the Port Orchard area, Whidbey Basin, northern Hood Canal, Sequim Bay and Discovery Bay. These production limits range from 50,000 lbs/yr in Sequim Bay to 5,900,000 lbs/yr in Skagit Bay. There are no restrictions on whether the production allotment for a given area is utilized by a single operation or divided among several smaller operations, provided that culture density does not exceed more than 1,000,000 lbs annual production per square nautical mile (defined as a square area having dimensions of 6076 feet on all sides).
 - Budd Inlet, Holmes Harbor and Hood Canal south of Hazel Point are areas of special concern because of chronic low dissolved oxygen at depth and persistent nitrogen depletion in surface waters. Net-pen culture, therefore, is not recommended unless the applicant can demonstrate that: 1) respiration and biochemical oxygen demand (BOD) will not significantly depress dissolved oxygen concentrations; and 2) nutrient input attributable to net-pen culture will not affect the frequency, extent, intensity or duration of phytoplankton blooms.
 - There are no water quality-based limits on the number of net pen operations in the Strait of Juan de Fuca, the Strait of Georgia, San Juan Islands, Main Basin of Puget Sound, and the southern Sound in the area of Anderson Island, Nisqually Reach and Tacoma Narrows. Culture density, however, should not exceed 1,000,000 lbs annual production per square nautical mile. More stringent production limits may be imposed in some instances to protect water quality in specific embayments.
5. Unpelletized wet feed (i.e., minced fish or shellfish) should not be used in net-pen culture.
6. If predator control is necessary, non-lethal predator control measures should be used against both bird and mammalian predators. Predator control methods must comply with appropriate federal and state rules, and the pen operator shall possess all necessary permits.
7. Tributyltin should not be used as an antifouling agent on the nets. The use of other antifouling agents should be reviewed on a case-by-case basis by state environmental management agencies. Any antifoulant use should be reported to the Washington Department of Ecology.

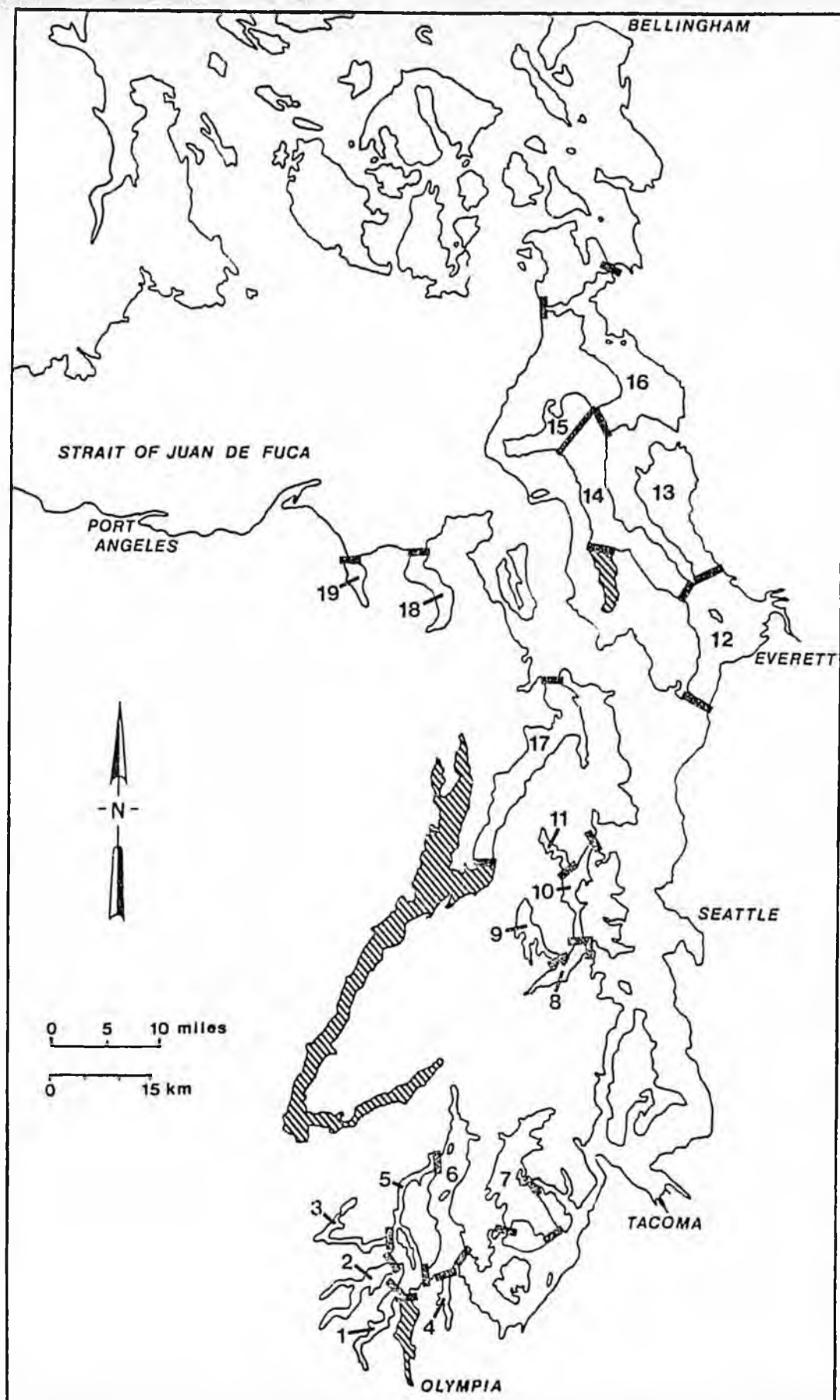


Figure 2. SUB-DIVISIONS OF PUGET SOUND USED IN ESTABLISHING THE WATER QUALITY GUIDELINES. CROSS-HATCHING DENOTES AREAS OF SPECIAL CONCERN.

Table 2

WATER QUALITY GUIDELINES

Area ¹	Description	Maximum Annual Salmon production (thousand lbs/yr)
1	Eld Inlet	190
2	Totten and Skookum Inlets	190
3	Hammersley Inlet and Oakland Bay	240
4	Henderson Inlet	80
5	Squaxin, Peale and Pickering Passage	680
6	Dana Passage and Case Inlet	980
7	Carr Inlet	1100
8	Sinclair Inlet	190
9	Dyes Inlet	460
10	Port Orchard	260
11	Liberty Bay	120
12	Possession Sound	3200
13	Port Susan	1100
14	Saratoga Passage	2000
15	Penn Cove and Crescent Harbor	730
16	Skagit Bay	5900
17	Northern Hood Canal	1900
18	Discovery Bay	540
19	Sequim Bay	50

The following are areas of special concern in which culture is not recommended unless the applicant can demonstrate that culture will not result in adverse environmental effects:

- Budd Inlet
- Holmes Harbor
- Hood Canal south of Hazel Point

The interim guidelines place no limits on the number of net-pen operations or total allowable production in the following areas:

- Strait of Juan de Fuca
- Strait of Georgia
- San Juan Islands
- Main Basin of Puget Sound
- Southern Puget Sound in the vicinity of Tacoma Narrows, Nisqually Reach and Anderson Island

¹See Figure 2 for the location of the areas and McLeilan (1954) for the precise geographic boundaries.

8. Only antibiotics licensed by the Food and Drug Administration shall be used, and these should be used only on a short-term basis for disease treatment or disease prevention. Antibiotics should not be used prophylactically on a long-term basis. The Washington Department of Fisheries should be notified of all antibiotic usage at the time of treatment, and should be informed of the disease or condition being treated and the antibiotic used.
9. Transfer of live fish or their reproductive products within the state or their importation into state shall be done in accordance with all applicable state and federal standards.
10. To facilitate environmental review, applications for culture should be accompanied by an operations plan which is to be submitted to the Department of Natural Resources (DNR) for distribution to other agencies. This plan should include projections for: (1) improvements at site (e.g., pens, log booms) and their relationship to natural features (e.g. bathymetry, shorelines); (2) pen number, size and configuration; (3) schedule of development and maintenance; (4) species cultured; (5) fish size at harvest; (6) annual production; (7) pounds of fish on hand throughout the year; (8) average and maximum stocking density; (9) source of eggs and smolts; (10) type of feed used; (11) feeding method; (12) chemical use (e.g., antibiotics); (13) predator control measures; and (14) antifoulant use.
11. A site characterization survey should be performed prior to permit application. This survey includes: (1) a bathymetric survey; (2) a hydrographic survey; and (3) a diver survey of biological resources to be done in the period April through September. The applicant is strongly encouraged to consult with state and local officials prior to permit application and in designing the site characterization survey. The initial state contact should be made with the Washington State Department of Agriculture, and this agency will facilitate additional contacts with the Departments of Fisheries, Ecology, Natural Resources, Game and Farks and Recreation.
12. A benthic baseline survey consisting of sediment chemistry and benthic infauna sampling should be performed by all operations with an anticipated annual production in excess of 100,000 lbs. The baseline survey should be conducted after net-pen installation, but before stocking with fish.
13. An annual summer diver survey should be performed by all operations with an anticipated annual production in excess of 20,000 lbs. For those operations growing in excess of 100,000 lbs per year, annual summer monitoring should also include: (1) sediment chemistry and infauna sampling; (2) water quality sampling; and (3, a hydrographic survey.

BACKGROUND INFORMATION AND DISCUSSION
FOR THE INTERIM GUIDELINES

1.0 INTRODUCTION

The net-pen culture of salmon is expanding throughout the world including Puget Sound. This growth is creating additional management responsibilities for state and local agencies. At both the state and local level there is a need for a coordinated approach to environmental review and regulation of this relatively new industry. These interim guidelines are intended to provide a basis for such a coordinated approach until completion of the programmatic Environmental Impact Statement (EIS) for the salmon net-pen industry.

The goal of the guidelines is to avoid significant adverse environmental effects from net-pen operations permitted prior to completion of the programmatic EIS. The recently completed review, "The Environmental Effects of Floating Mariculture in Puget Sound" (Weston, 1986), and many other studies have demonstrated that the environmental effects of net-pen culture are highly dependent upon siting and operational practices. Therefore, the goal of the guidelines is pursued through a combination of recommendations for project siting and operational practices, as well as a recommended protocol for annual monitoring. Although environmental protection is the primary goal, these interim guidelines have been developed to meet two secondary goals. First, it is anticipated that the guidelines will lessen the burden of environmental review at the county level. These guidelines should assist local government review of permit applications under the Shoreline Management Act and the State Environmental Policy Act. Secondly, it is also anticipated that these guidelines will assist the industry in application for new sites, and facilitate permitting of operations in sites which meet these guidelines. The permitting of sites which do not meet the guidelines is likely to be a more difficult process and will place the burden of proof on the applicant to demonstrate that culture can be conducted with minimal environmental affect.

As the term "interim guidelines" implies, this document is intended to provide guidance to state and local authorities responsible for the regulation of salmon net-pen culture. These recommendations for siting, operation and monitoring are intended to be flexible, and do not eliminate the need for careful case-by-case review of permit applications. The interim guidelines are, by necessity, generic in nature. It is therefore anticipated that site-specific

conditions may require that these guidelines be made more restrictive or relaxed occasionally on a case-by-case basis. Departures from these guidelines, however, are expected to be relatively rare. If a given project is made subject to restrictions or requirements not specified in these guidelines, state and/or local officials should provide the applicant, if requested, with an explanation of the environmental reasons for doing so. If relaxation of these guidelines is requested, it is the responsibility of the applicant to demonstrate that deviation from these guidelines can be made with minimal environmental effect.

These guidelines are formulated to minimize possible effects of net-pen operation on habitats of special significance as well as sediment and water quality. They do not address considerations of aesthetics, navigation or water/land use conflicts. These and similar issues are best considered at the county level on a case-by-case basis.

The guidelines apply to all net-pen operations in which salmon are grown with the intent to harvest and market the fish upon attainment of sufficient size. The guidelines do not apply to net-pen operations in which salmon are held primarily for research purposes because these facilities are typically of very small size and thus have a reduced potential for environmental effects. The guidelines do not apply to delayed release facilities used for enhancement of wild stocks. There are three reasons for this exclusion. First, fish are held in the delayed release facilities only for a period of four to six months, thus reducing the potential for effects such as feed and feces accumulation under the pens. Secondly, fish are not in the pens during the summer months when water quality concerns are the greatest. Finally, only commercial operations growing fish to a marketable size show significant growth potential in the near future in Puget Sound. Rapid growth of delayed release operations is not anticipated, thus the issue will be deferred to consideration in the programmatic EIS.

The interim guidelines are to be used in the permitting and management of net-pen operations in Puget Sound, the Strait of Juan de Fuca and the Strait of Georgia. They apply to net-pen operations which have not yet been permit-

ted, and do not apply to projects already in operation or permitted unless these facilities undergo significant expansion or modification of their original permit specifications. In this case, the expansion or modification may be evaluated for consistency with these guidelines.

2.0 DEPTH AND CURRENT GUIDELINES

The net-pen culture of salmon generates substantial amounts of excess feed and feces which ultimately settle to the sea floor. The amount of feed and fecal material generated will depend on the level of production of the operation, and the fate of the material will depend principally upon the depth and water currents at the site. These guidelines consider current velocity and facility production in conjunction with water depth.

The objectives of the guidelines are: (1) to minimize the rate of accumulation of feed and feces on the bottom; and (2) to minimize biological changes in benthic communities caused by culture activities. The guidelines consider both depth and current in an attempt to insure that feed and feces are dispersed over a broad enough area to minimize chemical and biological changes in the sediment. If net-pens are sited in accordance with the guidelines, the depth and lateral extent of visible accumulation of feed and feces should be considerably reduced from that currently reported under existing net-pens. There may be subtle and localized changes in sediment chemistry, or enhancement of species tolerant of organic enrichment. The potential for complete absence of macrofauna or the accumulation of thick mats of feed and feces that have been previously reported will be significantly reduced.

It should be emphasized that these guidelines represent the one of the few attempts anywhere in the world to minimize feed and feces accumulation by establishing depth criteria for siting, and the only effort to incorporate current velocity and facility production. Data that would allow exact determination of the combinations of depth and current required for adequate dispersal are, for the most part, lacking. In addition, few data exist on the assimilative capacity of the benthos. The interim criteria draw upon all available data, but rely heavily on scientific judgment. It is clear that more data are needed. The anticipated programmatic EIS will evaluate the effectiveness of these depth and current guidelines, and permit later refinement if necessary. The annual monitoring program recommended by these guidelines (Section 7.0) will, in part, serve to provide the data needed for this evaluation.

The variables of water depth current and operation size all interact to determine the extent of feed and feces accumulation on the bottom. The interim depth and current guidelines recognize this interaction in the siting of net-pen operations. The guidelines are displayed graphically in Figure 3. It is evident from this figure that recommendations for water depth and current velocity are dependent upon the size of the operation: the greater the annual production of the facility, the greater must be the water depth and/or current velocity. Net-pen operations are divided into three size classes as follows:

Class I:

- Operations with a production capacity of up to 20,000 pounds/year.

Class II:

- Operations with a production capacity in excess of 20,000 pounds/year, but no greater than 100,000 pounds/year.

Class III:

- Operations with a production capacity in excess of 100,000 pounds/year.

Figure 3 illustrates depth and current guidelines for each operational class. At any given current velocity, the minimum recommended depth beneath the pens is specified. Since these guidelines attempt to maximize the dispersal of feed and feces as they settle from the net-pens, current velocity should be measured mid-way between the bottom of the net-pens and the sea floor as described in Section 6.1. Surface current velocity is not an appropriate substitute. The guidelines are based on mean rather than maximum current velocity. A minimum mean current velocity of 0.1 knots (5 cm/sec) is recommended. At sites with a mean current velocity below this value, currents will not be adequate to insure dispersal of solid wastes, and no culture should be permitted.

The depth of concern has been defined as the distance from the bottom of the net-pens to the sea floor rather than total water depth. In application of the guidelines to a net-pen complex on a sloping bottom, the depth of concern is the smallest depth under any of the net-pens, and this value is to be used

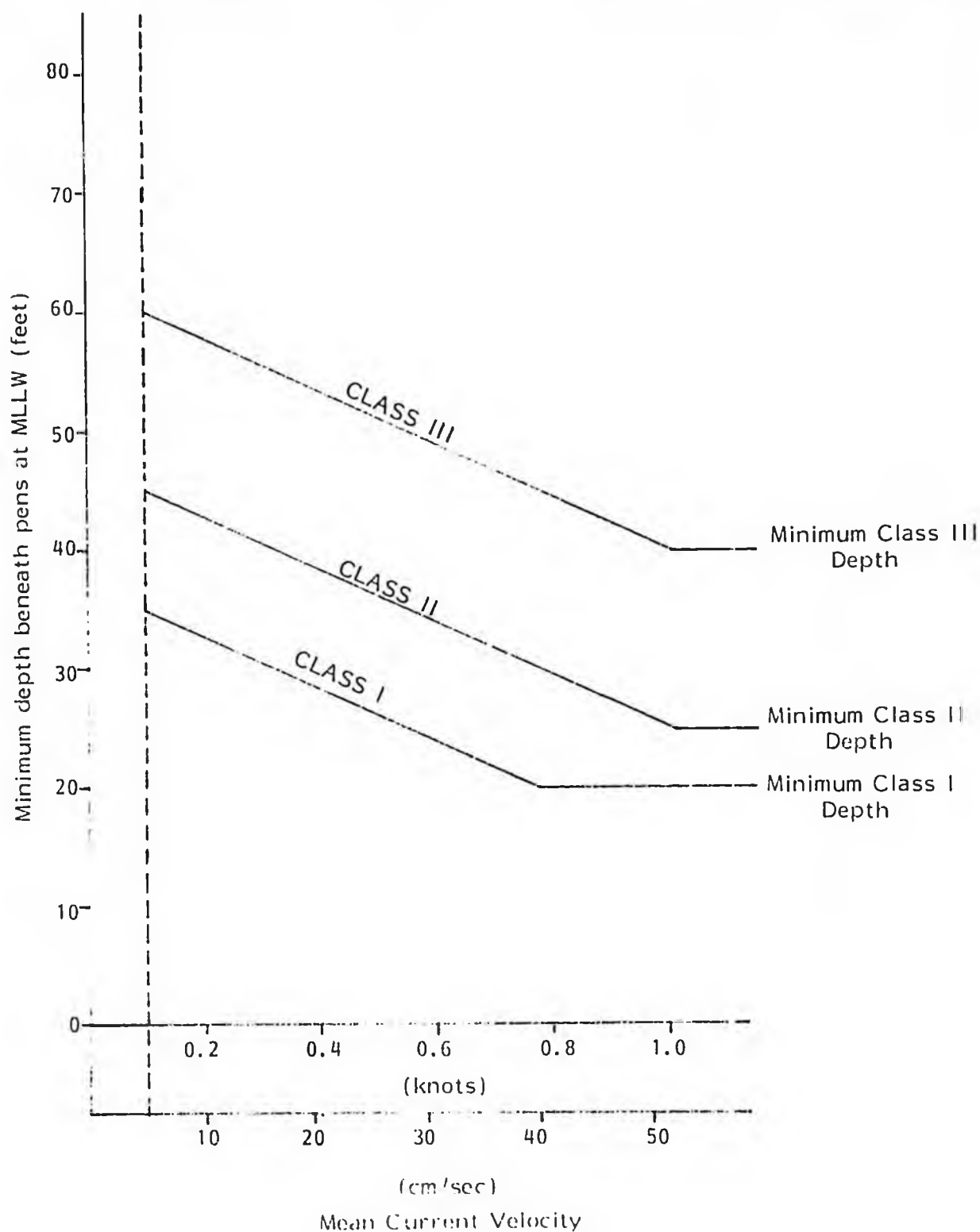


Figure 3

MINIMUM DEPTH AND CURRENT GUIDELINES
FOR NET-PEN SITING

(See text for explanation of Class I, II, and III
operations and for definition of mean current velocity)

in determining compliance with the guidelines. Depths are based on mean lower low water (MLLW). MLLW is the chart datum employed on nautical charts, thus simplifying application of the guidelines.

Pen configuration is also a significant factor in determining the depth and lateral extent of solids accumulation beneath a net-pen facility. Pens oriented in a row parallel to the prevailing current will tend to cause the greatest depth of solids accumulation per unit area, but may affect the least amount of bottom area. Pens oriented perpendicular to the prevailing current may affect a greater area of bottom, but may have the least accumulation per unit area. The guidelines do not specifically address pen configuration because it will be extremely operation-specific, and because of the limitations in sedimentation models which currently do not allow prediction of an optimal design. For those operations which meet the depth and current guidelines, however, pen configuration may ultimately prove to be an important consideration in further mitigating effects. This issue will require further consideration in the programmatic EIS.

3.0 HABITATS OF SPECIAL SIGNIFICANCE

Net-pens should not be located where their siting or the accumulation of excess feed and feces are likely to adversely affect habitats important to commercial or sport fisheries, that are of critical ecological importance, or that are especially sensitive to degradation by culture activities. These habitats should be afforded protection over and above the depth and current guidelines discussed in Section 2.0. The habitats of special significance are listed in Table 3. The Washington Department of Fisheries (WDF) will have responsibility for the designation of and assessment of impacts on plant, invertebrate and fish habitats of special significance. The WDF has considerable existing data concerning habitats of special significance for foodfish and shellfish, and is able to provide available information or comments in this regard.

It is recommended that net-pens not be sited within 300 feet from habitats of special significance located in the direction(s) of prevailing tidal currents. A 150-foot separation is recommended in all other directions. These distances are to be measured laterally from the net-pen perimeter. A review of the literature (Weston, 1986) found that visible accumulation of feed and feces or changes in sediment chemistry was generally reported to extend to distance from the net-pens of 100 feet or less. The greatest reported distance of visible accumulation was 150 feet from the net-pens. A separation of 300 feet in the direction(s) of prevailing currents should provide an additional margin of protection.

Habitats of special significance are, by definition, herein limited to water depths of 75 feet or less at mean lower low water (MLLW). Except in special cases (Item 8 of Table 3), no habitat restrictions are placed on net-pens if water depths within a 300-foot distance are in excess of 75 feet. For example, the occurrence of dense geoduck beds within 300 feet from a proposed net-pen site in the direction of prevailing current is sufficient to exclude that site from consideration if the beds are in a depth of 75 feet or less. These geoduck beds will not ordinarily be of concern in siting if they are at a depth greater than 75 feet. The 75-foot limitation to habitats of special significance has been established principally because of the reduced likelihood of feed and feces bottom accumulation at greater depths. For many of the

Table 3

HABITATS OF SPECIAL SIGNIFICANCE

1. Eelgrass (Zostera marina) beds having densities exceeding 13 turions (i.e., "shoots") per 0.25 m² in summer or 10 turions per 0.25 m² in winter. These densities should be based on 20 random 0.25 m² quadrat samples taken in the eelgrass bed. In addition to the density criteria above, culture should not be permissible if more than 10% of the samples exceed 20 turions per 0.25 m². These guidelines are those used by the Washington Department of Fisheries (WDF) in defining areas unacceptable for hardshell clam harvesting (DNR/WDF, 1981).
2. Kelp beds (i.e., dense beds of attached macroalgae, especially bull kelp, Nereocystis luetkeana).
3. Rocky reef habitats (high profile rock outcrops colonized by organisms such as hydroids, macroalgae, abalone, sea urchins, sea anemones, starfish, and other attached organisms).
4. Geoduck (Panope abrupta) populations with densities exceeding 0.4 animals per m². This density is the criterion used by state agencies to define major geoduck beds (DNR/WDF, 1985).
5. Hardshell clam populations with densities exceeding 1.2 kg (2.5 lbs) per m². This density is that required for hardshell clam harvest (DNR/WDF, 1981).
6. Habitats having significant populations of, or which are important to the feeding, reproduction or other life stages of Dungeness crabs (Cancer magister), herring (Clupea), lingcod/greenling (Hexagrammidae), true cod (Gadidae), soles and flounders (Pleuronectiformes), rock fishes (Scorpaenidae), cabezone and other large sculpins (Cottidae), or sea perch (Embiotocidae). The occurrence of these species in a potential culture area does not necessarily exclude it from development. The determination of whether the site is of special significance to these species will be determined by WDF on a case-by-case basis.
7. Wildlife refuges and habitats of endangered or threatened species. (A 300 foot separation from net-pens is recommended regardless of current direction).
8. Other habitats of special significance, regardless of depth, as determined on a case-by-case basis.

habitats of special significance, the 75-foot depth limitation is of little consequence for these habitats are found only in much shallower water (e.g., eelgrass, kelp, herring spawning areas).

Net-pens should not be sited within 1500 feet of habitats of special significance as identified by the Washington Department of Game (WDG). These include seal and sea lion haulout areas, seabird nesting sites or colonies, and areas specifically identified as critical for feeding or migration of birds and mammals. It is not clear what effects, if any, net-pen operations would have on these species or habitats, however, the intent of this guideline is to reduce the likelihood of interactions between net-pen operations and these species, and thus reduce the need for predator control measures. WDG will have the responsibility for the designation of mammal and bird habitats of special significance.

4.0 WATER QUALITY GUIDELINES

The primary objective of the water quality guidelines is to minimize any potential effect of net-pen activities on phytoplankton productivity (i.e., initiate or sustain blooms). Secondly, the guidelines attempt to prevent the input of feed and feces with a high biochemical oxygen demand (BOD) in areas which have chronically low dissolved oxygen concentrations. The guidelines address only incidentally potential toxic effects that result from the accumulation of metabolites (principally ammonia) or the respiratory depletion of oxygen in the water passing directly through the culture structure. Salmon are very sensitive to both elevated ammonia concentrations and low dissolved oxygen, and thus, the size of the operation is likely to be self-limiting with respect to toxic effects. In addition, net-pen operations of the size typical of Puget Sound are unlikely to cause increases in ammonia concentrations to the point where toxicity would become a concern (Weston, 1986).

A general overview of the water quality interim guidelines is shown in Table 4 and Figure 4. Net-pen culture is not recommended in Budd Inlet, Holmes Harbor or Hood Canal south of Hazel Point unless the applicant can demonstrate culture can be conducted without significant environmental effects. In the Main Basin of Puget Sound, portions of the southern Sound (Anderson Island, Tacoma Narrows and Nisqually Reach), the Strait of Juan de Fuca, the San Juan Islands and the Strait of Georgia the guidelines establish no water quality-based limitations on the number of net-pen operations, although the density of culture should not exceed more than 1 million pounds annual production within one square nautical mile (hereafter defined as a square area having the dimensions of 6076 feet on all sides). Much of the remainder of Puget Sound has been sub-divided into areas numbered 1 through 19 based primarily on the sub-divisions of Puget Sound used by McLellan (1954). In each of these sub-divisions, a maximum annual salmon production has been recommended. The guidelines place no restrictions on how the maximum production is distributed among operations. A single operation may utilize the production allotment for a sub-division, or the production allotment may be divided among several smaller operations. However, the annual production density should not exceed 1 million pounds per square nautical mile.

Table 4

WATER QUALITY GUIDELINES

Area ¹	Description	Maximum Annual Salmon production (thousand lbs/yr)
1	Eld Inlet	190
2	Totten and Skookum Inlets	190
3	Hammersley Inlet and Oakland Bay	240
4	Henderson Inlet	80
5	Squaxin, Peale and Pickering Passage	680
6	Dana Passage and Case Inlet	980
7	Carr Inlet	1100
8	Sinclair Inlet	190
9	Dyes Inlet	460
10	Port Orchard	260
11	Liberty Bay	120
12	Possession Sound	3200
13	Port Susan	1100
14	Saratoga Passage	2000
15	Penn Cove and Crescent Harbor	730
16	Skagit Bay	5900
17	Northern Hood Canal	1900
18	Discovery Bay	540
19	Sequim Bay	50

The following are areas of special concern in which culture is not recommended unless the applicant can demonstrate that culture will not result in adverse environmental effects:

- Budd Inlet
- Holmes Harbor
- Hood Canal south of Hazel Point

The interim guidelines place no limits on the number of net-pen operations or total allowable production in the following areas:

- Strait of Juan de Fuca
- Strait of Georgia
- San Juan Islands
- Main Basin of Puget Sound
- Southern Puget Sound in the vicinity of Tacoma Narrows, Nisqually Reach and Anderson Island

¹See Figure 4 for the location of the areas and McLellan (1954) for the precise geographic boundaries.

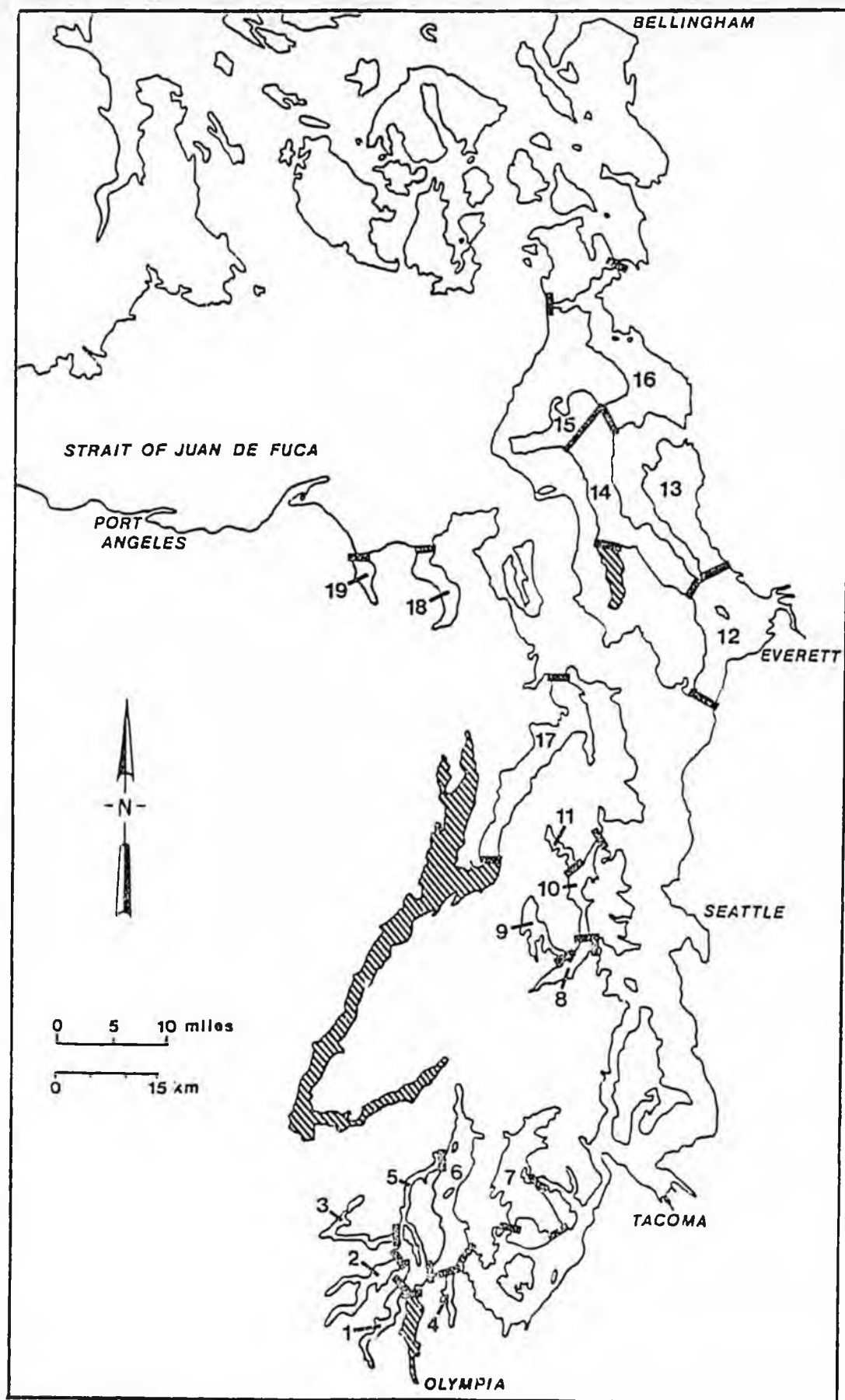


Figure 4. SUB-DIVISIONS OF PUGET SOUND USED IN ESTABLISHING THE WATER QUALITY GUIDELINES. CROSS-HATCHING DENOTES AREAS OF SPECIAL CONCERN.

To understand the basis for the water quality guidelines, existing water quality conditions throughout Puget Sound must be examined. Figures 5 through 7 illustrate dissolved oxygen and nitrogen concentrations throughout the Sound based on the Department of Ecology water quality monitoring data. Ecology monitoring stations are sampled monthly from April through November. Samples are collected at depths of 0, 33 and, if the water is of sufficient depth, at 98 ft. (corresponding to 0, 10 and 30 m). Data collected from April 1981 through November 1985 (approximately 40 sampling events) were used in development of these guidelines.

Figure 5 illustrates the percentage of observations with less than 5 mg/l dissolved oxygen in samples collected at a depth of 33 ft.. Two areas, Budd Inlet and the extreme southern end of Hood Canal, had chronically low dissolved oxygen concentrations at depths of 33 ft. Dissolved oxygen concentrations less than 5 mg/l were regularly reported at depths of 98 ft. in Hood Canal northwards to, and including, Dabob Bay (Figure 6). In Holmes Harbor dissolved oxygen concentrations less than 5 mg/l were observed in 15% of the samples.

Figure 7 illustrates the frequency with which nitrogen concentrations (sum of ammonia, nitrite and nitrate) drop below 0.1 mg/l. In Puget Sound nitrogen concentrations below this value suggest that nitrogen may limit phytoplankton growth, and that the addition of nitrogen by net-pen culture could increase primary productivity. The highest frequency of nitrogen limitation was observed in Hood Canal northwards to and including Dabob Bay. Nitrogen depletion below 0.1 mg/l was also observed at a frequency greater than 60% in Holmes Harbor, Budd Inlet, Totten Inlet, Port Orchard and Liberty Bay. In the Strait of Juan de Fuca, the San Juan Islands and the Main Basin of Puget Sound nitrogen was rarely limiting to phytoplankton growth.

The data displayed in Figures 5 through 7 were used to determine the maximum intensity of culture recorded in any given area under these interim guidelines. The conclusions drawn from the Ecology water quality monitoring data set were also compared and verified with readily available published data (Collias, et al., 1974; Friebertshauser, et al., 1971). It should, however, be recognized that the data search conducted for the interim guidelines was by

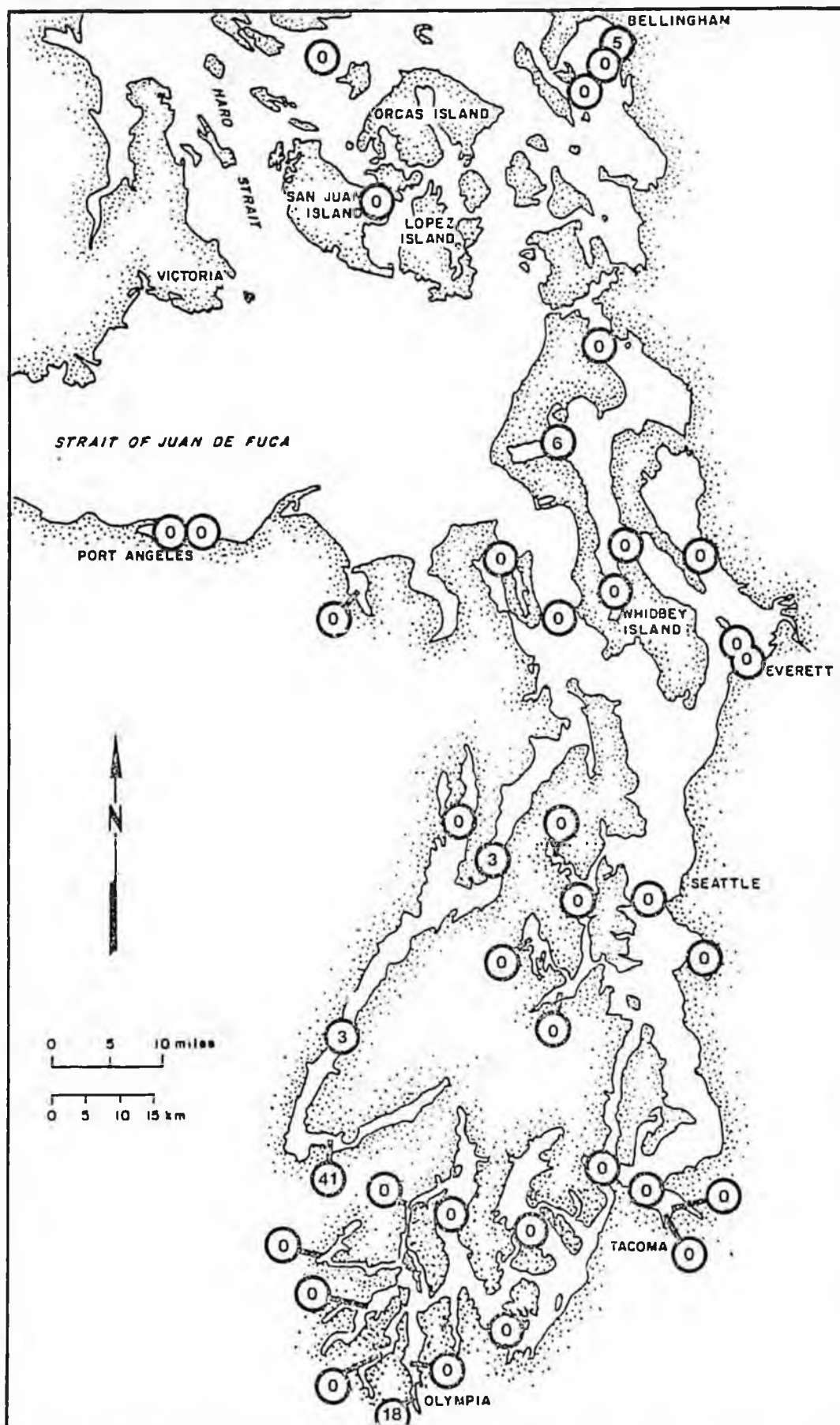


Figure 5. PERCENTAGE OF OBSERVATIONS WITH < 5 mg/l OXYGEN AT A DEPTH OF 33 ft (n=35-40)

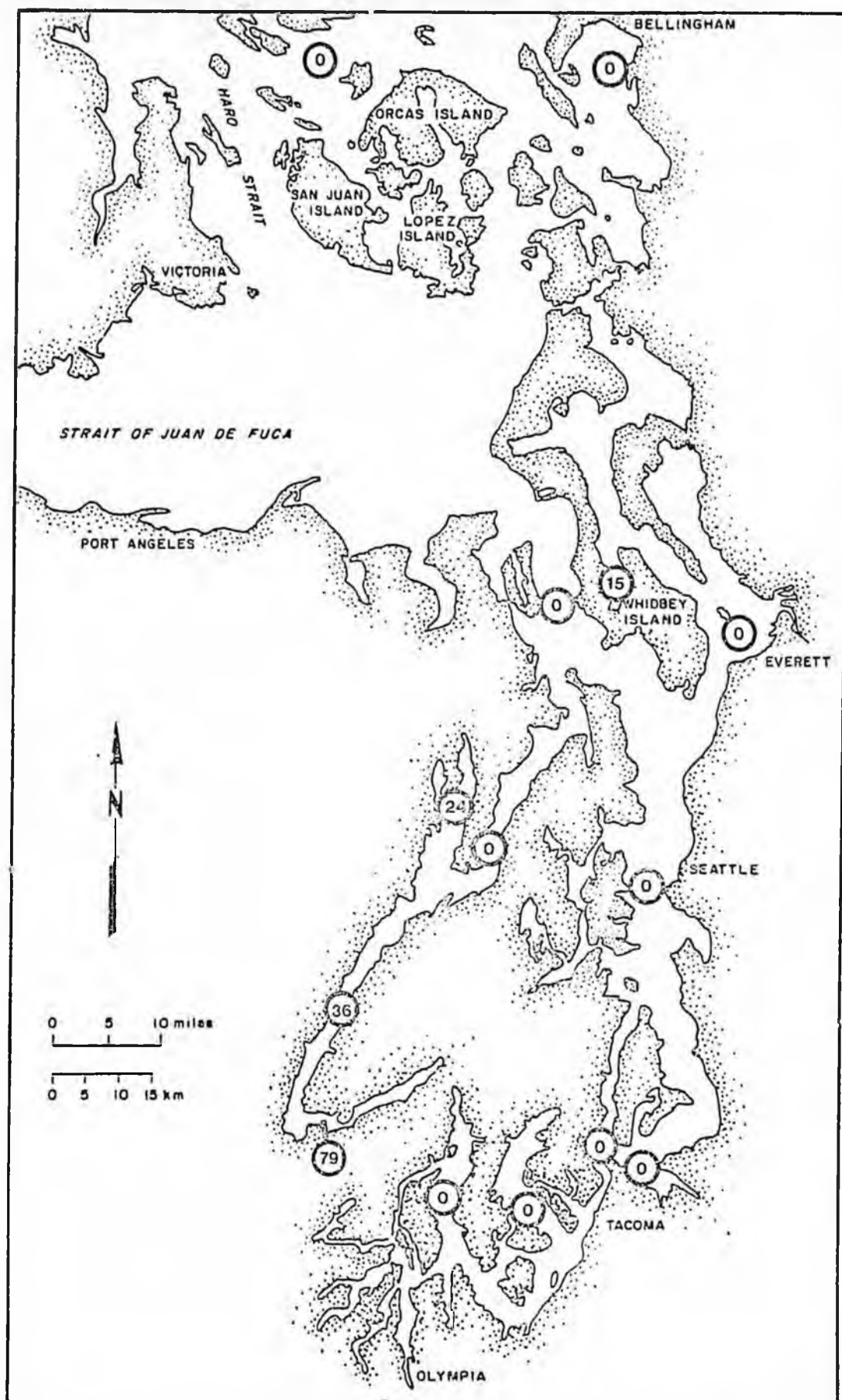


Figure 6. PERCENTAGE OF OBSERVATIONS WITH < 5 mg/l OXYGEN AT A DEPTH OF 98 ft ($n=35-40$)

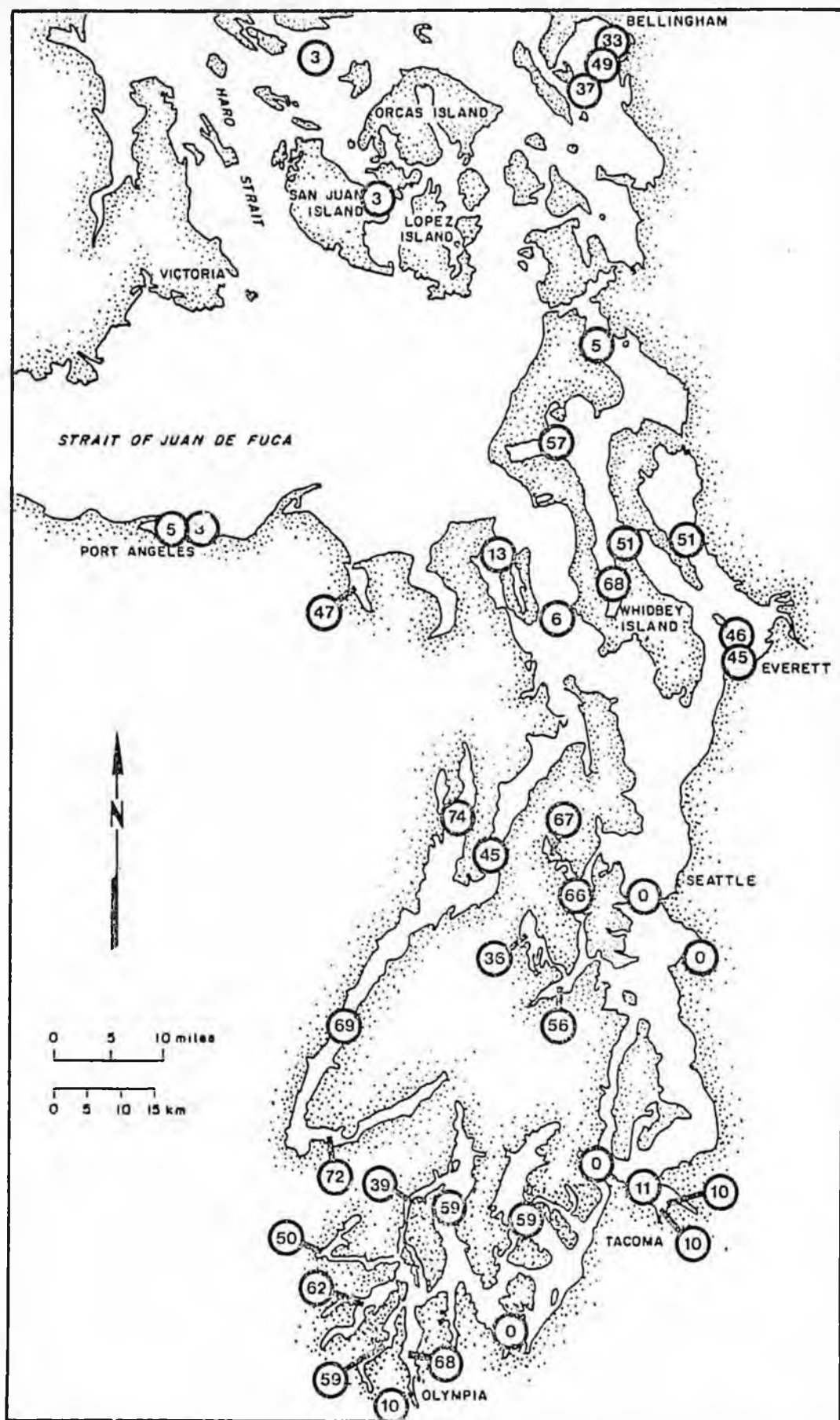


Figure 7. PERCENTAGE OF OBSERVATIONS WITH LESS THAN 0.1 mg/l NITROGEN IN SURFACE WATERS (n=35-40)

no means exhaustive. Much additional data from site-specific studies could not be utilized because of the limited time available for development of the interim guidelines. As this site-specific information becomes available, there may be justification to either relax these guidelines or make them more restrictive on a case-by-case basis. Assessment of additional data through the programmatic EIS process may also result in changes in the intensity of culture permissible in any given area. Given that the interim guidelines are based on a limited data set, a deliberately conservative approach has been used in their formulation.

The maximum recommended intensity of culture in any given area has been based on the frequency of oxygen depletion and nitrogen limitation in that area. Budd Inlet, Holmes Harbor and Hood Canal south of Hazel Point appear to have chronic oxygen depletion at depth and persistent nitrogen limitation in surface waters. In view of the existing poor water quality in these areas, any application for culture should be given careful scrutiny as to the potential environmental consequences. Culture is not recommended in these areas unless the applicant can demonstrate: 1) respiration and BOD will not significantly reduce dissolved oxygen concentrations; and 2) input of additional nutrients will not affect the frequency, extent, intensity or duration of phytoplankton blooms. The exclusion of much of Hood Canal is generally consistent with Washington Department of Ecology policy pertaining to municipal wastewater discharges to this water body. Since 1972 Ecology has required secondary treatment of all wastewater discharges to Hood Canal, and currently requires tertiary treatment (Bollen, unpub.; M. Palko, WDOE, pers. comm.). Although Ecology policy applies to all of Hood Canal, persistent oxygen and nitrogen depletion in the area north of Hazel Point were not evident in the data set reviewed for the interim guidelines. This area, therefore, has not been excluded from net-pen culture under these guidelines.

Areas where oxygen depletion or nitrogen limitation were observed infrequently include the the southern Sound in the area of Anderson Island, Tacoma Narrows and Nisqually Reach, the Main Basin of Puget Sound, the Strait of Juan de Fuca, San Juan Islands and the Strait of Georgia. In these areas, phytoplankton productivity is generally governed by factors other than nitrogen availability; thus the input of additional nitrogen from net-pen culture should not

stimulate additional phytoplankton growth. In addition, dissolved oxygen concentrations are rarely, if ever, reduced to biologically limiting levels. Inputs of nutrients and BOD associated with net-pen operation probably would not have measurable biological consequences, although site-specific conditions should be assessed on a case-by-case basis. These areas are also likely to be well-flushed with little opportunity for a nutrient enriched or oxygen depleted water mass to maintain its integrity for an appreciable length of time. Therefore, the interim guidelines place no water quality-based restrictions on the number of net-pen culture operations in these areas. However, in order to avoid excessive culture in a very localized area, it is recommended that the density of culture not exceed 1 million pounds annual production per square nautical mile. More stringent production limits may be imposed in some instances to protect water quality in specific embayments.

In the remainder of Puget Sound (most of the southern Sound, Port Orchard area, Whidbey Basin, northern Hood Canal, Sequim and Discovery Bays) recommended limits are placed on the maximum production of fish in any given region. The 1 million pounds annual production per square nautical mile applies in these areas as well. The approach taken in development of these guidelines allows net-pens to increase by a very small percentage the natural flux of nitrogen into the embayment that occurs with each tidal cycle. The natural tidal flux of nitrogen into the embayment is determined and net-pens are allowed to increase this flux by 1%. The weight of cultured fish that would produce this 1% increase is the maximum recommended production for the embayment. Each area of Puget Sound will have some capacity to assimilate additional nitrogen input. This assimilative capacity will, however, vary in each area, and in no case is there a means to predict, a priori, what this assimilative capacity may be. Lacking these data, the 1% increase has been specified throughout Puget Sound as an increase of small enough magnitude that it should be adequately protective.

The sub-divisions in the water quality guidelines are shown in Figure 4 and in general are based on those of McLellan (1954). In most cases the boundaries used by McLellan have been adapted without modifications since there is clear geomorphologic and hydrographic justification (e.g., Eld Inlet, Dyes Inlet and Sequim Bay). A number of McLellan's subdivisions have been grouped if there

was no apparent hydrographic reason for maintaining their distinction (e.g., three of McLellan's subdivisions grouped to form the Port Orchard sub-division of the interim guidelines).

Determination of the natural tidal nitrogen flux in a given area begins with calculation of the "half-life" of water in the area:

$$0.50 = e^{(-\frac{\Delta v}{v} \cdot T \cdot R)}$$

where 0.50 represents removal of half the initial water volume, v is the intertidal volume, v is the total volume of the embayment, T is the number of tidal cycles and R is the refluxing coefficient (a value of 0.5 was used). The equation is solved for T and then this solution is substituted in:

$$E = \frac{0.5v}{T}$$

where E represents the effective intertidal volume. Multiplying E by the nitrogen concentration of the water (measured at the surface in these calculations) yields the natural tidal nitrogen flux. A 1% increase in this flux from net-pen culture is then calculated. A more detailed discussion of the approach can not be presented here, but further explanation of some elements can be found in URS (1986). The calculations for each embayment are presented in Table 5, and further details on the approach are presented in the notes which follow Table 5.

Table 5

CALCULATIONS FOR WATER QUALITY GUIDELINES¹

Area	Description	Total Volume (10 ¹² L)	$\Delta v/v$	T	Effective Intertidal Volume (10 ¹² L)	Nitrogen Concentration (mg/L)	Tidal Nitrogen Flux (10 ⁶ g)	Fish Production (10 ³ lbs/yr)
1	Eld Inlet	0.130	0.455	5.05	0.213	0.049	1.04	190
2	Totten and Skookum Inlets	0.168	0.536	2.59	0.324	0.032	1.04	190
3	Hammersley Inlet and Oakland Bay	0.0519	0.840	1.65	0.157	0.083	1.30	240
4	Henderson Inlet	0.0426	0.558	2.48	0.0859	0.049	0.421	80
5	Squaxin, Peale and Pickering Passage	0.481	0.309	4.49	0.536	0.070	3.75	680
6	Dana Passage and Case Inlet	2.22	0.143	9.69	1.15	0.047	5.41	980
7	Carr Inlet	4.44	0.085	16.4	1.35	0.046	6.21	1100
8	Sinclair Inlet	0.375	0.124	11.2	0.167	0.063	1.05	190
9	Dyes Inlet	0.204	0.313	4.43	0.230	0.11	2.53	460
10	Port Orchard	0.431	0.194	7.14	0.302	0.048	1.45	260
11	Liberty Bay	0.0387	0.577	2.40	0.0806	0.079	0.637	120
12	Possession Sound	12.6	0.039	35.6	1.77	0.10	17.7	3200
13	Port Susan	4.36	0.068	20.4	1.07	0.059	6.31	1100
14	Saratoga Passage	8.75	0.049	28.1	1.56	0.072	11.2	2000
15	Penn Cove and Crescent Harbor	0.829	0.207	6.70	0.619	0.065	4.02	730
16	Skagit Bay	0.881	0.407	3.40	1.30	0.25	32.5	5900
17	Northern Hood Canal	5.04	0.064	21.6	1.17	0.089	10.4	1900
18	Discovery Bay	0.465	0.067	20.7	0.112	0.267 ²	2.99	540
19	Sequim Bay	0.0845	0.128	9.98	0.0423	0.066	0.279	50

¹See explanatory notes for Table 5 on following page.²Ecology does not maintain a water quality monitoring station in Discovery Bay as they do in all other areas listed. Therefore the nitrogen concentration is based on the June 1986 survey of the bay by Rensel (unpub. data).

Explanatory notes for Table 5

- Tidal flushing is treated as an exponential decay process. "New" water is introduced into the embayment on the flood tide. The ebb tide removes some portion of the "new" water as well as some portion of the "old" water. Over successive tidal cycles the intertidal volume consists of a greater and greater proportion of "new" water and a lesser and lesser proportion of "old" water. The effective tidal volume has been calculated by determining the number of tidal cycles required to remove 50 percent of the "old" water, and then determining the average volume of "old" water removed per tide.
- The calculations allow for refluxing; some portion of the water entering on the flood tide is the same water which left on the previous ebb tide. The refluxing coefficient will vary with each embayment, but a generalized estimate has been established at 0.5 for all interim guideline calculations.
- Intertidal and total volumes have been determined from the data of McLellan (1954). This source also provides the precise geographic boundaries that define the sub-divisions.
- Nitrogen concentrations are based on mean surface concentrations at each Ecology water quality monitoring station during the summer months (June through September) over the past five years (1981 through 1985).
- The quantity of nitrogen released into the environment by net-pen culture has been based on data from Ackefors and Södergren (1985), Penczak et al. (1982) and Warrer-Hansen (1982). These authors reported values ranging from 83 to 100 g N/kg fish produced/yr. This rate of nitrogen production has been expressed as 0.055 g N/lb. fish produced/tidal cycle in the interim guideline calculations.

5.0 MISCELLANEOUS GUIDELINES

1. Feed should be provided to the fish in a pelletized form. Unpelletized wet feed (i.e., minced fish or shellfish) should not be used in net-pen culture. The amount of uningested feed is several times greater for unpelletized wet feed than for either pelletized dry or moist feed (Ackefors and Södergren, 1985).
2. If predator control measures are necessary, non-lethal methods should be used against both bird and mammalian predators. The use of predator control measures is contingent upon receipt of appropriate National Marine Fisheries Service and U.S. Fish and Wildlife Service permits and must be conducted in accordance with permit restrictions and pertinent state requirements.
3. The use of tributyltin (TBT) as an antifouling agent should not be used on either the net-pens or the surrounding predator control nets. Studies have shown TBT to be exceptionally toxic to shellfish larvae (Hall and Pinkney, 1985). The National Marine Fisheries Service has also shown that fish held in TBT-treated nets tend to accumulate residues of the chemical in their tissues (Short and Thrower, 1986). Although no public health risk has been demonstrated for TBT residues in food fish, the cessation of its usage would appear prudent. It should be noted that there is currently no known use of TBT in Puget Sound net-pen culture. The use of other antifouling agents is not precluded under the guidelines, but proposed antifoulants should be evaluated by state agencies on a case-by-case basis. Antifoulant use should be reported to the Washington Department of Ecology.
4. Only antibiotics licensed by the Food and Drug Administration (FDA) for use in food fish shall be used. At the present time, FDA-approved antibiotics are limited to oxytetracycline (Terramycin), sulfamerizine and Romet 30. These substances should be used as sparingly as possible as required for disease treatment, or only on a short-term basis for disease prevention. Antibiotics should not be used prophylactically on a long-term basis. The WDF chief pathologist should be notified of antibiotic usage at time of treatment and should be provided information on the disease or condition being treated and the antibiotic used.
5. Transfer of live fish or their reproductive products within the state or their introduction into state waters shall be in accordance with applicable federal standards (Title 50) and state laws, rules, and policies (e.g., RCW 75.08.080, 75.08.285, 75.08.295; WAC 220-20-039, 220-20-040, 220-69-300, 220-76-015; WDF Policy 82-1). Depending on the point of origin and the species being transferred or introduced, the culturist may be required to obtain a transfer or importation permit, provide a Fish Health Inspection Report, provide a health history of the stock and hatchery, surface disinfect eggs, or hold fish in a quarantine facility. The state importation and transfer requirements may be modified in the near future by rules currently being adopted under the Aquaculture Disease Control Law (RCW 75.58).

6. Applications for culture must be accompanied by an operations plan which is to be submitted to and approved by DNR. This plan should include projections for:

- Improvements at site (e.g., pens, log booms) and their relationship to natural features (e.g. bathymetry, shorelines);
- Pen number, size and configuration;
- Schedule of development and maintenance;
- Fish species cultured;
- Size at harvest;
- Annual production;
- Pounds of fish on hand throughout the year;
- Average and maximum stocking density;
- Source of eggs and smolts;
- Feed type used;
- Method of feeding;
- Use of chemicals (e.g., antibiotics);
- Predator control measures;
- Antifoulant use.

6.0 ENVIRONMENTAL SURVEYS

Before a site can be developed for net-pen culture, an applicant must acquire numerous local, state, and federal permits. The permits, licenses, or approvals generally required include a Substantial Development Permit (local), SEPA (local), Aquaculture License and Permit (WDF), Seed Stock Importation Permit (WDF), Hydraulics Project Approval (WDF), Marine Lands Lease (DNR), Coastal Zone Certification (WDOE), Shoreline Conditional Use or Variance (WDOE), and Section 10/404 Permit (COE).

Many of these permits address water or land use conflicts which range far beyond the biological effects considered by these guidelines. However, the effect of development on the marine environment is a major consideration, therefore certain site-specific information is required for permit review. In order to assess the suitability of a site for net-pen culture and to evaluate the extent of environmental effects after initiation of culture, several environmental surveys should be performed at net-pen operations. These surveys include a site characterization survey, a baseline survey, and annual monitoring. The components of each of these surveys are summarized in Table 6 and discussed in detail in Sections 6.1 through 6.3.

6.1 SITE CHARACTERIZATION SURVEY

A site characterization survey should be performed prior to permit application. This survey would serve two principal functions. The primary purpose would be to provide state and local governments with the information necessary to evaluate the potential extent of environmental effects. Although not its primary intent, the site characterization survey will also provide the applicant with information critical to determining the suitability of the site for culture. A site characterization survey is composed of four principal elements: (1) initial consultation with state and local government; (2) a bathymetric survey; (3) a hydrographic survey; and (4) a diver survey.

CONSULTATION WITH STATE AND LOCAL GOVERNMENT

After selecting a potential culture site, but prior to performing the site characterization field survey, the prospective applicant should contact state

Table 6

RECOMMENDED ENVIRONMENTAL SURVEYS FOR
PUGET SOUND NET-PEN CULTURE

	Site Characterization Survey	Baseline Survey	Annual Monitoring
Class I Facilities	• Recommended consultation with state and local authorities • Bathymetric survey • Hydrographic survey - Current velocity and direction • Diver survey	• None	• None
Class II Facilities	• Recommended consultation with state and local authorities • Bathymetric survey • Hydrographic survey - Current velocity and direction • Diver survey	• None	• Benthic survey - Diver survey
Class III Facilities	• Recommended consultation with state and local authorities • Bathymetric survey • Hydrographic survey - Current velocity and direction - Drogue tracking - Vertical hydrographic profiling • Diver survey	• Sediment chemistry sampling • Benthic infauna sampling	• Benthic survey¹ - Diver survey - Sediment chemistry - Benthic infauna • Water quality sampling • Current velocity and direction

¹ Replaced by baseline survey during first year of facility operation

resource management agencies (Departments of Ecology, Fisheries, Natural Resources, Game and Parks and Recreation), federal and local officials (the shoreline administrator). Initial contact should be made with the Department of Agriculture, and this agency will then facilitate consultations with all other appropriate state agencies. These consultations cannot be required of the applicant, but are highly recommended to provide state and local officials with an opportunity to comment on the potential site at an early stage in the planning process. Resource management agencies may be able to identify nearby habitats of special significance (Section 3.0) or existing conditions (e.g., water quality problems) that would make the site unacceptable for development. County officials may be able to identify major use conflicts that would significantly reduce the probability of permit approval. Other government agencies or tribes may also need to be contacted if the potential site is likely to affect land or resources under their jurisdiction.

One of the principal purposes of these consultations is to determine the proximity of the potential site to habitats of special significance. WDF staff may be aware of nearby critical spawning areas or major shellfish beds. WDC staff should be able to identify haulout areas for seals and sea lions, seabird nesting sites and colonies, and critical feeding areas and migration routes for both seabirds and marine mammals. WDC maintains a Wildlife Data System which can be accessed to obtain information on endangered, threatened, sensitive, or monitor species.

State and local government officials should be given an opportunity to comment on the proposed field surveys (i.e., bathymetric, hydrographic and diver surveys). The survey content should be determined in consultation with those agencies having permit authority. The survey protocol described below is intended to provide the information necessary for permit review by a standardized and cost-effective method. This protocol should be adequate in most instances, but there may be certain site-specific concerns that would require minor modification of the generic protocol. For example, the diver survey may be modified to devote particular attention to areas of special concern. Departure from this protocol should be allowed only with strong justification, and modifications should generally result in the collection of more, rather than less, data.

BATHYMETRIC SURVEY

A bathymetric survey should be performed in order to apply the guidelines pertaining to depth and current (Section 2.0) and to identify the presence of any bathymetric features which might affect bottom accumulation of excess feed and fecal material (e.g., depressions). The area of concern is the seabed directly under the net-pens and within 300 feet of the net-pen perimeter. Multiple fathometer transects should be established with a density and spacing so as to adequately characterize the bathymetry under and around the pens. The position of the transects will depend upon the intended pen configuration. Figure 8 provides a recommended survey design given a rectangular net-pen configuration. The bathymetric survey report should note the period during the tidal cycle when the survey was made, and it should relate the measured depths to MLLW (mean lower low water).

HYDROGRAPHIC SURVEY

Information on current velocities and directions is necessary to apply the depth and current guidelines (Section 2.0) and to predict the dilution and dispersion of excess feed and wastes. The hydrographic survey should include: (1) current velocity and direction; (2) drogue tracking; and (3) vertical profiles of temperature, salinity and dissolved oxygen. Class I and II facilities, as defined in Section 2.0, should not be required to perform the drogue tracking and vertical hydrographic profiling studies because of their small size and reduced potential for water quality degradation.

Current velocity and direction - Current velocity and direction should be monitored at the center of the potential net-pen site. Both near-surface and mid-depth measurements should be made. The near surface measurements should be taken at a depth of 6 feet (corresponding to one-half the depth of typical net-pens). The mid-depth measurements should be taken mid-way between the maximum depth of the proposed net-pens and the sea floor. At both depths current velocity and direction should be monitored throughout one complete tidal cycle (one flood tide, one ebb tide). A minimum of ten measurements evenly spaced throughout the tidal cycle should be made at each depth. For purposes of applying the depth and current guidelines, "mean current" is determined by an arithmetic average of these ten or more measurements. The measurements

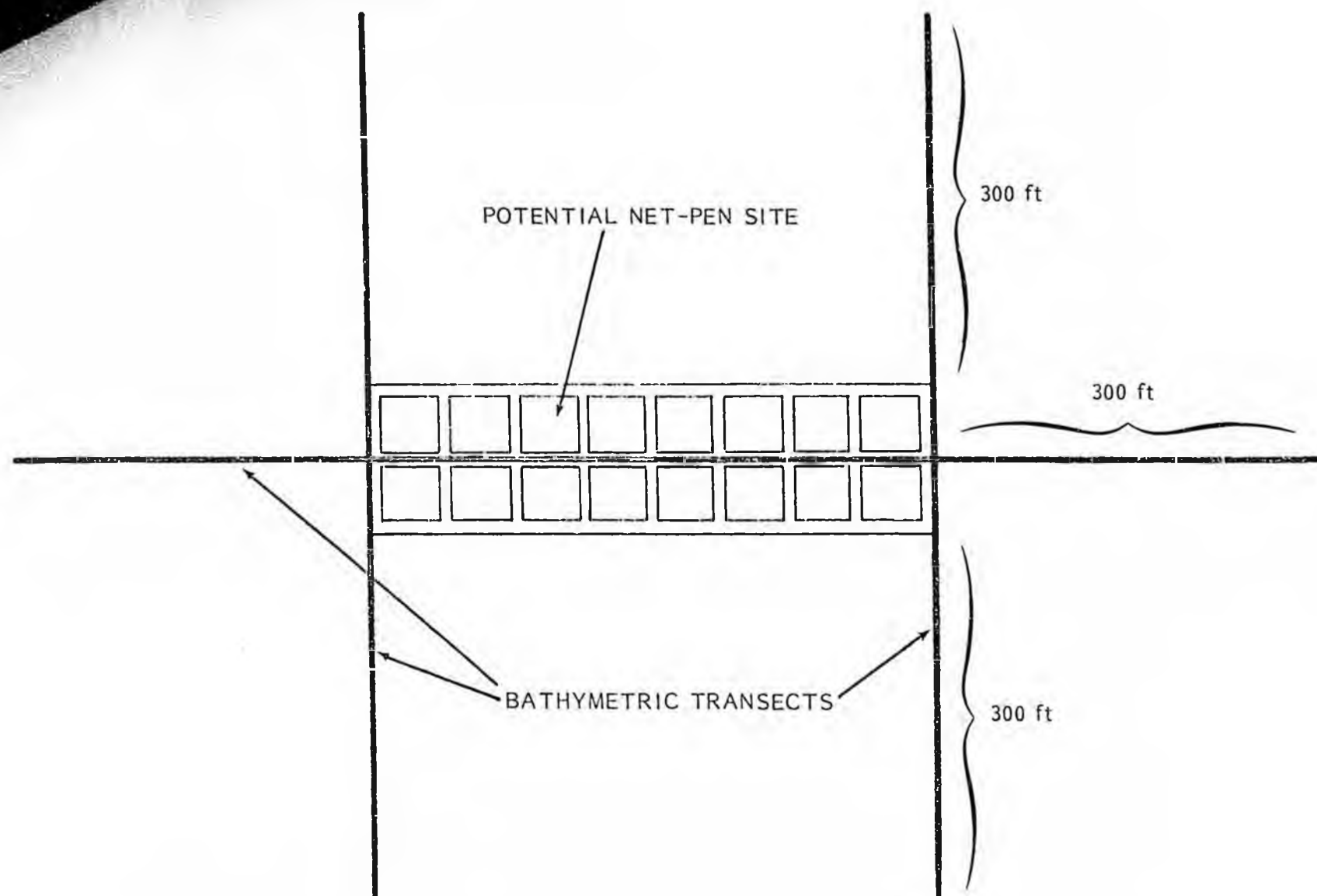


Figure 8. RECOMMENDED BATHYMETRIC SURVEY TRANSECTS FOR SITE CHARACTERIZATION

CORRECTION

**THIS DOCUMENT
HAS BEEN REPHOTOGRAPHED
TO ASSURE LEGIBILITY**

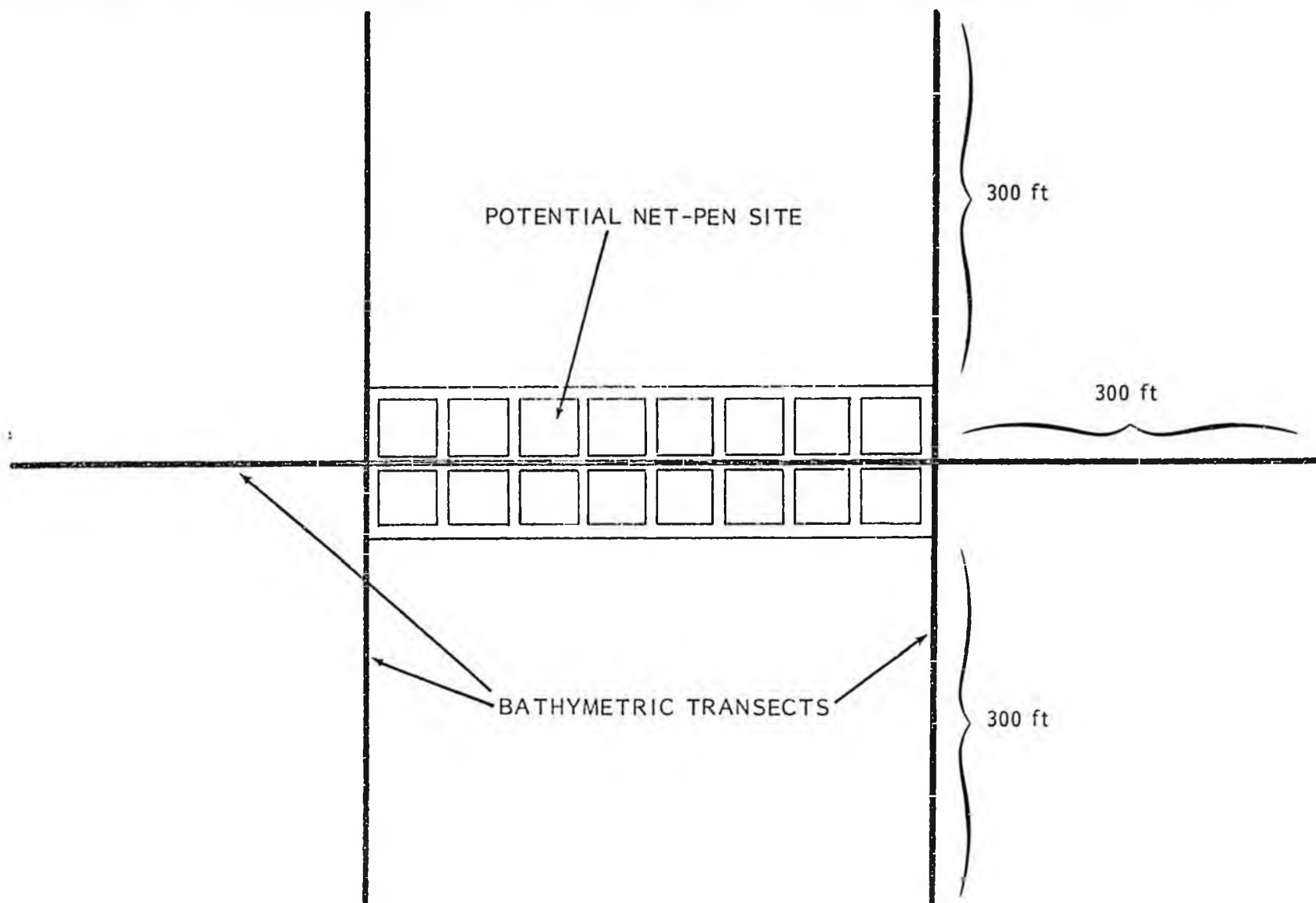


Figure 8. RECOMMENDED BATHYMETRIC SURVEY TRANSECTS FOR SITE CHARACTERIZATION

should be made during a period of "average" tides, and should not be representative of either extreme neap or extreme spring tides. The report of results should note any conditions (e.g., weather, extreme tidal range) that might make the data unrepresentative of "typical" conditions. If the prospective applicant believes the data do not reflect "typical" tidal currents and direction, resampling may be done, but all data collected should be used in determining a mean velocity.

Drogue tracking - Drogue tracking should be performed to estimate the potential fate of particulate material, and the potential for eddy circulation (i.e., the same parcel of water is repeatedly cycled through the area of the net-pen). Two drogues should be released from the center of the potential net-pen site. One should be set at a depth of 6 feet. The second drogue should be set at a depth mid-way between the bottom of the potential net-pens and the sea floor. The trajectory of these drogues should be followed for as long as daylight permits, and not less than 8 hours. The drogues may be reset at the original release site during this 8-hour period if they are transported beyond a practical tracking range.

Salinity, temperature, and dissolved oxygen profiles - Vertical profiles of salinity, temperature, and dissolved oxygen may be used to evaluate the intensity of water column stratification, a factor important both from the standpoints of environmental protection and the health of the cultured fish. Prospective applicants should provide any existing information on the site from such sources as the Ecology water quality monitoring network, Collias, et al. (1974), Friebertshauser, et al. (1971) and other site-specific studies. The prospective applicant should also take measurements of temperature, salinity and dissolved oxygen throughout the water column at the center of the potential site during the hydrographic survey. Measurements should be made at depths of 1, 10, 20, 30 feet, and at 30 foot intervals thereafter. The deepest measurement should be made 3 feet above the sea floor.

DIVER SURVEY

The diver survey is primarily intended to determine if habitats of special significance (Section 3.0) are present in the vicinity. Since many of the habitats of special significance would be readily visible only in the spring

and summer months (e.g. geoduck beds), the diver survey should be performed during April through September. The requirements for a diver survey during site characterization depend on the water depths in the vicinity of the site. No diver survey should be required if the area within 300 feet of the potential site is greater than 75 feet deep. A diver survey is required if water depth (MLLW) at the site or within a 300 foot radius of the potential location is less than or equal to 75 feet. If any portion of the area within 300 feet of the potential net-pens is in depths of 75 feet or less, it is potentially subject to accumulation of feed and fecal material, and therefore should be surveyed by a diver, even if the net-pens will be located over a site that is deeper than 75 feet. The design of the diver survey should be formulated in consultation with state and local government officials. WDF will take the lead role for the state in design of this survey. The number and spacing of the transects will depend on the particular site and should be established during these consultations. As a general guide, if all or most of the area is 75 feet or shallower, then 3 to 5 transects, each 200 feet long, should be surveyed per acre of pen. A larger pen complex would require additional transects; fewer transects would be required if most of the area is in depths greater than 75 feet. A diver should traverse the area making observations on substrate type, presence/absence of Beggiatoa mats and the density of geoducks and hardshell clams, eelgrass, kelp, demersal fish, crabs, and other large invertebrates. If eelgrass is present, counts of turion density in 0.25 m^2 quadrats are required to determine compliance with guidelines pertaining to habitats of special significance. Geoduck and hardshell clam density should be estimated by counts along transects. The abundance of other invertebrates and fishes should be noted by descriptors such as "rare," "common," etc.

REPORT PREPARATION

The results of the bathymetric, hydrographic and diver surveys should be assembled in a site characterization report to be submitted to Departments of Ecology, Fisheries, Game, Natural Resources and the county shoreline administrator. The site characterization report should include a figure of the proposed net-pen site in plan view at a scale of 200 feet or less to the inch. The figure should show nearby landmarks, the size and configuration of the proposed net-pens, bathymetric contours and the position of the diver transects. The report should also include identification of habitats of special

significance in the vicinity as determined in consultation with state agencies and the applicant's own surveys. The report should be a summary, analysis and interpretation of the data. The report should include, for example, a sectional view of the bathymetric profiles. A figure of the drogue trajectories should be also be included. The benthic survey should be described in narrative form with quantitative data provided when required or available.

6.2 BASELINE SURVEY

The baseline survey is intended to characterize bottom conditions at the net-pen site, before they could potentially be altered by culture activities. Sediment chemistry and benthic infaunal sampling were not included in the site characterization survey because of an anticipated uncertainty in the precise net-pen location and the difficulty of relocating samples without the aid of a moored net-pen as a position reference. Therefore, a baseline benthic survey should be required after emplacement of the net-pens, but before stocking the pens with fish. This survey should include sediment chemistry and benthic infauna sampling and may also include a diver survey if required by state resource management agencies or the county shoreline administrator. The baseline survey should be required for Class III operations, as defined in Section 2.0, but should not be required of Class I and II operations.

Stations should be established along a transect on the "downcurrent" side of the pens as determined by the prevailing currents (as measured at the mid-depth station in the site characterization survey). Stations should be established along this transect beginning directly under the perimeter of the net-pens and extending away from the net-pens at distances of 20, 50, 100, and 200 feet in the direction of prevailing currents. Each site should be sampled by three replicate diver cores or three replicate grab or box corer samples from which sub-cores are removed. Cores should be collected for analysis of total organic carbon, total Kjeldahl nitrogen and grain size distribution (median phi, percent gravel, sand, silt/clay). Cores should be inserted to a depth of two inches in the sediment. Care should be taken to insure that the core is representative of the undisturbed sediment column. Transparent cores should be used so that the redox potential discontinuity (RPD) depth can be noted and recorded. The position of the RPD is reflected by change in sedi-

ment color from brown to black. Each core should be homogenized for analysis, but the replicates should be treated as distinct samples and not pooled prior to analysis.

Benthic infauna samples may be collected either by a diver using a core sampler having an area of at least 0.01 m^2 or by a grab or box corer having an area of at least 0.1 m^2 . The same stations sampled for sediment chemistry (0, 20, 50, 100 and 200 feet from the net-pens) should be sampled for benthic infauna. Three replicate samples should be collected at each site. The same grab/box corer samples used for sediment chemistry should be used for benthic infaunal analysis provided no more than one-quarter of the surface of each sample has been removed for sediment chemistry sampling. Each benthic infauna sample should be sieved on a 0.5 mm screen or nested 1.0 and 0.5 mm screens. All macrofaunal organisms retained on the screen(s) should be identified to the lowest practical taxonomic level, generally species.

The results of the baseline benthic survey should be assembled in a report consistent with the report guidelines provided for the site characterization survey (Section 6.1) and the annual monitoring (Section 6.3). The baseline report should be submitted to DNR, and this agency will take responsibility for distribution to other appropriate state and local authorities.

6.3 ANNUAL MONITORING

The annual monitoring program is designed to serve two purposes. First, it is intended to monitor potential changes in water and sediment quality resulting from culture activities. Secondly, it is intended as a data gathering effort in support of the programmatic EIS. As additional data are obtained on the environmental effects of salmon net-pen culture, the annual monitoring protocol may be substantially revised. It is also possible that monitoring at some culture sites may be curtailed or eliminated entirely if little or no measurable effect on environmental quality is found after several years of operation. The determination to curtail or eliminate monitoring at any site will be made after agency review of survey results. However, no schedule for "phasing out" of the monitoring program at any site has been provided at this time since the interim guidelines are intended only for short-term application.

The annual monitoring program consists of three principal elements: (1) a benthic survey; (2) water quality sampling; and (3) a hydrographic survey. Class I facilities should be exempted from annual monitoring. Class II facilities should be required to conduct only a diver survey.

BENTHIC SURVEY

The benthic survey is intended to assess the extent of solids accumulation on the bottom in the vicinity of the culture operation and the biological effect of this accumulation. The survey consists of diver observations and sampling of sediment chemistry and benthic infauna. During the first year of facility operation, the benthic sampling conducted during the baseline survey should suffice in place of the annual monitoring benthic survey. Thereafter, the benthic survey as described below should be conducted annually.

Diver observations should be made if the net-pen or any portion of the bottom within 300 feet of the site is at a water depth of 75 feet or less. Four transects, each at least 200 feet in length, should be established as illustrated in Figure 9. The transects should be extended if feed or feces accumulation is visible 200 feet from the pens. Additional transects may be required to survey habitats or resources of special concern. Some transects may be shortened or eliminated entirely if they would require the diver to operate in depths greater than 75 feet. If any portion of the area within 300 feet of the net-pens is in depths of 75 feet or less, it should be surveyed even if the net-pens are located in depths greater than 75 feet.

One of the principal objectives of the diver survey is to document the depth and lateral extent of solids accumulation. The diver should estimate the depth of feed and feces accumulation at 20-foot intervals along each transect, and should note the greatest distance from the net-pens that visible accumulation is present. The diver should also note the presence/absence of Beggiatoa mats and estimate densities of demersal fish, crabs and other invertebrates. The annual monitoring benthic survey for Class III operations should also include collection of sediment chemistry and benthic infauna samples. The station location and sampling protocol should be exactly as described in the baseline benthic survey (Section 6.2).

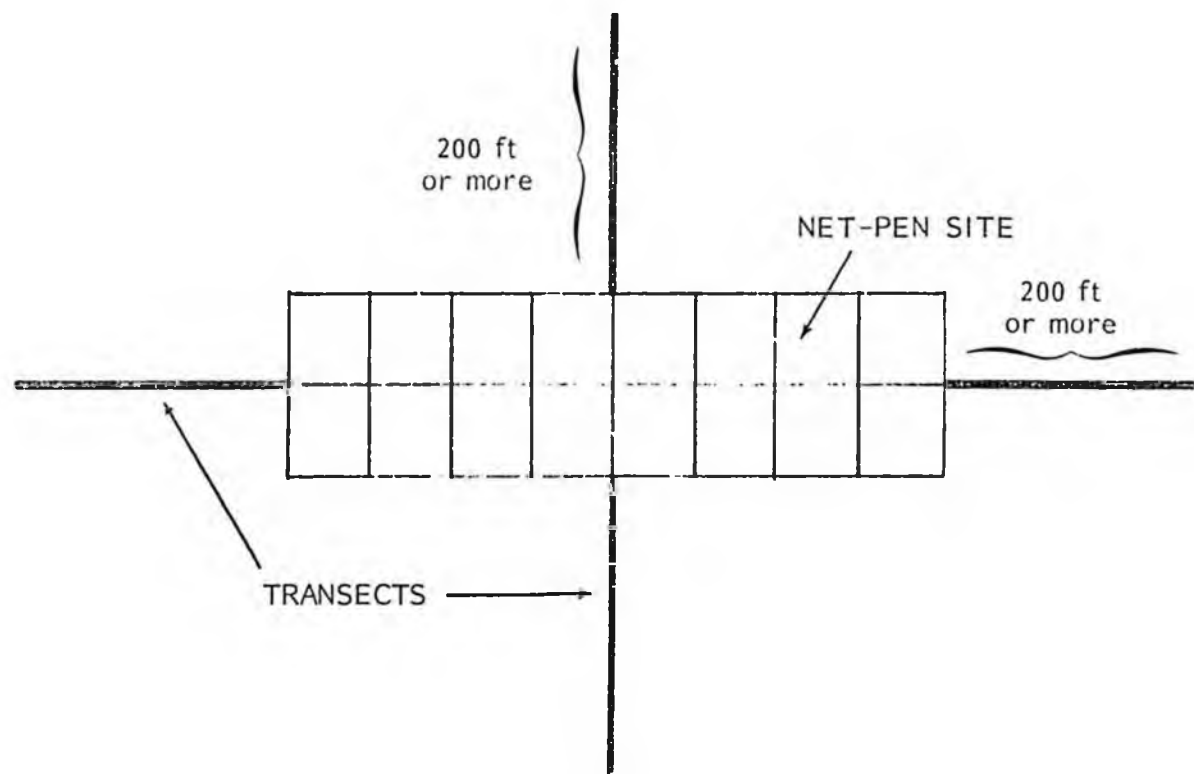


Figure 9. RECOMMENDED DIVER TRANSECTS DURING THE ANNUAL MONITORING SURVEY

WATER QUALITY SURVEY

Water quality sampling is intended to document the effect of culture activity on dissolved oxygen and nutrients in the water passing through the culture structure. The survey should be conducted in July, August or September of each year that the facility is in operation. Sampling in July through September is recommended since it is during this period that dissolved oxygen reductions or nutrient enrichment are of greatest concern. Three stations should be sampled: 100 feet upcurrent of the net-pens; 20 feet downcurrent; and 100 feet downcurrent. The precise location of the stations will depend on net-pen configuration, but they should be located so as to monitor the water passing through the greatest possible number of net-pens. Sampling should be conducted within one hour of slack tide. Three replicates should be taken at each station at a depth mid-way between the water surface and the bottom of the net-pens. Samples should be analyzed for the following parameters: dissolved oxygen; temperature; salinity; pH; ammonia; and nitrite/nitrate (either separate or combined). The concentration of unionized ammonia should also be calculated.

HYDROGRAPHIC SURVEY

Current velocity and direction should be measured at the depth at which the water quality samples are taken. A single measurement should be made 20 feet downcurrent of the net-pens concurrently with collection of the water quality sample from this station. Loading estimates (g/kg fish/day) should be calculated for ammonia and nitrite/nitrate based on: (1) the net increase in concentration between the upcurrent station and the 20 foot downcurrent station; (2) the current velocity 20 feet downcurrent; (3) the cross-sectional area of the net-pen complex; and (4) the weight of fish on hand at the time of the water quality survey.

REPORT PREPARATION

The comments made regarding the site characterization report apply here as well. Specifically, analysis and interpretation of the data should be provided, not merely presentation of the raw data. However, the raw data should be provided in appendices so as to permit independent assessment of conclusions.

In addition to a description of methods and data analysis and interpretation, the annual monitoring report should also include information on operational practices over the past year. This information should include:

- General description of facility (species cultured, size at which fish will be marketed, etc.).
- Size, number and configuration of net-pens at time of sampling.
- Significant changes in size, number and configuration of net-pens over the previous year.
- Annual production (pounds).
- Estimated weight of fish on hand during survey (pounds).
- Stocking density (average and range) (pounds/ft³).
- Type of feed used and feeding method employed.
- Types of antibiotics used and frequency of usage over the past year.
- Interactions with birds and marine mammals and a summary of types and frequency of predator control measures used.
- Types of antifoulants employed and frequency of net treatment.

The annual monitoring report should be submitted to DNR and this agency will take responsibility for distribution to other appropriate state and local authorities.

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AQUATIC FARM AND AQUATIC FARM HATCHERY PERMITS

CHAPTER 08.06

OPERATING PERMIT

Issued by DC&ED
Subject to DEC requirements
(18 ACC 34)
EPA

AQUATIC FARM STOCK ACQUISITION PERMITS

Issued by FISH & GAME
*

NOTICE OF TRANSFER

Notify DC&ED
Subject to F&G health
inspection

* At this point, the stock is transformed from a public resource to private property.

Alaska Mariculture Report

Published by the
Alaska Mariculture Association

March 1987

Vol. 1, No. 5

Legal Status of Mariculture 'Clearly Ambiguous'

A March 10 Attorney General's opinion clarifying the legal status of fish farming has raised more questions than it answered and appears to be adding pressure on the legislature to approve mariculture legislation.

In response to a request for clarification by the Department of Fish and Game, Assistant Attorney General Sarah McCracken wrote, "...it is clear that the activity of fish farming is one that the legislature intended to allow...the question then arises of how a potential fish farmer may acquire fish for the farming project."

The legal memorandum by McCracken goes on to rule out imported smolts or surplus hatchery stocks as potential sources. "...the one available source for fish within the state is from a commercial season. ...the board (of Fisheries) could set a special fishery for collection of fish for fish farms, or...fish could be taken during a normal commercial fishery (assuming the commercial fishery timing and lawful gear made this practical).

"In summary, fish farming could be accommodated under existing statutory authorities. The Department of Revenue could issue a fish farming permit...and your department (Fish and Game) could allow a fish farmer to obtain and keep brood stock by issuing a permit (to possess live fish) and by allowing the fish farmer to collect fish either during a normal commercial fishery or in a new fishery to be established by the board..."

While McCracken's opinion appears to accommodate mariculture including salmon farming under the existing legal framework, a second representative of the attorney general's office told the House Resources Committee the situation isn't so clear. Assistant AG Larri Spengler told lawmakers that the regulations governing transportation of live fish are "clearly ambiguous" on salmon farming and may need to be rewritten by the Board of Fisheries.

Spengler said the key to latest opinion is contained in the following footnote:

"Because a person taking fish for fish farming would be possessing and transporting live fish, the person would presumably be required...to have a fish transport license. (Regulations) provide that the fish transport license requirement applies only to the 'transportation, possession, or release of live fish transplanted for or cultivated for human consumption or sport fishing purposes, or as part of an aquaculture program for scientific, educational, or propagative purposes.' We believe the term 'cultivated for human consumption' probably is broad enough to encompass fish transported and held for fish farming purposes...To the extent that there may be any ambiguity regarding the applicability of the fish transport permit requirement, this can easily be clarified by the board of fisheries."

Spengler told the House Resources Committee the fish transport regulations are 'clearly ambiguous' on salmon farming and may have to be revised by the Board of Fisheries. Spengler said the Board of Fisheries may not have contemplated mariculture when it used the phrase 'cultivated for human consumption,' and lacking further evidence of original intent the board may be asked to interpret or clarify the regulations.

Spengler acts as attorney for the Board of Fisheries and authored earlier opinions on mariculture and salmon farming that were more restrictive than the March 10 memorandum.

Under questioning by committee members, Spengler said salmon hatcheries and fisheries on the Annette Island Indian reservation also could be sources of brood stock for Alaska salmon farmers, but fish transport permits still would be required. In response to additional questions, Spengler said the purpose of the regulations is to "prohibit a threat to public resources" and "not for economic protectionism."

Spengler later told AMA that the board could decide to not allow the fish transport permits to be used for mariculture purposes, effectively closing the final available sources of brood stock for sea farming. She also said board would have to provide good justification for distinguishing between different kinds of farming, such as allowing shellfish and disallowing salmon farming.

Rep. Johnny Ellis, prime sponsor of House Bill 108 which clears legal hurdle for mariculture, said the opinion and a pending lawsuit against the state on salmon farming makes it even more important for the state to clarify the legal status of mariculture. Ellis said the legislature needs to determine its policy objectives in mariculture development before the matter is settled by the courts without provisions for maximum Alaska participation.

AG's Opinion May Affect Shellfish Farmers

Assistant Attorney General Larri Spengler has told the Alaska Mariculture Association that the March 10 legal opinion may have major implications for scallop and mussel farmers.

The Department of Fish and Game may have to reject fish transport permit applications for mariculture purposes until the regulation is addressed by the Board of Fisheries, according to Spengler. The only exception would be for oyster farming with imported stocks which the board already has authorized.

Spengler's preliminary analysis of implications for shellfish farmers may derail plans by the Department of Fish and Game to devise a permitting process allowing the gathering of scallop spat. A spokesman said Fish and Game had planned to begin working on spat collection permits for scallop farmers if the opinion cleared the way. Many Kodiak residents interested in scallop farming had been seeking permits to expand beyond the scope of the project with the Japanese.

Senate Committee Moves Mariculture Legislation

The Senate Labor and Commerce Committee moved mariculture legislation to its next committee assignment over strong objections from two coastal senators.

The committee modified Senate Bill 106 to reflect changes made earlier in companion house legislation to restrict tideland permits to Alaska residents and companies licensed to do business in the state. Senator Bettye Fahrenkamp said she wants to tighten up the language to restrict the permits to Alaskans and resident-owned businesses, but did not want to delay the bill and would pursue the amendment in Senate Resources.

Senator Richard Eliason, a life-long troller from Sitka, and Senator Mike Szymanski, who represents Cordova fishermen who oppose salmon farming, both voiced strong objections to moving the bill from committee, but Fahrenkamp teamed with Senators Tim Kelly, committee chairman, and Rick Uehling, a co-sponsor of the legislation, to move SB 106 to Senate Resources.

Governor Cowper's Position on Mariculture

Governor Steve Cowper has issued a statement on mariculture to provide the legislature some guidelines of principles which legislation should address.

"Mariculture may provide substantial economic benefits to our coastal communities and help diversify and stabilize our economy if it is developed in an orderly fashion which provides the maximum benefit to

Alaskans while ensuring protection for our fisheries resources, other resource uses and the environment. In order to accomplish these objectives, any legislation authorizing a mariculture industry must satisfy the following principles:

1. "The mariculture industry must benefit Alaskans."
2. "The mariculture industry must pay for itself and the state should get a fair return for the use of state resources."
3. "The development of the mariculture industry in Alaska should be done in an orderly fashion which encourages a stable, dependable industry."
4. "The mariculture industry must meet all state and federal requirements for human health, product quality and sanitation."
5. "Mariculture activities must be managed to ensure protection of the biological integrity of natural plant and animal stocks."
6. "Mariculture activities must be managed in a manner which ensures adequate environmental safeguards and habitat protection."
7. "Mariculture activities must be sited to minimize land-use conflicts, maintain navigation and ensure access to upland areas."
8. "Broodstock acquisition for mariculture purposes should be carefully regulated, especially for species subject to limited entry fisheries."

Rodger Painter, AMA executive director, said aquatic farmers support the governor's policy objectives, and AMA believes it is possible to fashion legislation encompassing the goals while allowing mariculture to develop into an important expansion of the existing seafood industry.

Scallop Farming in Alaska--A Farmer's Perspective (Part Four)

by Timothy Ward

Central Kodiak Archipelago Scallop Farming Project

The Alaska/Japan scallop research project formally got under way on March 10 with several days of lectures and technique demonstrations at the Kodiak Community College. Special guest speakers included Dr. Kuniyoshi Maru of the Hokkaido Hakodate Fisheries Experimental Station and Dr. Neil Bourne of the Pacific Biological Station in Nanaimo, British Columbia.

The project is designed to test the feasibility of collecting weathervane scallop spat in Kodiak Island waters and will last until July 1988. The Alaska portion of the project is being organized by the Alaska Department of Fish and Game and the Kodiak Area Native

Association. The Japanese portion is coordinated by the Japan Overseas Fishery Cooperation Foundation (OFCF) which is supplying most of the project funding, equipment and expertise.

The primary phase of the project will be conducted in Kalsin Bay near the City of Kodiak, with six secondary sites established at Port Lions, Akhiok, Old Harbor, Kitoi Bay, Uganik Bay and Uyak Bay. Two large long-line collectors will be used at the main site, while smaller collectors (a buoyed and anchored vertical rope with attached spat collectors) will be used at the secondary sites.

Much general oceanographic data will be gathered and examined, and a very intensive planktonic larvae study will be undertaken to determine the abundance of weathervane scallop larvae and settling periods. Collection gear also will be modified and fine-tuned to achieve maximum efficiency.

A similar OFCF project has been successfully completed in Golden Bay near Nelson, New Zealand. That project entailed the collection of scallop spat, some intermediate culture, and the re-seeding of a once productive scallop bed. The goal of the Kodiak project is to create a scallop culture industry while increasing opportunities for commercial scallop fisheries.

(Next Issue: Scallop Culture in Japan.)

Salmon Farming B.C. Style--Lessons For Alaska?

Alaska lawmakers were warned in February by members of the Canadian Standing Senate Committee on Fisheries that "rapid development of the fish farming industry without government control can create political and practical disasters."

The Canadian senators said the government had slapped a moratorium on the issuance of new salmon farming permits in British Columbia and was conducting an inquiry into the problems created. Conspicuously absent in the ominous warnings by the group of east coast Canadian senators was mention that the moratorium was lifted and the independent inquiry resulted in recommendations favoring further salmon farming development.

Indeed, the first recommendation by inquiry chairman David Gillespie was that the provincial B.C. government should "continue its support for the finfish aquaculture industry. Aquaculture holds the promise of expanding employment, increasing capital investment in B.C., revitalizing economically depressed communities, and strengthening the commercial fishery sector as a whole. The Province should seize this opportunity to generate additional capital, employment, and business activity along the coast."

The Gillespie report went on to criticize the permitting process for salmon farming established by the provincial and Canadian governments

and recommended a number of reforms, including stronger cooperation between local, provincial and federal agencies and development of an overall aquaculture policy.

Despite stating that evidence did not support concerns raised over environmental and biological impacts, Gillespie was critical of the government's existing environmental assessment programs. He recommended increased research, mandatory environmental monitoring at each farm site, increasing separation between farms from .8 to 3 kilometers, increased control over use of chemicals, toxicants and antibiotics, and a ban on imports of Atlantic salmon eggs.

The Gillespie report was applauded by the B.C. salmon farming industry. Some B.C. salmon farmers have told AMA that many of the problems identified by Gillespie would have been avoided if the Canadian government had paid more attention to recommendations made earlier by the industry.

"Many state officials and legislators have mentioned during legislative hearings on mariculture legislation that Alaska should not repeat the mistakes of British Columbia," said Rodger Painter, executive director of AMA. "We agree. Let's also make sure we recognize what B.C. did right--encourage the growth of fish farming to diversify its economy and strengthen its seafood industry."

Mariculture Research Goals Drafted

An advisory committee including a number of Alaskans is working on mariculture research goals for the distribution of \$300,000 in federal grant funds available to West Coast states.

The advisory team composed of government officials and industry representatives has been put together by the Western Regional Aquaculture Consortium which distributes research funds by the U.S. Department of Agriculture. The project statements for 1987 funds will cover the following areas: extension programs; IHN control; broodstock nutrition; alternative protein sources; broodstock development and genetic improvement; habitat improvement and shellfish sanitation; sex control/ploidy and hybridization; and PSP and plankton blooms.

Alaska members include Donald Kramer, Rick Harris, Fred Conte, Brian Allee, Tony Gharrett and Bill Smoker. The program is administered by Dr. Ken Chew with the University of Washington School of Fisheries.

The Alaska Mariculture Report is a monthly newsletter published by the Alaska Mariculture Association. We encourage contributions. For more information or to obtain a subscription, contact: AMA, 130 Seward St., Suite 201, Juneau, AK 99801. (907) 463-3600.

Interagency Mariculture Workgroup
Report on Activities Over the Legislative Interim

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MEMORANDUM

State of Alaska

TO: Fisheries Cabinet

DATE: January 12, 1988

FILE NO:

TELEPHONE NO: 465-4100

FROM:  Interagency Mariculture
Workgroup

SUBJECT: Report on Activities
Conducted During the
Legislative Interim

The Interagency Mariculture Workgroup is pleased to present to you this report on our activities conducted over the legislative interim. The products contained in this report are in response to the tasks the Cabinet outlined last May. In the report you will find eight issue papers on a variety of biological, land-use, water quality and product quality issues which are central to the mariculture debate. Other products include a matrix summarizing how four other areas address these subjects, a description of the on-going socioeconomic studies, and the uniform shellfish permitting system we developed. Additional information is contained in the appendices.

Background

Last legislative session, the issue of authorizing expanded mariculture in Alaska received considerable attention. In particular, the prospect of pen-rearing salmon in Alaska became one of the hottest topics in the state. The market success of the Norwegian salmon farming industry, and the growth worldwide in fish farming generally have spurred interest in all forms of mariculture in Alaska. During last year's session of the Alaska State Legislature, bills were introduced to legalize expanded mariculture activities, including salmon pen-rearing. Senate Bill 106 and House Bill 108 would "encourage the establishment and growth of an aquatic farming industry" in Alaska. The bills would establish a permit system which would be administered by the Department of Commerce and Economic Development for aquatic farms and private-for-profit hatcheries.

In response to this action in the Legislature, Governor Cowper directed the Fisheries Cabinet to review the mariculture issue and prepare a recommendation to him. The Cabinet, after careful consideration, prepared for the Governor a set of criteria for judging any authorizing legislation. The Governor approved these criteria, which were then presented to the Legislature.

Late in the session it became apparent that authorizing legislation was not going to pass. All parties became concerned that the questionable legal status of pen-rearing

salmon could lead to speculation on tidelands sites and a "gold rush" mentality similar to the situation which developed in British Columbia. The resulting confusion and inevitable litigation would not be to anyone's advantage, so a carefully crafted moratorium bill was introduced and passed in the waning hours of the session. This bill, Senate Bill 297, placed a moratorium which expires July 1, 1988 on issuing permits for most finfish farming. It also authorized shellfish farming and limited finfish farming in fresh water.

The Fisheries Cabinet met on May 19, 1987 to develop a plan of action for addressing the mariculture issue over the legislative interim. At that time the Cabinet identified two general tasks which needed to be performed.

First, the administration needed to develop a uniform approach to permitting shellfish mariculture. This has been done. The staff workgroup reviewed existing authorities and permitting procedures, and developed the consolidated permit application form to establish a uniform application process. In conjunction with this, the Department of Fish and Game prepared regulations authorizing a shellfish farm permit, and a Fish Transport Permit for holding and transporting shellfish for commercial farming purposes. This cleared the way to allow expanded shellfish mariculture activities.

The second task identified by the Cabinet was to systematically address the issues raised during the legislative hearings. Senator Eliason and Representative Herrmann presented us additional questions which needed to be addressed as well. The issue papers, matrix, and the socioeconomic studies are the products we prepared to address this task.

The issues papers are designed to briefly discuss and summarize a number of biological, land-use, product quality, and water quality issues which are central to the mariculture debate. The matrix briefly summarizes how British Columbia, Maine, California, and Washington address many of these same issues. The socioeconomic studies, which are in progress, will address the questions regarding markets and cost of production.

Also included in the appendices are copies of SB 297, the issues lists from Senator Eliason and Representative Herrmann, a list of the staff on the workgroup, and Governor Cowper's Position on Mariculture.

LAND USE
Department of Natural Resources

ISSUE:

How will the state encourage the development of tide and submerged lands through mariculture while at the same time minimize conflicts with existing uses?

DISCUSSION:

Mariculture is a new and expanding industry in Alaska, and may become a significant long-term use of tide and submerged lands. Currently, mariculture activities are being permitted on a case-by-case basis with little or no comprehensive planning. Notable exceptions include the Prince William Sound Area Plan and the Prince of Wales Island Plan. The state needs a comprehensive approach to planning for mariculture activities in order to ensure the stable growth of this new industry and to minimize conflicts with existing uses. Such an approach should provide guidance to minimize conflicts on individual proposals and address the potential cumulative impact of numerous mariculture developments taking place over time.

Some of the potential land use problems associated with mariculture include: displacement of public uses such as recreation and subsistence; conflicts with other commercial uses of tide and submerged lands; land speculation; impacts on adjacent land holders; and cumulative impacts over time from the incremental expansion of mariculture activities.

Displacement of Public Uses such as Recreation and Subsistence

Mariculture sites may block or inhibit public access to important recreation and subsistence use areas. The expectation and desire for seclusion when recreating in rural Alaska is highly valued by residents and visitors. If the sense of seclusion is lost, an important part of the aesthetics of many bays is lost, and the recreational experience is less valuable. A mariculture facility, particularly with caretaker facilities located in a smaller cove, will essentially eliminate that sense of seclusion for recreational users other than the permit holder. In essence, the tendency will be for traditional recreational users of the cove to try to find other secluded and aesthetically pleasing areas.

Subsistence is an important activity in most of the areas where mariculture may occur. Conflicts between mariculturists and subsistence users could occur as more and more facilities are developed over time. This could entail

direct competition for subsistence resources as new residents enter rural areas, or loss of subsistence opportunities if mariculture facilities are placed in important subsistence resource areas. Siting criteria can minimize most of these problems.

And finally, the mariculturist may not want any intrusions into his or her area. There could be concerns over pollution, theft, damage, interference, or just the loss of privacy. This could lead to conflicts between the farmer and other users, in the end excluding other uses of the coastal area.

Conflicts with Other Commercial Uses of the Tide and Submerged Land

The best sites for mariculture facilities may often be the best sites for other uses such as mineral or timber transfer and support facilities, log storage, commercial fishing grounds or anchorages, or commercial recreation development. Although mariculture is a new industry in Alaska, experiences in British Columbia and Washington have demonstrated there can be conflicts with other uses. The potential for such conflicts has already surfaced in Kodiak, Prince William Sound, and Southeast.

Besides the need for space, water quality standards for mariculture may preclude the use of favored sites for other commercial or industrial facilities. Forcing more stringent mitigation measures or alternative siting for timber or mineral transfer or tailings disposal could reduce or eliminate the economic viability of the resource extraction industry in a given area.

Conversely, mineral or timber transfer, log storage, and floating camps associated with resource development activities may limit the space available or degrade water quality for mariculture facilities, thus making mariculture development more difficult and less likely.

Land Speculation

British Columbia experienced a dramatic rush for Section 10 permits prior to 1986. These permits allow the holder to enter and occupy a site to conduct research for up to one year. It appears that these permits were being issued for large areas of land with little regard for potential impacts to the public. This created a gold rush image which resulted in a great deal of public concern, and subsequently a moratorium was imposed. Alaska does not have an investigative permit similar to the Section 10 permit but we could experience land speculation in other forms, most notably by applying for tidelands and leases to tie-up a site.

Land speculation in this case is described as obtaining land use rights with the intent of not using the land for the proposed use but selling those rights for a profit. This problem is not unique to mariculture and it can occur in any use of state land. Speculation can be greatly reduced by close monitoring of development schedules and writing conditions in the land use document that would allow the state to revoke that document if the development is not proceeding as proposed.

Impacts on Adjacent Land Owners

Mariculture can impact adjacent land owners in a variety of ways: loss of tidelands access or boat moorage, loss of view, noise and loss of privacy, loss of habitat or water quality. This has been a significant issue in Washington and British Columbia, and may become a matter of concern in Alaska as well.

The adjacent land owner has a number of ways to influence the siting of mariculture facilities. They can participate in development of state land use plans, coastal zone management plans, and local comprehensive plans. The adjacent owner or owners are notified by mail of pending applications and are given an opportunity to comment on the project. A 30-day public notice pursuant to AS 38.05.945 is required for leases and the local government or regional native corporation is also notified if the project is within their boundaries. The local government or regional native corporation may hold public hearings if necessary. The Department of Natural Resources reviews all of these comments and weighs the use and enjoyment of the adjacent owner against what is considered to be the state's best interest. These determinations are made on a case-by-case basis and may or may not include consideration of cumulative impacts.

Cumulative Effects of Expanding Tidelands Use

The vast majority of the tide and submerged lands in Alaska are owned and managed by the State of Alaska. The remainder is owned by the federal government or by individuals and first class cities that acquired the land pursuant to AS 38.05.820.

The State of Alaska allows the development of its tide and submerged lands by granting leases and permits. The sale of tide and submerged land to a private entity is presently not legal. AS 38.05.045 excludes tide and submerged land from the public land that can be sold.

Tideland permits may be issued for a term not to exceed 5 years (11 AAC 62.720). This permit allows the use of tide and submerged lands for mariculture but does not provide the

security of a lease and does not constitute a preference to a lease.

Leases for tide and submerged land are issued in two ways, by public auction or negotiation. Leases may be negotiated for a term up to 55 years to an adjacent upland owner or upland lessee if the lease is for water transportation or another water-dependent purpose (AS 38.05.075(c)). Leases may also be negotiated for a period of no more than 10 years if the appraised value of the transaction is \$5000.00 a year or less (AS 38.05.070(b)). All other tideland leases are offered at public auction and anyone may bid on the lease parcel (AS 38.05.075(a)). The procedures for processing a tideland lease in each case is the same with the exception of the negotiated leases which do not have a public auction prior to the issuance of the lease.

For most of coastal Alaska, mariculture facilities will be permitted on an individual basis. The impact from one or two farms may be minimal, but the cumulative effects of numerous farms on existing uses may be dramatic. Under current statutes, management and area plans provide a process for resolving use conflicts on a regional basis, and the best interest finding required under AS 38.05.035(e) provides a mechanism for resolving conflicts on individual permits/leases. Although a regional perspective is preferred, the cost of management and area plans prohibits their use as a routine method of sorting out problems and resolving conflicts. This lack of a regional perspective could lead to significant conflicts over time and is one of the major problems with the existing system.

In developing statewide guidelines, Alaska should evaluate what British Columbia experienced during its initiation to finfish aquaculture. They had an immediate need for coastal planning because they were seeing a loss of access, a loss of anchorages, impacts on upland owners, and impacts on recreation and tourism. British Columbia placed a moratorium on leases and licenses for finfish farming and began an inquiry into finfish aquaculture and its impacts. The inquiry was completed in 1986 and many of their recommendations could be applied to Alaska. Some of the recommendations that apply to land use in Alaska are as follows:

1. The government should develop an aquaculture policy which clarifies direction, agency roles, and the responsibilities of both government and the private sector for the industry. The inquiry indicated that a clear policy would alleviate public concerns over lack of controls and lack of protection of the public resource. It would also serve to offset creation of the image of an uncontrolled land rush, which has

generated misunderstanding and suspicion about government objectives.

2. Initiate land use studies that would identify sites of high value for other important coastal interests. Use these studies to direct aquaculture away from major resource and user conflict areas.
3. Local governments should be encouraged to develop or revise local zoning laws to address mariculture within their boundaries. This would also involve modifications of local coastal zone management plans.
4. The land management agencies should review their practices involving advertising and notification for proposed aquaculture facilities. This includes notification to local governments. The inquiry recommended a 60-day review period.
5. The land management agencies should require a commitment bond to reduce speculation and a clean-up bond in the event of abandonment.
6. The aquaculture industry should be encouraged to institute a program to provide anchorage, access, and emergency assistance to other coastal users.
7. Establish a minimum distance separation guideline for farms as a means of reducing impacts on upland owners and other resource users.

Fees

Current statutes and regulations provide only two methods to collect fees for use of state land. AS 38.05.085 provides for a percentage of the fair market value as determined by appraisal. The parcel is not reappraised for 25 years. There are fees attached to permits which may be set by the regions. These fees may not provide a fair return to the state for the use of its resources. Options to consider for legislation may include: 1) a percentage of gross receipts; 2) revise lease terms to require reappraisal every five years (private sector norm).

Preference

Current statutes provide only a preference for adjacent owners. Any preference for Alaskan's would require a change in statutes.

Other statutory changes might include a lottery for new sites or a negotiated lease as well as the high bid method currently available.

SUMMARY:

It appears that most land use problems associated with mariculture can be resolved through state land use plans and the permit review process. The most comprehensive procedure to determine areas of public use is to develop state land use plans, such as the Prince of Wales Island Area Plan and the Prince William Sound Area Plan. Developing comprehensive area plans is desirable but time consuming (2-3 years) and expensive. A streamlined process needs to be developed and implemented which evaluates land-use issues, including the cumulative effect of multiple mariculture operations. Such a process should include provisions for strong local participation and be designed to meet the needs of reconciling land-use conflicts in a timely manner.

While the land use plans address siting considerations they do not resolve current statutory restrictions such as: how fees are charged; should and can Alaskans be allowed a preference to lease tide and submerged land.

WATER QUALITY
Department of Environmental Conservation
Division of Environmental Quality

ISSUE:

Ensure that high water quality is maintained during mariculture operations and that measures are taken so that preexisting uses and activities can continue without adversely affecting mariculture activities.

DISCUSSION:

Mariculture requires clean water. Water quality in areas surrounding the culture facility, however, can be affected by both the mariculture activity itself and by other nearby uses or activities. The state needs to ensure that water quality is adequate for mariculture, that high water quality is maintained during culture operations, and that measures are taken so that preexisting permitted uses and activities can continue.

Two key water quality issues associated with mariculture are:

1. Changes in water quality caused by mariculture operations; and
2. Potential siting conflicts with other uses or activities.

1. Changes to water quality from mariculture operations

Mariculture facilities can have significant impacts on local water quality and habitats if not properly sited, operated, and monitored. The impacts on water quality can be in three areas: 1) the creation of water quality and environmental conditions unfavorable for the growth and survival of cultured species; 2) a reduction of water circulation near culture facilities; and 3) the introduction of toxic or deleterious substances to the water.

One of the major concerns with mariculture operations is the unfavorable changes in water quality and environmental conditions that may develop during normal facility operations. Specific changes that may occur include:

- a) increased concentrations of particulates and organic matter (feed and fecal material) as byproducts of the culturing activity which accumulate as organic-rich deposits beneath culture facilities;
- b) increase in fecal coliform bacteria and ammonia due to increased production of waste; and

- c) decrease in dissolved oxygen due to increased oxygen demand by the cultured organisms and the bacteria that feed on their waste.

DEC has developed water quality criteria applicable to aquaculture operations (18 AAC 70.020). These criteria specify standards that must be met and maintained for aquaculture activities to take place. Specific criteria concern: fecal coliform bacteria, dissolved gas, pH, turbidity, temperature, dissolved inorganic substances, and sediments, among others. Mariculture operations, however, generate substantial amounts of waste products, unconsumed food and other debris which can settle, accumulate and affect nearby water quality and the benthic substrate.

The amount of organic matter which is produced and can subsequently accumulate below culture facilities is dependent upon several factors including the size of the mariculture facility, its production level, and environmental factors such as water depth, current velocity, flushing, and bottom topography at the facility site. This accumulation of wastes and sediments can also induce chemical and biological changes in the natural bottom habitat and water column.

An extensive accumulation of waste would stimulate the bacterial decomposition process. The biochemical oxygen demand (BOD) of this accumulated material can deplete dissolved oxygen in the water column, causing stress for the cultured organisms. Salmonids, for example, have a high dissolved oxygen requirement, 5.0 - 7.0 mg/l, which must be maintained in a crowded culture situation. Water quality criteria for aquaculture also specify that dissolved oxygen concentrations may not be less than 4.0 mg/l at any point beneath the water surface, and not greater than 17.0 mg/l in any location.

Another possible problem resulting from the deposition of excess food and feces is a change in the benthic macroinvertebrate community. Species unable to tolerate organic enrichment may disappear, and other more tolerant species become dominant. These changes may persist for the duration of the culture activity and for at least several years following its cessation.

Most, if not all of the unfavorable changes in water quality and environmental conditions can be avoided by properly siting mariculture facilities. Water quality problems would be anticipated only in areas of limited flushing or intensive culturing activity. Field studies rarely have shown organic deposition or dissolved oxygen to be a problem around culture facilities in well-flushed areas.

The second concern is that the culturing structure itself may reduce water circulation in the local area, particularly in the down-current direction. A number of variables can affect this flow reduction including flow rate, density of water, enclosure size and shape, degree of fouling, mesh type and material, and stocking density. This reduced circulation can also reduce dilution and dispersal of waste products from the culture facility. A reduction of this sort in water circulation, combined with an increased level of nutrients in the water from excess feed and feces, can promote phytoplankton blooms. This may be a particular problem in water bodies with naturally low levels of nutrients which normally result in nutrient-limited phytoplankton production. Some types of dinoflagellate blooms are associated with paralytic shellfish poisoning (PSP) and may pose a health hazard to humans who consume shellfish. Other dinoflagellate blooms can directly affect fish health and growth rates. These and other phytoplankton blooms also compete with cultured organisms for available dissolved oxygen, which could exacerbate problems of low oxygen stress. These water quality problems would be most likely to occur in areas of inadequate flushing or intensive culturing activity.

The third concern for water quality is that toxic or deleterious substances could be introduced during mariculture operations. The major problem substances include, but are not limited to, antibiotics, anti-fouling agents, and pathogens and parasites that could affect product quality and be transmitted to consumers. Chemical usage is highly regulated but also needs to be closely monitored. The accumulation of chemicals or pathogens in the cultured product must also be carefully monitored. Additional concerns regarding regulation of antibiotics, antifouling agents and shellfish pathogens are covered in the issue paper prepared by the Division of Environmental Health on the use of chemicals and additives.

Research has shown that properly sited and operated facilities will avoid many of the water quality problems described above. The state needs to develop siting criteria and guidelines to use in permitting these facilities. Specifically, criteria for tidal volumes, flushing action, currents, and water depth need to be developed. Certain of these criteria will need to be specific to the species being cultured, as environmental requirements may vary. It is also vital to have adequate information about the proposed facility during the permit review so that potential water quality problems can be avoided.

2. Potential siting conflicts with other uses or activities

The most suitable sites for mariculture facilities often are the most suitable sites for other water-dependent and water-related activities. Because mariculture facilities need clean water to operate, they may be incompatible with other activities in the surrounding area. Proper siting of the mariculture facility and subsequent monitoring of activities that occur around them are critical. A mariculture facility proposal may be submitted for an area which has historically been used for other activities, and these activities may not easily coexist. For example, some preexisting activities could have a discharge that would be detrimental to the cultured organisms. Non-point sources of pollution (e.g., sediment runoff from upland activities) may also affect water quality of embayments suitable for mariculture facility siting.

Another specific area of potential conflict with mariculture operations is the discharge for sewage from upland development, caretaker facilities associated with the mariculture project, and boat traffic. Shellfish are filter feeders and thus easily concentrate fecal coliform bacteria and heavy metals in their bodies. The National Seafood Sanitation Program has set strict standards for fecal coliform levels and heavy metal concentrations in shellfish. Currently, all shellfish growing areas in the state must be certified by DEC, Division of Environmental Health. In addition, all shellfish that will be marketed must also be certified by the Division of Environmental Health to ensure the the product is within safe limits. The State of Alaska Water Quality Standards also specify the levels of allowable fecal coliforms that are required by designated water use. These levels vary depending on the use under consideration. For example, in waters designated for industrial use, the allowable level of fecal coliforms (FC) is not to exceed 200 FC/100ml, based on a minimum of five samples taken over a period of 30 days. The allowable level of fecal coliforms for harvesting and consumption of raw mollusks or other aquatic life is 14 FC/100ml. Since all marine waters are classified to protect all uses, the most stringent use requirements prevail (e.g., 14 FC/100ml).

Siting conflicts arise when an area has historically been used for something other than mariculture and mixing zones have been established which allow fecal coliform or other water quality parameters to be above acceptable limits for an adjacent proposed mariculture operation. The determination before the department is whether to reduce the size of mixing zones for existing uses to allow mariculture facilities in the vicinity, or whether to find that the area is unsuitable for mariculture. DEC also needs to determine how long fecal coliforms persist in marine waters and the

size of contaminated areas. Information of this sort will give us an idea of the necessary separation distance between mariculture facilities and sewage discharges. It is essential information for the responsible permitting of mariculture facilities.

Summary

Mariculture requires clean water. Two key water quality issues associated with mariculture are changes in water quality caused by mariculture operations and potential siting conflicts with other uses and activities. The impacts on water quality can be in three areas: 1) the creation of water quality and environmental conditions unfavorable for the growth and survival of cultured species; 2) a reduction of water circulation near culture facilities; and 3) the introduction of toxic or deleterious substances to the water. Most, if not all of the unfavorable changes in water quality and environmental conditions can be avoided by properly siting and operating mariculture facilities. The state needs to develop siting guidelines to be used in permitting these facilities.

The most suitable sites for mariculture facilities often are the most suitable sites for other water-dependent and water-related activities. Because mariculture facilities need clean water to operate, they may be incompatible with other preexisting activities. The state needs to take measures to ensure that preexisting permitted uses and activities can continue.

DISEASE
Department of Fish and Game
Division of Fisheries, Rehabilitation,
and Development

ISSUE:

Protect native and hatchery stocks from potential disease arising from salmon farming operations.

DISCUSSION:

All populations of fishes, whether in saltwater or fresh, in the wild or in captivity, at some time contain disease agents such as bacteria, viruses, fungi, and invertebrate parasites. In Alaska, endemic disease agents are present throughout wild stocks and the marine environment. Many are opportunistic, causing disease primarily when the fish are crowded or stressed. However, it is extremely important to recognize that populations of fishes differ in the disease agents they carry, and that diseases newly introduced to fish populations can be very devastating.

To control disease in the ocean ranching program, Alaska set in place stringent regulations that govern the movement of salmon and their gametes within the state, and prohibited the import of any fish species or their gametes for aquaculture purposes. These regulations have applied for some 16 years and include requirements for thorough broodstock screening for disease agents, routine treatment of eggs to prevent disease outbreaks, annual inspections and strict reporting requirements, and the destruction of stocks if the state finds that this is necessary to control disease. The state's prohibition on importing species ensures that no new diseases are introduced into the state. For example, many chinook salmon stocks in Washington and Oregon carry IHN virus. Importing these fish could introduce new strains of IHN virus to indigenous stocks. Similarly, importing Atlantic salmon would bring the risk of importing exotic viral and bacterial diseases not found in Alaska. This could have serious impacts on the health of existing native and hatchery stocks, and must be avoided.

To maintain adequate protection of existing fishery resources, any future fish farming industry must be governed by the same fish health regulations currently governing Alaska's ocean ranching program. The species made available for farming should be from native or hatchery stocks having complete and acceptable disease histories. Prohibitions on importing species including Atlantic salmon must be maintained. This way, any diseases would be those already present in wild populations, not exotic diseases which could cause serious harm to the native stocks. All transport and possession of fishes and their gametes needs to be closely

controlled through Fish Transport Permits, and strict reporting and inspection requirements need to be enforced.

However, extending the Department of Fish and Game's fish health services to this new industry cannot be accomplished without the addition of new staff and monies to support these activities. Private sector fish health practitioners could pick up some of this additional workload. Such private practitioners would need to be certified by the state and monitored on a routine basis to ensure acceptable performance, but presently there are no private sector fish health practitioners currently operating in-state.

SUMMARY:

Assuming that imports of Atlantic salmon or other fish species to Alaska remain prohibited, that the state continues to meet its responsibilities in fish disease control, and that monies are provided for additional fish health services, this new industry can be accommodated without the threat of disease to existing native and hatchery stocks of fish.

GENETICS
Department of Fish and Game
Division of Fisheries Rehabilitation,
Enhancement, and Development

ISSUE:

Ensure that salmon farming does not impact the genetic integrity of existing natural and hatchery stocks of salmon and trout.

DISCUSSION:

Preserving the genetic diversity of Alaska's fishery resources has been recognized as an important fisheries management goal. This is especially true for the state's enormous salmon resources.

Alaska, in maintaining the health and perpetuity of its salmon resources, subscribes to the theory that identifiable units of salmon (populations, stocks, races) have through natural selection become adapted to the particular watershed that serves as home. This adaptation is preserved in the genetic make-up (gene pool) of the stock. State fisheries managers have sought to maintain stock diversity to ensure the long-term health of our salmon populations. Loss of stock diversity can occur through dilution brought about by interbreeding with other stocks. For these reasons, Alaska at the outset of its salmon ocean ranching program set in place stringent regulations that govern the movement of salmon and trout within the state and prohibited the import of salmon and trout for aquaculture purposes.

The Department of Fish and Game's genetics policy prohibits the importation of live salmonids (salmon family) into the state, and does not allow stocks to be transported between major geographic areas, such as Southeast, Kodiak Island, Prince William Sound, Cook Inlet, Bristol Bay, and AYK/Interior. The policy has been adopted in order to protect Alaska's diverse natural salmon and trout stocks.

Any new aquaculture venture, such as salmon farming, must be governed by the same policy, transport regulations, and statutes that have applied to the salmon ocean ranching program for the past 16 years. This is particularly true for provisions prohibiting the importation of exotic species, such as Atlantic salmon. Atlantic salmon are actually a trout and are the ecological counterpart of Alaska's indigenous or native steelhead trout. Since these species have not evolved together and thereby have not developed mechanisms to avoid competition with steelhead

trout or other trout, there is a concern about negative impacts on Alaska's indigenous trout.

Therefore, the genetics policy advocates the use of locally adapted stocks of salmon and trout of natural or hatchery origin because this will maintain the state's genetic diversity. This is important in the event of escape or "leakage" through holes in nets or other damage. The magnitude of impact on natural stocks is a function of numbers of fish that escape and that survive to spawn. It is assumed that low levels (less than 5 percent) of escapees can be managed by properly designed net-pen rearing units. Impacts on natural stocks from salmon farming would be minimized because of the policy of using locally adapted stocks.

SUMMARY:

Assuming that imports of exotic species such as Atlantic salmon or other fishes remain prohibited, that current regulations and policies remain in place, and that "leakage" of fish from the pens is kept low, salmon farming can be accommodated without the threat of impact to the genetic integrity of native and hatchery stocks of salmon and trout.

Broodstock
Alaska Department of Fish and Game
Division of Fisheries, Rehabilitation,
Enhancement and Development

ISSUE:

Availability of salmon eggs, fry, and smolts for salmon farming.

DISCUSSION:

The current form of salmon aquaculture in Alaska is ocean ranching. In this system, adult salmon return to their point of release after undergoing and extensive marine migration and contribute to the commercial, sport, subsistence, and personal-use fishery. This ocean ranching program is made up of public and private nonprofit (PNP) freshwater hatcheries and estuarine, juvenile net-pen rearing facilities. Enabling legislation created the public system in 1971, and in 1974, legalized the PNP Program.

Ocean ranching is not only the most successful form of aquaculture in Alaska, it is the largest program in North America and about the third largest in the world being Japan and Russia. The combined public and PNP ocean ranching harvest to the common property fishery in 1987 was in excess of 16 million salmon; this is projected to grow to 34 million for and estimated gross value of approximately \$78 million by 1993. In terms of evaluating the economic impact of the statewide ocean ranching program on the Alaskan economy, it represents \$75 million in resident-only personal income and 2,030 jobs for alaskans. It is in the context of a successful and building ocean ranching program that we need to evaluate the availability of salmon smolts for the proposed salmon farming industry.

When salmon farming is initially legalized in Alaska, a major factor limiting development will be the availability of smolts for these saltwater farms. The current public and PNP ocean ranching program produces salmon smolts which, as adults, contribute to the common property fishery. Since the common property fishery harvest is regulated by the Alaska Board of Fisheries, it also follows that the availability of smolts is also part of the allocation process. The principle reason salmon smolts would be surplus to the common property fishery is that the present ocean ranching program is operating below capacity due to funding constraints. However, if the salmon smolts are determined by the Board of Fisheries to be surplus to the common property fishery, then they could be sold by the Commissioner. Under existing law, only the state through the Commissioner of the Department of Fish and Game (ADF&G) can sell eggs, fry, or smolts. The PNP hatcheries are

prohibited from selling eggs, fry, or smolt except to another PNP hatchery or to the state. therefore, a change in the law would be required in order to extend the sales opportunity to the private sector. Once the private for-profit salmon farming industry begins to evolve, there will be a demand to have private for-profit freshwater hatcheries to produce smolts for the mariculture industry. These will come from either eggs taken by permit from natural salmon stocks, or by purchase of eggs from public or PNP hatcheries, or eventually from private broodstock produced from the saltwater farming operations. The latter will represent the preferred source of eggs because of the need to develop domesticated broodstock. This will take at least one generation, 4-5 years for chinook salmon to provide eggs, but generally three generations to initiate change towards domestication. Therefore, in the interim, the availability of eggs for salmon farmers with freshwater hatcheries or smolts for those with only saltwater farms will need to be addressed.

On the one hand, sale of eggs or smolts could assist in the financial health of the salmon ocean ranching program which benefits the common property fishery. This dilemma represents the heart of the public policy debate; specifically, the allocation of resources from an established common property fishery to a proposed private for-profit industry. This issue clearly belongs in the legislative arena, but it needs to be resolved so that agencies such as ADF&G know how to allocate eggs, fry, or smolts to the potentially new salmon farming industry.

SUMMARY:

The availability of eggs, fry and smolts for the salmon farming industry is an allocation decision, and is central to the public policy debate regarding allocation of resources from the common property fishery to the private for-profit farmer. Under the current law, the Board of Fisheries would probably make the determination of whether or not eggs, fry, or smolts are surplus. If the Legislature legalizes salmon farming and the Board of Fisheries determines that a surplus exists, then eggs, fry or smolts could be sold to potential salmon farmers by the commissioner of ADF&G.

HABITAT PROTECTION
Department of Fish and Game
Division of Habitat

ISSUE:

Ensure protection of important habitat through proper siting and design of mariculture facilities.

DISCUSSION:

Floating mariculture operations can result in one or both of the following environmental effects: (1) accumulation of organic-rich sediments on the benthic substrate beneath the facility, and (2) changes in water quality.

Proper siting of mariculture facilities is essential if there is to be minimal environmental effect from a mariculture operation. If not properly sited, the accumulation of organic-rich sediments in the form of wastes, uneaten food, and shell debris below the facility can cause physical and chemical changes in the natural bottom sediments. Included in these changes are increased oxygen consumption within the sediment; and increased concentrations of total volatile solids, total organic carbon, sulfides, nitrogenous compounds, and phosphates.

Accumulation of such sediments and resultant oxygen depletion in the interstitial water can have effects upon the infaunal invertebrate community in the immediate area. Loss of species that are intolerant of organic enrichment often occurs in these areas. In addition, if such accumulation occurs in an area of extensive bottom vegetation such as eelgrass beds, important habitats can be lost. It should be noted, however, that wastes generated by the farming operation generally are not similar to city wastes which can contain detergents, heavy metals, and other contaminants. The wastes referred to here are purely organic in nature.

In order to prevent organic-rich sediments from building up on the benthic substrate and affecting infaunal invertebrates and important habitats, facilities should be sited in areas known to be well flushed in water with adequate depth. Facilities should not be sited in sensitive habitats such as eelgrass beds, herring spawning areas, or mouths of anadromous fish streams. Siting over eelgrass beds or other marine vegetation can result in degradation of these habitat types by sediment accumulation or possibly shading. Likewise, if these habitat types are providing substrate for herring spawn, additional impacts would result from their loss. The mouths and intertidal areas of anadromous fish streams serve as feeding and marine

accumulation areas for outmigrating fry and smolts. Such areas should be avoided to minimize impacts to these sensitive areas and prevent possible disturbance to returning adults.

High concentrations of marine mammals and waterfowl can result in increased predation problems. In addition, disturbance to important wildlife could occur from increased human activity in the area. To minimize such problems, known concentration areas such as haulouts, nesting areas, and marine mammal or bird feeding areas should be avoided when possible.

SUMMARY:

Mariculture facilities could have a significant impact on important habitat areas if improperly designed and sited. These problems can be minimized by implementing proper siting and design criteria.

PREDATION
Department of Fish and Game
Division of Habitat

ISSUE:

Minimizing Predation and Bear/Human Conflicts

DISCUSSION:

Predation is a common problem with mariculture operations. The list of predators includes all types of fish or shellfish-eating mammals, fish and birds. Generally, the most serious problems with predator control involve mammals and birds. In Alaska, these categories can be expected to include seals, sea lions, mink, marten, otters, and various birds. If shore-based facilities are involved, improperly disposed garbage and wastes will attract bears and result in confrontation problems.

The problem of predation can be reduced by installation of screening or netting, and attempting to avoid known concentration areas such as bird nesting areas, marine mammal haulouts, or heavily used bird or mammal feeding areas. The department will consider mariculture facilities to be "attractive nuisances" to predators and would not favor destruction of predators under 5 AAC 92.410(a) (2), defense of life or property. The Department of Fish and Game is working closely with the Department of Environmental Conservation and the U.S. Forest Service to address the problem of bears and garbage, and garbage and wastes at shore-based facilities must be disposed of properly.

SUMMARY:

Predation could be a significant problem at mariculture facilities, but with proper design and siting predation can be minimized or prevented altogether.

PRODUCT WHOLESOMENESS
Department of Environmental Conservation
Division of Environmental Health

ISSUE:

Ensure product wholesomeness through site certification and by regulating the use of chemicals in mariculture operations.

DISCUSSION:

Currently, Alaskan seafood products have a world-wide reputation for quality and wholesomeness. The state has invested considerable resources in this reputation, through DEC's seafood inspection program and Alaska Seafood Marketing Institute's promotional efforts.. It is important to ensure the safety and wholesomeness of any seafood produced through a mariculture industry. The Department of Environmental Conservation believes that safe and wholesome mariculture products can be produced if the department is given the authority to regulate certain aspects of the industry.

The Department of Environmental Conservation needs additional authorities to develop standards and regulation for the certification of mariculture sites and for the control of chemicals used to treat the product or their environment.

Chemical Usage

Currently the use of chemicals in mariculture operations is regulated by the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA). The FDA regulates the use of medicines and food colorings, and the EPA controls the use of chemicals such as anti-fouling compounds and parasiticide.

These chemicals must be registered with the appropriate federal agency. The manufacturer for registration submits scientific data supporting claims for efficacy and safety and identifying any environmental hazards. If the regulating agency finds the data to be adequate, the agency issues a label for the product, including instructions for use and safety precautions.

The regulatory agencies have established, for some of these chemicals, required minimum time periods between the time when the chemicals are applied to food products and the time when the food product may be marketed. For some chemicals, there are restrictions on levels allowable in the tissues of

the product when it is sold. If label instructions for these chemicals are followed, use of these products should be safe and not present any harm to the consumer.

Chemical compounds are used as anesthetics to reduce trauma to the animals during handling; disinfectants are used to remove pathogens from gear and equipment; food colorings are used to alter the color of the animal's flesh; and antiseptics, antibacterials, viricides, fungicides, and parasiticide are used to control disease organisms.

The potential problem with the use of chemicals is ensuring that they are being applied according to the label instructions. Currently, the FDA and EPA are responsible for monitoring their use. However, both agencies have limited resources available for surveillance in Alaska. To maintain consumer confidence in the safety of mariculture products, the Department of Environmental Conservation needs specific authority to develop regulations to control the use of chemicals and authority to conduct inspections to confirm application according to label instructions. State regulations adopted pursuant to such statutory authority would refer to federal regulations so that federal labels would be accepted by the state. The purpose of monitoring would be to confirm that the chemicals were used properly. Regulations would likely include requirements for training and certification of applicators of these chemicals and requirements for record keeping and testing.

Site Certification

In order for any state's shellfish to be sold in interstate commerce, it is necessary for the state to have a shellfish site certification and processing inspection program that meets the requirements of the federal Food and Drug Administration. The Department of Environmental Conservation administers an Alaskan shellfish program which has been approved by the FDA. Under this program, all shellfish growing areas in Alaska must be certified, and harvesters and processors must be permitted by the Department of Environmental Conservation.

The Department of Environmental Conservation surveys growing areas for sources of pollution and extensively samples and tests the water quality to determine if it meets regulatory requirements. Sampling and testing is also conducted to determine levels of paralytic shellfish toxins.

If the site is acceptable, then it is certified by the Department of Environmental Conservation. Only shellfish from certified growing areas may enter commerce. The specific requirements for growing area water quality and site surveys are contained in the National Shellfish

Sanitation Programs Manuals which are referred to in Department of Environmental Conservation's regulations.

Legislation should give the Department of Environmental Conservation the authority to develop a certification and permitting program for other mariculture species similar to the one presently in place for shellfish. Mariculture sites should be surveyed and certified. The site certification program would ensure that Alaskan mariculture products were free from exposure to pollutants and contamination in the growing site. The site certification program would prevent mariculture products from being raised in areas which are subject to pollution.

Labeling

DEC is responsible for ensuring that seafood produced in Alaska is safe and wholesome. DEC also assists the Alaska Seafood Marketing Institute in developing programs to produce and promote quality products. It is important to ensure the safety and wholesomeness of any seafood produced through a mariculture industry. Current statutes and regulations would not require any differentiation in labeling between wild products and farmed products. It might be helpful to consumers to distinguish mariculture products from "wild" products. The Department of Environmental Conservation would enforce such requirements if they are instituted.

SUMMARY:

The production of safe and wholesome mariculture products and the preservation of Alaska's seafood product's reputation for quality can be maintained and enhanced by giving the the Department of Environmental Conservation's Division of Environmental Health the authority necessary to regulate the use of chemicals and insure that mariculture sites are free from contaminants which might affect public health.

Summary of Mariculture Requirements

(British Columbia, Maine, California, Washington)

The following chart is a compendium of information from four separate systems of implementing mariculture programs. For detailed information regarding actions taken by each program, please refer to the corresponding footnotes.

	☒ Issue addressed	☐ Issue not addressed	? Information not available	¹ Footnote
	British Columbia	Maine	California	Washington
General				
Lead Agency	☒ 1	☒ 2	☒ 3	☒ 4
Site Survey	☒ 5	☐ 6	☐ 7	☒ 8
Public Notice/Hearings	☒ 9	☒ 10	☒ 11	☒ 12
Application Fees	☒ 13	?	☒ 14	☒ 15
Annual Report	☒ 16	?	☒ 17	☒ 18
Land Use				
Size/Density of Farm	?	☒ 19	?	☒ 20
Land Use Planning Designation for Mariculture	?	?	?	☒ 21
Leases Issued for Mariculture	☒ 22	☒ 23	☒ 24	☒ 25
Land Use Preferences	?	☒ 26	?	☒ 27
Conflict Resolution	☒ 28	☒ 29	☒ 30	☒ 31
Clean-up/Performance Bonds	☒ 32	☒ 33	?	☒ 34
Land Rent	☒ 35	☒ 36	☒ 37	☒ 38
Survey Plat Required	?	?	☒ 39	☒ 40
Water Quality				
Separation of Facilities	☒ 41	☐ 42	☐ 43	☒ 44
Waste Discharge	☒ 45	☐ 46	☒ 47	☒ 48
Water Quality Siting Criteria	☒ 49	☐ 50	☒ 51	☒ 52
Water Quality Monitoring	☒ 53	☒ 54	☒ 55	☒ 56
Fish and Wildlife				
Broodstock Acquisition	☒ 57	?	☒ 58	?
Disease Controls	☒ 59	?	☒ 60	☒ 61
Genetic Controls	☒ 62	?	☒ 63	☒ 64
Exotic Species	☒ 65	?	☒ 66	☒ 67
Private For-Profit Hatcheries	☒ 68	?	☒ 69	?
Protection of Existing Wild Stocks or Other Fish & Wildlife	☒ 70	?	?	☒ 71
Measures to Protect Sensitive Habitats	☒ 72	☒ 73	☒ 74	☒ 75
Product Quality/Wholesomeness				
Site Certification and Evaluation	☒ 76	?	☒ 77	☒ 78
Control and Monitoring of Chemicals and Additives	☒ 79	?	?	☒ 80
Product Labeling	☒ 81	?	☒ 82	?

Mariculture Requirement Footnotes

General

1. **Finfish:** An environmental assessment of site suitability must be completed for every potential net pen site. Possible requirements, in addition to a site plan (location and boundaries), include: depth contours, current patterns, maps of sub-tidal vegetation, invertebrate studies and pre-installation water quality data. A SCUBA survey is required in areas where water depth is less than 20 meters to describe substrate, vegetation and faunal presence. In areas deemed "sensitive", may also require: seasonal assessment of oceanographic characteristics, identification of other effluent discharges in the same area, measurements of background water quality and sediment quality characteristics, vegetation mapping, and compilation of fisheries resources information.

Other species: The culture of molluscs, crustaceans and marine plants may also have significant environmental impacts. Site survey information required may vary depending on the proposal. Department of Fisheries and Oceans (DFO) offices should be contacted. Information required may include certain of the survey elements required for finfish culture.

2. No requirements at present. Maine is in the process of developing standards for siting and other criteria for management of mariculture activities.
3. No standardized site survey requirements. The Sanitary Engineering Branch of the Department of Fish and Game studies and decides on the acceptability of all shellfish areas. Applicants are required to provide preliminary water quality data (no specifics listed) to evaluate the areas for pollution. Also, the application for the lease of state water bottoms for aquaculture must include, when available, high and low tide lines.
4. **Finfish:** Prior to permit application, an initial site characterization survey is required. Requirements vary by facility size (i.e. Class I = production capacity less than 25,000 lbs/year; Class II = production capacity greater than 25,000 lbs/year but less than 100,000 lbs/year; Class III = production capacity greater than 100,000 lbs/year). Requirements for all classes: recommended consultation with state and local authorities, bathymetric survey, hydrographic survey (i.e. current and velocity), and diver survey of biological resources done April thru September. Class III additional requirements: drogue tracking, vertical hydrographic profiling (as part of hydrographic survey), sediment chemistry sampling and benthic infauna sampling.

Other species: Site survey requirements vary; are dependent upon local SEPA (State Environmental Policy Act) requirements.

5. Mandatory public hearings after 20 day notice in newspaper and trade journal.
6. Mandatory public hearings after 90 day notice in newspaper.
7. \$25
8. \$100
9. \$25
10. Annual health report required by the Fish Transport Committee, Department of Fisheries and Oceans (DFO). Operational log with monthly or quarterly production figures required. Water quality monitoring report specified on a site-specific basis.
11. Yearly registration with the California Department of Fish and Game required.
12. Annual report must be submitted to the Department of Natural Resources which distributes it to other resource agencies. Facilities with less than 20,000 lbs/year production are exempt. Those with productions of 20,000 to 100,000 lbs/year must submit benthic dive survey only. Facilities with production greater than 100,000 lbs/year must submit complete report (benthic survey, water quality survey and hydrographic survey).

Land Use

13. 5 acres per lease with a maximum acreage of 200 acres per person.
14. Maximum of 40 acres per oyster farm, salmon farms are divided into Class I, Class II and Class III farms depending on the carrying capacity of the site. The class determines how many thousands of pounds can be produced at the site.
15. Lease or license of occupation issued, section 10 permit used for one year to allow site research.
16. Leases issued up to 10 years, negotiated if there is no competitive interest.
17. Leases issued for up to 25 years auctioned.
18. Leases issued for 5 to 10 years.
19. First to the state, second to riparian owner of the intertidal area within the lease area, third to fisherman who have traditionally fished in or near the lease, fourth to the riparian owner within 100 feet of the lease area.
20. To adjacent upland owner.
21. Based on type of use.
22. Auction amount plus privilege tax charged for amount of product sold.
23. Fair market value plus value of existing edible shellfish within the lease.
24. Paper plat tied to existing upland monuments.
25. Paper plat tied to existing upland monuments.

Water Quality

26. Minimum distance between operation lease boundaries must be at least 5 km to minimize risk of disease transfer and minimize potential cumulative water quality impacts.
27. No spacing or size limits; many sites are contiguous. The size and location of allotments is decided by the Department of Fish and Game on a case-by-case basis as they work with the applicants.
28. No specific distance limits, however, may limit fish production due to local water conditions (i.e. they restrict production in areas with chronic water problems due to dissolved oxygen and nitrogen concentrations). Washington also limits maximum production to 1,000,000 lbs/year/square nautical mile.
29. The Ministry of Environment, Waste Management Branch, has draft regulations that exempt finfish farm effluent (feces and feed) from waste management permit requirements. Shellfish farms are also exempt. Sewage facilities associated with farm facilities are required to get a waste management permit for water discharge, although this permit requirement has not been strictly enforced. B.C.'s main waste concern at this time is dead fish and possible disease transmission from disposal in open water. They are hoping a multi-collection and disposal service can be arranged.
30. Regional Water Quality Boards (9 in state) issue water quality discharge permits - NPDES permits. Water quality discharge standards are the same as the federal standards.

31. A NPDES permit is required for the discharge of pollutants into surface waters of the state by a point source. Both aquaculture activities and processing operations require permits. For aquaculture, this includes "Concentrated Aquatic Animal Production Facilities" such as ponds, raceways, or similar structures which produce 20,000 pounds per year of cold water species or more, and which feed 5,000 pounds per month of feed or more, and which discharge at least 30 days per year. Permits for such facilities require sedimentation basins for cleaning wastewater and require monitoring of effluent quality. Also included are in-water aquaculture projects in which a discharge of pollutants is used to grow aquatic organisms. Washington has water quality and effluent standards that all discharges must meet. Also, any activity or action which would cause short-term violation of the state's Water Quality Standards requires a Water Quality Standards modification from the State Department of Ecology.
32. For finfish: Pens must be anchored in not less than 10 meters of water at zero tide. Minimum of 2 meters between bottom of pen and ocean floor. Net pens should be located in areas of good circulation and tidal flushing. No direct sewage discharge from living quarters on the lease site.
33. No preconceived rules or standards. Decisions are made on a case-by-case basis. The proposed area must have good flushing.
34. For finfish: Required minimum depth between pen bottom and ocean floor ranges from 20 to 60 feet, depending on the size of operations and local currents.
35. Monitoring of approved net pen operations may be required to provide information on substrate quality, water quality (distribution of dissolved and suspended solids, nutrients, pathogens, chemicals), accumulation patterns of organic deposits, alterations in vegetation distribution patterns, change in benthic structure or other site-specific information. Once a site has been in operation for some time, reporting requirements may be required if there is increased production, negative impact on the environment, or as part of a general coastwide aquaculture impact assessment program. Sample measures, replicates and frequency are specified on a site-specific basis.
36. The Department of Marine Resources may conduct an annual review of each aquaculture lease if the operation has been conducted in a manner injurious to marine organisms.
37. Operators are required to provide on-going water quality data as deemed necessary to evaluate the area and ensure year-round protection of the shellfish consumer. The amount of sampling required depends on the location and susceptibility of harvest sites to pollution problems. At any time the state may obtain water samples.
38. Annual monitoring requirements vary by facility size. Class I = none; Class II = Benthic survey/diver survey; Class III = Annual summer monitoring to include benthic/diver survey, sediment chemistry, benthic infauna, water quality sampling, current velocity and direction.

Fish and Wildlife

39. Eggs obtained from surplus eggs at federal hatcheries or purchased from private hatcheries.
40. Broodstock purchased from commercial sources (commercial license holders or registered aquaculturists). If no commercial supply available, then broodstock can be collected from wild stocks under permit from the California Department of Fish and Game (CFG). The broodstock remains the property of the state, but the progeny belong to the applicant.
41. Eggs must be certified as disease free by the Department of Fisheries and Oceans (DFO). Fish Health Protection Regulations (DFO) apply.
42. Covered by Aquaculture Disease Control Regulations of the CFG.

43. Requires permit from the Washington Department of Fisheries (WDF) for transportation or import of live fish or viable sexual parts.
44. DFO and Provincial Ministry of Environment require approval for transport of eggs, smolts, or fish over 50km.
45. Any fish planting requires approval of the CFG.
46. Covered by fish transport permit (WDF).
47. All salmonid importation must comply with Federal-Provincial Policy for the importation of live salmonids into British Columbia.
48. All importation, transportation, and planting of fish is controlled by the CFG.
49. Covered by fish transport permit (WDF).
50. Must be licensed by DFO.
51. Controlled by CFG regulations.
52. Federal-Provincial importation policy for salmonids.
53. Importation, transportation, and planting of fish is controlled by the CFG.
54. Site location controlled by Interim Guidelines of the Department of Ecology. WDF and the Washington Department of Game review site locations.
55. Location approval by DFO. Detailed dive survey required. No finfish pens located within 1km radius of the mouth of anadromous fish streams. No net pens in "sensitive habitats" as defined by Sec. 31(5) of the Fisheries Act.
56. Applicant cannot unreasonably interfere with ingress and egress of riparian owners, navigation, fishing or other uses of the area (Department of Marine Resources regulation).
57. Lessee may not unreasonably impede public access to state waters, but may limit public access to the extent necessary to protect facility (CFG regulations). CFG reviews location of sites.
58. Interim guidelines do not allow siting over "habitats of special significance" (determined by WDF) in waters 75 feet or less in depth.

Product Quality and Wholesomeness

59. Siting criteria is considered one of the most important criteria for aquaculture development. Information may be required for current patterns, sub-tidal vegetation mapping, invertebrate studies, and water quality parameters.

Net pens are restricted by distance from shellfish operations and from other lease operations. This restriction prevents contamination of shellfish or other fish from transfer of pathogenic organisms and chemicals.
60. No information on product quality or wholesomeness available from materials on hand.
61. Requires an actual on-site inspection by a representative before a permit is given. Aquaculture proposals are required to include a description of plans and maps showing locations of proposed harvesting areas. They also must include a description of type and location of any facilities to be used for handling, packaging, or string products within the state.

62. Applicants must have submitted a site assessment prior to the application process which included 1) a bathymetric survey 2) a hydrographic survey and 3) a dive survey of biological resources.

Washington has also divided the coastline into "habitats of special significance" which identify 1) areas important to commercial or sport fisheries, 2) those of critical ecological importance and 3) those especially sensitive to degradation by culture activities.

63. They are looking into effects of anti-foulant and antibiotic use on net pen farms. Initial indications show that oysters accumulate chemicals that are used to treat nets with the result of reduced growth and poisonous flesh. No research available yet on accumulation in farm fish of anti-foulants. Because of this, distance restrictions are in place for proximity of net pens to shellfish and other fish farms. From literature, it does not appear that B.C. has any definite restrictions or federal guidelines regarding the use of chemicals or additives.

64. Use of chemicals was not mentioned in material available.

65. Applications for aquaculture must go through an environmental assessment by submitting an operations plan which includes chemical and anti-foulant use. Also as a guideline, Washington has determined that TBT should not be used as an anti-foulant agent. Use of other anti-foulants must be reviewed on a case-by-case basis and reported to the Washington Department of Ecology.

Only antibiotics licensed by FDA are allowed to be used at the present time. This limits use to oxytetracycline, sulfamerazine, and Romet 30. These should be used sparingly on a short-term basis (there did not appear to be minimum time and dosage requirements for this).

Annual monitoring report includes types of antibiotics used and frequency of use over past year. Also includes types of anti-foulants used and frequency of net treatment.

66. Fish crossing provincial lines must have proof of coming from registered facility. This is also true for exporting fish.
67. Department of Health Services, Food and Drug Branch sets requirements for proper packaging and labeling of fish and shellfish moved in commerce.
68. No information on labeling from information available.

STATE OF ALASKA

OFFICE OF THE GOVERNOR

DIVISION OF GOVERNMENTAL COORDINATION

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Dear Applicant:

The Shellfish Farm Application is designed to help you obtain most of the authorizations you will need from the State of Alaska Departments of Natural Resources (DNR), Fish and Game (ADF&G), Environmental Conservation (DEC), and Division of Governmental Coordination (DGC) in order to begin your shellfish mariculture project. A Coastal Project Questionnaire, which is available from any of these agency offices, must also be submitted with your application to help determine which specific permits must be obtained prior to constructing your project.

Please read this application carefully. A fully completed application will help the state agencies to process your request promptly. Incomplete or incorrect information may result in requests for additional information, processing delays, or the application may be returned to you for resubmission. You will receive a notice and processing schedule for the state coastal zone consistency review from DGC when your application has been accepted for processing. Your permits will also be processed on this schedule.

If you need technical assistance in completing this application, please refer to the list of agency representatives provided at the back of this application packet. If you have questions about this application process, or you are not able to determine which agency can best answer your technical questions, contact the Division of Governmental Coordination in Juneau at 465-3562, in Anchorage at 274-1581, or in Fairbanks at 451-2818.

Additional Permits

In addition to the permits and approvals which you are applying for in this consolidated permit application, you will also need to separately apply for and obtain a Fish

Transport Permit from ADF&G to obtain and hold broodstock; and a Growing-Area Certification and a Harvester's Permit from DEC in order to sell your product. These permits are not covered by this application since they are required for later phases of your project.

A Fish Transport Permit is required by ADF&G in order to hold, transport, and raise live fish including shellfish. You will need this permit before you can obtain, hold, or begin raising your product. We encourage you to contact the Fisheries Rehabilitation, Enhancement and Development (FRED) Division in Juneau at 465-4160 or in Anchorage at 267-2157 as early as possible in order to apply for and obtain a Fish Transport Permit.

You should contact DEC regarding area certification requirements so that you can be reasonably sure that your site will qualify. We recommend that you apply for growing area certification and a harvester's permit at least six months before you intend to harvest shellfish. To obtain more information on certification requirement please contact DEC in Anchorage at 272-1561 or in Juneau at 465-2609 or 465-2696.

jbak87122401DMF

Consolidated Shellfish Farm Permit Application

General Instructions

1. Fill in the blanks on the form provided.
2. If additional space is needed to fully answer a particular question, attach additional pages marked with the corresponding number in the application.
3. Applications must be *typed* or *printed* clearly in *ink*.
4. Applications must be signed by the applicant or an authorized representative.
5. The application should be forwarded to the appropriate regional office of the Office of Management and Budget's Division of Governmental Coordination for the region in which the farm is to be located (see attached map for regional boundaries).

Southeast Regional Office
431 North Franklin Street
P.O. Box AW, Suite 101
Juneau, Alaska 99811-0165
(907) 465-3562

Southcentral Regional Office
2600 Denali Street
Suite 700
Anchorage, Ak 99503-2798
(907) 274-1581

Northern Regional Office
675 Seventh Avenue
Station H
Fairbanks, AK 99701-4596
(907) 451-2818

6. ***Please note:*** This application is for a specific mariculture project. You will need to submit a new application if you change any of the following:
 - A. The species to be propagated
 - B. The size or design of your operation
 - C. The location of your operation
 - D. Request a long-term tidelands lease for a previously permitted site

PERMIT APPLICATION
State of Alaska Consolidated Shellfish Farm

APPLICANT INFORMATION

1. _____
Name _____
Mailing Address _____
City _____ State _____ Zip Code _____
Phone _____
2. _____
Business Name (if applicable) _____
Business Address _____
City _____ State _____ Zip Code _____
Phone _____
3. _____
Authorized Agent (if applicable) _____
Address _____
City _____ State _____ Zip Code _____
Phone _____

PROJECT INFORMATION

1. Provide a brief description of the facility and your overall proposal. Include upland facilities as well as tide and submerged land facilities.
- _____
- _____
- _____
2. What experience, expertise, and other resources do you have available for this project?
- _____
- _____
- _____

PROJECT LOCATION

1. Is the Project on: (please mark with ✓)
State Land _____ Federal Land _____ Private Land _____ Municipal Land _____
2. Township _____ Range _____ Meridian _____ Section _____
3. Number of acres applied for:
Uplands _____ Tidelands _____
4. Provide the names and addresses of the landowners of adjacent uplands and tidelands.
- | Uplands | Tidelands |
|---------|-----------|
| A _____ | A _____ |
| B _____ | B _____ |
| C _____ | C _____ |

5. Attach topographic maps (U.S.G.S. Scale 1: 63360) and nautical charts to this application that show the site location and general area. Clearly indicate the site location on the charts and maps.

SITE PLAN & PHYSICAL DESCRIPTION

1. Provide a site plan drawn to scale (no less than 1" = 50') which shows the layout and location of the following:
 - A. The rafts or other production facilities employed (please include size and number).
 - B. Anchoring systems and shoreties.
 - C. Docks, floathomes, or caretaker facilities, including source of freshwater for domestic use and processing water, wastewater disposal systems, and solid waste storage and disposal.
 - D. Any freshwater discharges.
 - E. Roads or air strips.
 - F. Other upland or tideland facilities at the site associated with the farming operation.
 - G. Fuel and chemical storage.
 - H. Property lines referenced in #4 of the previous section.
2. On the site plan, draw lines and identify the tide level at the following stages:
 - Mean Lower Low Water (MLLW)
 - Mean Higher High Water (MHHW)
 - Mean High Water (MHW)
3. Diagram surface tidal current speed and direction at maximum tide flow on the site plan or nautical chart.
4. Water depth at the site of culture gear at MLLW would be: _____

SITE SUITABILITY

1. Physical and Biological Characteristics
 - A. Have you conducted an on-site investigation? yes _____ no _____
 - B. Provide any information you may have regarding tidal flushing, water temperature, salinity, and turbidity/sedimentation at the site. Include the dates these data were obtained.

 - C. Describe the bottom type composition at the site (if more than one type, indicate percent).
sand _____ mud _____ rock _____ gravel _____ eelgrass _____
other: _____

 - D. Describe winter conditions at the site (temperatures, icing, storms, etc.).

E. Do anadromous fish (e.g. salmon) use any streams in the area for spawning? yes _____ no _____

If yes, indicate which streams are used and label them as such on the site plan.

F. Is the target species naturally present in the area? yes _____ no _____

If yes, describe abundance condition.

G. Describe measures you would propose to control predation by marine mammals, seabirds, or other potential predators.

WATER QUALITY

NOTE TO APPLICANT: Sewage or industrial discharge(s) may accumulate in, or harm the growth or consumptive use of your shellfish product. Oysters, mussels and scallops are filter feeders and may accumulate fecal coliform bacteria from sewage discharges. If a caretaker facility is located near the culturing operation there may be a risk of contamination. DEC will require that the wastewater treatment systems used on caretaker facilities meet Alaska State Water Quality Standards criteria for harvest or consumption of raw mollusks or other aquatic life.

A. Were there any sources of past pollution at the site, such as a shorebased seafood processor, industrial facility, or a town or village? yes _____ no _____

If you answered yes to the above, identify:

- The type of previous use (i.e. mine, village, seafood processor) _____
- The last known date of use _____
- The distance from site of previous use to your project site _____

B. Are there any currently active sources of human or industrial pollution in the area?
yes _____ no _____

If yes, please describe:

- The type of discharge(s) _____
- The location and distance from your site _____
- The name of the discharger(s), if known _____

C. If there is a caretaker facility proposed for the site, please identify:

- The sewage treatment method to be used _____
- The expected volume of seawater and greywater _____
- The location of the treated sewage's discharge point _____

CURRENT LAND USE STATUS

Describe the type and intensity of all present uses of the project site and the surrounding area (e.g. commercial development, mining, timber harvest or transfer, sheltered anchorage, subsistence, recreation, commercial fishing, sport fishing, or residential use, etc.).

FARM OPERATION AND DEVELOPMENT

1. Species to be raised:

Species	Annual Production Goal
A _____	_____
B _____	_____
C _____	_____

2. Please provide a timetable showing approximate dates for installation of spat collection gear, placement of production facilities, date of first sale, and a schedule for reaching expected maximum production.

3. Donor Stock

Have you submitted a Fish Transport Permit application to the Department of Fish and Game?
yes _____ no _____

If yes, date of application _____

Certification Statement

I certify that all of the information contained herein is true and complete to the best of my knowledge. I also understand that I must separately apply for and hold a Fish Transport Permit from the Department of Fish and Game in order to hold, transport, and raise shellfish, and a Growing Area Certification and a Harvesters Permit from the Department of Environmental Conservation in order to sell my product.

Signature of Applicant or Agent

Date

Register __, __ 1988 FISH AND GAME

5 AAC 41.001

5 AAC 41.100

TITLE 5.
FISH AND GAME
CHAPTER 41.

TRANSPORTATION, POSSESSION, AND RELEASE OF LIVE FISH

ARTICLE 1.
SCOPE OF REGULATIONS

5 AAC 41.001 is amended to read:

5 AAC 41.001. APPLICATION OF THIS CHAPTER. The provisions of this chapter govern the transportation, possession, or release of live fish transplanted for or cultivated for human consumption or sport fishing purposes, or as part of an aquaculture program for scientific, educational or propagative purposes, and the transportation and possession of shellfish for commercial purposes in conjunction with a shellfish farming operation.

(In effect before 1988; am __/__/88, Register __)

Authority: AS 16.05.251(a)

ARTICLE 3.
GENERAL PROVISIONS

5 AAC 41.100 is amended to read:

5 AAC 41.100. DEFINITIONS. In addition to the definitions set out in AS 01.10.060 and AS 16.05.940, in 5 AAC 41.001--5 AAC 41.100

(1) "completed application" means a form, series of forms, letters or other documents which provide all of the information necessary for the commissioner or his authorized designee to issue, condition or deny a permit;

(2) "department regional office" means the Alaska Department of Fish and Game, Fisheries Rehabilitation, Enhancement and Development Division offices located as follows:

Region I - Southeastern Region
Island Center Building
P. O. Box 2-
Douglas, Alaska 99824-0020

Region II - Central, Westward and
Arctic-Yukon-Kuskokwim Region
333 Raspberry Road
Anchorage, Alaska 99502

(3) "fish pathology section" means the Alaska Department of Fish and Game, Fisheries Rehabilitation, Enhancement and Development Division, Fish Pathology Section, located at 333 Raspberry Road, Anchorage, Alaska 99502, telephone (907) 344-0541;

(4) "ornamental fish" means a fish commonly known as "tropical fish," "aquarium fish," or "goldfish" which are imported, cultured, or sold in the state customarily for viewing in aquaria or for raising in artificial systems, and not customarily used for sport fishing or human consumption purposes;

(5) "permit" means a fish transport permit, including any amendment or condition issued or approved by the commissioner or his authorized designee, which has not been suspended, terminated or expired;

(6) "permittee" means the holder of a permit and includes anyone employed, contracted, or assigned by the person to whom the permit was issued.

(In effect before 1988; am __/__/88, Register __)

Authority: AS 16.02.251(a)

5 AAC 41 is amended by adding a new article:

ARTICLE 4.
SHELLFISH FARMING

Section

- 200. Applicability of Regulations
- 210. Permit Required
- 220. Shellfish Farm Permit Application
- 230. Additional Information
- 240. Review and Determination
- 250. Permit Conditions
- 260. Inspection of a Farm
- 270. Annual Report
- 400. Definitions

5 AAC 41.200. **APPLICABILITY OF REGULATIONS.** The provisions of 5 AAC 41.200 -- 5 AAC 41.400 govern the permit application process for shellfish farm permits, and establish guidelines and procedures regarding the operation of permitted shellfish farms. (Eff. / / , Reg.)

Authority: AS 16.05.020
AS 16.05.092
AS 16.05.251
AS 16.05.340(b)

5 AAC 41.210. PERMIT REQUIRED. A shellfish farm permit, issued by the commissioner, is required for the operation of a shellfish farm. (Eff. / / , Reg.)

Authority: AS 16.05.020

AS 16.05.092

AS 16.05.251

AS 16.05.340(b)

5 AAC 41.220. SHELLFISH FARM PERMIT APPLICATION. An applicant must submit a consolidated shellfish farm permit application and coastal project questionnaire to the nearest office of the Office of Management and Budget, Division of Governmental Coordination for purposes of complying with the project consistency review of the Alaska Coastal Management Program as identified in 6 AAC 50.010-6 AAC 50.190. (Eff. / / , Reg.)

Authority: AS 16.05.020

AS 16.05.092

AS 16.05.251

AS 16.05.340(b)

5 AAC 41.230. ADDITIONAL INFORMATION. If, after an application has been distributed to the department, and the department determines that information in the application is insufficient for an adequate evaluation of the proposed shellfish farm, the department will request additional information from the applicant. (Eff. / / , Reg.)

Authority: AS 16.05.020

AS 16.05.092

AS 16.05.251

AS 16.05.340(b)

5 AAC 41.240. REVIEW AND DETERMINATION. (a) The commissioner will review the recommendations resulting from the department's review of the application before rendering a decision on an application.

(b) The commissioner will render a decision on the application within 5 days after a determination on project consistency with the Alaska Coastal Management Program has been issued by the Office of Management and Budget. The commissioner's decision will be based on the following considerations:

(1) the physical and biological characteristics of the proposed location must be suitable for a shellfish farming operation;

(2) the proposed farm may not unreasonably or adversely affect management of natural stocks, and must not

Register____, ____ 1988 FISH AND GAME

5 AAC 41.250
5 AAC 41.270

require significant alterations in traditional fisheries or other existing uses of fish and wildlife resources;

(3) the proposed farm may not significantly affect fisheries, wildlife or their habitats in an adverse manner; and

(4) the proposed shellfish farm plans and staffing plans must demonstrate technical and operational feasibility.

(c) An application for a shellfish farm permit which has been denied by the commissioner will, in the commissioner's discretion, be reconsidered if the applicant provides new or additional information that may have altered the original decision. (Eff. / / , Reg.)

Authority: AS 16.05.020
AS 16.05.092
AS 16.05.251
AS 16.05.340(b)

5 AAC 41.250. PERMIT CONDITIONS. The commissioner will include conditions to the permit that are appropriate to ensure the shellfish farm does not significantly affect fisheries, wildlife or their habitats in an adverse manner. Permits will be issued for a period of three years. Permits may be renewed by submitting a request in writing to the commissioner. (Eff. / / , Reg.)

Authority: AS 16.05.020
AS 16.05.092
AS 16.05.251
AS 16.05.340(b)

5 AAC 41.260. INSPECTION OF A FARM. A permit holder shall allow inspection of the shellfish farm by department inspectors at any time the farm is operating. (Eff. / / , Reg.)

Authority: AS 16.05.020
AS 16.05.092
AS 16.05.251
AS 16.05.340(b)

5 AAC 41.270. ANNUAL REPORT. A person who holds a permit for a shellfish farm shall submit an annual report no later than December 15 to the department. The annual report form shall be distributed to permit holders by the department. (Eff. / / , Reg.)

Authority: AS 16.05.020
AS 16.05.092
AS 16.05.251
AS 16.05.340(b)

5 AAC 41.400. DEFINITIONS. In 5 AAC 41.200 -- 5 AAC 41.400

(1) "commissioner" means the commissioner of the Department of Fish and Game or his designee;

(2) "department" means the Alaska Department of Fish and Game;

(3) "farm" means a specific location where shellfish are raised in captivity or under positive control as in a pen, pond, raft, bottom culture or an area of water completely enclosed by a generally escape-proof barrier for the purposes listed in 5 AAC 41.200 -- 5 AAC 41.280;

(4) "shellfish" means any species of crustacean, mollusk, or other invertebrates, in any stage of their life cycle, found in or introduced into the state, consistent with the definition of "fish" in AS 16.10.296. (Eff. / / , Reg.)

Authority: AS 16.05.020
AS 16.05.092
AS 16.05.251
AS 16.05.340(b)

DOC 0062r

MEMO -- January 12, 1988

TO: Fisheries Cabinet

FROM: Paul Peyton

RE: Aquaculture socioeconomic studies

Legislators and others considering proposed regulation of aquaculture activities in Alaska have asked for additional information concerning the social and economic impacts of the various possible forms of development in Alaska. Central to most of the discussion is whether salmon can be profitably farmed in Alaska and compete in the marketplace with wild salmon and farmed fish from other areas. If farm production was to be permitted, what are the potential impacts to the existing common property fishery? What sort of commitment, in terms of time and dollars, would be required of the State to manage and support salmon farming activities?

The DCED has entered into a \$20,000 contract with the Sea Fare Group in Seattle to conduct a study of world salmon markets and evaluate the extent of market competition between wild and farmed salmon, including farmed salmon which potentially could be produced in Alaska. Principle investigator for this study will be Dr. James Anderson of the University of Rhode Island. Anderson is a recognized authority in the area and has authored several papers dealing with the market's response to increasing world supplies of farmed salmon. Market contacts, statistical research and report editing functions of the contract will be conducted by the Sea Fare Group which is a commercial consulting business operated by those people that put out the Seafood Leader magazine.

A second \$20,000 contract has been undertaken with the DPA group of Vancouver, B.C. DPA will evaluate the relative costs of farmed salmon production in major producing regions around the world, develop a proforma cost of production model for the Alaska situation and assess the sensitivity of major cost factors to overall costs of production. DPA has done similar work for the Government of British Columbia and others and has identified specific sources for the necessary data.

Both contracts call for an interim or progress report to be submitted about February 1st and the final report during the first week of March.

A third phase of the project, that of developing a policy options matrix will be postponed at least until preliminary results from the two contracted studies are reported. At that time we may elect to select a limited number of issues for policy option development and conduct the required work in-house or through an RSA agreement with ISER. There is about \$5,000 remaining in the project budget.



STATE OF ALASKA

STANDARD AGREEMENT FORM
FOR PROFESSIONAL SERVICES CONTRACT

1. Agency Contract Number	
2. ATN Number 88-0200	
3. Service Code(s) 5950	
4. Financial Coding 08751001	
5. Agency Assigned Encumbrance Number 0881427	
6. Vendor Number	7. AK Bus. Lic. #

This contract is between the State of Alaska.

8. Department of Commerce and Economic Development				hereafter, the State, and	
9. Contractor The DPA Group, Inc.				hereafter, the Contractor	
Mailing Address 601 West Cordova Street		Street or P.O. Box		City Vancouver, B.C. (Canada)	
		State		Zip Code V6B 1G1	

10. ARTICLE 1. Appendices: Appendices referred to in this contract and attached to it are considered part of it.
- ARTICLE 2. Performance of Services:
- 2.1. Appendix A (General Provisions), Articles 1 through 14, governs the performance of services under this contract.
 - 2.2. Appendix B sets forth the liability and insurance provisions of this contract.
 - 2.3. Appendix C sets forth the services to be performed by the contractor.
- ARTICLE 3. Period of Performance: The period of performance this contract begins December 21, 19 87, and ends March 15, 19 88. Performance may be extended for additional periods by the written agreement of the parties.
- ARTICLE 4. Consideration:
- 4.1. In full consideration of the Contractor's performance under this contract, the State shall pay the Contractor a sum not to exceed \$ 20,000 (U.S.) in accordance with the provisions of Appendix D.
 - 4.2. When billing the State, the Contractor shall refer to the ATN Number and send the billing to:

11. Department of Commerce and Economic Development		Attn: Division of Business Development	
Mailing Address P.O. Box D, Juneau, AK 99811		Attention Larry Merculieff	

NOTICE: This contract has no effect as an offer by the Contractor until it is approved by the Department of Administration.

12. CONTRACTOR		14. APPROVAL BY THE STATE CONTRACTING AGENCY NOTICE: This certifies the availability of funds. I am aware that certifying false, inaccurate, or misleading documents constitutes an unsworn falsification punishable under AS 11.56.210	
Name of Firm The DPA Group, Inc.		Signature of Head of Contracting Agency or Designee <i>[Signature]</i> Date 12/29/87	
Signature of Authorized Representative <i>[Signature]</i> Date 12/23/87		Typed or Printed Name of Authorizing Official John D. Williams	
Typed or Printed Name of Authorized Representative John D. Williams		Title Deputy Commissioner	
Title Larry Merculieff		15. APPROVAL BY THE DEPARTMENT OF ADMINISTRATION <i>[Signature]</i>	
13. REQUESTING AGENCY #8751			
Department/Division Division of Business Development			
Signature of Project Director <i>[Signature]</i> Date 12/23/87			
Name of Project Director Larry Merculieff			
Title Director			

APPENDIX A
GENERAL PROVISIONS

- Article 1. Definitions.
- 1.1. In this contract and appendices, "Project Director" means the person who signs this contract on behalf of the Requesting Agency and includes a successor or authorized representative.
 - 1.2. "State Contracting Agency" means the Department for which this contract is to be performed and for which the Commissioner or Authorized Designee acted in signing this contract.
- Article 2. Inspection and Reports.
- 2.1. The Department may inspect, in the manner and at reasonable times it considers appropriate, all the Contractor's facilities and activities under this contract.
 - 2.2. The Contractor shall make progress and other reports in the manner and at the times the Department reasonably requires.

APPENDIX C
SERVICES TO BE PERFORMED

COST OF PRODUCTION MODEL FOR PEN-REARING
OF SALMON IN ALASKA AND CURRENTLY PRODUCING REGIONS
ATN No. 88-0200

This study will be conducted in two phases. In the first phase, The contractor will determine the relative costs of production in major pen-rearing regions. In the second phase, the contractor will develop a cost of production model for pen-rearing salmon in Alaska and assess the sensitivity of major cost factors to overall costs of production.

Phase I - Comparative Cost of Production Analysis

The steps to be undertaken by the contractor in Phase I are detailed as follows:

1. Discuss with representatives of the Department of Commerce and Economic Development to clarify the scope of the study.
2. Conduct a literature review of recent studies (to include Bjorndal, Salvanes, Ridley, Shaw, BIM, Anderson, Wurmman, Nasaka) on cost of production in the five major supply regions.
3. Develop profiles for B.C. and Chile from previous models developed by study team members to complete the comparison of costs of production.
4. From a literature review, determine the public support provided to the five major supply regions. The types of public support to be quantified will include the following:
 - final assistance;
 - research and development;
 - education; and
 - other services (for example, diagnostic and extension).

In addition, the type of tax structure established to pay for the support provided by governments in each country will be determined.

5. Prepare an interim report that summarizes the findings of Phase I (refer to reporting requirements in appendix D).

Phase II - Cost of Production Analysis for Alaska

The detailed steps that are to be undertaken by the contractor in Phase II are listed as follows:

1. Collect and analyze background information on likely general development areas. This activity will include a preliminary assessment of expected salmon farm development locations in the southeastern and southcentral areas, to guide the formulation of general biophysical assumptions for the production model. The assessment will include a brief examination of:

- location of logistic centers;
- transportation methods;
- probable areas excluded based on pollution, major alternate user groups, proximity to river mouths, excessive exposure to wind, etc.;
- location of existing potential smolt suppliers; and
- location of possible new hatchery locations.

These data will be collected in part during discussions with personnel in the Department of Commerce and Economic Development and the Department of Fish and Game.

2. Collect and review general biophysical data from selected development areas. This activity will include examination of:

- marine and freshwater temperature data;
- salinity data;
- location of major streams entering saltwater;
- phytoplankton data;
- important marine mammal concentrations; and
- location of major spawning streams and hatcheries.

These data will be obtained through discussion with personnel in government agencies and review of published data and additional unpublished data provided by government personnel. Agencies to be contacted will include:

- the Alaska Department of Fish and Game; and
- the National Oceanic and Atmospheric Administration, National Fisheries Service (Auke Bay Laboratory, Alaska, and Northwest and Alaska Fisheries Centre, Seattle, Washington).

3. Collect and review recent salmon culture activities in Alaska. This activity will include a review of recent state hatchery production data, particularly for chinook and coho salmon, and experimental marine farming results within the state (e.g., Little Port Walter Research Station). These data will be obtained through discussion with personnel in the government agencies identified in Step 2. This information will be used together with the biophysical data (especially temperature) collected in Step 2 to develop growth projections.
4. Prepare production criteria and assumptions for site areas suitable for pen-rearing of salmon. The information analyzed in Step 1 will be used to identify:

- theoretical average monthly temperatures;
- expected growth rates based on the average temperatures;
- seasonal differences in feed conversion rates;
- average monthly feeding rates; and
- stocking densities.

Where possible, the data will indicate the range of values or conditions that could exist within the study area. In addition, the analysis will identify:

- the likelihood of problems with phytoplankton outbreaks and predator populations; and
 - expected smolt acquisition, transportation and acclimation requirements and problems.
5. Adapt the British Columbia growth models to Alaska by estimating the impact of differences in temperature and other factors between B.C. and Alaska on the likely growth of pen-reared salmon.
 6. Estimate the cost of critical inputs for the selected areas for site development. The inputs would include the following:
 - capital costs (net cages, nets, etc.);
 - smolts;
 - fish feed;
 - labor; and
 - diagnostic services.
 7. Conduct sensitivity analyses to establish break-even points for pen-rearing salmon in Alaska. This would include an assessment of the following scenarios:
 - production at small and large scales;
 - with and without fish feed production within the state;
 - with and without direct transport to market; and
 - with constant and changing prices.
 8. Write and present to the Project Director a draft report of the study findings (refer to the reporting schedule in Appendix D). In addition, the contractor will supply the State with a computer diskette in JAVELIN format containing the cost of production model with supporting documentation. The draft report will also incorporate the findings of the interim report.
 9. After review by the project director, make required changes, if any, to the report and to the cost of production model.

APPENDIX D
CONSIDERATION, REPORTING SCHEDULE AND GENERAL CONDITIONS

COST OF PRODUCTION MODEL FOR PEN-REARING
OF SALMON IN ALASKA AND CURRENTLY PRODUCING REGIONS
ATN No. 88-0200

REPORTING SCHEDULE: The contractor will submit an interim project report in writing to the Project Director which summarizes the findings of Phase I (Comparative cost of Production Analysis) by February 1, 1988.

A draft of the final project report containing all study findings, including those findings contained in the interim report, will be submitted in writing to the Project Director for review and approval by February 23, 1988. At the same time the contractor will submit a computer diskette containing the cost of production model with supporting documentation. The contractor will incorporate changes to the draft material suggested by the Project Director and submit ten copies of the approved final report and two copies of the production model diskette on or before March 4, 1988. This schedule allows three days for the Project Director to complete his review of the draft report.

CONSIDERATION: The contractor will submit an invoice for payment with the interim project report on or before February 1, 1988 which reflects all expenditures and services rendered for that period of the contract. A second and final invoice for payment will be submitted with the final project report on or before March 4, 1988 which reflects all expenditures and services rendered for the remaining period of the contract. Payments on both the interim and final invoices are subject to the limitations and conditions described below. All invoice amounts will be stated in U.S. dollars and all payments will be made in U.S. dollars.

Fees charged for services performed by the contractor's various study team members will not exceed the rates shown in the schedule below. (All amounts are in U.S. dollars):

<u>Study team member</u>	<u>Per day</u>	<u>Per hour</u>
D. Egan	\$375	\$47
J. Dale	200	25
M. Winsby	350	44
T. Bjorndal	520	65

Upon acceptance of the interim and final project reports and receipt of the accompanying invoices by the Project Director, the State will pay the contractor within 30 days. Failure of the contractor to comply with the reporting provisions of this contract will result in the State withholding payment until such compliance is obtained.

If the total amount due on the contractor's interim invoice exceeds \$12,000 (U.S. dollars), the State will withhold payment of the excess until the final project report and model is received and accepted by the Project Director. Payment of any excess due on the interim invoice will be made at the same time as the final payment. Under no circumstances will the State be liable for total project costs in excess of \$20,000 (U.S. dollars).

If the State cancels the project at any time during the course of this contract, the Contractor shall submit a final billing based on actual expenses incurred up to the termination date.

CONTRACT DISPUTES: All contract disputes will be subject to the provisions of Appendix A, Article 3 of the Standard Form For Professional Services Contract, unless other specifically identified statutes and/or legal requirements apply.

REQUESTS FOR CONTRACT EXTENSION: Requests to extend the ending date for contract performance must be submitted in writing at least 21 days prior to March 4, 1988. The written request should specify the reason why the contract extension is requested and the proposed date to which extension is needed. Upon receipt of the requested extension, the Project Director will send contract amendment forms to the contractor. Contract amendment forms must be signed by the Contractor's authorized agent and returned to the Project Director at least 10 days prior to expiration of the contract. Requests for contract amendments will not be considered if such requests are not received within the time frames specified. Because the value of this study to the State is highly dependent on having the required reports completed according to the schedule specified above, it is unlikely that the Project Director will approve an extension of the contract.



STATE OF ALASKA

STANDARD AGREEMENT FORM
FOR PROFESSIONAL SERVICES CONTRACT

1. Agency Contract Number	
2. ATN Number 88-0198	
3. Service Code(s) 5950	
4. Financial Coding 08751001	
5. Agency Assigned Encumbrance Number 0881428	
6. Vendor Number	7. AK Bus. Lic. #

This contract is between the State of Alaska,

8. Department of

Commerce and Economic Development

hereafter, the State, and

9. Contractor

The Sea Fare Group

hereafter, the Contractor

Mailing Address

Street or P.O. Box

City

State

Zip Code

3510 1st Avenue N.W.

Seattle

Washington

98107

10. ARTICLE 1. Appendices: Appendices referred to in this contract and attached to it are considered part of it.

ARTICLE 2. Performance of Services:

- 2.1. Appendix A (General Provisions), Articles 1 through 14, governs the performance of services under this contract.
- 2.2. Appendix B sets forth the liability and insurance provisions of this contract.
- 2.3. Appendix C sets forth the services to be performed by the contractor.

ARTICLE 3. Period of Performance: The period of performance this contract begins December 24, 19 87, and ends March 30, 19 88. Performance may be extended for additional periods by the written agreement of the parties.

ARTICLE 4. Consideration:

- 4.1. In full consideration of the Contractor's performance under this contract, the State shall pay the Contractor a sum not to exceed \$ 20,000 in accordance with the provisions of Appendix D.
- 4.2. When billing the State, the Contractor shall refer to the ATN Number and send the billing to:

11. Department of

Commerce and Economic Development

Attn: Division of

Business Development

Mailing Address

P.O. Box D, Juneau, Alaska 99811

Attention

Bonnie Jo Borchick

NOTICE: This contract has no effect as an offer by the Contractor until it is approved by the Department of Administration.

12.

CONTRACTOR

Name of Firm

The Sea Fare Group

Signature of Authorized Representative

Date

12/22/87

Typed or Printed Name of Authorized Representative

Sandi McKenzie

Title

President

Employer I.D. No. (EIN) or SSN

91-1224431

13.

REQUESTING AGENCY #8751

Department/Division

DCED/Division of Business Development

Signature of Project Director

Date

12/29/87

Name of Project Director

Larry Mercurieff

Title

Director

14.

APPROVAL BY THE STATE CONTRACTING AGENCY

NOTICE: This certifies the availability of funds. I am aware that certifying false, inaccurate, or misleading documents constitutes an unsworn falsification punishable under AS 11 56 210.

Signature of Head of Contracting Agency or Designee

Date

12/30/87

Typed or Printed Name of Authorizing Official

J. Anthony Smith

Title

Commissioner

15.

APPROVAL BY THE DEPARTMENT OF ADMINISTRATION

N/C

APPENDIX A
GENERAL PROVISIONS

Article 1. Definitions.

- 1.1. In this contract and appendices, "Project Director" means the person who signs this contract on behalf of the Requesting Agency and includes a successor or authorized representative.
- 1.2. "State Contracting Agency" means the Department for which this contract is to be performed and for which the Commissioner or Authorized Designee acted in signing this contract.

Article 2. Inspection and Reports.

- 2.1. The Department may inspect, in the manner and at reasonable times it considers appropriate, all the Contractor's facilities and activities under this contract.
- 2.2. The Contractor shall make progress and other reports in the manner and at the times the Department reasonably requires.

APPENDIX C
SERVICES TO BE PERFORMED

WORLD MARKETS FOR SALMON -- PEN-REARED SALMON IMPACTS
ATN No. 88-198

The purpose of this project is to evaluate the extent of potential market competition between wild and farmed Alaska salmon, and between Alaska salmon and farmed salmon from other states and countries.

Questions such as the following are of key concern and will be addressed by the contractor:

- Will world markets be able to absorb farmed Alaskan salmon, from 1990 (when the potential first harvests of Alaskan pen-raised salmon would take place) onward at a price that will be profitable for the producers?
- Will the amount of farmed salmon projected for production worldwide in this time frame dampen current markets for Alaskan wild salmon, and if so, to what extent?
- Would the Alaskan pen-raised salmon be directly competitive with Alaskan wild salmon or simply a part of the farmed salmon supply?

TASK 1: BASELINE MARKET AND PRICE INFORMATION

In-house files of recent and on-going studies of the contractor, Dr. James Anderson's sources and other existing information will form the basis of data for this task, however, some original data gathering will be performed. In particular, supermarket representatives and Japanese salmon buyers will be interviewed. Interviews will be conducted so that the data gathered is consistent with work performed by Dr. Anderson for New England food service groups.

The contractor will first outline the current distribution channels for farmed salmon and Alaskan wild production and describe the areas in which wild and farmed stocks may directly compete.

Next, historical prices will be examined for any trends relative to supply for both farmed and wild salmon. While average prices will be reported in this step, exceptions to the rule will be noted. Of particular interest are exceptions that reflect higher prices through unique marketing or product identification efforts, particularly where products are specifically identified as Alaskan.

A. Where are Alaska's King, Coho and Sockeye Salmon Marketed?

The contractor will present a thorough overview of the current market and marketing conditions for Alaskan king, coho and sockeye salmon. The overview will be specific as to species, product form, transportation modes, purchase arrangements, export assistance, tariff barriers, trade promotion activities and other information which will help to thoroughly describe the existing markets for Alaska wild salmon.

A survey will be performed for major institutional and retail market sectors to delineate the geographic sales distribution, utilization of various product forms, seasonality of sales, and usual distribution channels.

B. Price Levels Over the Past 10 Years for King, Coho and Sockeye Salmon.

The contractor will present an accurate historical description of market price trends for Alaskan salmon. Government and private seafood price data sources will be analyzed to determine domestic and export price and volume of sales information by major product form. The contractor will include supply level (landings) figures and a comparison by product form.

C. Existing Markets for Farmed Salmon.

The contractor will present a thorough and quantitative overview of the major world supply sources and markets for farmed salmon. The overview will be specific as to species, product form, transportation modes, purchase arrangements, export assistance, tariff barriers, trade promotion activities and other information which will help to thoroughly describe existing market conditions. This will be drawn in part from the contractor's in-house studies of domestic and world salmon farming activities and markets, such as recent work by Anderson and Brooks analyzing buyer preferences for farmed and wild salmon in the northeast. The contractor will expand the analysis to include other countries and geographic regions of the United States as part of this task. Particular emphasis will be given to the market in Japan. Additional information will be obtained from interviews with trading companies and other firms and individuals active in and knowledgeable about the salmon industry.

D. Price Levels of Pen-Reared Salmon Over the Past Five Years.

The contractor will describe and compare the prices and volumes of pen-reared salmon products over the past five years in all major world markets.

E. Effects of the Exchange Rate and Supply Changes on Market and Price Distribution.

Exchange rate information will be collected and correlated with import/export figures and the price levels of major salmon products over the last five years. The contractor will compare the fluctuating value of the dollar to the price and volume of salmon products traded on the world market.

TASK 2: MARKET FORECASTS

Because farmed salmon production could not occur in Alaska for several years, forecasts of future market conditions are important to investment decisions. Forecasts of expected demand levels and prices will be presented by the contractor. Using information collected in Task 1, the relationship between wild and farmed products stocks will be examined.

A. Volume of Farmed Salmon Expected to Enter the Marketplace Over the Next 10 Years.

The contractor will review recent studies of farmed salmon production trends and projections for the next ten years. Where discrepancies are evident, the contractor will provide an evaluation of the accuracy of the studies presented.

B. Future Markets and Price Level Expectations for Potential Alaskan Farmed Salmon.

The contractor will develop a matrix of market size and price forecasts to be used in evaluating the effects of production increases expected over the next ten years. The matrix will be derived from available econometric work, interviews with industry, academic and government experts and research completed in the tasks above. The contractor will project a range of possible volumes of farmed Alaska salmon, and predict the effects on major markets, including the an analysis of the most likely market niches these salmon could occupy and the price ranges available. An analysis of the effects of possible exchange rate changes will be included.

C. Analyze the Degree of Overlap or Competition Between Alaskan Wild Salmon, Potential Alaskan Farmed Salmon and Other Farmed Salmon in Major Markets

The contractor will predict the degree of market competition expected in the future between Alaska wild salmon and potential farmed salmon products. The analysis will compare projected

prices, availability, product forms and characteristics (fresh/frozen, size, color, method of harvest and etc.), of the major Alaskan wild salmon fisheries and farmed salmon harvests. The major marketing attributes that may cause substitution or differentiation of the types of salmon will be analyzed in the particular areas where there might be market overlap or competition.

The contractor will suggest the probable outcome of any future market overlaps which are identified. This work will identify Alaska salmon products that may not be competitive in the marketplace and the characteristics which make them noncompetitive, which products would have advantages in specific markets and the reasons, and will analyze the possibilities of undertaking effective marketing programs to improve sales and maximize prices.

APPENDIX D
CONSIDERATION, REPORTING SCHEDULE AND GENERAL CONDITIONS

WORLD MARKETS FOR SALMON -- PEN-REARED SALMON IMPACTS
ATN No. 88-198

REPORTING SCHEDULE: The contractor will submit an interim project report in writing to the Project Director which summarizes the results of work completed to date by February 5, 1988, as described in Appendix C..

A draft of the final project report containing all study findings, including those findings contained in the interim report, will be submitted in writing to the Project Director for review and approval by February 25, 1988. The contractor will incorporate changes to the draft material suggested by the Project director and submit ten copies including the unbound original (for further duplication) of the approved final report on or before March 4, 1988. This schedule allows three days for the Project Director to complete his review of the draft report.

CONSIDERATION: The contractor will submit an invoice for payment with the interim project report on or before February 5, 1988 which reflects all expenditures and services rendered for that period of the contract for review and approval by the Department. A second and final invoice for payment will be submitted with the final project report on or before March 4, 1988 which reflects all expenditures and services rendered for the remaining period of the contract. Payments on both the interim and final invoices are subject to the limitations and conditions described below.

Fees charged for services performed by the contractor's various study team members will not exceed the rates of \$75 per hour. Upon acceptance of the interim and final project reports and receipt of the accompanying invoices by the Project Director, the State will pay the contractor within 30 days. Failure of the contractor to comply with the reporting provisions of this contract may result in the State withholding payment until such compliance is obtained.

If the total amount due on the contractor's interim invoice exceeds \$12,000, the State will withhold payment of the excess until the final project report and model is recieved and accepted by the Project Director. Payment of any excess due on the interim invoice will be made at the same time as the final payment. Under no circumstances will the State be liable for total project costs in excess of \$20,000 (twenty thousand dollars).

If the State cancels the project at any time during the course of this contract, the Contractor shall submit a final billing based on actual expenses incurred up to the termination date.

WORK PLAN: Work on the various segments of this contract will be shared by Dr. James L. Anderson and other individuals in The Sea Fare Group. The contractor will obtain written approval of the Project Manager, and if necessary an approved contract amendment, before any significant change is made in the following schedule:

TASK 1: BASELINE MARKET AND PRICE INFORMATION

Where are Alaska's king, coho and sockeye salmon marketed?

Sea Fare Group 90%
James L. Anderson 10%

Price levels over the past ten years for king, coho and sockeye salmon.

Sea Fare Group 98%
James L. Anderson 2%

Existing markets for farmed salmon

Sea Fare Group 70%
James L. Anderson 30%

Price levels of pen-reared salmon over the past five years

Sea Fare Group 98%
James L. Anderson 2%

Effects of the exchange rate and supply changes on market and price distribution.

James L. Anderson 100%

TASK 2: MARKET FORECASTS

Volume of farmed salmon expected to enter the market place over the next ten years.

Sea Fare Group 70%
James L. Anderson 30%

Future markets and price level expectations for potential Alaskan farmed salmon

James L. Anderson 100%

Analyse the degree of overlap or competition between Alaskan wild salmon, potential Alaskan farmed salmon and other farmed salmon in major markets.

James L. Anderson 100%

CONTRACT DISPUTES: All contract disputes will be subject to the provisions of Appendix A, Article 3 of the Standard Form For Professional Services Contract, unless other specifically identified statutes and/or legal requirements apply.

REQUESTS FOR CONTRACT EXTENSION: Requests to extend the ending date for contract performance must be submitted in writing at least 21 days prior to March 4, 1988. The written request should specify the reason why the contract extension is requested and the proposed date to which extension is needed. Upon receipt of the requested extension, the Project Director will send contract amendment forms to the contractor. Contract amendment forms must be signed by the Contractor's authorized agent and returned to the Project Director at least 10 days prior to expiration of the contract. Requests for contract amendments will not be considered if such requests are not received within the time frames specified. Because the value of this study to the State is highly dependent on having the required reports completed according to the schedule specified above, it is unlikely that the Project Director will approve an extension of the contract.

APPENDIX E

- A) For the purposes of this work it is understood that unless specified all data sources are secondary sources.
- B) Because of the tight schedule required by this contract, the final draft may be received chapter by chapter. Jim Anderson's original work may be part of the final draft.

A handwritten signature, possibly reading "Jim", is located to the right of the text in item B.

Original sponsors: Zharoff, Eliason
and Duncan

1 IN THE SENATE BY THE RESOURCES COMMITTEE
2 HOUSE CS FOR CS FOR SENATE BILL NO. 297 (Resources)
3 IN THE LEGISLATURE OF THE STATE OF ALASKA
4 FIFTEENTH LEGISLATURE - FIRST SESSION

5 A BILL

6 For an Act entitled: "An Act placing a moratorium until July 1, 1988, on
7 the issuance or granting of licenses, permits,
8 leases, or authorizations for commercial finfish
9 farming; providing for a bivalve spat collection
10 permit; and providing for an effective date."

11 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

12 * Section 1. FINFISH FARMING MORATORIUM. (a) Except as provided in
13 (b) of this section, the following licenses, permits, leases, or authoriza-
14 tions may not be issued or granted for the construction or operation of a
15 commercial finfish farm:

- 16 (1) authorization for use of an interim-use permit for the
17 experimental commercial taking of a fishery resource (AS 16.05.050(10));
18 (2) fish farming license (AS 16.05.340(a)(14));
19 (3) collection permit (AS 16.05.340(b));
20 (4) land use or tidelands permit (AS 38.05.035);
21 (5) a land lease (AS 38.05.070);
22 (6) fish transport permit (5 AAC 41.005);
23 (7) permit to appropriate water (11 AAC 93.120);
24 (8) temporary water use permit (11 AAC 93.210 - 11 AAC 93.220).

25 (b) A fish farming license and a fish transport permit may be issued
26 for commercial finfish farming in a privately owned freshwater body that
27 has no outlet to state water.

28 * Sec. 2. NO PREFERENCE INTENDED. A license, permit, lease, or au-
29 thorization described in sec. 1 of this Act that is issued or granted for a

1 purpose other than commercial finfish farming and that is in effect during
2 the period of the moratorium imposed by sec. 1 of this Act does not create
3 a right or preference with regard to the issuance, granting, or renewal of,
4 or conditions or limitations placed on, any license, permit, lease, or
5 authorization for aquatic farming after the period of the moratorium.

6 * Sec. 3. AS 16.05.340(b) is amended to read:

7 (b) The commissioner of fish and game may issue without cost a
8 permit to collect fish and game, including fur animals, subject to
9 limitations and provisions that are appropriate, for a scientific,
10 propagative, or educational purpose. The commissioner also may issue
11 a permit for the collection of bivalve spat for use in connection with
12 an aquatic farm. In addition, the commissioner shall issue a permit
13 for the collecting of wild fur animals for improving the genetic stock
14 of fur farm animals. Permits issued under this subsection shall be in
15 accordance with current sustained yield management practices for the
16 species of wild game for which the permit is requested. The annual
17 permit fee for an Alaska resident to collect wild fur animals for fur
18 farming purposes is the same as the fee for resident trappers.

19 * Sec. 4. Section 1 of this Act is repealed July 1, 1988.

20 * Sec. 5. This Act takes effect immediately under AS 01.10.070(c).

ALASKA STATE LEGISLATURE - SENATE

SENATOR RICHARD I. ELIASON

5373

FILES COMMITTEE CHAIRMAN
LABOR & COMMERCE COMMITTEE VICE-CHAIRMAN
LEGISLATIVE COUNCIL
RESOURCES COMMITTEE
FISHERIES SUBCOMMITTEE CHAIRMAN



P.O. BOX 143
SITKA, ALASKA 99835
P.O. BOX V
JUNEAU, ALASKA 99811
(907) 485-4916

May 11, 1987

Commissioner Don Collinsworth
Department of Fish and Game
P.O. Box 3-2000
Juneau, Alaska 99802

COMMISSIONER'S OFFICE
RECEIVED
MAY 12 1987

Dear Commissioner Collinsworth,

DEPARTMENT OF FISH AND GAME

Recently hearings on Senate Bill 106, an act relating to aquatic farming, were conducted by the Senate Resources Subcommittee on Fisheries at five different locations -- Dillingham, Kodiak, Anchorage, Ketchikan, and Sitka. The individuals testifying at the hearings raised many concerns which must be addressed fully prior to the Legislature taking any formal action on permitting aquatic farming in Alaska.

Some of the unanswered questions asked are as follows:

- 1) How will land use conflicts be resolved?
- 2) How can favoritism or the appearance of favoritism be avoided in the awarding of tide land permits?
- 3) What steps will be implemented to reduce tide land speculation?
- 4) What is the role of the non-profit hatcheries in the sea farming industry?
- 5) Will the role of a non-profit hatchery change if the hatchery chooses to rear pen salmon?
- 6) What will be the role of borough governments if a sea farm is within the borough's jurisdiction?
- 7) What will be the procedures in determining the monetary value for the tide land sites?

- 8) Will additional safeguards be established if the potential sea farm site is in a designated wilderness area?
- 9) How will the upland owners' concerns be resolved?
- 10) What exactly is known regarding any potential environmental danger in raising salmon in a concentrated area?

As these questions and other unresolved concerns regarding aquatic farming are reviewed and discussed during the interim by the Subcommittee on Fisheries, it will be most helpful if the various affected state agencies take an active role in the discussion. As chair of the interdepartmental work group on mariculture, the subcommittee looks forward to working with you and other members of the working group during the interim.

Commissioner Collinsworth, hopefully, time will allow the subcommittee to meet with the agency representatives prior to adjournment in order to formalize plans for the next few months.

Sincerely,



Senator Dick Eliason, Chair
Senate Resources Subcommittee on Fisheries

cc: Senate Resources Committee Members
House Resources Committee Members

Suggested questions to be addressed
from the Office of Representative Herrmann

1 BIOLOGICAL CONSIDERATIONS

- 1) What is the potential disease and genetic threat to wild stocks?
- 2) How can these be controlled
- 3) What type of oversight and supervision of mariculture operations is necessary to ensure that wild stocks are not threatened
- 4) How should pens be stocked?
- 5) Who should regulate egg take?
- 6) Should Atlantic Salmon be allowed? and should other species be imported?
- 7) What are the potential effects on habitat for anadromous fish streams?

11 MARKET QUESTIONS

- 1) Is foreign marketing of pen-reared salmon currently effecting markets for Alaska's wild stocks?
- 2) If Alaska got into pen-rearing of salmon, would our pen-raised salmon be able to compete?
- 3) Could increased efforts at marketing the advantages of wild salmon give Alaska fishermen a competitive edge in certain markets over pen-reared salmon?
- 4) Would development of pen-reared salmon in Alaska displace fishermen? - If so, How many?
- 5) How valid is the statement that the world market will be glutted with salmon by the time Alaska is ready to get into the industry?

111 ECONOMIC FEASIBILITY & BENEFITS

- 1) What is the range of options for proceeding with mariculture operations?
 - A) What would be the economic costs and benefits if the state only permitted small operations? or only large operations? (How many jobs would be created? How much would they pay, How much revenue would be generated? How many people would be displaced? What would be the economic impacts to the state if the fishing industry experienced displacement? Would these operations be economically viable?
 - B) What would be the best way to proceed if the goal of the state was to maximize the revenues generated?

III. Government Involvement

- B. To what extent should the state be involved in necessary monitoring/oversight. What is the state required to do? (i.e. Federal NSSP requirements).
- C. To what extent should the state be involved in providing technical assistance in site selection and necessary environmental analysis?
 - 1. How much should the industry contribute to offset administrative costs?
- D. 2. To what extent should the industry be required to pay for the use of the public resources and the resulting externalities such as pollution and landscape alterations?
- E. What role should the state play in market development?
- F. Given the fiscal and technical policy impacts of the different options - should we proceed to encourage various mariculture operations, and if so, in what areas?
- G. What criteria should be established to determine a whether or not a permit applicant is "fit, willing and able".
 - 1. How do we avoid excluding small, locally owned operations?
 - 2. Should bonding be required to discourage speculation and protect the state in the case of failure? (Clean-up costs).
- H. How are permits going to be transferred? Who decides?
- I. To what extent should the state provide investment incentives? (State subsidization through loans, tax credits ect.) Several sources say that tax credit incentives are necessary to attract venture capital.
- J. How much should the industry pay for necessary regulation, monitoring and oversight?

- C) What would be the best way to proceed to create the most jobs and steady employment?
- D) What would be the best way to provide economic benefits to rural areas?
- E) What would be the best way to provide economic benefits to urban areas?
- F) What would be the best way to minimize the effects on fishermen who may be displaced
- G) What would be the comparative costs and benefits of not going ahead with mariculture but instead increasing marketing strategies so that wild salmon could compete?

IV LAND USE & SITING CONFLICTS

- 1) How should best interest findings be made?
- 2) What guidelines should be established to determine whether a site should be permitted if there are competing uses (some of which may not be permitted?)

V ENVIRONMENTAL IMPACTS

- 1) Water Quality
- 2) Land Use Impacts
- 3) Impacts on habitat for wild stocks .

VI GOVERNMENT INVOLVEMENT

Will financial resources be diverted from other fisheries programs such as hatcheries, and economic development of other existing fisheries?

(See Attached)

5/20/87

INTERAGENCY WORKGROUP ON MARICULTURE

David Benton	465-4100
Department of Fish and Game	
Doug Donegan	465-2609
Department of Environmental Conservation	
Rick Focht	465-4081
Commercial Fisheries Entry Commission	
Kerry Howard	465-2653
Department of Environmental Conservation	
Mike Kaill	465-4160
Department of Fish and Game	
Amy Kruse	789-3151
Department of Environmental Conservation	
Diane Mayer	465-3562
Office of Management and Budget	
Bob Palmer	465-3400
Department of Natural Resources	
Paul Peyton	465-2162
Department of Commerce & Economic Development	
Rick Reed	465-4290
Department of Fish and Game	
Jim Wakefield	465-2700
Department of Labor	

Cowper Administration Position on Mariculture

Mariculture may provide substantial economic benefits to our coastal communities and help diversify and stabilize our economy if it is developed in an orderly fashion which provides the maximum benefit to Alaskans while ensuring protection for our fisheries resources, other resource users and the environment. In order to accomplish these objectives, any legislation authorizing a mariculture industry must satisfy the following principles:

1. The mariculture industry must benefit Alaskans.

The mariculture industry must be developed in a manner which does not result in unfair competition with existing fisheries or cause undue economic displacement in our coastal communities. Legislation should, to the extent possible under the law, provide for local hire at mariculture facilities and give preferential access to mariculture permits and mariculture related tidelands leases to Alaskans.

2. The mariculture industry must pay for itself and the state should get a fair return for the use of state resources.

Legislation should contain provisions for recovering administrative and other state costs associated with managing the industry. The legislation should also ensure that the state gets a fair return for the use of tidelands and other resources.

3. The development of the mariculture industry in Alaska should be done in an orderly fashion which encourages a stable, dependable industry.

Legislation should provide general criteria which will lead to the development of a regulatory program which discourages speculation on permits and tidelands leases, encourages sound financial planning, and provides for a diverse industry ranging from "Mom and Pop" ventures to larger corporate operations.

4. The mariculture industry must meet all state and federal requirements for human health, product quality and sanitation.

Legislation should ensure that mariculture facilities meet all state and federal requirements for human health, safety, and sanitation. Legislation should also require that mariculture products meet or exceed

all state and federal product quality and human health standards, and provide the means to ensure that state

regulators can protect human health and product quality.

5. Mariculture activities must be managed to ensure protection of the biological integrity of natural plant and animal stocks.

Legislation must address the issues of pathological and genetic protections for natural sea vegetable and fish stocks.

6. Mariculture activities must be managed in a manner which ensures adequate environmental safeguards and habitat protection.

Legislation must ensure that mariculture facilities are sited, designed and operated to protect air and water quality, to provide for proper disposal of wastes, and to minimize adverse effects to important fish and wildlife habitat.

7. Mariculture facilities must be sited to minimize land-use conflicts, maintain navigation and ensure access to upland areas.

Legislation should provide guidance for siting facilities to minimize conflicts with other tidelands users, reducing visual and aesthetic impacts, maintaining navigation and ensuring access across state tidelands.

8. Broodstock acquisition for mariculture purposes should be carefully regulated, especially for species subject to limited entry fisheries.

Legislation should contain provisions limiting the acquisition of broodstock for species subject to limited entry fisheries. Legislation should grant the Department of Fish and Game the authority to regulate the acquisition, transport, and propagation of mariculture broodstock, and provide the Board of Fisheries the ability to resolve allocation decisions regarding broodstock acquisition if necessary.