

ALASKA LEGISLATURE SPECIAL COMMITTEE/SUBJECT FILES 8672

2315 SCOMM 95: HOUSE SPEC. COMM. ON FISHERIES 1995-1996

Secretary. The Secretary retained overall allocation decision authority, including the authority to modify an allocation at any time.

As part of the Community Development Quota program application process the Governor's designees as identified in AS §6 AAC 93.915 establish a schedule for the receipt of the applications, initial application evaluation, public hearings and final application review. Within a reasonable time before the beginning of the application period, the designees also publish a notice of the CDP application schedule in at least one newspaper of general circulation in Western Alaska and one newspaper of general circulation in the state. The state also mails a copy of the notice to eligible communities. The application period will be a minimum of 14 days except as provided for in AS §6 AAC 93.075 which states the governor can, at his discretion, relax or reduce the notice requirements if the governor determines that a shortened or less expensive method of public notice is reasonably designed to reach all interested persons.

The CDQ application is required to contain a description of the goals and objectives of the Community Development Plan (CDP), the allocation requested, the length of time necessary to achieve these goals as well as the number of individuals expected to be employed and a description of vocational and educational training programs the CDP will generate. The CDP should also include a description of the existing fishery related infrastructure and how the CDP would use or enhance existing harvesting or processing capabilities, support facilities and human resources. The CDP is also required to include a description of how new capital or equity will be generated for the applicants fishing or processing operations; a plan and schedule for transition from reliance on the CDQ to self-sufficiency in fisheries; and a description of the short and long-term benefits to the applicant from the allocation.

Upon receipt of the CDP applications the governor's designees perform an initial evaluation of the CDP to determine if it is complete and has the necessary information required under §6AAC 93.025. The designees, staff members of the Departments of Community and Regional Affairs, Fish and Game, and Commerce and Economic Development, schedule a public hearing in accordance with federal regulations. The governor's designees then take into consideration the CDP application and public testimony and select those applications that they believe best satisfy the objectives, requirements, and criteria of the CDQ program and recommend those applications to the governor, who in turn evaluates and makes the final recommendation to the Secretary of Commerce for approval.

The initial application process in 1992 occurred during an extremely short time frame. The ability of the eligible villages to organize into CDQ groups, develop a Community Development Plan and form industry partnerships is a testimony to the determination the people of western Alaska to gain the greatest possible benefit from the CDQ program.

During the last half of 1992, communities and fishermen's groups along the Bering Sea coast began to organize in response to the pending CDQ regulations. In order to qualify for a

CDQ allocation, an organization and its member communities had to meet several criteria. The major criteria for community qualification consisted of:

- Location within 50 nautical miles of the Bering Sea.
- Native village as defined by the Alaska Native Land Claims Settlement Act
- Residents conduct over 50% of their current subsistence and commercial fishing effort in the waters of the Bering Sea.
- No previously developed harvesting or processing capacity sufficient to support substantial groundfish fisheries participation

A total of 56 communities were eligible and all held meetings to select fishermen representatives. As the summer drew to a close, the communities coalesced into six different applicant organizations. The groupings were self-determined and were based primarily on geographical proximity and cultural boundaries.

Community Development Quota Groups	
Aleutian Pribilof Island Community Development Association (APICDA)	5 communities
Bristol Bay Economic Development Corporation (BBEDC)	13 communities
Central Bering Sea Fishermen's Association (CBSFA)	1 community
Coastal Villages Fishing Cooperative (CVFC)	17 communities
Norton Sound Economic Development Corporation (NSEDC)	15 communities
Yukon Delta Fisheries Development Association (YDFDA)	4 communities

List of CDQ Communities by Group

APICDA	Atka, False Pass, Nelson Lagoon, Nikolski, St. George
BBEDC	Aleknagik, Clark's Point, Dillingham, Egegik, Ekuk, Manokotak, Naknek, King Salmon/Savonoski, Pilot Point/Ugashik, Port Heiden, South Naknek, Togiak, Twin Hills
CBSFA	St. Paul
CVFC	Cherfornak, Chevak, Eek, Goodnews Bay, Hooper Bay, Kipnuk, Konigianak, Kwigillingok, Mekoryuk, Newtok, Nightmute, Platinum, Quinhagak, Scammon Bay, Tooksook Bay, Tuntutuliak, Tununak
NSEDC	Brevig Mission, Diomedes/Inalik, Elim, Gambell, Golovin, Koyuk, Nome, Savoonga, Shaktoolik, St. Michael, Stebbins, Teller, Unalakleet, Wales, White Mountain
YDFDA	Alakanuk, Emmonak, Kotlik, Sheldon Point

Membership of each CDQ group is composed of a representative of each member community. An appropriate governing body from each community joining a CDQ group had to elect a representative from the community to the CDQ organization's Board of Directors. Three-quarters of the members of each Board were required to be either commercial or subsistence fishermen.

In order to qualify for a pollock allotment, each CDQ group had to prepare a comprehensive Community Development Plan (CDP) application for presentation to the Governor of Alaska and the Secretary of Commerce. The application had to describe the communities and their economies and lay out the group's specific goals and objectives. The plans had to request specific amounts of pollock, and to describe specifically how the pollock proceeds would be utilized, including describing specific fishery development projects that would be pursued along with measurable milestones. Finally, the plans had to demonstrate that the CDQ group itself would be able to continue as a viable business entity after the CDQ program had ended.

Application Requirements
The CDQ group's goals and objectives
Employment to be created
Existing fishing related infrastructure
Business plans
Business and loan relationships
Presentation of a budget
Sufficient management and technical experience

Industry Partners

A large part of the 1992/93 application process for CDQ groups involved locating and contracting with an industry partner and developing programs to utilize anticipated CDQ revenues. Each CDQ group found it necessary to contract with an established seafood company to make sure that the pollock would be harvested and processed in an economically efficient manner. The concept of partnerships with industry participants was perceived as an excellent vehicle for joint venture investments. It also would facilitate an important transfer of skills and expertise in the seafood industry to the CDQ groups. It was hoped that the industry partners would contribute greatly to the entry of CDQ communities as successful participants in the Bering Sea fishing industry.

When pollock CDQs were imminent, a number of major pollock harvesters and processors investigated partnerships with potential CDQ recipients. A request for proposals process ensued in which each CDQ group chose from a variety of offers. Each industry proposal contained a different mix of payments, training, employment opportunities, and assistance with other regional fishing business ventures. Existing pollock harvesters and processors were interested in the CDQ program because it gave them an opportunity to continue to operate their vessels at a time when they might otherwise be idle.

The industry partners were chosen by the CDQ groups based on the mix of which most closely fit the development goals of that group. Each of the six groups agreed to a specific price per metric ton for the use of CDQ pollock or a base price plus some form of profit sharing.

By the time the 1994/95 application process occurred, a steep decline in pollock prices had demonstrated the volatility of the pollock market. Several of the groups switched from a fixed fee to a base price and profit sharing. This was done both to provide a higher potential price to the CDQ groups and to protect the industry partners in the event of a continued pollock market collapse.

CDQ organizations and their industry partners (1992 - 1995):

Aleutian Pribilof Community Development Association	Trident Seafoods, Inc.
Bristol Bay Economic Development Corporation	Oceantrawl, Inc.
Central Bering Sea Fishermen's Association	American Seafoods Company, Inc.
Coastal Villages Fishing Cooperative	Golden Age Fisheries
Norton Sound Economic Development Corporation	Glacier Fish Company
Yukon Delta Fisheries Development Association	Golden Alaska Seafoods, Inc.

CDQ Allocations

The pollock allocations for 1992 and 1993 were made in late 1992. Different amounts were given to each group based on the number of communities they represented, their expressed needs, and the soundness of their plans.

Approved CDQ Allocations	1992/93	1994/95
APICDA	18%	18%
BBEDC	20%	20%
CBSFA	10%	8%
CVFC	27%	27%
NSEDC	20%	20%
YDFDA	5%	7%

The 1994 and 1995 allocation process began in early 1993 and the Secretary made final allocations late in the year. As indicated in the above chart, changes were made to the 1994 and 1995 allocations.

As stated earlier, the allocation decisions are based on the CDQ organization's Community Development Plan(CDP) and their ability to implement and fulfill their goals. The allocation process is of a competitive nature with each group preparing a CDP that would provide substantial gain to their communities. This was done to ensure the greatest benefit to the residents of the region.

CDQ Groups' Goals & Objectives

Each CDQ group proposed to use its funds to create more local development opportunities. To this end, all are using funds for training and education, jobs, and infrastructure development. Because of their different geographical locations, existing economic conditions, and other local employment opportunities, each group developed a different program philosophy. The result has been a blend of investing, training, and infrastructure development all aimed at developing and improving the regional fisheries and overall economies.

All but one of the groups declared itself a non-profit corporation. The one group which formed a for-profit company entered into a partnership in a factory-trawler. Most of the groups have since formed auxiliary for-profit corporations to participate in business projects and activities. These include YDFDA's small boat fleet, APICDA's Management Company, NSEDC's Norton Sound Fish Co., and CVFC's salmon processor. More for-profit ventures such as these are being developed as more development plans are implemented.

By declaring themselves to be non-profit corporations, each group had to seek a ruling from the Internal Revenue Service as to whether or not these activities and corporate structures would qualify. The wait for the IRS ruling resulted in an important-side benefit: each group was required by the State to keep 40% of their revenues in a dedicated tax liability fund. Consequently, during the first year of the CDQ program the groups were subject to enforced savings. This allowed them to grow and refine their development plans without over-spending on initial projects. The expenditure and savings patterns of the groups for 1992/93 reflect this.

CDQ Group Primary Development Philosophies

Due to the regional idiosyncratic nature of the CDQ groups, each CDQ organization developed goals and objectives to meet the both the long and short-term needs of their communities. As reported earlier, each group has commonalties such as high unemployment, low living standards and limited economic development opportunities. How each region decides to address these issues is entirely self-determined. The list of development philosophies below is an indication of the differing objectives of each group.

APICDA -

Create income and infrastructure generating business opportunities for the CDQ group in local communities and businesses.

BBEDC -

Create an investment fund with which to invest in the seafood industry outside local, highly capitalized fisheries.

CBSFA -

Use CDQ income to leverage local infrastructure development.

CVFC -

Invest in ownership of offshore processor and use vertical integration and CDQ allocations to generate local employment.

NSEDC -

Increase participation and profitability by residents in regional fisheries and invest in the seafood industry.

YDFDA -

Train community residents as fishermen and finance vessel and gear loans and infrastructure development

CDQ Program Monitoring

The CDQ program requires both federal and state oversight. The federal and state governments have each added staff to respond to monitoring needs. Approximately the equivalent of one federal and three state full-time positions are dedicated to the CDQ administration as well as part-time assistance on policy-making decisions by staff from several agencies.

The federal monitoring agency is the National Marine Fisheries Service. Federal responsibilities include daily monitoring of catch, debriefing of fishery observers, writing regulations, and review of the overall program. As is the case in the open-access fishery, federal funds support the fishery management and allocation decision making process.

The State is responsible for the ongoing monitoring of each CDQ group's performance, ensuring compliance with CDQ plans and regulations, providing professional assistance, reviewing quarterly and annual reports, and participating in the allocation decision making process. State agencies involved in this process include the Departments of Community and Regional Affairs, Fish and Game, and Commerce and Economic Development. The State requires quarterly reports, conducts several meetings with each group annually, requires annual audit and compliance reports, and retains the right to conduct an internal audit and review of any CDQ group's accounts at any time.

CDQ Fisheries Monitoring

All at-sea processors in the open access pollock fisheries are required to carry a single authorized government observer. However, with the necessity of accurate accounting for all harvests to the pound, new methods were required. The CDQ organizations were attuned to this especially in terms of bycatch of species such as salmon and herring. These species are important to western Alaskans for both commercial and subsistence fishing. Therefore, the industry partners and CDQ groups voluntarily instituted new monitoring systems. They began using two observers on each processing vessel so that the trawls could be observed around the clock. Also, they began implementing methods to volumetrically measure all harvest. The methods determined by the North Pacific Fishery Management Council may be used as a basis for monitoring programs currently under consideration for the rest of the industry.

IV. OVERVIEW OF CDQ GROUPS AND ACTIVITIES

This chapter provides a brief overview of each CDQ group and the activities that it has undertaken to date.

Table IV-1 provides an overview of all activities of the six CDQ groups. Activities listed in bold type are actually underway. Activities listed in italics are in a development or planning stage. Activities listed in parentheses are potential projects which have been suggested by the CDQ groups in their Community Development Plans or other documents.

Table IV-1

CDQ Organizations	APICDA	BBEDC	CBSFA	CVFC	NSEDC	YDFDA
PROJECT TYPE						
Administration	x	x	x	x	x	x
Business Development						
Alaska Seafood Investment Fund		x				
Salmon & Herring Marketing (Coastal Village Investment Fund)					x	
(Cattle Ranch -revoked)	x					
(Nikolski Tourism - revoked)	x					
(Vessel Haul Out/Storage)			x			
(Seafood Waste Conversion)			x			
(Entrepreneurship Program)		x				
Employment						
Resident Employment Program	x	x	x	x	x	x
Equity Investments						
APICDA Management Co.	x					
APICDA Joint Ventures	x					
Imparpiqamiut Partnership				x		
Longline Partnership			x		x	
Norton Sound Fish Co.					x	
Yukon Delta Fisheries, Inc.						x
J/V Floating Processor (Longline Vessel)						x
Fishery Development						
Salmon Restoration Program					x	
Exploratory Fishing Research			x	x		x
Product Diversification Program	x			x	x	
St. Lawrence Halibut Fishery					x	
(Fishery Development Grants)		x				

ORGANIZATION	APICDA	BBEDC	CBSFA	CVFC	NSEDC	YDFDA
IFQ/Limited Purchase						
IFQ Fund	x					
Permit Brokerage		x				
IFQ/Permit Fund					x	x
Infrastructure						
Atka Dock Facility	x					
St. George Harbor	x					
False Pass Gear Storage	x					
Nelson Lagoon Dock	x					
False Pass Dock Improvement	x					
Nome Dock					x	
Savoonga Ice Delivery System					x	
Koyuk Ice Machine					x	
St. Paul Harbor			x			
St. Paul Dock			x			
Nikolski Boat Ramp	x					
Moses Pt. Buying Station					x	
Golovin Buying Station					x	
(Infrastructure Fund)		x				
Loan Program						
Small Business	x					x
Boat & Gear	x	x	x	(x)	x	x
Processing Plant						
Atka Pride Seafoods J/V	x					
Unalakleet Fish Plant					x	
Coastal Villages Fisheries				x		
Emmonak Cooperative						x
Norton Sound Crab Co.					x	
Shaktoolik Plant					x	
Mekoryuk Plant				x		
Nelson Lagoon Plant	x					
(J/V Shoreside Plant)			x			
Scholarship						
Scholarship Program	x	x	x	x	x	x
Training						
Shoreside Training Program	x					
Vocational Training & Education	x	x	x	x	x	x
(Salmon Roe University)				x		
(Observer Training Program)		x				
Other						
Impact Fund			x			

Activities are listed in thirteen different categories. All groups are involved in some categories, including administration, training, employment and scholarship programs. In contrast, only some groups are involved in IFQ purchases, infrastructure development, fisheries development and equity investments.

The remainder of this chapter provides a more detailed description of the goals and activities of each group.

ALEUTIAN PRIBILOF ISLAND COMMUNITY DEVELOPMENT ASSOCIATION

The Aleutian Pribilof Island Community Development Association (APICDA) represents the five communities of Atka, False Pass, Nelson Lagoon, Nikolski and St. George. Their industry partner is Trident Seafoods, Inc. APICDA received 18% of the total CDQ pollock allocation in 1992 - 1995.

Goals

According to the Community Development Plan submitted by APICDA, the major goals of APICDA are as follows:

- 1. Provide capital for construction and investment to facilitate community participation in Bering Sea/Aleutian Islands fisheries.** APICDA plans to acquire and conserve capital to avail itself of investment opportunities while at the same time be aware of the overcapitalization of the fishing industry. When making investments, APICDA must review a variety of factors to properly gauge the value of the opportunity.
- 2. Provide and promote employment and educational opportunities for local residents in all aspects of the Bering Sea/Aleutian islands fisheries.** APICDA member communities are strategically located in the Aleutian Island/Bering Sea region. As the economic health of the industry deteriorates, and fishing seasons become shorter and shorter, the location of support services becomes more and more important to the industry. Local infrastructure such as harbors and docks are necessary to provide support services. APICDA will strive to provide infrastructure development to all member communities.
- 3. To become a self-sustaining entity that will foster continued development, participation and stability for the regions communities and their residents.** In the APICDA communities, there is no more valuable right than access to the right to fish commercially. To the extent that local residents do not receive IFQs, and/or to the extent that the accompanying CDQ programs for halibut and sablefish are insufficient to meet the harvest needs of local residents, APICDA plans to participate in programs designed to assist local residents in acquiring IFQs.

CDQ Group Management/Administration

APICDA's board of directors employs the firm of Pacific Associates for the daily management of the organization. Pacific Associates offices are located in Juneau, Alaska. APICDA also employs community liaison officers to disseminate information throughout their communities. Management and policy decisions are made by the Board and carried out by Pacific Associates, their harvesting partner and subsidiary corporations.

Other CDQ Activities

Offshore Employment - Trident/Starbound offers a preferential hire program for residents of the APICDA area. They also provide training when needed and are investigating the establishment of a shoreside training program.

Training and Educational Program - APICDA's training program strives to provide meaningful employment and training opportunities by ensuring that all residents of APICDA communities fully understand the program. APICDA does this through employment of community liaison officers in each community.

Product Diversification Program - The product diversification program constitutes a major commitment to work with Trident and Starbound to develop new and expanded product forms from salmon.

APICDA Joint Ventures - Atka Pride Seafoods - APICDA formed a joint venture partnership with Atka Fishermen's Association to upgrade the existing processing facility and operate the processing plant as Atka Pride Seafoods.

APICDA Management Corporation - AMC holds all wholly owned subsidiaries of APICDA. - **Atka Floating Dock** - APICDA has constructed a small floating dock to serve the needs of the community until a larger, permanent dock can be constructed. AMC also owns three 32' longline vessels which are operated by local residents.

False Pass Dock Improvement - APICDA allocated funds to install sewer and water services to the dock.

St. George Dredge - APICDA provided \$1.2 million to match the \$3.3 million of state funds to dredge the St. George Harbor. APICDA views this as an economic investment since APICDA will participate in subsequent economic activity.

St. George Dock - APICDA has allocated almost a million dollars during 1995 for the design and construction of a dock in St. George. This facility will be owned by

APICDA Management Corporation and will be located on land APICDA leased from the City of St. George as a quid pro quo exchange for APICDA's earlier contribution toward the completion of the Zapadni Bay dredging project.

Loan Guarantee Program - APICDA has plans to provide an IFQ loan guarantee program to assist local residents in purchasing halibut and sablefish quota shares.

Nelson Lagoon Dock - The Nelson Lagoon Dock project continues on schedule, construction is expected to begin in the spring of 1995.

BRISTOL BAY ECONOMIC DEVELOPMENT CORPORATION

Bristol Bay Economic Development Corporation (BBEDC) represents the thirteen communities of Aleknagik, Clark's Point, Dillingham, Egegik, Ekuk, Manokotak, Naknek, King Salmon, South Naknek, Togiak, Twin Hills, Pilot Point, Ugashik and Port Heiden. Their industry partner is Oceantrawl, Inc. BBEDC received 20% of the total CDQ pollock allocation in 1992-1995.

According to the Community Development Plan submitted by BBEDC, the major goals of BBEDC are as follows:

Long range goals:

1. Increase and improve the quality of employment opportunities.
2. Develop long term employment opportunities and job diversification by funding vocational and academic scholarships.
3. Strengthen and expand the region's fisheries industry.

Specific Goals

- A1 Provide a self-sustaining basis for community development and employment.
- A2 Employment for the region's residents.
- A3 Provide training and education to residents appropriate to developing new employment opportunities.

- A4 Develop a regional fishery's development plan that anticipates changes in North Pacific fisheries.
- A5 Provide for infrastructure development based on new economic development.
- A6 Develop a timely method for getting information about the corporation and its programs out to the region and interested public.
- A7 Develop and maintain an efficient and cost effective staff and internal administrative and management procedures.
- A8 Maintain an effective and efficient Board of Directors.

CDQ Group Management/Administration

The Bristol Bay Economic Development Corporation offices are located in Dillingham, Alaska. Employment at BBEDC consists of an executive director, an office manager and secretary. Various consultant services are contracted as needed.

Other CDQ Activities

Offshore Employment Program - BBEDC works closely with their industry partner, Oceantrawl, to place their people on factory trawlers as entry level workers and encourages upward mobility.

Permit Stabilization Program - BBEDC has developed a permit brokerage business as an independent broker with Permit Masters. Permit Masters, Ltd. in Seattle is an established and reputable broker of fishing permits. The objective is to retain limited entry permits within the community when an individual is forced to sell his/her permit for various reasons.

Training and Scholarship Program - The training program has altered from the original 1993 CDP. Factory trawler training at a vocational school has decreased due to the fact that Oceantrawl prefers to do their own training. BBEDC is concentrating on basic vocational training to develop human resources in a broad and diverse context. BBEDC is also working with industry and government to develop an observer training program for the region.

Alaska Seafood Investment Fund - BBEDC has established the Alaska Seafood Investment Fund (ASIF) to make investments in Alaskan seafood businesses. These investments will be made outside of Bristol Bay's fully developed sockeye salmon and herring fisheries.

CENTRAL BERING SEA FISHERMEN'S ASSOCIATION

Central Bering Sea Fishermen's Association (CBSFA) represents the community of St. Paul. CBSFA was allocated 10% of the total pollock CDQ allocation for the 1992/93 season and 8% for the 1994/95 season.

According to the goals of CBSFA's Community Development Plan, the major development goals are as follows:

1. Develop for St. Paul Island a stable, self-sufficient, enduring and diversified economy not based on the harvest of furs seals, as directed by the Fur Seal Act Amendment of 1983.
2. Develop an appropriate locally based, locally owned, Bering Sea fishing fleet, to contribute community economic benefits and stability, key participation in local fishery business infrastructure, and safe and efficient harvest of local commercially valuable species.
3. Establish and maintain local access to Bering Sea resources as a key component in establishment and maintenance of an economy for St. Paul Island.
4. Establish Aleut participation and CBSFA participation in management and preservation of a Bering Sea ecosystem that supports rational use of renewable Bering Sea resources for the benefit of all persons.
5. Convert and merge a successful community fishery development plan and CDQ quota with the NPFMC fishery rationalization plan.

CDQ Group Management/Administration

Central Bering Sea Fishermen's Association is managed by the President of the board of directors who acts as the executive director of CBSFA. CBSFA's main office is located in Anchorage, with another office in St. Paul. CBSFA staff is mainly comprised of St. Paul residents, with consultants contracted on a part-time basis.

Other CDQ Activities

St. Paul Harbor Dredge - CBSFA along with the State of Alaska has committed funds for the dredge of the St. Paul Harbor. This project has an expected completion date of Spring 1995.

Temporary Marine Facilities - A small dock will be constructed upon completion of the harbor dredge. The dock has been designed and materials purchased, however construction is on hold pending completion of the dredge.

Scholarship Program - CBSFA has dedicated funds to a scholarship fund for St. Paul Island students accepted to institutions of higher education.

Vocational Training - CBSFA makes funds available for St. Paul Island Aleuts to obtain vocational or technical training in any field related to development of a fishery economy on St. Paul Island.

Fishery Employment - CBSFA will provide meaningful employment for the Aleut population of St. Paul Island. Jobs will be generated in commercial fishing operations, seafood processing, resource management and other fishery management and service related employment opportunities.

Vessel Loan Program - CBSFA loans up to 1/3 of the value of a vessel at reduced interest rates for locally qualified applicants who are successful in obtaining traditional financing for the remaining 2/3.

Gear Loan Program - CBSFA provides 100% financing for local fishermen at reduced interest rates to finance fishing gear for locally owned fishing vessels.

Test Fishery Project - CBSFA chartered a Bering Sea fishing vessel to test fish waters around St. Paul Island using a variety of small vessel pot gear to determine future fishery development.

Equity Investment in Longline Vessel - CBSFA has purchased ownership interest in the F/V Zolotoi.

Impact Fund - CBSFA has established an impact fund available for social, recreational and cultural impacts.

COASTAL VILLAGES FISHING COOPERATIVE

The Coastal Villages Fishing Cooperative (CVFC) represents the communities of Cherfornak, Chevak, Eek, Goodnews Bay, Hooper Bay, Kipnuk, Konigianak, Kwigillingok, Mekoryuk, Newtok, Nightmute, Platinum, Quinhagak, Scammon Bay, Tooksook Bay, Tuntutuliak, and Tununak. CVFC received 27% of the total pollock CDQ allocation during 1992 - 1995.

The Community Development Plan submitted by CVFC identifies the following major development goals:

1. Through the CDQ program, to develop a self-sustaining, self-sufficient fisheries economy in the CVFC region.
2. Develop the technical and managerial potential of CVFC members to own and operate a diversified fishing company through a "career track" program.
3. Provide jobs and expand employment opportunities for the residents of CVFC member villages.
4. Accumulate capital for Coastal Village region fisheries infrastructure development through:
 - Profit distributions from CVFC/Golden Age Fisheries(GAF) owned vessels
 - Employment on CVFC/GAF owned vessels in the CDQ fisheries or others
 - Employment on all other GAF owned vessels in all fisheries
 - Identification and development of new local fisheries resulting from nearshore trawl survey
 - Increase employment in local fisheries
 - Increased ownership of local fisheries
 - Expanded markets for local fisheries
 - Higher prices for products from the local fisheries through competition
 - improved quality control and product development
 - Higher prices for products through sales and marketing which emphasize the superior quality of CVFC region products
5. Invest capital in new ventures to further develop the Coastal Villages region.
6. Establish CVFC ownership in onshore processing facilities (for value-added production) and off-shore harvesting and processing capacity (factory trawlers, longliner, crab and processing vessels) capable of fishing in nearshore and offshore fisheries.
7. Provide markets for local salmon and herring fisheries.

CDQ Group Management/Administration

The Coastal Villages Fishing Cooperative, organized as a *for-profit* cooperative corporation, made a conscious decision to remain relatively small and lean during its early development. The cooperative employs four individuals: one each located at offices in Chevak, Bethel, Tooksook Bay and the executive director in Juneau.

Other CDQ Activities

Resident Employment Program - CVFC has an employment coordinator who actively recruits CVFC residents for employment and internship opportunities especially with Golden Alaska Fisheries ventures.

Scholarship Fund - CVFC and GAF created the Coastal Villages Scholarship Fund through the contribution by CVFC and GAF joint ventures of 5% of their profits. The fund has been incorporated as a non-profit corporation under the State of Alaska and awards scholarship grants or loans.

Coastal Village Fisheries - CVF is the first major locally owned salmon operation on the Kuskokwim river. This venture became operational in 1993. Due to poor salmon returns, CVF did not operate in 1994.

Imarpiqamiut Partnership - A fundamental part of CVFC's CDP is the 50% ownership in the F/T Brown's Point with its partner, Golden Age Fisheries. This vessel provides CVFC with direct access to the Bering Sea groundfish resources as well as a platform for processing value-added salmon products. This also allows for training of CVFC residents aboard their own vessel.

NORTON SOUND ECONOMIC DEVELOPMENT CORPORATION

The Norton Sound Economic Development Corporation (NSED) represents the villages of Brevig Mission, Diomed/Inalik, Elim, Gambell, Golovin, Koyuk, Nome, Savoonga, Shaktoolik, St. Michael, Stebbins, Teller, Unalakleet, Wales and White Mountain. NSED was allocated 20% of the total CDQ pollock allocation in 1992 - 1995.

According to the Community Development Plan submitted by NSED, the major goals of NSED are as follows:

1. Employment continues to be the top priority for the 94/95 program for the Bering Strait region. Increased employment and the resulting income are the prime objectives behind each of the programs described in the CDP. Whether the employment is jobs in shoreside fish plants, on floating processors, on fishing boats in existing or new fisheries, in office work etc., NSED is committed to this program.

2. Self-Sustaining Fisheries Development.

Another priority is that NSED's activities and programs be able to stand alone. NSED was established as a permanent regional economic development force for the future.

3. Education and Training

One of the biggest components of the NSED CDP continues to be education and training. These goals are addressed through NSED's training, education and employment program, and the endowment fund.

4. Retention/Addition of Locally Held Permits

The ability to participate in many nearshore fisheries has traditionally depended on who owns the limited-entry permits. One of the disadvantages of the transferable permits is that the ownership of the right to fish in regional waters may be sold or awarded to a party outside of the community, meaning that some of the economic value of the fishery is not captured locally. NSED will provide local fishermen with loan funds to purchase limited entry permits and IFQ's.

5. Fisheries Rehabilitation and Enhancement

NSED intends to increase economic returns by rehabilitating or enhancing salmon runs in the Bering Strait region.

6. Provision of Value to State and Local Government

NSED believes that as in shore-based fisheries, CDQ operations should help pay for state costs related to establishing and implementing the CDQ program. The passage of a state landing tax by the Alaska legislature in 1993 accomplished this goal.

CDQ Management/Administration

The Norton Sound Economic Development Corporation is organized as a tax-exempt not-for-profit corporation. NSEDC manages their CDQ program with an executive director, located in their Elim headquarters, and local staff personnel in various locations. NSEDC has five advisory committees which hold periodic meetings to review CDQ program activities. Consultants are contracted as needed.

Other CDQ Activities

Resident Employment Program - NSEDC has set near-term goals for hiring local people to work in the Bering Sea fishing industry in jobs that will directly result from CDQ fishing operations. GFC hires residents of the Bering Strait region on a preferential basis for CDQ operations and any other fisheries related to GFC and NSEDC.

Education Endowment Fund - NSEDC provides scholarships to qualified students in the region to obtain advanced or continuing, technical and vocational, and/or a college education. GAF contributes to the scholarship fund to assist residents attending college to obtain an education in a fisheries related field.

Revolving Loan Program - NSEDC has established a revolving loan program to provide capital at reasonable interest rates to fishermen throughout the region to help support commercial fishing activities. This includes: 1) vessel upgrade loans, 2) herring and salmon gear loans, 3) crab and halibut gear loans, and 4) permit loans.

Norton Sound Crab Company - The Norton Sound Crab Company operates as a crab, salmon and bait processing facility in Nome. Recently, a smoker was installed to process a value-added product as part of their long-term diversification strategy.

Norton Sound Fish Company - NSEDC made an equity investment in a joint venture with Glacier Fish Company (GFC) to acquire and operate a freezer/longliner vessel. The F/V Norton Sound became fully operational in 1995.

Unalakleet Processing Plant - The Village Council of Unalakleet received a grant to revitalize the fish processing plant in Unalakleet.

Salmon and Herring Marketing Program - NSEDC has organized salmon and herring buying/processing operations and will conduct additional market research for various products from the Norton Sound fisheries.

Koyuk Ice Delivery System - In 1993, NSEDC allocated funds to purchase and ship an ice machine to Koyuk as part of a project to develop an ice delivery system to support Norton Bay salmon fisheries.

Savoonga Ice Delivery System - The City of Savoonga received funds from NSEDC to build an ice delivery system to support the developing commercial halibut fishery.

Shaktoolik Processing Plant - The City of Shaktoolik was allocated funds to make repairs to their fish plant to support the salmon fishery.

Salmon Rehabilitation and Enhancement Program - The salmon restoration and enhancement program includes three components: 1) comprehensive planning with substantial local involvement, 2) resource inventory and 3) a development fund to finance future site-specific projects.

St. Lawrence Island Halibut Fishery - In 1993, NSEDC established a commercial halibut fishery at St. Lawrence Island. This work included successful efforts to change International Pacific Halibut Commission (IPHC) regulations to establish an experimental fishery in area 4D.

YUKON DELTA FISHERIES DEVELOPMENT ASSOCIATION

Yukon Delta Fisheries Development Association (YDFDA) represents the communities of Alakanuk, Emmonak, Kotlik and Sheldon Point. YDFDA received 5% of the CDQ pollock allocation in 1992-1993 and 7% of the total pollock CDQ allocation in 1994-1995.

According to the Community Development Plan submitted by YDFDA, the major development goals are as follows:

1. Stabilize, enhance, and diversify the economy of the Lower Yukon River Delta region by participating in the Bering Sea groundfish industry.
2. Maximize the social and economic benefits to the lower Yukon River Delta region from the harvesting and processing of Bering Sea fisheries.
3. Safeguard the benefits achieved in Objective 1 and 2 through responsible participation in a range of Bering Sea resource management institutions.

CDQ Management/Administration

The Yukon Delta Fishermen's Association is organized as a not-for-profit corporation created expressly to develop the economy of the Yukon Delta region. YDFDA currently has their main office in Seattle, with Golden Alaska Seafoods, and employs an executive director, office manager and accountant. YDFDA also maintains an office in Seward to be near the Alaska Vocational and Technical Education Center, which is conducting much of their industry and boat building training.

Other CDQ Activities

Fishery Employment Program - The employment objectives of the employment program are to provide on-the-job training and experience in offshore fisheries to community residents and provide immediate employment and income-earning opportunities to these residents.

Comprehensive Training Program - YDFDA will strive to assure that 1) an appropriately skilled native workforce is available for all opportunities created in the CDQ enterprises and 2) provide technical knowledge to the native workforce to assure that qualifications are developed to enable them to move into high paying senior positions.

Exploratory Fishing Research - The exploratory fishing research program conducts research on the distribution, appropriate gear, and preferred fishing methods suitable for community-based commercial fishing in the eastern Bering Sea.

Yukon Delta Fish Marketing Cooperative - YDFDA loaned funds to the Yukon Delta Fish Marketing Cooperative to provide matching funds for a federal Economic Development Assistance grant of \$680,000. The money will be used to upgrade and expand existing processing facilities Emmonak.

Yukon Delta Fisheries, Inc. - The major component to YDFDA's CDP is the establishment of a small-multi fishery boat fleet. YDFDA currently has six, thirty-two foot aluminum boats and two larger vessels fishing several species, and two more 32' boats are being built at AVTEC in Seward.

V. ECONOMIC IMPACTS OF THE CDQ PROGRAM

This chapter examines the economic impacts of the CDQ program, narrowly defined as changes in employment and income attributable to the CDQ program. The following chapter will look at the broader and more difficult question of the contribution of the CDQ program to "economic development."

Direct Employment and Income Impacts of the CDQ Program

Table V-1 summarizes the "Number Working," "Total Wages" and "Work Hours" information reported for all CDQ group reported in the quarterly reports. The table shows the information reported for each quarter as well as annual average "Number Working" (the total for the four quarters divided by four) and total annual wages. In the discussion below, we use the term "jobs" in place of "number working." The annual average number working on CDQ group projects was 173 in 1993 and 387 in 1994. The highest quarterly number working was 213 in the third quarter of 1993 and 761 in the third quarter of 1994.

Total wages for all CDQ jobs were \$2.5 million in 1993 and \$4.2 million in 1994. Total wages divided by the number working (a rough measure of average annual income per CDQ job) was \$14.5 thousand in 1993 and \$13.4 thousand in 1994.

As shown in Figure V-1, in 1994 CDQ management and administration accounted for 10 percent of 1994 jobs and 19 percent of wages. Pollock harvesting and processing accounted for 18 percent of jobs and 26 percent of wages. Salmon, herring and halibut fisheries accounted for 32 percent of jobs and 19 percent of wages. Other employment accounted for 40 percent of jobs and 36 percent of wages.

Table V-1: CDQ Employment and Wages: All CDQ Groups

Employment by Quarter	Quarter								Annual Average/Total*	
	93-1	93-2	93-3	93-4	94-1	94-2	94-3	94-4	1993	1994
Number Working										
Management/Administrative	21	23	23	28	36	41	41	43	24	40
CDQ Pollock-Related	120	44	50	67	117	53	90	24	70	71
Salmon, Herring & Halibut-Related	0	110	122	0	0	217	276	0	58	123
Other Employment	13	21	18	31	63	133	354	58	21	152
Total	154	198	213	126	216	444	761	125	173	387
Total Wages inc. Benefits (\$)										
Management/Administrative	105,730	139,670	142,871	205,235	220,500	285,516	259,052	240,748	593,506	1,005,816
CDQ Pollock-Related	647,057	132,190	245,933	316,140	682,576	168,754	351,269	152,549	1,341,320	1,355,148
Salmon, Herring & Halibut-Related	0	26,447	15,477	0	0	210,898	789,205	0	41,924	1,000,103
Other Employment	150,648	51,779	60,709	267,604	243,062	277,883	769,369	521,085	530,740	1,811,399
Total	903,435	350,086	464,990	788,979	1,146,138	943,051	2,168,895	914,382	2,507,490	5,172,466
Total Wages/Number Working										
Management/Administrative	5035	6073	6212	7330	6125	6964	6318	5599	24,990	24,989
CDQ Pollock-Related	5392	3004	4919	4719	5834	3184	3903	6356	19,094	19,087
Salmon, Herring & Halibut-Related		240	127			972	2859		723	8,114
Other Employment	11588	2466	3373	8632	3858	2089	2173	8984	25,578	11,917
Total	5866	1768	2183	6262	5306	2124	2850	7315	14,515	13,383

*Annual average number working; total annual wages. Blanks indicate that data were not available. Source: CDQ Group Quarterly Reports.

Relative Employment and Income Impacts of the CDQ Program

An overview of the relative impacts of the CDQ program may be gained by comparing employment and income generated by the CDQ program with employment and income reported by the 1990 U.S. Census on data from 1989. Note that the census measures employment at the time the census was taken (April 1990) rather than annual average employment. Thus the census employment data are not necessarily representative of annual average employment in 1989. However, the census does provide a measure of total annual income in 1989.

Relative Employment Impacts

The top two rows of Table V-2 show two different measures of employment in April 1989: total employment and "basic employment." "Basic" employment refers to employment in the following private sector basic industries:

Table V-2: CDQ Employment & Income Compared with 1989 Employment & Income Reported by 1990 U.S. Census	Total, All CDQ Groups
Employment in 1989 (from census)	6281
"Basic" employment in 1989	679
CDQ employment	
1993 average	173
1994 average	387
1993 highest quarter	213
1994 highest quarter	761
CDQ employment as % of 1989 emp.	
1993 average	3%
1994 average	6%
1993 highest quarter	3%
1994 highest quarter	12%
CDQ employment as % of "basic" emp.	
1993 average	25%
1994 average	57%
1993 highest quarter	31%
1994 highest quarter	112%
Total income in 1989 (from census)	\$219,708,878
CDQ wages	
1993 total	\$2,507,490
1994 total	\$5,172,466
CDQ wages as % of 1989	
1993 wages as % of 1989	1.1%
1994 wages as % of 1989	2.4%

Agriculture, forestry and fisheries
Mining
Construction
Manufacturing, nondurable goods
Manufacturing, durable goods

Basic industries usually produce goods or services for sale outside a region, and usually represent the foundation of a region's economy. Other industries, such as transportation, communications, trade, and services are usually considered "support" industries, in that they provide goods or services for sale within a region and are driven by income produced in the basic industries. In rural Alaska, government often provides much of the foundation that basic industries might provide in other, more developed regions.

As can be seen in Table V-2, basic employment tends to be much lower than

total employment in most CDQ regions--although the census may have understated basic employment because fishing and mining activities are concentrated during the summer months.

The middle rows of Table V-2 compare these census employment data with four measures of CDQ employment:

1993 average number employed
1994 average number employed
1993 highest quarter for number employed
1994 highest quarter for number employed

Average 1993 CDQ jobs were 3% of 1989 employment, and average 1994 CDQ jobs were 6% of 1989 employment. CDQ jobs in the highest quarter (the third quarter) of 1993 were 6% of 1989 employment, and CDQ jobs in the highest quarter (the third quarter) of 1994 were 12% of CDQ employment.

CDQ jobs were much higher as a percentage of 1989 "basic employment." For example, average CDQ jobs in 1994 were 57 percent of total "basic" employment in 1989. For some CDQ groups the CDQ program represented more than a doubling of total "basic" employment compared with that reported in the 1989 census. Put differently, although CDQ jobs appear to represent a relatively small share of *total* jobs in the CDQ region, they represent a very substantial increase in "basic" employment.

Relative Income Impacts

The bottom rows of Table V-2 compare CDQ wages with total annual income in 1989 for each of the CDQ group areas. For the CDQ region as a whole, 1993 CDQ wages and benefits represented a 1.1% increase in income compared with 1989, while 1994 CDQ wages and benefits represented a 2.4% increase in income.

Indirect Employment and Income Effects

Some of the income earned in CDQ jobs, as well as spending for supplies and services in support of CDQ projects, passes through local merchants, service providers, and others before the money "leaks" out of the region for imports. The additional employment and income generated in this way is referred to as "indirect" economic impacts. In an area such as western Alaska, where very few goods and services are provided locally, money leaks out of the region relatively quickly. For example, a 1987 report by the University of Alaska's Institute of Social and Economic Research estimated that each dollar of income generated in commercial fishing in southwest Alaska generates an additional 24 cents of income within the region.¹

It is impossible to estimate precisely the indirect employment and income impacts of the CDQ region, but it is reasonable to assume that they are smaller than the direct impacts--probably about half the magnitude or less. Nevertheless, every extra contribution to jobs and income helps, and these additional impacts of the CDQ program should not be overlooked.

¹Matthew Berman and Teresa Hull, *The Commercial Fishing Industry in Alaska's Economy*, Institute of Social and Economic Research, March 1987, page 44.

Data Sources

The CDQ employment and income data are derived from quarterly reports provided by the six CDQ groups to the Alaska Department of Community and Regional Affairs (DCRA). For each of the eight quarters in 1993 and 1994, each of the six groups has prepared a Quarterly Activity Report for DCRA. Among other information, the quarterly activity reports include summary employment tables providing information on four kinds of employment:

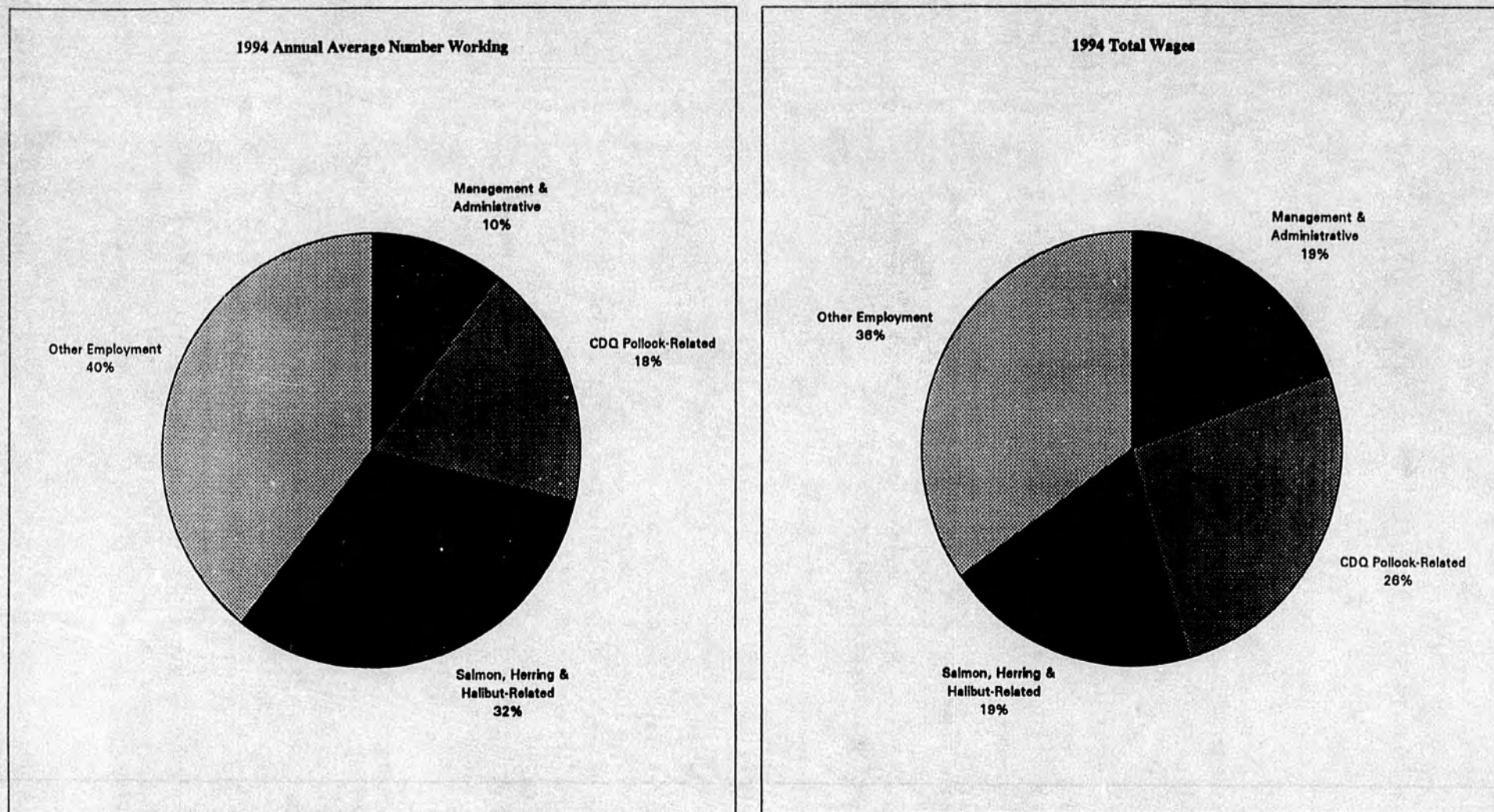
- Management/Administration Employment
- CDQ Pollock-Related Employment
- Salmon, Herring, and Halibut Fishing/Processing Employment
- Other Employment

For each of these kinds of employment, the following information is provided:

- Number of CDQ region residents working
- Total wages and benefits earned by CDQ region residents
- Total work days worked by CDQ region residents (not reported by some CDQ groups)

The data reported by the CDQ groups are not necessarily perfect for assessing the precise contribution of the CDQ program to employment and income in western Alaska. For example, some jobs are part-time or seasonal, or involve matching funds or joint ventures with non-CDQ organizations. However, the data represent the only detailed source of information on employment and income generated by the CDQ program. As long as the limitations described above are kept in mind, and it is recognized that actual employment and income impacts may be somewhat lower or higher than reported, it is reasonable to use these data to gain a general sense of the economic impacts of the CDQ program to date.

FIGURE V-1



VI. OTHER IMPACTS OF THE COMMUNITY DEVELOPMENT PROGRAM

Infrastructure Development

A major goal of many of the CDQ groups was to develop infrastructure within the region that would make possible greater participation in the fishing industry. Substantial progress has been made towards this goal. Major infrastructure projects which have been completed or are underway include:

- 1) Dock facilities in Atka, Nelson Lagoon, False Pass and Nome;
- 2) Harbor improvements in St. George and St. Paul;
- 3) Ice Delivery Systems in Savoonga and Koyuk;
- 4) Gear Storage facilities in False Pass.

Each of these infrastructure developments provide benefits to the region as a whole as well as the entire fishing industry. However, the exact economic impacts are difficult to measure at this time. Additional infrastructure is needed in many communities and there are several projects in the development stage:

- 1) Dock and small boat harbor in St. Paul
- 2) Boat ramp in Nikolski
- 3) Large dock facility in Atka
- 4) Additional buying stations in Golovin and Moses Pt.

Without additional CDQ funds from the continuation of the pollock CDQ program, the future of these projects is uncertain. The level of infrastructure development in Western Alaska is minimal, thus one of the reasons for the CDQ program. It is unreasonable to expect two years worth of activity sufficient to bring an area as large and diverse as the western coastal region up to current development standards. The gains to date represent 61% of the projects identified in the Community Development Plans as necessary to achieve the identified goals. This is remarkable given the short time frame involved.

Several other projects have been identified as necessary infrastructure for the development of even a limited fishing economy. However with the future of the pollock CDQ program unpredictable, it is difficult to draft a development strategy. A complete list of proposed infrastructure development projects was presented in chapter four.

Apart from the physical infrastructure needs of the community, equally important is the business infrastructure such as developed markets and management expertise necessary for the successful operation of a business. The Community Development Quota program has invested heavily in this type of infrastructure development through the technology transfers which exists between the CDQ groups and their industry partners.

The CDQ organizations work closely with their pollock partners in several aspects of the fishing industry. Several organizations have interns within their offices as well as providing expertise to the CDQ organizations staff and board members when needed. It is through this process that the knowledge necessary for the successful participation within the Bering Sea fishery is gained.

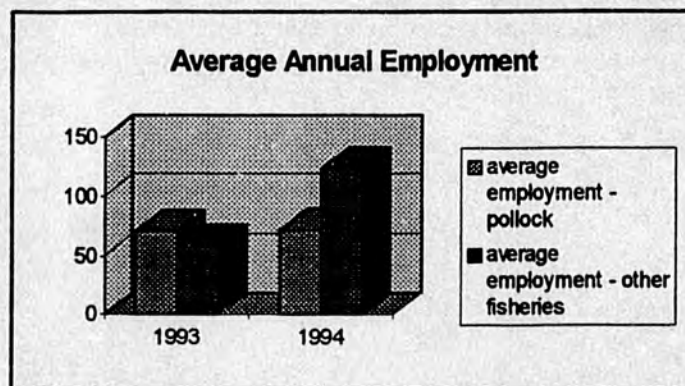
Another major contribution of the CDQ program has been the investment of resources and the assumption of risk in the development of new salmon products. Three CDQ groups and their harvesting partners have spearheaded industry efforts to produce boneless, skinless frozen salmon product forms at a time when the Alaska salmon industry needs to expand their product lines.

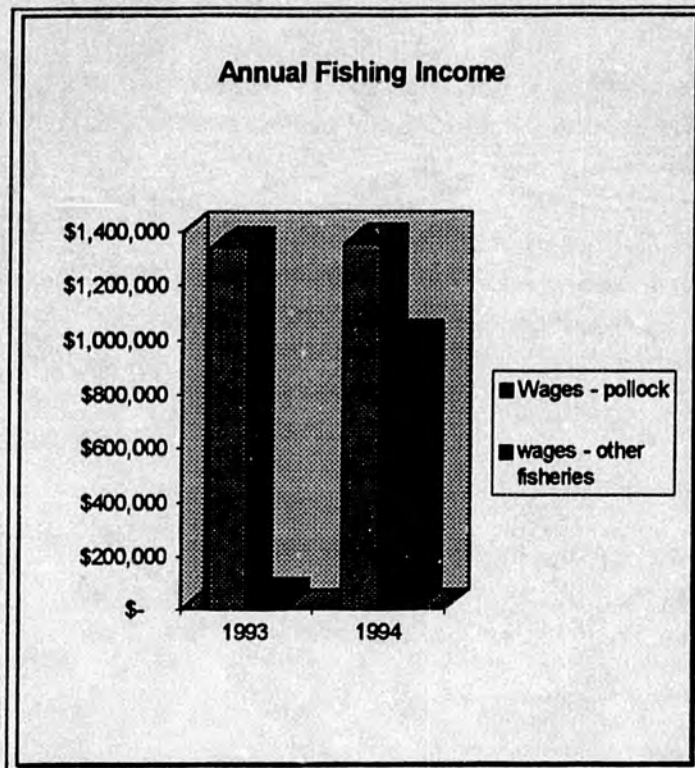
Fisheries Participation

Another major goal of the CDQ program was to provide for increased participation by western Alaska residents in the fisheries of the Bering Sea, including both the pollock fishery as well as other fisheries. Progress has been made towards this goal, but much remains to be achieved.

As discussed in chapter five, employment within the fisheries has increased dramatically for residents of western Alaska, not only on factory trawlers but on smaller vessels, and shoreside processing plants as well. Many CDQ groups have purchased interest in longliners, a factory trawler, or have begun to develop a small multi-fishery fleet. The establishment of loan programs has also facilitated increased involvement in the fisheries of the Bering Sea. Several fishermen are now able to purchase small vessels and/or gear where previously, conventional financing was not available.

The following graphs shows the level of employment and wages in the pollock and other Bering Sea fisheries:





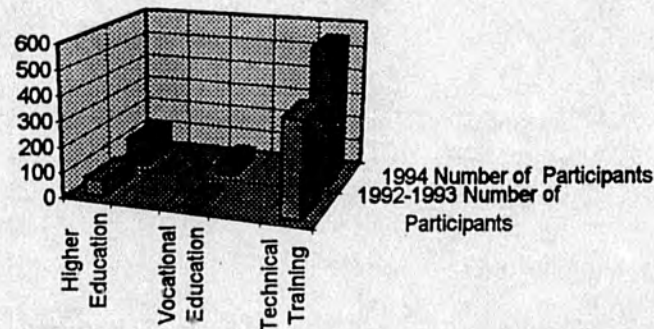
An important issue is whether future fisheries participation by western Alaska residents is dependent on continuation of the CDQ program. The State believes that most of the gains which have been made to date might be lost if the CDQ program were to end in 1995. For example, investments made by CDQ groups in fishing vessels and processing plants might not be viable if guaranteed access to pollock resources were not continued. Also, many of the projects which are in the development stage may not be completed if CDQ revenues cease.

With the exception of one, all of the CDQ groups now have access to the resources of the Bering Sea through their investments in a variety of fishing vessels. Although the investments are often limited to a minority position in a single vessel, the fact remains that the CDQ organizations are gaining entry. The amount of capital required to gain entry is enormous, and these efforts are the beginning of a localized fleet.

However, other gains are clearly permanent. For example, the small multi-fishery fleet built by the Yukon Delta Fishermen's Association participates in the halibut and sablefish, other bottom fish and crab fisheries. Their fleet operates from Norton Sound to Unalaska. The residents of the YDFDA region are quickly gaining skills that will prove useful for years to come.

Training and Education

Training and education of residents is an important goal for all of the CDQ groups and the training opportunities for the residents in the region are substantial. The chart below is indicative of the increased training opportunities to the residents of western Alaska. A total of 176 scholarship participants, 927 technical participants and 38 vocational students have benefited from the variety of educational opportunities available during the period late 1992 through Dec. 1994.



The importance of appropriate educational training at all levels cannot be overlooked. For any society to build sustainable development and improve the standard of living of their community, an educated populace is necessary. The CDQ groups provide training for their residents based not only on the needs of the individual, but the needs of the community overall.

The following table describes some the type of training and number of participant for the CDQ groups as a whole:

Table VI-1

	1992-1993 Participants	1994 Participants	Totals
Higher Education	64	112	176
Includes University and College			
Vocational Education			
Aluminum Boat Fabrication	0	18	18
Auto and Diesel Technology	0	4	4
Biomedics Electronic Technician	0	1	1
Business Management	0	8	8
Carpenter	0	1	1
Paralegal	0	2	2
Power Plant Operation	0	1	1
Seafood Industry Management	0	2	2
Travel Specialist	0	1	1
	0	38	38
Technical Training			
Processing Workers	161	44	205
Vessel Safety	49	92	141
Fishing Training	47	90	137
Computer Applications	30	151	181
Electronic Navigation	26	65	91
Equipment Operation	23	28	51
Mechanics/Welding	14	51	65
Grants Management	12	12	24
Clerical	6	15	21
EMS	5	0	5
HAZWOP	1	0	1
Baker	1	0	1
Marine Firefighting	0	1	1
Industrial Refrigeration	0	1	1
HVAC	0	2	2
	375	552	927

This table represents 1141 training opportunities for the residents of western Alaska during a twenty four month period. These training and educational opportunities

will enhance the ability of the residents to gain employment in all aspects of the fishing industry. When these numbers are compared with the figures in table II-2, which shows a total number of people unemployed in all CDQ regions of 1217, the impact of the CDQ group's training programs is enormous.

CDQ Financial Reporting

The CDQ groups are required to provide financial information on a quarterly basis and annual audited financial statements to the State of Alaska. The specific financial data for each group is confidential. Therefore, a report on the financial status of each CDQ group is not possible. However, overall the CDQ groups are taking a conservative approach in their investment decisions.

Several CDQ groups have advisory board members from the financial community who are non-voting board members. Due to the complexity of the fishing industry, these members are able to give insight from a financial perspective that may not otherwise be available.

The CDQ groups have received approximately \$53 million in royalties during the 1992-1994 period. The groups used these royalties to fund several infrastructure and product development projects, training and education programs, assist residents in gaining employment aboard factory trawlers as well as made investments in the fishing industry that will provide continued access to the Bering Sea.

Development Impacts

One of the goals of the Community Development Quota Program is to encourage "economic development" in the participating communities. An assessment of the program's success must have some way of recognizing the economic development consequences of the program. In this section we discuss what is generally accepted as the definition of economic development and suggest some ways to indicate the effect of the CDQ program on the economic development of the region.

Defining and measuring economic development is not easy. There are many potential dimensions to economic development. Development typically occurs over a period of time measured in decades rather than years, accompanied by other social, cultural and political changes. We should not expect to be able to measure progress towards "economic development" definitively after only two years. Much of the development has only been initiated through this initial infusion of capital. The CDQ program will require continued sustenance to survive its infancy.

Defining Economic Development

Definitions of economic development have evolved over time. The evolution of these definitions reflects the postwar development experience. Historically, economic development was perceived as synonymous with economic growth, and was measured in terms of the expansion of a region's output. In recent decades, however, economic development has increasingly been perceived as a process of complex structural changes in the economy and the society (Todaro, 1981).

According to currently accepted concepts of economic development, three characteristics help to define economic development in a region. First, when development occurs growth or at least expanded output becomes the norm. Put differently, short-term, one-time expansion of regional output is *not* economic development. In rural Alaska, the physical or economic exhaustion of a resource may end an economic boom, and leave a region no better off than it was prior to the boom. In contrast, economic development structure changes ensure higher levels of output which, once achieved, may be maintained or expanded.

A second characteristic of economic development is that the growth of output is shared. Regional economic development implies that the residents of the region share broadly in the gains in income created by economic growth. Regional economic development includes development of the people of the region as well as the surrounding and supporting infrastructure.

A final characteristic which is sometimes added to the definition of economic development is local control. This usually means that economic development also increases the importance of locally made economic decisions. Local residents can participate in economic growth as resource owners and entrepreneurs as well as employees.

Measuring Development Impacts of the CDQ Program

Because economic development is a complex process, it is difficult to measure. Attempting to assess the development consequences of the CDQ program is especially difficult because it has been in existence for only two years. Three questions can be asked which may serve as indicators of progress towards and potential for economic development resulting from the CDQ program.

Economic Growth *How many jobs and how much income has the CDQ program created? How do these jobs compare with the kinds of jobs which existed previously in the region?* By the simple measures of contribution to jobs and income, the CDQ program appears to be contributing to economic development. Clearly, the contribution varies between different CDQ groups. Clearly, the economic activity generated to date has not transformed the region economically--but there is no reason to expect that it

would have. But it has generated many new "basic" jobs and new income in a region where there is very little economic base other than government.

Local control: *Are local residents in control of the new economic activities which are being created in the region? Has the program worked to expand local decision making? Are there more local entrepreneurs? Are more resources locally owned?* The CDQ program provides for direct local control of a portion of the Bering Sea pollock resource--although this control is exercised in cooperation with industry partners. The additional activities being carried out using the revenues generated from the pollock resource are clearly under local control and the skills to sustain long-term economic development remain a high priority of the CDQ program.

Sustainability: *Are the benefits generated by the CDQ program sustainable? Would they continue even if the CDQ program were to end? Have the CDQ group done things which will most likely result in continue growth or at least the maintenance of higher levels of income?* Obviously some of the activities generated by the CDQ program to date would come to an end if the CDQ program were to end. However, the program has also brought about significant investment in the region's physical and human capital--investments which would continue to contribute to future growth even if the program were to end. Infrastructure projects contribute to the viability of new economic activities. Training and education programs are providing residents with skills which can be used within the region or in other places. The program is also helping to develop business and entrepreneurial skills within the region.

In sum, by all of these measures, the CDQ program is contributing towards the process of economic development within the western Alaska region. It is bringing about economic development, as measured by jobs, local control, and long-term sustainability. Another aspect that should be considered is that it provides opportunities to work where few existed before, especially during the long winters when jobs are scarce. Not everyone chooses to fish, however the hope and opportunities created are an invaluable addition to the collective self-esteem of the region's people. However, there should be no expectation that the program could or should transform the region within a few years.

FISCAL NOTE

STATE OF ALASKA
1995 LEGISLATIVE SESSION

BILL NO. HJR 23

Revision Date: _____ Dept. Affected: Fish and Game
Title: Community Development Fishing Quotas BRU: Commercial Fishing Management and De
Component: Fisheries Management
Sponsor: Rep. Austerman
Requester: House Fisheries COMPONENT SERIAL NO. 1941

Expenditures/Revenues

(Thousands of Dollars)

OPERATING EXPENDITURES	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
PERSONAL SERVICES	0.0	0.0	0.0	0.0	0.0	0.0
TRAVEL	0.0	0.0	0.0	0.0	0.0	0.0
CONTRACTUAL	0.0	0.0	0.0	0.0	0.0	0.0
SUPPLIES	0.0	0.0	0.0	0.0	0.0	0.0
EQUIPMENT	0.0	0.0	0.0	0.0	0.0	0.0
LAND & STRUCTURES	0.0	0.0	0.0	0.0	0.0	0.0
GRANTS, CLAIMS	0.0	0.0	0.0	0.0	0.0	0.0
MISCELLANEOUS	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL OPERATING	0.0	0.0	0.0	0.0	0.0	0.0

CAPITAL EXPENDITURES						
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CHANGE IN REVENUES ()						
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FUND SOURCE

(Thousands of Dollars)

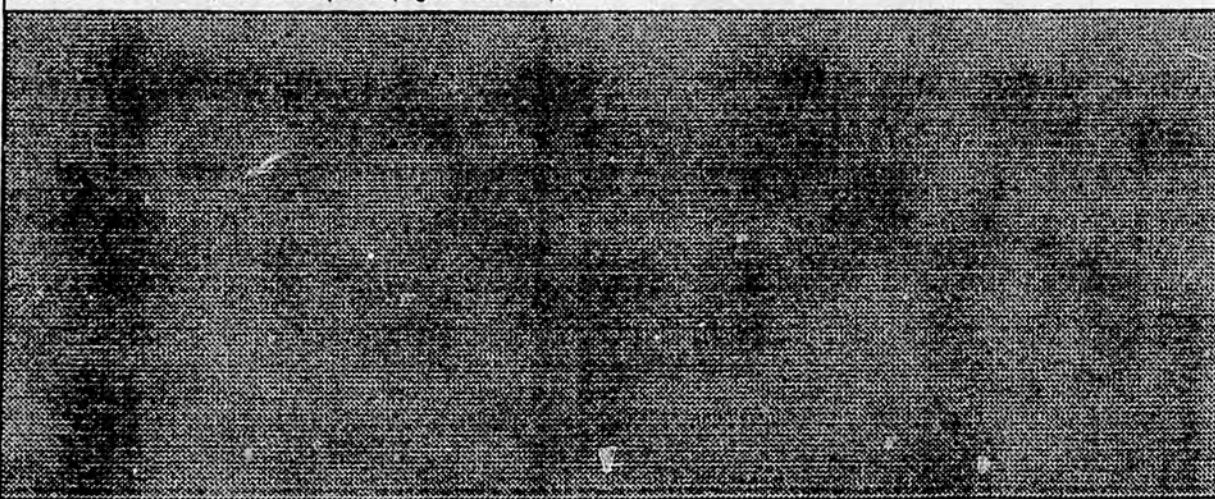
1002 Federal Receipts						
1003 GF Match						
1004 GF						
1005 GF/Program Receipts						
1006 GF/MHTIA						
Other						
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0

Estimate of any current year (FY95) cost: \$ 0.0

POSITIONS

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS: (Attach a separate page if necessary)



Prepared by: Geron Bruce GB
Division: Commissioner's Office
Approved by Commissioner: [Signature]
Agency: Fish and Game

Phone: 485-6143
Date: 2/5/95
Date: 2-6-95

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Comments of the Alaska Department of Fish and Game on HJR 23

The CDQ allocation was instituted when the North Pacific Fishery Management Council (NPFMC) approved a four-year Inshore/offshore allocation of pollock. Pollock CDQ fishing began in December 1992, but is scheduled to sunset at the end of 1995, unless the NPFMC rolls the program over for a three-year extension while they complete work on a groundfish and crab limited entry program.

A smaller, permanent CDQ program for Bering Sea halibut and sablefish was also passed by NPFMC as part of an IFQ program for those two species. Most of the CDQ halibut will be caught by local skiff fishermen beginning April 1. The halibut program also provides an example of the non-economic benefits that may be associated with CDQ programs when the resource involved is of cultural significance.

The State of Alaska is the main monitoring agency for the CDQ programs. Three departments share responsibility of ensuring the groups follow state and federal regulations. The state also is responsible for allocating portions of the CDQ quota between the established CDQ groups which represent 56 western Alaska communities historically reliant on the Bering Sea resources.

The Bering Sea groundfish and crab fisheries are extremely capital intensive-industrial fisheries. The Council has begun a program of Comprehensive Rationalization to end the open access nature of these fisheries. The main qualifying criteria being considered by the council relies on previous catch history or participation in the Bering Sea fisheries.

This criterion eliminates Western Alaskans, who have not had the opportunity to participate. CDQ communities have historically not had access to the capital necessary to participate in these industrial fisheries in their own back yard. Additionally, the quantities of fish caught and processed are immense, and the price paid per pound only becomes profitable when huge volumes are landed. Thus making it impossible for local small boat owners to have participated and gained catch history.

The inclusion of a CDQ allocation under the council's comprehensive rationalization program will (1) allow the council to move forward with limitation and reduction of the industrial sectors; and (2) provide opportunities to residents who are proximate to, and historically reliant upon the Bering Sea resources, but have been

functionally excluded from commercial participation.

To date, the six pollock CDQ groups have benefitted tremendously from the program. Harbors, docks, vessels and other facilities have been built by CDQ groups which benefit the whole Bering Sea fishing industry. Large numbers of villagers have found work on factory trawlers and processing plants. More have been trained to become fishers and are catching cod, halibut, sablefish and crab from CDQ boats. These investments in human and physical capital have already provided enormous benefits to residents of Western Alaska, but the initial emphasis on infrastructure development is not complete. When this infrastructure is harnessed to sustain long-term participation in the fisheries off Alaska, the benefits will be even greater. Therefore, CDQs should be continued and expanded to include more species.

STATE OF ALASKA

DEPARTMENT OF COMMERCE AND ECONOMIC DEVELOPMENT

DIVISION OF ECONOMIC DEVELOPMENT

TONY KNOWLES, GOVERNOR

P.O. BOX 110804
JUNEAU, ALASKA 99811-0804
PHONE: (907) 465-2017

DCED COMMENTS ON HJR 23

BACKGROUND

The pollock Community Development Quota (CDQ) program is a federal allocation of approximately 100,000 metric tons of pollock annually to 56 Alaska communities that border the Bering Sea. It was implemented in December of 1992 and is scheduled to sunset in December of 1995 unless extended by the North Pacific Fishery Management Council (Council) and approved by the Secretary of Commerce. It is worth approximately \$20 million annually in revenues generated by lease of those harvesting rights to seafood industry partners. By the time the program sunsets later this year, it will have generated more than \$80 million in payments to the region and created more than 600 jobs.

The halibut and sablefish CDQ program is also a federal allocation of fishery resource to eligible communities. That allocation was made as part of the halibut and sablefish IFQ program and will **not** sunset. It is a much smaller allocation, worth approximately \$3 million annually.

The 56 eligible communities have grouped themselves into six organizations that vary in size from one to 17 villages.

The intent of the CDQ program is to provide these remote Alaskan villages, which have historically been reliant on the fishery resources of the Bering Sea, an "entry ticket" into the capital intensive fisheries of the North Pacific. For that reason, the goal of the CDQ program is to attain economic self-sufficiency for these regions through successful investment in fishing industry businesses and infrastructure in the North Pacific seafood industry.

One of the most unique features of the CDQ program is that it fosters accomplishments of ambitious Community Development Plans (CDP) because of the competitive nature of the allocation process. These plans, which include employment, training and investment milestones are actively monitored by the state. If a group fails to meet scheduled milestones, it could hurt their ability to secure desired allocation levels during the next allocation cycle. While CDPs can be amended, good cause must be demonstrated to win approval from the state and federal government.

While this is a federal program, it is the state's responsibility to oversee its implementation and assure compliance with state and federal regulations. The state also provides assistance to CDQ participants to help facilitate the success of their projects and programs. The three agencies which share equally in the management of the CDQ program are the Department of Community and Regional Affairs (DCRA), Alaska Department of Fish & Game (ADF&G), and Department of Commerce and Economic Development (DCED). The National Marine Fisheries Service (NMFS) provides federal oversight.

DCED COMMENTS ON HJR 23
PAGE 2

Since the CDQ program was implemented, two pollock allocations and one halibut and sablefish allocation have been made. To date, all recommendations made by the state have been approved at the federal level.

PROGRAM EFFECTS

The most important work ahead of us is to extend the pollock CDQ program beyond 1995 and expand it to additional species. It has been the policy of the state that it will seek a CDQ allocation whenever a limited access scheme is proposed for any species under federal jurisdiction. That policy has been implemented as part of efforts by the state to roll-over separate onshore and offshore allocations of groundfish and to develop a Comprehensive Rationalization Plan (CRP) to change federal fishery management in the North Pacific.

Currently, extension of the CDQ program is being moved forward for consideration in four separate platforms:

1. extension of the onshore/offshore allocation program
2. the state's proposed license limitation program
3. the state's proposed phased-in quota program
4. reauthorization of the Magnuson Act

Extension of the CDQ program, as proposed in this resolution, should continue to receive high priority by the state for several reasons:

1. It uses private sector money to spur significant economic development and jobs in Western Alaska and has decreased reliance on state and federal programs.
2. All CDQ programs are developed at the local level and reflect the unique needs of these diverse communities.
3. The partnership formed between the CDQ groups and their harvesting partners has forged a transference of knowledge and expertise that is unequalled in the public sector.
4. It has provided a strong incentive for joint venture seafood investments by the CDQ groups and their partners that will increase the likelihood of successful investment participation by CDQ groups in the North Pacific seafood industry.
5. It has benefited the entire fishing industry by providing venture capital to the CDQ groups to complete port infrastructure development in the region and to help finance development of new salmon products.
6. It is the most effective way to significantly increase Alaskan ownership in the North Pacific fishing industry.

WESTERN ALASKA FISHERIES DEVELOPMENT ASSOCIATION

Coastal Villages Fishing Cooperative • Norton Sound Economic Development Corporation
Bristol Bay Economic Development Corporation • Yukon Delta Fisheries Development Association



725 Christensen Drive, Suite 5 • Anchorage, Alaska 99501 907-279-6519 Fax 907-258-6688

February 7, 1995

RECEIVED

FEB 10 1995

Ans'd.....

The Honorable Alan Austerman
Chairman – Special Committee on Fisheries
Alaska House of Representatives
State Capitol
Juneau, Alaska 99801-1182

Dear Representative Austerman:

The members of the Western Alaska Fisheries Development Association wish to thank you for your introduction of House Joint Resolution No. 23, "Relating to the Western Alaska Community Development Quota Program and the North Pacific Fishery Management Council Comprehensive Rationalization Program."

HJR 23 accurately presents all the relevant information and encourages the North Pacific Fishery Management Council to take action – the continuation of a innovative fisheries development program – that benefits the entire State of Alaska. WAFDA, comprised of four of the six regional groups that participate in CDQ program, strongly endorses this resolution.

WAFDA is an active participant in the NPFMC's ongoing efforts to develop a comprehensive rationalization plan, which would establish an allocation system for all North Pacific groundfish and shellfish species. To date, the council has included CDQ allocations for all species in its working documents for staff analysis.

Under the current CDQ program, the federal government allocates 7.5 percent of the harvestable Bering Sea pollock (approximately 100,000 metric tons annually) to economically disadvantaged communities that are located within 50 miles of the Bering Sea coast. The communities use this allocation to open up new opportunities for employment and to generate revenues for investment in job-creating fisheries development projects. The program has created over 700 jobs for western Alaskans and now comprises over 18 percent of the private sector economy in this part of the state.

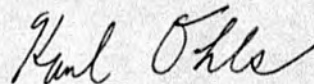
"Working in support of Alaska's Community Development Quota program"

For this reason, there is great interest in western Alaska in making pollock CDQs a permanent program and providing an opportunity for CDQs to diversify into additional Bering Sea species. These goals could be accomplished through the comprehensive rationalization plan.

HJR 23 is an affirmative statement that encourages the council, as it continues with comprehensive rationalization, to include CDQs in the final allocation plan.

Again, thank you for introducing HJR 23. We appreciate your broad outlook on fisheries issues and your initiative in supporting a program with both regional and statewide impact. Please do not hesitate to contact our office if we can provide you with more information.

Yours truly,

A handwritten signature in cursive script, appearing to read "Karl Ohls".

Karl Ohls
Executive Director



Alaska State Legislature

House of Representatives
Special Committee on Fisheries

SPONSOR STATEMENT

HJR 23 - "COMMUNITY DEVELOPMENT QUOTAS AND THE
NORTH PACIFIC FISHERIES MANAGEMENT COUNCIL
COMPREHENSIVE RATIONALIZATION PLAN"

by Rep. Alan Austerman

House Joint Resolution 23 asks the North Pacific Fishery Management Council (NPFMC) to allocate groundfish and crab to the Western Alaska Community Development Quota Groups. Options under consideration by the NPFMC for groundfish and crab allocations for CDQs include a variety of percentage variations.

Currently, the NPFMC is developing a comprehensive rationalization plan which would involve a license limitation program for groundfish and crab. This action by the Council does not abandon the Individual Fishing Quota (IFQ) option as a potential management solution in the future.

HJR 23 respectfully asks the NPFMC to equitably allocate to the CDQ groups as a vital part of the fishing economy in western Alaska. The successes of the CDQ groups to date have set an example for economic development in western Alaska. Adding groundfish and crab to their economic activities should assist the coastal communities they represent in an even greater measure and ensure measurable returns to the state.

AMENDMENT #

OFFERED IN THE HOUSE

TO: HJR 23

1 Page 2, line 13, after "area;"

2 Insert "and

3 **WHEREAS** the Congress is considering reauthorization of the Magnuson Fishery
4 Conservation and Management Act and has the opportunity during the reauthorization process
5 to permanently establish the CDQ program as part of the Magnuson Fishery Conservation and
6 Management Act;"

7 Page 2, line 17, after "prepares":

8 Insert "; and be it

9 **FURTHER RESOLVED** that the Alaska State Legislature supports inclusion of the
10 Community Development Quota program in legislation (S.39 and H.R.39) being considered by
11 the Congress to reauthorize the Magnuson Fishery Conservation and Management Act"

SCOMM

95:40

X

Alaska State Legislature

Representative Carl E. Moses

CHAIRMAN
HOUSE RULES COMMITTEE

VICE-CHAIRMAN
HOUSE SPECIAL COMMITTEE ON FISHERIES



SESSION:
STATE CAPITAL BUILDING
JUNEAU, ALASKA 99801-1182
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716 W. 4TH AVE. #630
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SPONSOR STATEMENT

House Joint Resolution 24

Relating to reduction of wanton waste in North Pacific Ocean and Bering Sea fisheries

House Joint Resolution 24 addresses an issue of immediate concern to Alaska and its commercial fishing industry. In an August 1994 report prepared for the Alaska Department of Fish & Game by Pacific Associates, the wanton waste of fishery resources in the North Pacific Ocean and Bering Sea was documented.

HJR 24 complements the efforts of Alaska's congressional delegation. Senator Frank Murkowski proposed a resolution to the United Nations General Assembly calling on all the nations of the world to address the issue of commercial bycatch and discards in 1995. The resolution puts the United Nations on record as believing the issue warrants serious attention in the international community and that a continued response is needed to ensure long-term sustainable development of fisheries.

Discards of either dead or live fishery resources occur in the North Pacific Ocean and Bering Sea fisheries for three basis reasons: economics, management policies and fishing practices. Discards sometimes occur because of the economic loss associated with processing the entire harvest. When species of little or no value are harvested along with the target species, there is no real economic incentive to discourage discarding.

Management induced discards occur for several reasons. There are federal regulations that prohibit fishermen utilizing certain gear types from retaining certain species. The fact that the fish may be dead or alive does not matter. This is called *prohibited species* catch. Groundfish fisheries in the North Pacific are managed by an open-access method with species quotas. Fishermen are interested in targeting their particular species as rigorously as possible before the allotted quota is reached. This method also lends itself to waste through discards of non-target species.

ADAK • AKUTAN • AMCHITKA • ATKA • ATTU • BELKOFSKI • CHERNOFSKI • CHIGNIK • CHIGNIK LAGOON • CHIGNIK LAKE • COLD BAY • DUTCH HARBOR
EGEGIK • FALSE PASS • IGIUGIG • ILIAMNA • IVANOF BAY • KING COVE • KING SALMON • KOKHANOK • KOKHANOK BAY • LEVELOCK • NAKNEK
NELSON LAGOON • NEWHALEN • NIKOLSKI • NONDALTON • PEDRO BAY • PERRYVILLE • PILOT POINT • PORT ALSWORTH • PORT HEIDEN • PORT MOLLER
SAND POINT • SHEMA • SQUAW HARBOR • SOUTH NAKNEK • ST. GEORGE ISLAND • ST. PAUL ISLAND • UGASHIK • UNALASKA • UNGA

Fishing practices' discards may be the result of direct action by fishermen or through a combination of management requirements and fishing practices. Some fishermen "prospect" for a closed-fishery species while targeting another species. Because they will harvest prohibited species while doing this, there is mortality associated with the non-targeted species. Technical modifications to gear to make it "legal" (e.g., modifying on-bottom trawl gear to mid-water trawl) can cause increased bycatch mortality.

HJR 24 respectfully urges Congress to either amend the Magnuson Fishery Management and Conservation Act, or to enact other legislation, to address the waste of fishery resources. It also recommends harvest priority incentives for clean fishing practices to reduce wanton waste in the Bering Sea and North Pacific Ocean fisheries.

ALASKA SPORTFISHING ASSOCIATION
P.O. BOX 241847
ANCHORAGE, AK 99524

RECEIVED
FEB 08 1995
Ans'd.....

Dear Representative Austerman and Members of the Fisheries Committee

We were pleased to learn of House Joint Resolution 24 and want to extend our appreciation to the sponsors of HJR 24. This resolution echoes the feelings of responsible fishermen who detest the wanton waste of our fisheries resource by some of the fishers in the North Pacific and Bearing Sea fisheries. The current fisheries practices are unacceptable to say the least.

Although the general public is slowly being made painfully aware of the wasteful practices occurring off our shores, in front of the rule makers, their voices are most often muted by the special interests who handsomely profit from these practices. We applaud the Legislature's action in making its loud voice heard on this issue.

The Alaska Sportfishing Association, thanks you for acting on this critical issue.

Phil Cutler, President

FISCAL NOTE

STATE OF ALASKA
1995 LEGISLATIVE SESSION

BILL NO. HJR 24

Revision Date:	Dept. Affected: <u>Fish and Game</u>
Title: <u>Waste in Pacific and Bering Sea Fishery</u>	BRU: <u>CFMD</u>
Sponsor: <u>Representative Moses</u>	Component: <u>Fisheries Management</u>
Requester: <u>House Fisheries</u>	COMPONENT SERIAL NO. <u>1941</u>

Expenditures/Revenues (Thousands of Dollars)

OPERATING EXPENDITURES	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
PERSONAL SERVICES	0.0	0.0	0.0	0.0	0.0	0.0
TRAVEL	0.0	0.0	0.0	0.0	0.0	0.0
CONTRACTUAL	0.0	0.0	0.0	0.0	0.0	0.0
SUPPLIES	0.0	0.0	0.0	0.0	0.0	0.0
EQUIPMENT	0.0	0.0	0.0	0.0	0.0	0.0
LAND & STRUCTURES	0.0	0.0	0.0	0.0	0.0	0.0
GRANTS, CLAIMS	0.0	0.0	0.0	0.0	0.0	0.0
MISCELLANEOUS	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL OPERATING	0.0	0.0	0.0	0.0	0.0	0.0

CAPITAL EXPENDITURES						
----------------------	--	--	--	--	--	--

CHANGE IN REVENUES ()						
------------------------	--	--	--	--	--	--

FUND SOURCE (Thousands of Dollars)

1002 Federal Receipts						
1003 GF Match						
1004 GF						
1005 GF/Program Receipts						
1006 GF/MHTIA						
Other						
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0

Estimate of any current year (FY95) cost: \$ 0.0

POSITIONS

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS: (Attach a separate page if necessary)

Prepared by: <u>Geron Bruce GB</u>	Phone: <u>465-6143</u>
Division: <u>Commissioner's Office</u>	Date: <u>4/27/95</u>
Approved by Commissioner: <u>Frank Rue Geron Bruce for</u>	Date: <u>4/27/95</u>
Agency: <u>Fish and Game</u>	

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For further distribution information, call the Governor's Legislative Office

FISCAL NOTE

REQUEST:

Revision Date: _____ Affected Agency: _____

Title: Relating to reduction of wanton waste in North Pacific Ocean and Bering Sea fisheries. BRU: _____

Sponsor: Representative Moses Components: _____

Requestor: House Special Committee on Fisheries _____

EXPENDITURES/REVENUES: (THOUSANDS OF DOLLARS)

OPERATING	FY 96	FY 97	FY 98	FY 99	FY 2000	FY 2001
Personal Services						
Travel						
Contractual						
Supplies						
Equipment						
Land & Structures						
Grants, Claims						
Miscellaneous						
TOTAL OPERATING	0					

CAPITAL	0					
---------	---	--	--	--	--	--

REVENUE	0					
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FUNDING: (THOUSANDS OF DOLLARS)

General Fund						
Federal Fund						
Other						
TOTAL	0					

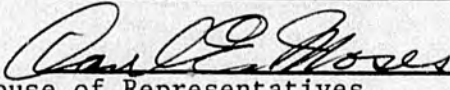
POSITIONS:

Full-Time						
Part-Time						
Temporary						

Estimated FY 95 Impact: 0

ANALYSIS: (ATTACH A SEPARATE PAGE IF NECESSARY)

Prepared By: Cheryl Sutton, Legislative Aide Date: 2/7/95
Division: Legislative/House Rules Committee Phone: 465-6848

Approved By:  Date: 2/7/95
Agency: House of Representatives

DISTRIBUTION (BY PREPARER
LEGISLATIVE FINANCE
LEGISLATIVE SPONSOR

REQUESTOR
OFFICE OF MANAGEMENT AND BUDGET
AGENCY(IES)

CS FOR HOUSE JOINT RESOLUTION NO. 24(FSH)
IN THE LEGISLATURE OF THE STATE OF ALASKA
NINETEENTH LEGISLATURE - FIRST SESSION

BY THE HOUSE SPECIAL COMMITTEE ON FISHERIES

Offered:

Referred:

Sponsor(s): REPRESENTATIVES MOSES, Austerman, Finkelstein

A RESOLUTION

1 **Relating to reduction of wanton waste in North Pacific Ocean and Bering Sea**
2 **fisheries.**

3 **BE IT RESOLVED BY THE LEGISLATURE OF THE STATE OF ALASKA:**

4 **WHEREAS** more fish were discarded in the federally managed fisheries of the North
5 Pacific Ocean than were landed by American fishermen in the North Atlantic Ocean in 1992;
6 and

7 **WHEREAS**, in 1994, 25,881,596 kilograms of halibut and 1,866,272 kilograms of
8 herring were discarded by fisheries in the North Pacific Ocean and the Bering Sea; and

9 **WHEREAS**, in 1994, 15,459,253 crab were discarded by fisheries in the North Pacific
10 Ocean and the Bering Sea; and

11 **WHEREAS**, in 1994, 195,609 salmon were harvested in groundfish fisheries of the
12 North Pacific Ocean and the Bering Sea; and

13 **WHEREAS** these discarded herring, crab, and salmon are resources managed by the
14 State of Alaska that were intercepted in offshore federal waters; and

15 **WHEREAS** these resources are the economic and cultural lifeblood for many Alaskans
16 who depend on the sea for their livelihoods and subsistence; and

1 **WHEREAS** marine wildlife species in Alaska marine waters that depend on fish for
2 food are faced with declining populations and a potential listing as endangered species; and

3 **WHEREAS** this continued wanton waste undermines any long-term management
4 strategy for sustained commercial, subsistence, and recreational fisheries, and places the rural
5 communities of Alaska at risk; and

6 **WHEREAS** efforts to implement severe penalties against vessels responsible for high
7 bycatch and discard rates have failed; and

8 **WHEREAS** minimizing the catch of undersized fish and reducing wanton waste will
9 conserve fisheries resources for present and future generations of subsistence users,
10 commercial and recreational fishermen, seafood industries, coastal communities, consumers,
11 and the nation; and

12 **WHEREAS** fisheries can technically or operationally reduce waste and the incidental
13 taking of nontarget species if given economic incentives or if appropriate regulatory measures
14 are applied;

15 **BE IT RESOLVED** by the Alaska State Legislature that the wanton waste now
16 occurring in federal fisheries of the North Pacific Ocean and the Bering Sea is of utmost
17 ecological, social, and economical importance; and be it

18 **FURTHER RESOLVED** that the Alaska State Legislature respectfully urges the
19 Congress to amend the Magnuson Fishery Conservation and Management Act, or to enact
20 other legislation, encompassing a broad range of measures to reduce wanton waste in North
21 Pacific Ocean and Bering Sea fisheries, including harvest priority incentives for clean fishing
22 practices and other management tools.

23 **COPIES** of this resolution shall be sent to the Honorable Al Gore, Jr., Vice-President
24 of the United States and President of the U.S. Senate; the Honorable Newt Gingrich, Speaker
25 of the U.S. House of Representatives; the Honorable Strom Thurmond, President Pro Tempore
26 of the U.S. Senate; the Honorable Bob Dole, Majority Leader of the U.S. Senate; the
27 Honorable Ron Brown, Secretary of the U.S. Department of Commerce; the Honorable
28 Richard B. Lauber, chair of the North Pacific Fishery Management Council; and to the
29 Honorable Ted Stevens and the Honorable Frank Murkowski, U.S. Senators, and the
30 Honorable Don Young, U.S. Representative, members of the Alaska delegation in Congress.

NEWS



U.S. SENATOR

**FRANK
MURKOWSKI**

OF ALASKA

For Immediate Release
December 20, 1994

Contact: Chuck Kleeschulte or Cindi Bookout
O(202) 224-9306; H 301/283-4149 O 224-8767

**MURKOWSKI: U.N. APPROVES MURKOWSKI RESOLUTION; WILL
ADDRESS BYCATCH ISSUES IN FALL GENERAL ASSEMBLY**

WASHINGTON -- The United Nations General Assembly has unanimously approved a United States resolution calling on all the nations of the world next year to take up the issue of commercial fisheries bycatch and discards.

The resolution, proposed by Alaska Sen. Frank Murkowski, R, is designed bring international attention to the issue and build political support for ongoing efforts to address it. The resolution passed the U.N. as the body moves to wrap up its 49th General Assembly business prior to the Christmas holidays.

"This puts the issue of bycatch and discard out before the international community where it can no longer be ducked by those who would prefer to avoid talking about uncomfortable facts," said Murkowski. "We don't want to undermine the international efforts already underway, but we want the political side to realize what the conservation community already knows: this issue must be addressed head-on."

Murkowski, who is one of two delegates to the United Nations from the U.S. Congress for this 49th session of the General Assembly, presented an initial draft of the resolution to U.S. Ambassador to the U.N. Madeleine Albright and asked for her rapid support during a meeting in New York Nov. 28.

Murkowski said the resolution was needed to ensure that the international community is fully aware of the bycatch and discard issue, which is of great concern to scientists around the world.

The United Nations Committee on Environment and Sustainable Development last week gave unanimous approval to the resolution calling on the international community to consider the issue of global fishery bycatch and discard during next year's fall session of the United Nations. By pressing for action in this year's session, Murkowski shaved

Murkowski: U.N. Adopts Bycatch Resolution**December 20, 1994**

as much as a year off the time when the full U.N. could take up the issue.

According to Murkowski, a recent report by the United Nations Food and Agriculture Organization, based in Rome, indicates that the total amount of fishery discards -- fish caught, but for various reasons not retained for processing -- is far larger than previously thought. The report estimates global discards at approximately 27 million metric tons per year. When added to global landings of 83 million metric tons, that means ocean harvesting may exceed the ocean's ability to produce a sustainable yield by ten million metric tons or more annually.

"This is extremely serious," said Murkowski. "The ocean is not limitless, and it is urgent that we undertake the research needed both to define the problem in accurate, scientific terms, and to make it possible to make better use of the resources we are harvesting. In a world where food is a major concern to millions of people and hundreds of nations, we cannot continue to harvest only the most profitable and throw away everything else. Even if only 25 percent of the discards are edible, that is still enough food to supply a quarter of the world's population with almost 50 protein-rich meals -- far in excess of what is currently available to many."

The resolution as approved notes that progress on bycatch and discard issues is already being made by a number of international organizations, but stresses that, "improvements in monitoring and assessing bycatch and discards and improving bycatch reduction techniques continue to be necessary."

The resolution puts the United Nations on record as believing the issue warrants serious attention in the international community, and that a continued response is needed to ensure long-term sustainable development of fisheries.

LEGI-SLATE Report for the 103rd Congress Wed, December 15, 1993 7:41pm (EST)
BILL TEXT Report for S.1756

As introduced in the Senate, November 20, 1993

S.1756 As introduced in the Senate, November 20, 1993

103d CONGRESS

1st Session

S. 1756

To encourage the optimum utilization of fisheries resources, to reduce waste
in commercial fish harvesting and processing, and for other purposes.

IN THE SENATE OF THE UNITED STATES

November 20 (legislative day, November 2), 1993

Mr. Murkowski introduced the following bill; which was read twice and
referred to the Committee on Commerce, Science, and Transportation

A BILL

To encourage the optimum utilization of fisheries resources, to reduce waste
in commercial fish harvesting and processing, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United
States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Commercial Fisheries Waste Reduction Act of
1993".

SEC. 2. FINDINGS.

The Congress finds that:

(1) Current commercial fisheries practices in the United States and
world wide contribute to a significant waste of edible food resources
which are harvested, but discarded without processing for human
consumption or other uses.

(2) Fish currently harvested but discarded without processing include
in some fisheries large numbers of juvenile fish which would have
significantly greater value both as an economic asset to the fishery and
to the maintenance of the species if they were allowed to reach maturity
before harvesting.

(3) Fish currently harvested but discarded without processing include

in some commercial fisheries significant numbers of adult fish or fish parts which could be processed for human consumption, but which are required to be discarded for various fisheries management purposes, or which are considered unsuitable for a particular market of immediate interest to the fishing vessel operator.

(4) Fish currently harvested but discarded without processing include significant numbers of fish of species for which there is presently no viable market, but which, if they remained unharvested, could form the basis for future fisheries as new markets and processing techniques are developed.

(5) There is cause for concern that current levels of mortalities among non-target fish species may have adverse environmental consequences.

(6) High discard levels, if concentrated geographically, may cause damage to the productivity of the resources using the ocean bottom and near-bottom areas.

(7) The current level of scientific knowledge is insufficient to determine if adverse impacts may result from the removal of nutrients presently returned to the ocean through the discard of non-target fish species and of unutilized portions of targeted species.

(8) It is in the national interest both environmentally and economically to minimize mortalities among non-target species taken incidentally to the various directed fisheries.

(9) It is in the national interest to encourage the utilization where practicable of all parts of fish harvested in directed fisheries for the species.

SEC. 3. AMENDMENTS TO MAGNUSON ACT.

The Fisheries Conservation and Management Act (16 U.S.C. 1801 et. seq.) is amended--

(1) in subsection 1801(b)(4) by inserting "in a non-wasteful manner and" after "maintain,";

(2) in subsection 1801(b)(6) by inserting "in a non-wasteful manner" after "such development";

(3) in subsection 1802(21)(B) by inserting ", including efforts to limit mortality in non-target species for the purposes of resource conservation and food production" after "ecological factor";

(4) in section 1802 by adding at the end the following new paragraph:

"(33) The term 'non-target species' means fish caught incidentally to fishing for a particular species or group of species and which may or may not be retained aboard the fishing vessel for subsequent processing and/or sale.";

(5) in section 1851(a)(1) by adding "and encourage the minimization of mortalities among non-target species" after "prevent overfishing";

(6) in section 1851(a)(5) by striking the word "promote" and inserting in its place the word "consider";

(7) in section 1851(a) by adding at the end the following new paragraph:

"(8) Conservation and management measures shall encourage the non-wasteful taking of fishery resources, including the reduction of discards of fish and fish parts, and the minimization of mortalities among non-target species.";

(8) in section 1853(a) by redesignating paragraph (4) as paragraph (6) and renumbering the subsequent paragraphs accordingly; and by inserting the following new paragraphs:

"(4) assess and specify--

"(A) to the maximum extent practicable an estimate by numbers of fish or weight thereof of the extent of anticipated mortalities among non-target species taken incidentally to the fishery or fisheries for which the plan is prepared, and

"(B) to the maximum extent practicable, an estimate by numbers of fish or weight thereof of anticipated discard levels of fish and fish parts taken pursuant to the fishery, but not utilized;

"(5) contain a description of measures intended to reduce mortalities among non-target species taken incidentally to the fishery or fisheries for which the plan is prepared, and to encourage the use of target species in a manner which minimizes the discard of fish and fish parts;" and

(9) in section 1853 by adding at the end the following new subsection:

"(g) Required Amendment of Management Plans.--Each council shall--

"(1) within one year from the date of enactment of this subsection, submit to the Secretary such amendments for each management plan under its jurisdiction as are needed to comply with subsections (a)(4) and (5)

of this section; and

"(2) thereafter submit annually to the Secretary a report identifying any changes to the estimates and descriptions required in subsection (a) (4) and (5) and in paragraph (1) of this subsection, and providing an explanation of the cause or causes of such changes."

Press ENTER to return to MAIN MENU:

NPFMC studies programs aimed at reducing waste

By JOHN PFEIFER
Special to the Mirror

After years of struggling with the thorny issue of bycatch, the North Pacific Fishery Management Council (NPFMC) last week ordered a study of two pilot programs designed to explore ways of reducing the amount of fish discarded in Alaskan waters.

Pressure has been increasing in recent years for the industry to do something about the problem.

National environmental groups have even gotten into the act, lobbying both the council and Congress to clamp down on waste.

"Many people in coastal communities throughout Alaska are alarmed and outraged by the figures for bycatch, up 50 percent from 1992 to 1993, to 740 million pounds," said Fran Bennis, of the Alaska Marine Conservation Council.

The NPFMC has already implemented at least one program designed to reduce bycatch. The Vessel Incentive Program (VIP), which began in 1991, was intended to punish vessels with the highest discard rates. However, enforcement problems slowed the program to a virtual halt.

As first envisioned, VIP was to have provided "real-time" punishment of fishermen with high discard rates by forcing them to sit out a portion of the season.

However, the program ran afoul of the U.S. Constitution, which guarantees everyone the right to due process, or — in other words — the right to have their day in court.

Instead of assessing real-time penalties, NMFS was forced to prosecute violators. The first case didn't reach the courts until the summer of 1994.

Now, the council is focusing its attention on other approaches.

One is called "harvest priority." It is a program designed to

change fishermen's behavior before the season even begins.

A harvest priority program would encourage fishermen to reduce their catch of unwanted species by allowing those who met certain bycatch standards to participate in a reserve fishery, held after the regular season.

The trouble is, it may also have some of the same problems with due process that the VIP program did. Fishermen who are not rewarded with the chance to participate in a second season, might also want their day in court.

The other approach being examined by the council is called full retention/full utilization.

"It would require fishermen to retain at least a percentage of the unwanted species they catch. A certain portion of those fish would also have to be utilized, i.e., processed for human consumption."

During more than five hours of discussion, council members heard a wide range of ideas.

Environmental groups tended to favor harvest priority because it would deal with the problem up front, reducing the catch of unwanted species before it occurred.

They also said a harvest priority system would be less onerous to small-boat fishermen, who might have trouble complying with a full retention requirement.

Several crab fishermen who testified placed most of the blame on the trawl industry and said it was high time for them to clean up their act.

"Salmon fishermen are standing on the beach. One hundred thousand or 400,000 fish — I hear all kinds of numbers — are being thrown over the side as bycatch," said Nancy Hillstrand, co-owner of an Alaskan crab boat.

"Crab fishermen are standing on the beach. Twenty million

animals are being thrown overboard.

"What does this show to the rest of the world, when there's no fishing now on the Georges Banks, no fisheries on the North Sea, and down in Oregon and Washington they've been cut way back," she said.

"Full utilization, I don't think so. I think full utilization would just give them a license to continue this bycatch kill," Hillstrand said.

Tom Casey, who represents 13 crab fishermen, suggested the council could easily deal with the problem of discards — at least in the Pacific cod fishery — if it simply outlawed trawl gear.

Casey said the discard rate for trawlers targeting Pacific cod in the Gulf of Alaska is 18 percent. The discard rate for pot fishermen, however, is less than 2 percent.

"I want to convince you that codfish should not be caught with trawls," Casey said.

"They're too valuable. They're not pollock in disguise, they're king salmon in disguise. We could be the codfish capital of the world if we treated codfish better," Casey said.

Paul MacGregor, representing the American Factory Trawler Association, took issue with the repeated characterization of trawlers as bad guys.

"I think it's time for everybody to recognize that bycatch and discard is a prevalent and pervasive problem in every fishery under our jurisdiction, whether it be trawlers or pot fishermen or longliners," MacGregor said.

"All God's children got bycatch."

MacGregor also preferred a more market-driven approach. He suggested the council reserve a certain portion of the bycatch, or PSC, for industry pools. Those industry pools would be responsible for policing them-

selves, and could only continue fishing until they exhausted their supply of bycatch.

"Fishermen would be able to select whether they wanted to operate in the open access pool and be subject to the normal regulations, or they could select to fish in the industry pool and be subject to the internal rules that the industry group had adopted. You'd have a contractual arrangement between the fishermen in that pool," MacGregor said.

After listening to several hours of testimony from all corners of the fishing industry, the council decided to examine two pilot programs incorporating aspects of both harvest priority and full retention/utilization.

One program, proposed by the Alaska Department of Fish and Game (ADF&G), would zero in on the Bering Sea-Aleutian Island rock sole and mid-water pollock fisheries.

The other, a more specific plan recommended by Cold Sea International, Inc., deals with the rock sole fishery alone.

The rock sole fishery — primarily a roe fishery — is one of the "dirtiest" in Alaskan waters.

Data collected by the National Marine Fisheries Service (NMFS) during 1994, showed that trawlers fishing in the Bering Sea and Aleutian Islands retained just 31 percent of what they caught. The rest, almost 70 percent, was thrown back over the side.

The mid-water pollock fishery, on the other hand, is one of the cleanest. NMFS records show the trawl discard rate in that fishery to be less than 3 percent.

ADF&G's proposal assumes that some sort of retention and utilization standards would be set for both fisheries.

Those standards would either be adopted all at once, or phased in over a 3-year period. A cer-

tain percentage of the targeted bycatch would have to be processed, possibly into a form suitable for human consumption.

The proposal submitted by Cold Sea International is much more specific.

It outlines a plan that incorporates aspects of both the harvest priority system and full retention/utilization.

The Cold Sea program would divide the Bering Sea-Aleutian Island rock sole fishery into two seasons, one starting in January and the other in August.

A certain percentage of the Total Acceptable Catch (TAC) would be allocated for each season, as would a certain amount of the bycatch.

Fishermen would be required to retain a certain portion of their catch during both seasons.

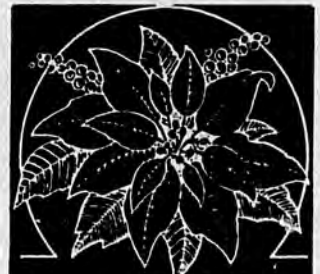
For discussion, Cold Sea suggests 60 percent retention during the "A" season and 75 percent retention during the "B" season.

Only those boats that met the retention standards during the "A" season would be rewarded by being allowed to fish during the "B" season.

NPFMC and NMFS staff will begin analyzing both the ADF&G and Cold Sea proposals during the next few months.

In April, they will report the results of their investigation to the council.

At that time, the council will decide which plan, or combination of plans, it wants to pursue.



New Holiday

FAX SHEET

TO: Amy
Fax #: 465-4956

FROM: Phyllis Furness
Phone #: 907-586-7228
Fax #: 907-586-7465

RE: 1994 bycatch of
prohibited species.

The halibut column is
in kilograms

The mortality column
is actual halibut
mortality in metric
tons. * dead halibut

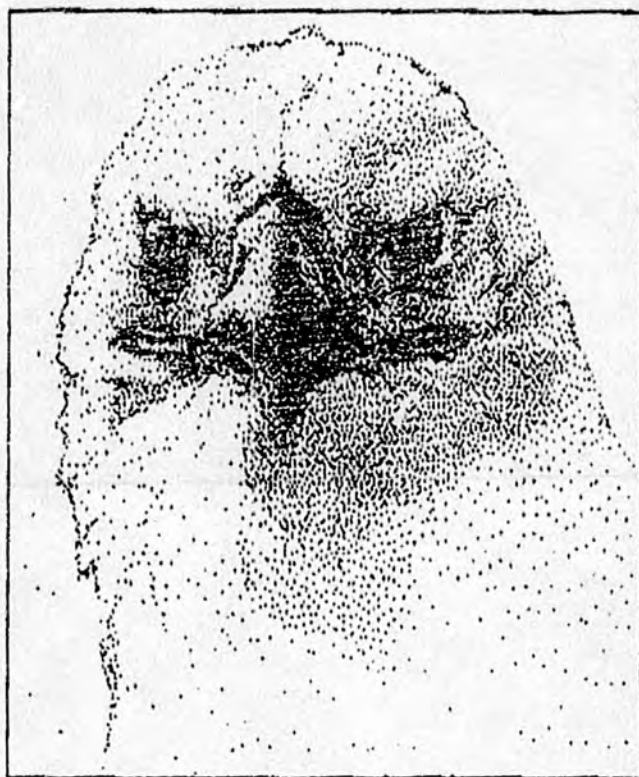
Herring is in kg

Crab includes:

Bairdi, red king,

Opilio tanner, oking (other king crab) These are 5

Salmon includes - chinook + other sal + are in #'s
This data comes from observer reports +
is organized by the Gulf of AK + Bering
Sea and Aleutian Islands.



1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729

200

HALIBUT	MORTALIT	BAIRDI	RED_KING	CHINOO	OTHER_SA	HERRING	OPILIO TA	OKING
14,057,939	4,919	2,544,982	281,023	44,544	96,470	1,765,220	12,482,127	77,138

1994 GULF OF ALASKA

Page: 1

	HALIBUT	MORTALI	BAIRDI	RED_KING	CHINOO	OTHER_SA	HERRING	OPILJOTA	OKING
1	11,823,657	3,348	52,228	69	13,978	40,617	101,052	13,494	6,192

SCOMM

95:41

FISCAL NOTE

STATE OF ALASKA
1995 LEGISLATIVE SESSION

BILL NO. SSHJR 25

Revision Date: _____ Dept. Affected: Fish and Game
Title: Ban trawling in eastern Gulf of Alaska BRU: CFMD
Component: Fisheries Management
Sponsor: Rep. Grussendorf
Requester: House Fisheries Component Serial No. 1941

Expenditures/Revenues (Thousands of Dollars)

OPERATING EXPENDITURES	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
PERSONAL SERVICES	0.0	0.0	0.0	0.0	0.0	0.0
TRAVEL	0.0	0.0	0.0	0.0	0.0	0.0
CONTRACTUAL	0.0	0.0	0.0	0.0	0.0	0.0
SUPPLIES	0.0	0.0	0.0	0.0	0.0	0.0
EQUIPMENT	0.0	0.0	0.0	0.0	0.0	0.0
LAND & STRUCTURES	0.0	0.0	0.0	0.0	0.0	0.0
GRANTS, CLAIMS	0.0	0.0	0.0	0.0	0.0	0.0
MISCELLANEOUS	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL OPERATING	0.0	0.0	0.0	0.0	0.0	0.0

CAPITAL EXPENDITURES						
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CHANGE IN REVENUES ()						
------------------------	--	--	--	--	--	--

FUND SOURCE (Thousands of Dollars)

1002 Federal Receipts						
1003 GF Match						
1004 GF						
1005 GF/Program Receipts						
1006 GF/MHTIA						
Other						
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0

Estimate of any current year (FY95) cost: \$ 0.0

POSITIONS

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS: (Attach a separate page if necessary)

Prepared by: Geron Bruce Geison Phone: 465-6143
Division: Commissioner's Office Date: 2/28/95
Approved by Commissioner: [Signature] Date: 2/28/95
Agency: _____

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HOUSE COMMITTEE REPORT

(5)

Date Referred: February 20, 1995

FURTHER REFERRALS:

Resources

Date of Committee Action: 3/1/95

The HOUSE SPECIAL COMMITTEE ON FISHERIES Committee considered:

SSHJR 25

SPONSOR SUBSTITUTE FOR HOUSE JOINT RESOLUTION NO. 25

BAN TRAWLING IN EASTERN GULF OF ALASKA

Relating to a ban on trawling in the eastern Gulf of Alaska east of 140 degrees west longitude.

recommends it be replaced with the following committee substitute _____ [] the same title [] a new title

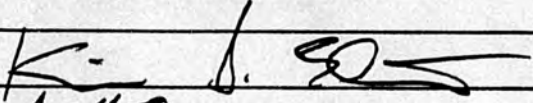
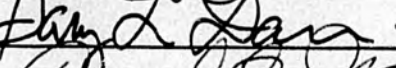
[] additional referral to _____ Committee
[] attached amendment(s)

ADOPTS: _____ Letter of Intent

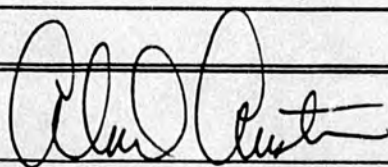
ATTACHES NEW FISCAL NOTE(S): (Dept) APPROVES PREVIOUS: (Dept/Date)

[] fiscal note(s) _____ [] fiscal note(s) _____

[X] zero fiscal note(s) ADFG [] zero fiscal note(s) _____

SIGNING WITH RECOMMENDATIONS	DP	DNP	NR	AM
	✓			
			✓	
			✓	
			✓	
	✓			

CHAIR'S SIGNATURE



3/1/95

REPRESENTATIVE
BEN GRUSSENDORF
1221 HALIBUT POINT ROAD
SITKA, ALASKA 99835
(907) 747-8458

FINANCE COMMITTEE

DISTRICT 2
KUPREANOF
PETERSBURG
SITKA
WRANGELL

Alaska State Legislature



WHILE IN JUNEAU
STATE CAPITOL
JUNEAU, ALASKA 99801-1182
(907) 485-3824

House of Representatives SPONSOR STATEMENT

SPONSOR SUBSTITUTE FOR HOUSE JOINT RESOLUTION 25

"Relating to a ban on trawling in the eastern Gulf of Alaska east of 140 degrees west longitude."

Southeast Alaska has a unique marine environment. The delicate marine environment differs from northern areas. It is extremely vulnerable to long term damage to the habitat of the bottom. Southeast Alaska also has a long history of longline fishing offshore. This economy is threatened by the activities of the factory trawlers. The species affected by the trawlers are fully allocated.

Southeast's marine environment has provided longline fishers the opportunity to make a living for over a century. Targeted species of halibut, sablefish, shelf rockfish and cod are caught on longlines with little damage, if any, to the bottom of the Pacific shelf. Most of the longline vessels are small. In many small towns commercial fishing is the only commercial opportunity.

I have introduced this resolution at the request of the Alaska Longline Fisherman's Association. I believe it is a good compromise with the trawl fleet and protects a generously productive marine environment from harm. It also will protect an industry that is for the most part locally owned and operated and which provides great returns to the communities and the economies of those communities.

I respectfully request your support.

Alaska State Legislature

REPRESENTATIVE
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1221 HALIBUT POINT ROAD
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FINANCE COMMITTEE

DISTRICT 2
KUPREANOF
PETERSBURG
SITKA
WRANGELL



WHILE IN JUNEAU
STATE CAPITOL
JUNEAU, ALASKA 99801-1182
(907) 465-3824

House of Representatives

TO: Representative Alan Austerman
Chairman
House Special Committee on Fisheries

FROM: Representative Ben Grussendorf

DATE: February 20, 1995

RE: SSHJR 25, "Relating to a ban on trawling in the eastern Gulf of Alaska east of 140 degrees west longitude."

I have introduced SSHJR 25 in response to concerns expressed by Southeast fishermen for the devastating impacts of trawl fisheries on the condition of the rockfish stock and on the delicate habitat on the bottom of Southeast Alaska waters. The level of trawl fishing effort in the eastern Gulf of Alaska is expected to increase, resulting in depressed populations of several species of rockfish and damage to the fragile deep water habitat in Southeast.

The sponsor substitute made the following changes from the original resolution:

page 1, lines 1 - 2 was amended as follows:

"Relating to a ban on trawling in the eastern Gulf of Alaska east of 140 degrees west longitude."

page 1, line 12 added a new whereas:

"Whereas the eastern Gulf of Alaska contains a unique assemblage of valuable rockfish species in amounts small enough that the rockfish stocks could be easily damaged by large vessel activity; and"

page 1, lines 15 - 16; page 2, line 1 reworded a whereas:

"Whereas, under federal fishing regulations, if any single species in the rockfish complex reaches its over fishing level, the entire rockfish complex and any other fishery that might take any of the over fishing rockfish species are closed; and"

page 2 lines 13 - 14 was amended as follows:

"Whereas, only by closing the eastern Gulf of Alaska east of 140 degrees west longitude to trawl fishing, will the unique assemblage of local marine resources be protected;"

page 2 line 16 was amended by deleting the reference to emergency regulations.

I appreciate your consideration in scheduling a hearing for this resolution in your committee at your earliest convenience.

Thank you.

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Environmental impact of trawling on the seabed: a review

J. B. JONES

Fisheries Research Centre
Ministry of Agriculture and Fisheries
P. O. Box 297
Wellington, New Zealand

INTRODUCTION

There is growing public and political awareness of the environmental impact of fishing activities. This is reflected in the U.N. Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) which requires (Article II) that signatory States harvest resources in such a way that the direct and indirect effects on the marine ecosystem are minimised, and that changes which are not potentially reversible over 2 or 3 decades are prevented.

The long-established technique of bottom trawling is attracting increasing criticism over the perceived environmental damage it may cause. This is of particular concern in Australasia where commercial fishers are developing new trawling grounds down to 1200 m (Judd 1989) and will certainly fish deeper as technology improves. Whether bottom trawling causes environmental damage which is not potentially reversible over a few decades is the subject of this paper. For the purposes of this review, bottom trawling includes the use of beam trawls, dredges, otter trawls, and Danish seine-nets, but not hydraulic clam dredges. A review of the effects of the latter can be found in Meyer et al. (1981).

Historical overview

As early as 1376 the British Parliament was petitioned by fishers concerned over the damage done to their fisheries by bottom trawling. Early complaints included the capture of undersize fish, the indiscriminate capture of non-target species, and a perception that fishing was deteriorating. Trawling also destroyed 'the living slym and underwater plants' (March 1970; De Groot 1984). Gear used by sailing beam trawlers was relatively light and was towed at slow speed in shallow water. It was not until the advent of the steam trawler in the 1900s that the size and weight of the trawl gear began to increase, in particular through the use of 'tickler' chains (chains between the wings of the trawl scraping the seabed ahead of the footrope). Following complaints from fishers, one of the earliest studies on the effects of such gear was carried out during 1938 on the plaice

Abstract Fishers have been complaining about the effects of bottom trawl gear on the marine environment since at least the 14th century. Trawl gear affects the environment in both direct and indirect ways. Direct effects include scraping and ploughing of the substrate, sediment resuspension, destruction of benthos, and dumping of processing waste. Indirect effects include post-fishing mortality and long-term trawl-induced changes to the benthos. There are few conclusive studies linking trawling to observed environmental changes since it is difficult to isolate the cause. However, permanent faunal changes brought about by trawling have been recorded. Research has established that the degree of environmental perturbation from bottom trawling activities is related to the weight of the gear on the seabed, the towing speed, the nature of the bottom sediments, and the strength of the tides and currents. The greater the frequency of gear impact on an area, the greater the likelihood of permanent change. In deeper water where the fauna is less adapted to changes in sediment regimes and disturbance from storm events, the effects of gear take longer to disappear. Studies indicate that in deep water (>1000 m), the recovery time is probably measured in decades.

Keywords New Zealand; trawling; environment; damage; impact; effects; benthos; sediment; mortality

M91040

Received 23 July 1991; accepted 9 January 1992

shing grounds in the North Sea (Graham 1955). On that study, based on comparisons of catches on normally fished grounds and from areas where commercial trawlers did not usually fish, Graham (1955) concluded that trawling was having no long-term effect on the macrobenthos.

By the end of World War II, the use of the powered trawler towing an "otter" or "Granton" trawl had become widespread. However, the beam trawl had also persevered, with the introduction of heavy tickler chains and chain chaffing mats. The weight of these beam trawls increased steadily with the increasing power of the towing vessel. Beam trawls weighed up to 3.5 t total weight in the late 1960s (Cole 1971) but by the early 1980s had reached about 11 t (Beck et al. 1990). The heavy tickler chains were known to dig up and displace large boulders which then damaged the lighter gear of other fishers. The chains made the gear more efficient at catching demersal fish and crustaceans (Anon. 1971; Hittenden & van Engel 1972; Harden Jones & Scholes 1974) and their use persisted despite complaints by other fishers (Anon. 1971).

In the early 1970s, the French "Institut Scientifique et Technique des Pêches Maritimes", concerned at the changes to the bottom topography of fishing grounds around Corsica—which they attributed to heavy chain on trawls—obtained a ban on the use of this gear in the Mediterranean (De Groot 1984). They then sought a similar ban on Dutch beam trawlers working along the French Atlantic coast. Fisheries laboratories bordering the North Sea had not noticed any significant changes to the benthos over time, and other countries were even less convinced that a problem existed (Anon. 1971; Cole 1971). The subject was raised at the 58th International Council for the Exploration of the Sea (ICES) meeting in 1970 and resulted in an ongoing series of studies on the effects on the benthos of all trawl gear types. Most of these studies are unpublished ICES working papers and are referenced in Redant (1987, 1990). A 1988 ICES study group concluded that changes in the benthic community could be related to fishing. However, no firm conclusions could be reached because relevant information on the physical effects of trawling was not available, and the impact of other effects such as eutrophication and pollution could not be estimated. In 1990, ICES established a working group to evaluate the effects of fishing on the marine ecosystem, including the effects on marine mammals, birds, and endemics (Rijnsdorp et al. 1991).

Early studies (generally in shallow water and on sand and/or mud) showed that benthic organisms were

exposed to predators by the action of trawl gear (e.g., Armitz & Weber 1970; Caddy 1973), but it was concluded that this extra food source could only benefit the fishery. If there was a reduction in the invertebrate fauna, it was felt that this would be of no account as food availability was not usually limiting to fisheries (Cole 1971).

More recent studies have examined the effects of trawling on hard-bottom communities and assessment of the impact has varied. Following concerns that trawl gear might reduce the amount of productive fish habitat (Wenner 1983), Dolah et al. (1987) reported the results of a single research trawl tow (in 20 m depth) on a hard-bottom assemblage of sponges and corals. They concluded that, though damage was caused, the effects could not be detected after 12 months. This result contrasted with a 1979 study in Florida by Tilmant (cited in Dolah et al. 1987), who used a prawn trawl, and who was working in an area heavily fished by prawn trawlers.

As the concept of community ecology has become established and the realisation has grown that the associated fauna provide more than just a food source for the target fishery (Sainsbury 1988), the debate over the long-term chronic effects of observed seabed changes has continued. This debate is not confined to Europe as similar concerns over the effects of trawling have been voiced in Australia (Gibbs et al. 1980; Bulcher et al. 1981; Hutchings 1990), New Zealand (Saxton 1980; Bradstock & Gordon 1983), Indonesia and Thailand (Chong et al. 1987), and in North America (Dolah et al. 1987; Goudey & Loverich 1987; McAllister 1991). Apollonio (1989) went as far as to question whether eliminating the otter trawl could be the key to better fisheries management. A similar view was put forward by Chong et al. (1987) following the 1980 Indonesian Government ban on trawling (trawling was primarily for prawns with pre-ban landings of 130 000–200 000 t). Chong et al. (1987) reported that the trawl ban caused no reduction in the total Indonesian marine landings but there was, however, a positive impact on fishing profitability. The reasons for this were complex, involving the recovery of overfished stocks, improved value of the catch, and the distribution of wealth derived from the fishery among the local communities rather than to offshore trawling companies. In New Zealand, Feenaghty & Bagley (1981) note that the Otago fishery was far more productive in tonnage landed in the early 1900s than it was in the 1970s, despite the introduction of large trawlers and modern trawl gear.

Allied with trawling activities is the problem of disposing unwanted catch, fish heads, and frames.

Dumping this waste at sea benefits predatory fish, marine mammals, and seabirds (an aspect outside the scope of this review). However, concern has been expressed at the effects on the seabed of discharging substantial quantities of such waste (Livingston & Rutherford 1988). Trials have shown that dissolved oxygen levels could be affected near the seabed but no studies have been made on the grounds.

OBSERVED EFFECTS

Trawl gear has a direct physical effect on the seabed wherever the ground rope, chains and bobbins, sweeps, doors, and any chaffing mats or parts of the net bag contact the bottom. Ways in which gear affects the seabed can be classified as: scraping and ploughing; sediment resuspension; and physical destruction, removal, or scattering of non-target benthos. The fishing operation further affects the seabed through waste dumped from the vessel. Indirect effects on the seabed are related to the stress imposed on the benthos. These effects include post-fishing mortality of damaged or disturbed organisms, and long-term changes to the benthos community structure.

Scraping and ploughing

Otter boards imprint distinct tracks on the seafloor, ploughing a groove which can vary from a few cm up to 0.3 m deep (Armitz & Weber 1970; Caddy & Iles 1972; Krost et al. 1990). Bobbins and chains can also leave recognisable tracks (Krost et al. 1990) and may skim off the surface sediment layers between the two grooves left by the otter boards. The depth of the otter board groove depends on the weight of the board (which can be several tonnes), the angle of attack (the board is towed at an angle to the direction of motion to generate the lift required to spread the net), and the nature of the substrate, being deepest in soft mud.

These trawl tracks remain visible for varying times depending on the nature of the substrate and on water movements over the bottom. The greater the water movement, the faster the tracks will be filled in. Bernhard (reported in Krost et al. 1990) found that the sandy mud of Eckernförde Bay held the same trawl track for almost 5 years. Churchill (1989) and Krost et al. (1990) reported an increase in the frequency of tracks attributed to trawl doors in deeper water, presumably where water movement is less pronounced.

Appreciable areas of the fishing grounds can be affected. Caddy (1973) calculated that c. 3% of the

bottom area in Chaleur Bay (Gulf of St Lawrence) was covered in what were presumed to be trawl tracks. Studies by Caddy & Iles (1972) revealed a high frequency of trawl tracks on parts of the Georges Bank area of the Northwest Atlantic. Churchill (1989) reported up to 20 tracks/100 m² at depths of 100 m on the southern New England shelf.

Each set of trawl tracks defines an area swept by a trawl. Even if the footrope and net were clear of the bottom, the benthos between these tracks would still have been affected by turbulence. In a detailed survey of Kiel Bay (Baltic), Krost et al. (1990) found up to 19% of the study area, which was deeper than 20 m and in mud, bore trawl tracks. They calculated that there was a "more or less complete" disturbance in those areas where trawl tracks were classified as "abundant" (10–35% of the survey area). In the Netherlands, where the spatial distribution of fishing effort is known for 30 × 30 mile squares, it has been calculated that, in heavily fished squares, every square metre of the seabed is trawled, on average, at least 7 times a year (Rijnsdorp et al. 1991).

Sediment resuspension

The sediment cloud generated by turbulence from trawl doors contributes to fish capture, especially in clear water (Main & Sangster 1979, 1981). However, these trawl sediment clouds can also contribute to the total suspended sediment load. Churchill (1989) modelled sediment resuspension by trawling and found that this may be a primary source of suspended sediment over the outer shelf (100–140 m) where storm-related bottom stresses are weak. This suspended sediment reduces light levels on the substrate, and when the sediment eventually settles out, the benthos can be smothered. Galtsoff (1964) showed that as little as a 1 mm layer of silt over a settlement surface could prevent spat settlement in *Ostrea virginica* and Stevens (1987) claimed that high levels of turbidity inhibited settlement of *Pecten novaezelandiae* veliger larvae, depressed growth rates of adults, and caused inefficient metabolism of glycogen stores through enforced anaerobic respiration.

Theil & Schriever (1990) studied sediment resuspension in deep-ocean environments. They found that an experimental plot at 4000 m, previously ploughed repeatedly with a rig resembling a trawl bobbin gear and chains, had not recovered from the effects of sediment redeposition after 6 months. Even the harpacticoid copepod fauna remained significantly reduced (G. Schriever pers. comm.). Their assessment

as that the substrate would take decades to recover.

As well as resuspending sediment, trawl gear can bring about vertical redistribution of sediment layers. Ayer et al. (1991) showed that heavy chain dredges could mix surface organic material into subsurface layers. This organic material was removed from the surface metazoan-microbial aerobic chain to an anaerobic system. If the subsurface layers are already anoxic, further problems can occur. Churning up the soft bottom can create anaerobic turbid conditions which are, for example, capable of killing scallop (*Platinopecten* sp.) larvae (Yamamoto 1960). The question whether the resuspended organic material improved nutrient availability to filter feeders was studied by Anderson & Meyer (1986) who found that sediment resuspended from clam dredges in a Maine estuary did not improve the food value of the resuspended material available to filter feeders, and if expressed as protein per unit weight of sediment filtered, actually decreased the food value since filter feeders had to filter more material to obtain nutrients.

Destruction of non-target benthos

The large, heavy-shelled bivalve *Cyprina islandica* formed a substantial part of the food of cod and flatfish in Kiel Bay (Baltic) only after trawling began in the area. Armitz & Weber (1970) concluded that the fish were feeding on bivalves crushed by the otter boards. Medcof & Caddy (1971) and Caddy (1973) confirmed there was feeding on exposed and damaged benthic animals in trawl tracks. By contrast, observations made using submersibles, reported in Stevens (1990), found that trawling caused no observable injuries to crabs whereas Butcher et al. (1981) found little or no damage to the Jervis Bay (Australia) environment by scallop dredging. These differences in results may well be caused by the different sites used since Creutzberg et al. (1987), for example, found that the number of tickler chains on an experimental beam trawl had no effect on the catches of epibenthic animals over a mud substrate but at sandy stations the number of chains used did correlate to the catch. The effects of trawling can be quite subtle. Bull (1986) found that survival of *Pecten novaezelandiae* spat in Golden Bay (New Zealand) was better than 20% after 9 months in an area closed to trawling but was only 0.8% for an adjacent site which was open to trawling.

Wilson (1979) suggested that patches of the deep water coral *Lophelia* would be broken up by trawling and thus provide new settlement substrate, increasing

the rate of colonisation. However, he also noted that the coral grows at only 6 mm per year at the depth studied (220–350 m) and that the coral dies when in contact with the substrate. Repeated trawling over the same patch would therefore be expected to eradicate the *Lophelia*—not spread it. Saxton (1980) and Bradstock & Gordon (1983) recorded the effects of the systematic destruction by trawlers of the bryozoan beds in Tasman Bay, New Zealand, which provided habitat for juvenile snapper (*Pagrus auratus*) and tarakihi (*Nemadactylus macropterus*). The surviving beds were closed to trawling to conserve fish stocks. Riesen & Relse (1982) describe the removal of *Sabellaria* reefs in the German Wadden Sea by shrimp fishers clearing trawling grounds of obstacles, and De Groot (1984) makes the point that recolonisation does not occur as the substrate has been changed (though not necessarily by trawling—see Rees & Eleftheriou (1989)). Trawling and dredging effects were also implicated in the spread of mussels through the Norderaue area of the Wadden Sea (Relse 1982; Relse & Schubert 1987).

Dumping of processing waste

The amounts dumped as "waste" can be substantial. Off India's north-east coast, some 100 000 t of bycatch is discarded yearly (Anon. 1991). Wassenberg & Hill (1990) estimated that Australian prawn trawlers, in catching about 500 t of prawns, discarded 3000 t of material, primarily crustaceans and echinoderms. This dumping can inject high levels of nutrient into the ecosystem providing additional food for birds and predatory fish, but most probably sinks to the seabed causing potential problems with oxygen depletion (Hill & Wassenberg 1990). By contrast, Berghahn (1990) after noting the rarity of recently discarded fish during bycatch studies in the North Friesian Wadden Sea, estimated that predators (birds, seals, and fish) were capable of clearing discards of moribund fish from the study area. Livingston & Rutherford (1988) calculated that the discarded waste from the New Zealand West Coast Hoki fishery could be as much as 47 800 t dumped in an area of 1000 km² over 60 days. Rutherford (1987) modelled the potential oxygen depletion such wastes would cause, calculating that oxygen concentrations at the seabed could be reduced to 4–5 g m⁻³ (45–55% saturation), but actual oxygen measurements have not been made and no studies have been done to establish if discarded material reaches the seabed.

Little published information is available on the effects of discarding fisheries wastes on the seabed

(Saila 1983) and no studies have been carried out on the compounding effects of exposure of anaerobic sediments by the ploughing effect of the gear. Most published studies have been on shallow water or estuarine sites polluted by onshore processing plants. In coastal waters, small-scale vertical oxygen gradients can be critical (Rosenberg 1977; Jørgensen 1980; Armitz 1981). In the south-east Baltic, Armitz & Rumohr (1982) recorded a poor benthic fauna in areas of oxygen stress but found that experimental containers of sediment suspended 30–40 cm above the bottom developed a more normal fauna. Changes to the catch per unit effort in the Norway lobster (*Nephrops norvegicus*) fishery in the Kattegat have been linked with low oxygen levels bringing the lobsters out of their burrows (Bagge & Munch-Petersen 1979; Rosenberg 1985). Following complaints from fishers that tailing *Nephrops* at sea "spoils" the grounds, Chapman (1981) presented evidence that the presence of "heads" appeared to temporarily inhibit *Nephrops* from emerging from their burrows.

Indirect effects

McLoughlin et al. (1991) review studies of natural mortality on scallop beds which showed that natural mortality and indirect fishing mortality rates were much higher on fished scallop beds than the natural mortality on unfished beds. They point out that post-fishing mortality is not just confined to shells damaged by dredges. Their study showed that 4–5 times as many scallops were crushed or damaged as were caught and landed by the scallop gear used in the Bass Strait (Australia) fishery. However, within 9 months of the start of the fishery "virtually the entire stock was lost", which McLoughlin et al. (1991) attributed to a suspected bacterial infection resulting from decomposing scallops on the seabed.

New Zealand commercial fishers and Ministry of Agriculture and Fisheries staff (including the author) have frequently seen a noticeable reduction in the invertebrate fauna brought up by trawls as new deep-water (> 800 m) grounds are developed. Amounts of non-crustacean invertebrate fauna caught are not recorded, so quantitative evidence is lacking. Saxton (1980) noted a decline in juvenile fish with the removal of bryozoan beds in Tasman Bay, New Zealand. Sainsbury (1988) found a significant reduction in sponge frequency on the Australian north-west shelf between 1967–73 and 1979. Loss of sponges, together with alcyonarians and gorgonians, lead to a change in the catch composition of the pair-trawl fishery on the Australian north-west shelf between those years. The

fishes *Lethrinus* and *Lutjanus* were associated with habitats containing large epibenthos and catches of these fish species had significantly declined. The fishes *Nemipterus* and *Saurida* occurred mostly over the open sand and had increased in biomass.

A general decrease in diversity can be predicted as long-lived slow-growing species are removed or killed by human activities. Reise (1982) noted a disproportionate increase in polychaetes had occurred in the Wadden Sea over the previous 112 years. Pearson et al. (1985) found a 20% reduction in deposit feeders, a 19% increase in suspension feeders, and a 25% increase in predators in the Kattegat between 1911–12 and 1984. Overall, they found an increase in ophiuroids and worms with a decrease in echinoids with the change most apparent in shallow water. Although trawl effects could not be eliminated, these authors suggested that eutrophication was the main cause of the change. Evidence that such changes occur in the absence of trawling was provided by Kröncke (1990) who detected a 30% decline in the macrofauna total biomass on the northern Dogger Bank between 1950–54 and 1987. Though the drop in biomass was caused by the lack of the bivalve *Spisula*, the presence of the echinoderm *Echinocardium* indicated that trawling was unlikely to be the cause. The area of the Dogger Bank in question had not been heavily fished since the 1970s.

THEORETICAL CONSIDERATIONS

Apart from direct studies on trawl gear, there is a growing body of information on effects to seabed fauna of other potentially disruptive operations (for example, spoil dumping and pollution). Such studies provide information on the resilience of the fauna to stress and particularly on recovery rates. Several studies have focused on the ability of macrofauna to recolonise sediments (summarised in Boesch & Rosenberg 1981). These studies confirm that recovery rates on the continental shelf and deep sea are much slower than in shallow-water temperate communities (and are measured in years at depths over 1000 m). Subsequent work by Flint & Young (1983) supports the hypothesis of Boesch & Rosenberg (1981) that communities in less constant environments are more resistant to disturbance and that colonists in shallow waters are usually species already dominant in the community, rather than short-lived opportunist species. The reverse is true in deeper-water, less disturbed habitats, where colonisers differ markedly from the long-lived equilibrium species.

SUMMARY AND CONCLUSIONS

From the work performed under the aegis of ICES, it would appear that beam trawls, otter trawls, and dredges are all basically similar in their effect. Generally, the heavier the gear in contact with the seabed, the greater the damage. The effects vary greatly depending on the amount of gear contact with the bottom, together with the depth, nature of the seabed, and the strength of the currents or tide.

In areas of tide and current, the resuspension of the sediments is of short duration and the effects of the sediment redeposition are not permanent on biota adapted to storm events and sediment transport by currents. However, in areas of little water movement such as in the deep ocean, where the benthos is not adapted to high sediment loads, the adverse effects of sediment resuspension by gear could persist for decades.

The removal of the macrobenthos also has variable effects. In shallow-water areas where the damage is intermittent, recolonisation soon occurs. However, where the macrobenthos is substantially removed and recovery is not permitted (such as the *Sabellaria* beds of the Wadden Sea and the bryozoan beds of Tasman Bay), the change is permanent.

The predicted changes in shallow-water communities, a relative increase in *r*-strategists such as polychaetes (where population size is determined by the intrinsic rate of population growth *r*) and a decrease in *K*-strategists such as molluscs and crustaceans (population size is determined by the carrying capacity of the environment *K*), have been observed in the Wadden Sea (Riesen & Reise 1982), the Kattegat (Pearson et al. 1985), and the English Channel (Holme 1983). There is, however, great difficulty in attributing such observed long-term changes in the benthos to the effects of trawl gear alone, since natural fluctuations and other changes such as chemical dumping and eutrophication have undoubtedly occurred (Pearson & Barrett 1987; Rees & Eleftheriou 1989).

Most shallow coastal Northern Hemisphere grounds have been fished for centuries and have at the same time been affected by land use changes such as deforestation, pollution, and war. The marine environment was probably changing and adapting before modern "baseline" measurements began (about 100 years ago). The North Sea is not the best place for detecting environmental changes resulting from trawling, but this is where most of the studies have been done.

It is also noticeable in reviewing the literature that authors have underestimated the sampling problems

inherent in trying to attribute observed changes to a single cause. Simple pre- versus post-treatment designs, or plot comparison designs (such as that of Graham (1955)), do not allow for the separation of effects resulting from the treatment from those effects resulting from other causes (Walters et al. 1988). In addition, many types of impact do not change long-run mean abundances (Underwood 1991). Experimental designs suitable for assessing transient responses to environmental disturbances are becoming available and should be used (Walters et al. 1988; Faith et al. 1991; Underwood 1991).

The evidence is that bottom trawling has an impact on the environment, but that the extent and duration of that impact varies depending on local conditions. There is an urgent need to carry out trawling impact studies in deeper water (> 500 m) since this is where studies indicate that effects could be severe and that any recovery may be measured in decades. Changes to the seabed, by whatever cause (and bottom trawling gear is certainly involved), can affect the fisheries above the beds (Bradstock & Gordon 1983; Sainsbury 1988). To what extent this is a factor in observed "fishery declines" has seldom been addressed in the literature on fisheries management.

ACKNOWLEDGMENTS

I am grateful for the helpful comments and encouragement from Peter Horn and Simon Thrush, who commented on an early draft of the manuscript. Two anonymous reviewers made helpful suggestions.

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Effects of a Research Trawl on a Hard-Bottom Assemblage of Sponges and Corals

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(Accepted for publication 9 September 1986)

ABSTRACT

Van Dolah, R.F., Wendt, P.H. and Nicholson, N., 1987. Effects of a research trawl on a hard-bottom assemblage of sponges and corals. *Fish. Res.*, 5: 39-54.

The effects of a research trawl on several sponge and coral species was assessed in a shallow-water, hard-bottom area located southeast of Savannah, Georgia. The study entailed a census of the numerically dominant species in replicate 25-m² quadrats located along five transects established across a trawling alley. The density of undamaged sponges and corals was assessed in trawled and non-trawled (control) portions of each transect immediately before, immediately after, and 12 months after a 40/54 roller-rigged trawl was dragged through the alley once. Some damage to individuals of all target species was observed immediately after trawling, but only the density of barrel sponges (*Cliona* spp.) was significantly reduced. The extent of damage to the other sponges (*Ircinia campana*, *Haliclona oculata*), octocorals (*Leptogorgia virgulata*, *Lophogorgia hebes*, *Titanideum frauenfeldii*) and hard corals (*Oculina varicosa*) varied depending on the species, but changes in density were not statistically significant. Twelve months after trawling, the abundance of specimens counted in the trawled quadrats had increased to pre-trawl densities or greater, and damage to the sponges and corals could no longer be detected due to healing and growth. Trawl damage observed in this study was less severe than the damage reported for a similar habitat in a previous study. Differences between the two studies are attributed to (1) differences in the roller-rig design of the trawls used, and (2) differences in the number of times the same bottom was trawled.

INTRODUCTION

Hard-bottom reefs are a common topographic feature of the continental shelf off the southeastern United States. Parker et al. (1983) estimates that hard grounds cover approximately 30% of the shelf between Cape Fear, North Carolina, and Cape Canaveral, Florida. In shallow shelf waters, these areas are

Contribution No. 228 from the South Carolina Marine Resources Center

often characterized by low-relief rocky outcrops and extensive areas of hardpan with no emergent rock (Henry and Giles, 1979; South Carolina Wildlife and Marine Resources Department (SCWMRD), 1982). Because hard-bottom habitats support diverse communities of sessile reef invertebrates, they are attractive to many commercially and recreationally important fishes such as snapper, grouper, porgy and black sea bass. Traditionally, these fishes have been caught by hook and line and fish traps, but there is growing interest among some commercial fishermen in trawling hard-bottom areas for these fishes. Trawls have also been used extensively in several research programs to assess demersal fish communities associated with hard-bottom habitats (e.g. Ulrich et al., 1976; Miller and Richards, 1980; SCWMRD, 1981, 1982; Wenner, 1983).

Concern that trawl gear may cause long-term or irreversible damage to reef communities has been expressed by various fishing groups, researchers (Tilmant, 1979; Wenner, 1983) and management agencies. Previous studies on the effects of trawls on benthic communities generally have been restricted to sand-bottom areas (Graham, 1955; Bridger, 1970; Anon., 1971; Caddy, 1973; Gibbs et al., 1980). Thus far, only one study in Florida has documented damage to hard-bottom communities caused by roller-frame trawls (Tilmant, 1979), and that study evaluated the effects of commercial trawl gear which is not commonly used in the South Atlantic Bight.

This paper presents results from a second study which examines trawl effects in hard-bottom habitats. The primary objective of this study was to evaluate damage to sponge and coral assemblages resulting from research trawling practices used in a larger study examining hard-bottom resources in the South Atlantic Bight (SCWMRD, 1981, 1982). Sponges and corals represent the largest and most conspicuous sessile species in hard-bottom habitats of the region. As a result, they are extremely important components of the invertebrate community because they greatly enhance the structural complexity of the bottom, particularly in hardpan areas where sessile invertebrates provide the only topographic relief attractive to fishes. Thus, a better understanding of the effects of trawl gear on these taxa is needed.

STUDY AREA AND DOMINANT FAUNA

The study site was located approximately 32.5 km east of St. Catherines Island, Georgia (31°35.7'N, 80°47.9'W), at a depth of 20 m. This hard-bottom area was chosen for study because it was typical of low-relief hard-bottom habitat in the South Atlantic Bight and because it was easily relocated due to its proximity to an artificial reef (Georgia "Reef J").

Preliminary diver surveys characterized the study area as having a smooth rock bottom covered by a thin layer of sand. Although rock ledges were noted nearby, no emergent rock outcrops were observed in the area to be trawled. Sessile invertebrate growth was extensive throughout the area, with sponges

and corals being the largest growth forms. Ascidiars, hydroids, bryozoans and algae were also common, but these taxa were generally represented by low or encrusting growth forms.

Three of the most abundant large sponges, *Haliclona oculata*, *Ircinia campana* and *Cliona* spp. (mostly *C. celata*), were selected for assessment. All of these species have been collected in roller-trawl samples taken at inner-shelf hard-bottom stations (SCWMRD, 1982). The finger sponge, *H. oculata*, is an upright ramous sponge which usually occurs as a single stalk with multiple branches. It has a spongy texture and the branches are quite flexible. The purple vase sponge, *I. campana*, is a keratose sponge which persistently occurs in a cup or vase shape. The texture of this sponge is firmer than *H. oculata*, but it is still quite pliable. Finally, the boring sponges, *Cliona* spp., are upright and cake or barrel shaped in the gamma stage. These sponges have a distinct dermis covered with tubercles and are hard or stiff in consistency. *Cliona* spp. are similar in shape and sometimes confused with the massive loggerhead sponge, *Spheciospongia vesparium*, which is also common in hard-bottom areas of the South Atlantic Bight (SCWMRD, 1982; Wenner et al., 1983).

The dominant octocorals in the area were the whip coral *Leptogorgia virgulata*, the false sea fan *Lophogorgia hebes*, and the stick coral *Titanideum frauenfeldii*. All of these species were more common than the sponges and generally grew tall enough to be collected in roller-trawl samples at inner-shelf hard-bottom sites (SCWMRD, 1982; Wenner et al., 1983).

The only hard coral found in the area was the branching tree coral *Oculina varicosa*. This species occurred only rarely, and the colonies were usually small. Even though *O. varicosa* was uncommon, it was assessed in this study due to its fragile composition and probable susceptibility to damage from trawling.

METHODS

Trawling alley

A trawling alley was established by placing two parallel series of five 90-kg concrete anchors on the bottom, running in an east-west direction (Fig. 1). The alley was approximately 105 m wide and the anchors served as points of attachment for transect lines which were stretched across the alley. All anchors were buoyed and secured with iron spikes driven into the substrate. Transects 1-3 were approximately 20 m apart and were located in an area of high sponge and coral density (Fig. 1). Transects 4 and 5 were located approximately 40 and 60 m, respectively, to the west of Transect 3 and were in an area of high octocoral density but low sponge density.

Transect lines, consisting of 3-mm galvanized cable, were shackled to each pair of anchors approximately 40 cm above the bottom and then drawn tight with a ratchet hoist so that the lines were tautly suspended above the bottom

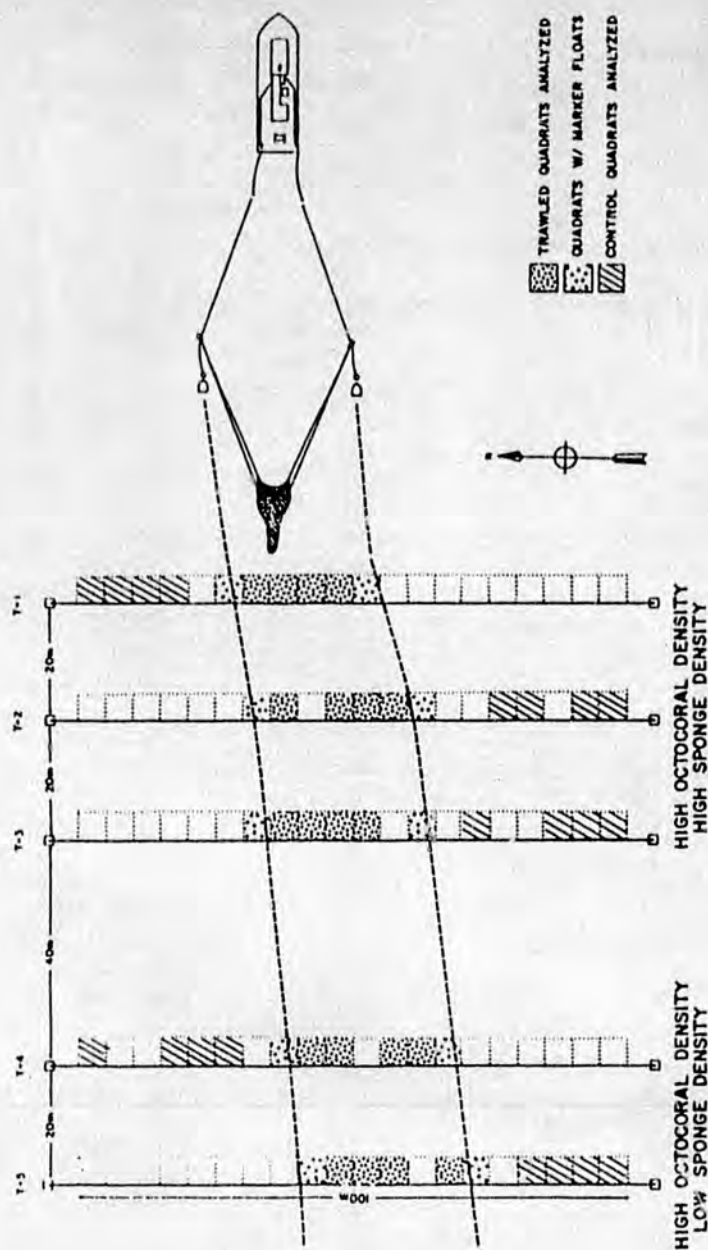


Fig. 1. Diagram of the trawling alley showing the path of the trawl through the alley and the quadrats analyzed for damage assessment. Vessel and trawl are drawn approximately to scale.

along their entire length. Each transect line was marked with numbered tags at 5-m intervals, starting 2 m from the southern anchor. To further assist in placing quadrat frames in the same position during each assessment, 100-cm² colored plexiglas plates were spiked to the bottom under all numbered tags.

Pre-trawl assessment

For the initial survey (August 1982), divers assessed 20 quadrats along each transect line because the exact path of the trawl through the alley could not be anticipated. Quadrat boundaries were defined by placing a square PVC frame (5×5 m) on the bottom along the east side of the line (Fig. 1). The sponges *Haliclona oculata*, *Ircinia campana* and *Cliona* spp., and the corals *Leptogorgia ulrgulata*, *Lophogorgia hebes* and *Oculina varicosa* were then counted in the entire 25-m² area of each quadrat. Because the octocoral *Titanideum frauenfeldii* was so abundant, it was counted only in a 1-m² sub-quadrat set up in the northwest corner of each 25-m² quadrat area. Organisms present under the sides or northern edge of the PVC frames were included in the quadrat count. Organisms occurring under the southern edge of the frame were only counted in the first quadrat of each transect line. Sponges and octocorals smaller than 10 cm in height were not counted, but the hard coral *O. varicosa* was counted regardless of size. After the pre-trawl assessment was completed, all transect lines were removed from the area in preparation for trawling.

Trawling operations

The roller trawl used in this study was a 40/54 fly net with a 12.2-m headrope and a 16.5-m footrope equipped with six 30-cm rubber rollers separated by numerous 15-cm diameter rubber discs along most of its length. The net had a 12.8-m vertical mouth opening and stretch-mesh dimensions of 20.3 cm in the wings, 10.2 cm in the body, 4.1 cm in the codend and 0.6 cm in the codend liner. The net was attached to 1.8×1.2-m China-V doors using 30.5-m leg lines. This net has been used extensively in previous research trawling in the South Atlantic Bight (Waltz et al., 1982; SCWMD, 1982; Wenner et al., 1983; Sedberry and Van Dolah, 1984). Larger versions of this net are currently being used by some commercial fishermen in the area.

The trawl was towed once through the trawling alley (26 August 1982) from the 30.8-m R/V "Oregon" at an approximate speed of 6.0 km h⁻¹ using a 3:1 scope in the trawl warps. Under these conditions, the spread of the trawl rig from door to door was approximately 30–35 m. The trawl was deployed well in advance of the alley entrance to ensure that it was fishing properly, and was hauled immediately after passing through the alley. To mark the trawl path, two small chase boats followed buoys attached to each trawl door (Fig. 1), and deployed small sub-surface markers approximately every 5 m along the path.

These markers consisted of grouped fishing weights attached to small balsam floats on 3-m sections of line.

Contents of the trawl were sorted, weighed and then preserved in a 10% formalin-seawater solution for identification in the laboratory.

Post-trawl assessment

After trawling operations were completed, divers replaced all transect lines in their original positions. Quadrats with sub-surface markers denoted the trawl path. Eight quadrats from each transect were then randomly selected for re-assessment. Four were selected from quadrats in the trawl path; the other four from those outside the trawl path to serve as control areas (Fig. 1). Quadrats with markers were not considered in this selection since unequal portions of those quadrats were affected by the trawl, and selection of control quadrats was limited to one randomly selected side of the trawl path to minimize diver swimming time. This sampling design provided a total of 20 trawled quadrats and 20 control quadrats for analysis.

Counting techniques used in the post-trawl assessment (August–September 1982) were similar to those used in the pre-trawl census except that the number of damaged specimens of each species was also noted. Additionally, the degree of damage was subjectively categorized as none, slight, moderate or heavy. Damaged organisms were counted regardless of size. Twelve months later (August 1983), the same 40 quadrats were re-assessed in the control and trawled areas. Counting techniques were the same as before, except that organisms were not categorized by degree of damage since that was no longer evident.

Data analysis

The species selected for assessment of trawl damage were compared with respect to densities of undamaged specimens in the trawled quadrats before, immediately after, and 12 months after trawling. Damaged specimens were not included in the analyses since some organisms were completely removed from the area, thereby precluding accurate counts. Control (non-trawled) areas were also compared before and after trawling to evaluate accuracy of the counting technique, and to monitor natural changes in the density of each species with time. Comparisons between treatment groups (before, after, 12 months after) were made using 1-way ANOVA tests on $\log(x+1)$ transformed data. When differences were significant, the a posteriori Student–Newman–Keuls test was used to determine separation of treatment groups.

The distribution of octocorals and hard corals appeared to be fairly uniform throughout the study area. Therefore, quadrats from all 5 transects were treated as replicates in control and trawled groups. Sponge density, on the other hand, was noticeably lower along Transects 4 and 5 than along Transects 1–3. As a

result, separate analyses were performed for each sponge species in the high density (T_1 – T_3) and low density (T_4 – T_5) areas since quadrats from these two portions of the alley could not be considered to be replicates. This provided 8 and 12 replicate sponge counts per treatment group in the high- and low-density areas, respectively.

RESULTS

Pre-trawl sponge density was much higher along Transects 1–3 than along Transects 4–5 (Fig. 2). The most abundant sponges counted in both areas were the barrel sponges *Cliona* spp., which were more than twice as numerous as the finger sponges, *Haliclona oculata*, and the vase sponges, *Ircinia campana*. The latter species was the least abundant sponge found along all 5 transects. Octocorals were more numerous than sponges, with the stick coral *Titanideum frauenfeldii* being the most abundant species (Fig. 3). An accurate estimate of the density of *T. frauenfeldii* could not be made because counts were based on the number of emergent stalks which sometimes grew from the same basal disc. Even so, *T. frauenfeldii* stalks were so numerous that colony density of this species was undoubtedly higher than that of the other octocorals, *Leptogorgia virgulata* and *Lophogorgia hebes*, which were also abundant throughout the alley. The stony coral *Oculina varicosa* was the least abundant coral counted in the quadrats (Fig. 4). In contrast to the sponges, no consistent differences in density were noted between transects for any of the coral species.

Immediately after trawling, divers surveyed the area and noted that the sub-surface markers accurately defined the path of the trawl doors based on damage to surrounding sponges and corals. At least some specimens of all species counted in the pre-trawl assessment were found damaged in the area between the door marker-floats, with more destruction noted among sponges than corals. Damage to sponges ranged from slight tears and nicks to major portions being torn off, or the entire sponge being knocked down. Grooves resulting from rubbing by the trawl leg lines were also observed in the sides of several sponges, especially *Cliona* spp. Damaged octocorals and stony corals were most often completely severed at their base.

Histograms of undamaged sponge density before versus immediately after trawling (Fig. 2) illustrate a significant decrease in the number of undamaged sponges present in the trawled quadrats of Transects 1–3 ($P < 0.05$, ANOVA). A similar decline was also noted in trawled quadrats of Transects 4–5, but this decrease was not statistically significant at the 95% confidence level. Of the 208 sponges remaining in the 20 trawled quadrats, 31.7% were damaged. In contrast, no sponge damage was detected in the control quadrats of any transect and total sponge abundance had not changed significantly in either the high- or low-density areas ($P > 0.75$).

Most of the damaged sponges were *Cliona* spp. (Fig. 2). In the high- and

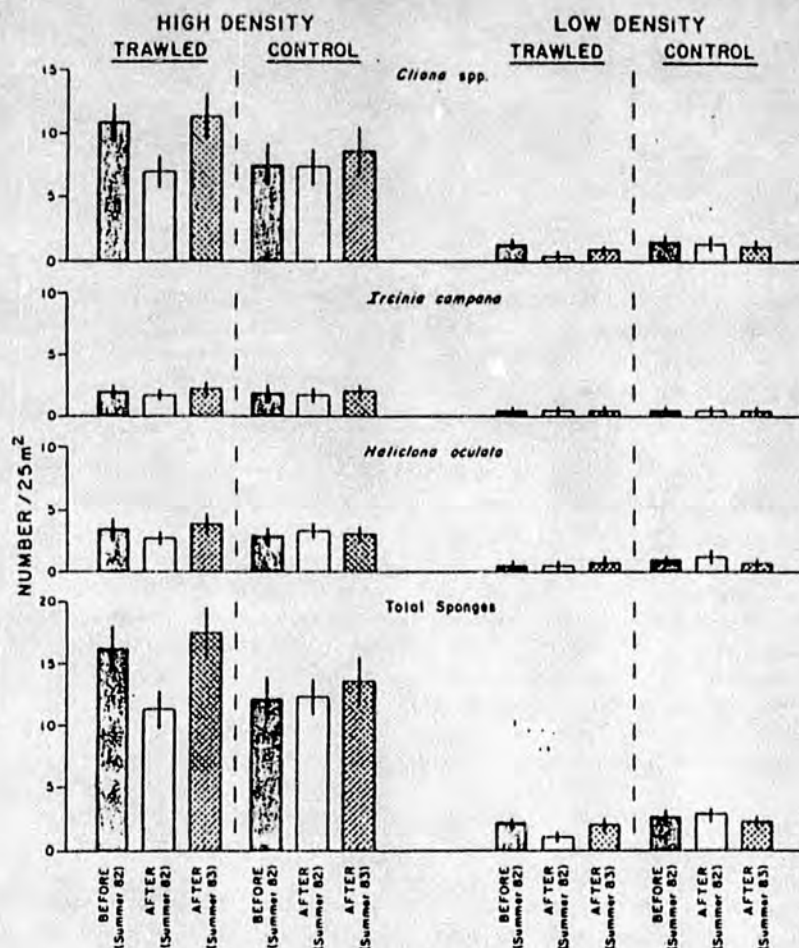


Fig. 2. Mean density ($\pm$ SE) of undamaged sponges counted in trawled and control quadrats during the three census periods. High-density histograms represent quadrats from Transects 1-3 and low-density histograms represent quadrats from Transects 4-5.

low-density areas, respectively, there were 35.3 and 76.9% fewer undamaged clionid sponges present in the trawled quadrats. Both of these decreases were statistically significant ($P < 0.05$, ANOVA), whereas in the control quadrats no significant decreases were noted in sponge density after trawling ($P > 0.75$). Although trawl damage to *Cliona* was significant, it should be noted that only 7 of the 149 clionid sponges initially counted were missing from the quadrats after the trawl had passed through the area. Furthermore, of the 49 specimens

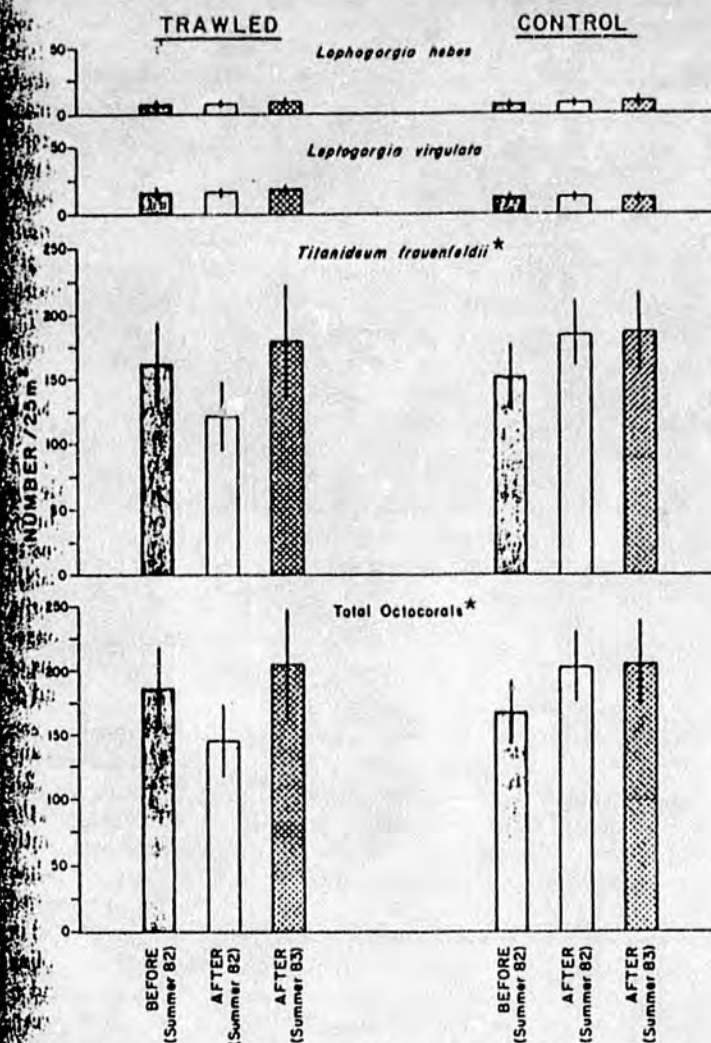


Fig. 3. Mean density ($\pm$ SE) of undamaged octocorals counted in trawled and control quadrats during the three census periods. Values are based on quadrats from all transects and (*) indicates estimates based on counts of *T. frauenfeldii* in 1-m² quadrats.

found damaged, only 29 were considered to be heavily damaged (i.e. > 50% damage or loss of the specimen).

Twelve months after the trawl had passed through the alley, divers could not confidently relocate any of the damaged *Cliona* spp., and the abundance of

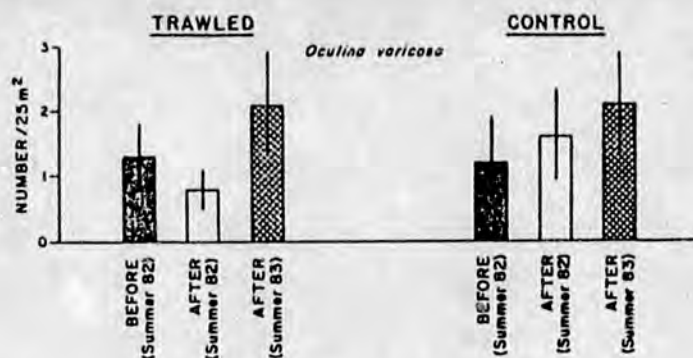


Fig. 4. Mean density of undamaged stony corals counted in trawled and control quadrats during the three census periods.

specimens counted in trawled quadrats had increased to pre-trawl densities or greater (Fig. 2). No significant differences were detected, in either the high or the low-density areas, between pre-trawl and 12-month post-trawl density estimates of either *Cliona* spp. alone or all sponges as a group ($P > 0.05$, SNK tests). Regeneration of tissue among the damaged *Cliona* during the interim period was sufficient to have rounded off the tops of partially severed sponges and to have closed wounds on other sponges. Thus, while some specimens of *Cliona* were obviously shorter than before, none appeared to be moribund or even damaged.

Effects of the trawl gear on the other large sponges, *Haliclona oculata* and *Ircinia campana*, were not as severe as those noted for *Cliona* sp. (Fig. 2). Although 16 damaged finger sponges were found in the trawled quadrats, the mean density of undamaged *H. oculata* in those quadrats was not significantly different between census periods ($P > 0.5$, ANOVA). Additionally, fewer than 8 of those 16 sponges were considered heavily damaged. Vase sponges appeared to be least affected by the trawl, with only one damaged *I. campana* found in the alley. As with finger sponges, no significant differences between sampling periods were noted in the mean abundance of undamaged *I. campana* found in trawled quadrats ($P > 0.05$), nor were there any significant differences between sampling periods with respect to the density of either species in control quadrats ($P > 0.75$).

Total octocoral abundance declined in the alley after trawling (Fig. 3), and a few damaged specimens of all species were found in the trawled quadrats. However, effects of the trawl on the three octocoral species appeared to be minimal in comparison with the sponges, since there were no significant differences between pre-trawl and post-trawl density estimates for any of the three species ($P > 0.5$, ANOVA). In fact, mean densities of the fan and whip

corals, *Lophogorgia hebes* and *Leptogorgia virgulata*, remained constant in the first post-trawl assessment, and only the stick coral *Titanideum frauenfeldii* declined in mean abundance immediately after trawling (Fig. 3). The constant mean densities observed for fan and whip corals before and after trawling were unexpected, since divers counted 9 damaged *L. hebes* and 6 damaged *L. virgulata* in trawled quadrats. This discrepancy was probably due to counting errors. Twelve months after trawling, the densities of all octocoral species were higher than pre-trawl densities, although differences were not significant ($P > 0.5$, Fig. 3). Octocoral densities in the control quadrats also remained fairly constant throughout the study period ($P > 0.5$).

Divers counted 30% fewer undamaged stony corals in the trawled quadrats during the immediate post-trawl assessment (Fig. 4). Of the seven colonies affected by the trawl, four were moderately to heavily damaged and three were damaged only slightly. Twelve months after trawling, the mean density of *Oculina varicosa* was greater than the pre-trawl estimate (Fig. 4), and damage could not be detected on any of the colonies. Differences in the density of stony corals between sampling periods were not statistically significant in either the trawled or control areas ($P > 0.25$, ANOVA).

All of the species examined in this study were collected in the trawl net, with the exception of the vase sponge *Ircinia campana* and the stony coral *Oculina varicosa* (Table 1). Biomass of the invertebrates collected in the trawl was within the range of biomass estimates from previous trawl collections at inner-shelf stations where trawling distances were longer (SCWMD, 1982). Relatively few fish were collected in comparison with previous catches using this gear (SCWMD, 1982; Sedberry and Van Dolah, 1984). However, the distance trawled was much shorter than in the previous studies. In general, the catch and all observations made during trawling operations indicate that the trawl was fishing properly when it passed through the alley.

DISCUSSION

Data generated from this trawling study support the hypothesis that roller trawls damage sponges and corals found in hard-bottom habitats of the South Atlantic Bight. However, the damage observed in this study was not as severe as that noted in the only other study of trawling effects on this type of bottom (Tilman, 1979). In that study, the effects of commercial shrimp trawling with roller-frame trawls were evaluated in a shallow-water area of Biscayne Bay, Florida. Tilman observed severe damage (specimens crushed or torn loose) to more than 80% of the stony corals, 50% of the sponges and 38% of the soft corals along the trawl path. In contrast, significant damage in our study was limited to sponges, of which 31.7% were found damaged immediately after trawling. Damage to octocorals was much lower, with only 3.9% of the colonies affected in trawled quadrats. A higher percentage of stony corals was affected in our

TABLE 1

List of taxa captured in the trawl net during its pass through the trawling alley

Species	Number caught	Biomass (kg)
Phylum Porifera		
<i>Cliona</i> spp.	3	22.80
<i>Haliclona oculata</i>	1	1.00
<i>Ircinia ramosa</i>	1	0.38
Porifera (undet. fragments)	-	0.90
Phylum Cnidaria		
<i>Leptogorgia virgulata</i>	6	0.54
<i>Lophogorgia hebes</i>	3	0.26
<i>Telesto</i> sp.	-	0.26
<i>Titanideum frauenfeldii</i>	-	0.14
Phylum Mollusca		
Teuthoidea (undet.)	1	0.52
Phylum Echinodermata		
<i>Arbacia punctulata</i>	1	0.05
Holothuroidea (undet.)	1	0.01
Phylum Chordata		
Subphylum Urochordata	-	
Asciacea (undet.)		0.58
Subphylum Vertebrata		
<i>Acanthostracion quadricornis</i>	1	0.27
<i>Aleuterus schoepfi</i>	5	0.46
<i>Momocanthus hispidus</i>	2	0.05
Other (misc. invertebrate fragments)	-	0.19

study (30.4%), but the initial density of those corals was very low in the trawling alley.

Two factors may account for the differences observed between Tilmant's (1979) study and this one. First, the roller-frame trawls used by Florida shrimp trawlers are considerably different in design from the roller trawl used in our study. The shrimp trawl frame generally has non-flexible roller assemblies consisting of steel pipes welded around a central axle to form slatted roller-cylinders approximately 13 cm in diameter (Tabb and Kenny, 1967). The roller assembly used on our trawl, on the other hand, is more flexible because it consists of several short rubber rollers spaced along a chain with smaller rubber discs

separating them. Additionally, these rollers are larger in diameter (30 cm) than the steel-slatted rollers used on the shrimp trawls. The relatively large size and flexibility of this roller assembly undoubtedly accounted for the less severe damage to the large sessile fauna in our study as compared to that produced by the smaller, less flexible rollers used in Tilmant's study.

The second factor which may explain differences between the two studies is related to the number of times the same area of hard bottom was trawled. Although much of the damage Tilmant (1979) described was attributed to a single tow, he noted that his post-trawl assessment followed "... 44 nights of fishing by an average of 10 shrimp boats (440 boat nights) working in the area". Thus, some of the severe damage he observed may have been caused by previous trawling over the same bottom. In contrast, the trawl damage noted in our study purposely reflects the effects of one tow through the alley, since this study was designed to evaluate the effects of our research trawl which typically does not cross the same bottom area more than once (SCWMD, 1982; Sedberry and Van Dolah, 1984). Multiple tows through the alley would probably have caused much greater damage to sponge and coral populations.

Commercial trawlers often drag over the same area more than once to minimize gear damage and loss due to hangs on unfamiliar rocky bottom. Thus, their effect on hard-bottom communities would probably be much greater than that noted for our research trawling. Commercial trawling without roller rigs would have even more serious adverse impacts on bottom communities. For example, C.A. Wenner (unpublished data) collected approximately 477 kg ha⁻¹ of invertebrates (mostly sponges and corals) in a single tow over hard bottom using paired 40/60, 4-seam semi-balloon trawl nets without rollers. On a sand bottom, Bridger (1970) found that tickler chains on trawls could dislodge rocks partially buried in the sand, thereby changing the bottom environment.

In our study, the barrel sponges, *Cliona* spp., were the most severely affected organisms in the trawl path. As noted previously, these sponges are relatively inflexible and thus would be more easily torn or knocked down than sponges such as *Ircinia campana* and *Haliclona oculata*, which are less rigid. Colony flexibility may also account for the comparatively insignificant damage observed among the three octocoral species *Lophogorgia hebes*, *Leptogorgia virgulata* and *Titanideum frauenfeldii*. *Oculina varicosa*, on the other hand, is very brittle and the fact that most of the stony corals in the trawl path were not crushed or broken was probably due to the small size of the *O. varicosa* colonies in this area. This would have allowed many coral heads to escape damage as the trawl bounced over larger organisms. Additionally, the relatively small size of both stony corals and many octocorals would have minimized damage from the trawl leg lines, which apparently drag above the bottom based on evidence of leg-line damage on the sides of larger *Cliona* spp.

The location of the trawl door markers in the alley indicated that the path of the trawl rig was approximately 30-35 m wide. Since the width of the trawl

net and rollers was only about 6 m at the towing speed used (unpublished data), most of the bottom area affected by this trawl rig was damaged by the lower leg lines which connect the net footrope to the trawl doors. Fauna damaged by these leg lines would generally not be captured in the net, as evidenced by the low numbers of sponges and corals collected in our trawl relative to the number found damaged. Thus, it is important to consider gear design in any evaluation of trawl damage to bottom invertebrates. Trawls with doors attached directly to the nets would greatly reduce the bottom area damaged by trawling activities, as would any modifications to the net roller rig that would raise the lower leg lines even further off the bottom.

Sponges and corals damaged in this study appeared to have recovered, at least partially, within 1 year following the trawling operation, since divers could not distinguish damaged from undamaged organisms during the last post-trawl survey. While this capacity for regeneration reduces the likelihood of serious long-term impacts from limited research trawling over hard-bottom communities, the small amount of growth rate information obtained during this study (Van Dolah et al., 1983) suggests that it may take several years for some damaged sponges and corals to attain their original size. Other studies also suggest that sponges and corals in general may be slow growing. For example, Nicol and Reisman (1976) measured *Cliona celata* in New York waters and reported growth data which indicate that it may take several years for *Cliona* to reach sizes equivalent to those present in our study area. Similarly, Grigg (1974) examined two gorgonian corals (*Muricea* spp.) in California waters and noted that it takes approximately 40 years for those corals to reach a height of 50 cm. More extensive data on the recruitment and growth rates of sponges and corals is needed to fully evaluate impacts from roller trawling, particularly since the size and density of these organisms directly influence the structural complexity of hard-bottom habitats and, consequently, the attractiveness of these areas to fishes.

ACKNOWLEDGMENTS

We wish to thank several people who contributed significantly to the success of this study. Those who provided considerable help in the diving efforts included D. Ansley, H. Ansley, C. Cowman, J. Evans, R. Flournoy, D. Harris, D. Herrin, J. Kaufman, B. Kroscavage, B. Mahood, L. Reddick, D. Varnedoe, J. Vickery and J. Wymes. Captain J. Causby and the crew of the R/V "Oregon" worked carefully to ensure that the trawling effort was successful. C.B. O'Rourke assisted in field work and the processing of associated fauna samples in the laboratory, in addition to helping with data analysis and report preparation. N. Peacock typed all drafts of this report and K. Swanson drafted all figures for this report. A. Danneberg of SPD was the on-site observer for the trawling operation and C. Curtis was in charge of the SPD research. We also

wish to thank Drs. C. Barans, C. Wenner and J. Tilmant for their review comments on earlier drafts of this manuscript. This study was funded by the NOAA, Office of Ocean and Coastal Resource Management, Sanctuary Programs Division, under contract No. NA-82-AA-8-C2-098.

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Recruitment Characteristics of the Commercially Harvested Red Sea Urchin *Strongylocentrotus franciscanus* in Southern British Columbia, Canada

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(Accepted for publication 27 August 1986)

ABSTRACT

Sloan, N.A., Lauridsen, C.P. and Harbo, R.M., 1987. Recruitment characteristics of the commercially harvested red sea urchin *Strongylocentrotus franciscanus* in southern British Columbia, Canada. Fish. Res., 5: 55-69.

The test size frequencies of red sea urchin, *Strongylocentrotus franciscanus* (Agassiz), populations from British Columbia revealed low recruitment overall ($\approx 9.5\%$) compared with populations from lower latitudes. Juvenile urchins tended to shelter under adult conspecifics. On a fine scale, i.e. over 0.5-8.0 km, high variability in recruitment was evident. Possible effects of commercial harvesting are discussed. Site-specific harvest controls based on local habitat and urchin population (size-frequency) data are desirable as a fishery management tool, but would be too costly to gather over such an extensive coastal area.

INTRODUCTION

Populations of red sea urchin, *Strongylocentrotus franciscanus* (Agassiz), in southern British Columbia are experiencing increased harvesting by diving fishermen (Fig. 1). A special biological concern with this fishery is that harvesting of adult urchins not only reduces brood stock, but may also affect recruitment by decreasing the amount of spine-canopy shelter provided by adults for young conspecifics (Tegner and Dayton, 1977). Recruitment is defined by Ebert (1983) as being the addition of new individuals, which are just large enough to be collected in proportion to their true abundance, to a population by reproduction or immigration. Estimates of recruitment in British Columbia populations are generally lower than those in southern California