

ALASKA LEGISLATURE SPECIAL COMMITTEE/SUBJECT FILE 8672
2115 SCOMM 79: HOUSE SPEC. COMM. ON OIL & GAS, 1991-1992

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The Settlement May Not Provide Sufficient Funds
For Critical Restoration Needs

The Prince William Sound/Gulf of Alaska ecosystem, which was smothered in eleven million gallons of oil, faces another significant threat: extensive clear-cut logging. The fact that the proposed settlement payments (particularly those which would be due in the first few years under the agreement) may be inadequate to allow the Trustees to prevent this additional threat to the ecosystem is discussed in NWF's Comments on the 1991 Restoration Work Plan. Appendix 1 at 2-5, Attachment B. In addition, as structured, the settlement cannot pass the pragmatic test of providing sufficient funds for needed restoration work.

In public testimony before the Alaska Legislature, both Alaska Attorney General Charles Cole and Alaska Fish and Game Commissioner Carl Rosier stated that they have abandoned the State's previous goal of preventing clear-cut logging via timber acquisition. See Anchorage Daily News, April 17, 1991 (Appendix 5). This significant change in the State's position may confirm that the proposed settlement does not provide money sufficient to achieve this important priority objective²⁵.

III. SETTLEMENT LETS ALYESKA OFF THE HOOK

In NWF's comments on United States v. Exxon Shipping and Exxon Corp., No. A90-015 CR. (D. AK March 13, 1991) (the "Plea Agreement"), the Federation argues that the Plea Agreement

²⁵ The environmental community believed that settlement of natural resource damage claims against Exxon and Alyeska would be sufficient to cover immediate needs such as timber acquisition, continued physical restoration (and the requisite scientific work to direct restoration), and continued cleanup. Moreover, NWF believed that such a settlement would include adequate funds so that all the monies would not have to be spent immediately and could form the principal for an environmental trust.

While the proposed settlement was negotiated, the Natural Resources Defense Council and NWF submitted a memorandum to U.S. Assistant Attorney General Richard Stewart and Alaska Attorney General Charles Cole (Appendix 6), that outlines the benefits of an endowed trust and suggests a way in which the trust could be organized. This approach would create a permanent source of funds that could support restoration work necessitated by effects of the Exxon Valdez spill discovered in the future, as well as serve related educational and pollution prevention purposes.

Unfortunately, it does not appear that the proposed settlement envisions the creation of a trust.

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relieves Alyeska Pipeline of criminal liability, despite convincing new evidence that Alyeska wilfully ignored a legally-binding obligation to clean up spills in Prince William Sound, what Congressional investigators suggest that this dereliction is a criminal violation of the Clean Water Act.²⁶

The Consent Decree compounds this mistake by absolving Alyeska of civil liability to the governments for natural resource damages. As with the Plea Agreement, it appears that Alyeska has been released from this substantial potential liability merely because Exxon drove a hard bargain.

As in our comments on the Plea Bargain, NWF urges the Court to strike these unjust provisions and/or to appoint a magistrate, special master, or independent counsel to review Alyeska's outrageous conduct to determine the fairness of permitting the consortium to substantially benefit from this proposed settlement.

IV. PROVISIONS FOR PUBLIC INPUT ARE INSUFFICIENT

The proposed settlement fails to resolve two important related issues. First, the documents do not set forth any categories of restoration projects that may or may not be considered by the Trustees. Second, the MOA does not establish the types of public participation which would be appropriate. The MOA merely states:

The Trustees shall establish procedures providing for meaningful public participation in the injury assessment and restoration process, which may include establishment of a public advisory group to advise the Trustees....

56 Fed. Reg. 11644 (March 19, 1991). NWF believes the optimum solution to these omissions is to create a vital public participation process.

While the proposed settlement was being negotiated, NWF and NRDC submitted a memorandum to several of the agencies involved in negotiations discussing an option for public participation (see Appendix 7). Essentially, the memorandum outlines a broad based public committee with an independent staff which would consult with involved governmental agencies. NWF urges the Trustees and/or the Court to revise the MOA to require this type of public advisory group.

²⁶ See Appendix 1 at Attachment C.

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NWF also urges the Court to require that the Trustees parallel the public participation approach contained in provisions of the Superfund statute. The statute and regulations contain guidance regarding public participation planning, technical assistance grants for interested members of the public, and public repositories for important documents which relate to restoration activities. Although the Superfund public participation program is not a paradigm,²⁷ it offers the Trustees an established model, as well as a source of professional staff with pertinent experience.

V. AS A MATTER OF POLICY AND AS A MATTER OF LAW
THE REOPENER IN THE SETTLEMENT IS INADEQUATE
TO PROTECT THE ENVIRONMENT FROM UNEXPECTED FUTURE DAMAGES

The Reopener is Unreasonably Narrow

Paragraphs 17-19 of the agreement include a narrowly drawn "reopener" provision that authorizes the governments to reopen the settlement if unexpected damages are discovered in the future. This clause is subject to a \$100 million cap. The terms of this reopener limit availability of those funds: between September 1, 2002 and September 1, 2006. Moreover:

(a) the cost of a restoration project must not be grossly disproportionate to the magnitude of the benefits anticipated from the remediation; and

(b) the injury ... could not reasonably have been known nor could it reasonably have been anticipated by any Trustee from any information in the possession of or reasonably available to any Trustee on the Effective Date.

Consent Decree at paragraph 17.

Thus, solely in the case of an injury which could not reasonably be anticipated based upon "any information ... reasonably available to any trustee" could the government recover up to \$100 million, and there could be no claim before 2002 or after 2006. Moreover, Exxon would fiercely resist any claim to reopen the agreement under this extraordinarily narrow provision.

²⁷ For example, to obtain technical assistance grants, citizens must comply with onerous accounting requirements, meet unrealistic matching fund requirements, and compete for limited funds.

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Except in an extremely unusual situation, the public -- not the criminally culpable polluter -- bears the risk of unforeseen injuries. This reopener is a mirage.

The Reopener Violates the Law

The federal government's complaint states in paragraph 6, the "United States of America is trustee for the natural resources injured by the spill pursuant to various federal statutes and treaties which include . . . the Clean Water Act, 33 U.S.C. §1251 et seq.; [and] the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §9601 et seq...." CERCLA, the Superfund statute, provides specific requirements for a settlement in which Trustees covenant not to sue a polluter for damages to natural resources. For example, CERCLA requires that except in certain extraordinary circumstances not present here:

a covenant not to sue a person concerning future liability to the United States shall include an exception to the covenant that allows the President to sue such person concerning future liability resulting from the release or threatened release or threatened release that is the subject of the covenant where such liability arises out of conditions which are unknown at the time the President certifies ... that remedial action has been completed at the facility concerned.

42 U.S.C. §9622(f)(6)(A).

It has been established in a precedent-setting case in which the United States and the National Wildlife Federation were parties, that a settlement into which the United States enters which contains a covenant not to sue for natural resource damages under CERCLA must include a reopener (as required by section 122(f)(6)(A)). In re Acushnet River and New Bedford Harbor: Proceedings Re: Alleged PCB Pollution, 712 F.Supp. 1019, 1037-38 (D.Mass. 1989). As the Court explained:

The thrust of this subsection is to ensure that the federal government, and thus ultimately the taxpayer, does not bear the costs of future unknown damages. Rather, such costs appropriately should be borne instead by those responsible for the pollution. This is in keeping with Congress' intent to make responsible parties pay for the problems caused by their own pollution..

Id. at 1037. The Court went on to hold that even if the actual specific terms of CERCLA requiring a reopener did not apply to

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the settlement there at issue, the policies underlying Congress' adoption of the reopener provision rang as true for that settlement as they did for CERCLA cleanup settlements. The Court explained that

Admittedly, requiring such a [reopener] provision will make settlements somewhat more difficult to achieve. Beyond peradventure, however, Congress is willing to accept such a trade-off in return for greater security that the settlement will adequately resolve a pollution problem in the cleanup context and no reason is evident why that intent should not apply to the natural resource damages context.

Id. at 1038.

In the case of the Exxon Valdez settlement, the "Governments release and covenant not to sue ... with respect to any and all civil claims, including claims for Natural Resource Damages, ... [and] including, without limitation any and all civil claims under all federal or state statutes...." Agreement paragraph 13 (emphasis added). Thus, it is clear that the United States has granted a covenant not to sue Exxon for natural resource damages under CERCLA.²⁸ In order to do so, the United States must include a reopener as required by CERCLA section 122(f)(6)(A) and the New Bedford Harbor decision. Unfortunately, the reopener as drafted is so narrow as to render it meaningless, and includes a

²⁸While it is arguable that Superfund does not apply to a spill of oil, recent allegations have been made that supertankers in the TAPS trade, including the Exxon Valdez, carry hazardous waste water in addition to crude oil. "Exxon Confirms Waste Water Charges; Move May Impede a Valdez Settlement," Wall Street Journal February 19, 1991 (Appendix 8). If it were true that the Exxon Valdez were carrying hazardous waste or other CERCLA hazardous substances, CERCLA's liability provisions would clearly apply.

In addition, the settlement specifically waives all natural resource damage claims under any federal statute--obviously including CERCLA. Thus, to the extent that the settlement waives CERCLA claims, it must abide by section 122 of CERCLA's limits on settlements, including the reopener provision, and the provision in section 122(j)(2) requiring the polluter to take necessary steps to protect and restore injured resources. See New Bedford, 712 F.Supp. at 1032-38. Finally, it is clear that the policies enunciated by Congress for hazardous substance spills are equally applicable in the context of an oil spill. The polluter, rather than the taxpayer, should bear the risk that there is unknown damage.

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cap that eviscerates the purpose of the provision. The reopener must be revised to allow the government to reopen the agreement for unexpected damages at any time without the \$100 million cap.

Finally, it should be noted that Clean Water Act sections 311(f)(4) and (5) require that the Trustee restore the natural resources injured by the spill. If natural resources are injured by unexpected impacts of the spill, the narrow reopener combined with the inadequate payment schedule for restoration virtually assures that these obligations will be unfulfilled.



Working for the Nature of Tomorrow

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COMMENTS OF THE NATIONAL WILDLIFE FEDERATION
ON THE DRAFT 1991 RESTORATION WORK PLAN
REGARDING
THE EXXON VALDEZ OIL SPILL
[56 Federal Register 8898, March 1, 1991]

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April 15, 1991

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INTRODUCTION

The National Wildlife Federation ("NWF" or "the Federation") is very concerned about the failure of the Exxon Valdez oil spill 1991 Restoration Work Plan to provide urgently needed protection to wildlife habitat in and around Prince William Sound which is threatened by clear-cut logging (and other threats). The natural resources Trustees must take immediate steps to ensure habitat protection as part of the 1991-92 restoration program for the catastrophic Exxon Valdez spill¹. In order to satisfy this critical need, the Trustees should defer recovery of past costs from the payments pursuant the proposed settlement and/or use their own money and seek compensation from the tail end of the settlement payments. The Trustees should act quickly and ensure that there are adequate funds to restore the stressed environment in the Sound or face a collapse in critical elements of these fragile ecosystems.

NWF is the nation's largest private conservation education organization. Founded in 1936, the Federation, its 5.5 million members and supporters, and 51 affiliated organizations, educate, empower, and inspire individuals and organizations to conserve fish, wildlife and other natural resources, to protect the environment, and to build a globally sustainable future.

For several years, NWF has been involved in oil spill and natural resource damage issues. The Federation is actively working on oil spill issues and is on the forefront in urging safeguards to prevent damages such as those associated with the Exxon Valdez oil spill. NWF, the Wildlife Federation of Alaska and the Natural Resources Defense Council, represented by the Trial Lawyers for Public Justice, have filed suit against Exxon and Alyeska Pipeline requesting the court create a trust fund which would aid in restoring the natural resources damaged by this catastrophe. In addition, the Federation continues to participate in the Valdez spill natural resource damage assessment process via comments submitted in the public record.

¹ Under the scheme set out in the Clean Water Act and the Superfund statute, trustees must be appointed to represent injured natural resources. In the case of the Exxon Valdez oil spill, there are both federal and state trustees (collectively, the "Trustees"). The federal trustees are: Department of the Interior, Department of Commerce (through the National Oceanic and Atmospheric Administration, NOAA), and the Department of Agriculture (the "Federal Trustees"). The Alaska state trustees are: Department of Fish and Game, Department of Environmental Conservation, and Department of Law (the "State Trustees").

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The Federation welcomes this opportunity to provide input on the 1991 Restoration Work Plan for the Exxon Valdez oil spill. This Work Plan is important to NWF, its members and supporters. As one of the principal plaintiffs in the State of Ohio et al. v. Department of the Interior, 880 F.2d 432 (D.C. Cir. 1989) and State of Colorado et al. v. Department of Interior, 880 F.2d 481 (D.C. Cir. 1989) (collectively, "Ohio case"), NWF confirmed that restoration, replacement, and acquisition of the equivalent (hereinafter sometimes referred to simply as "restoration") of damaged natural resources in the paramount goal of governmental Trustees representing those resources. Similarly, in In Re Acushnet River and New Bedford Harbor: Proceedings Re: Alleged PCB Pollution, 712 F.Supp. 1019 (D. Mass 1989), NWF intervened and successfully established the important precedent that natural resource damage settlements must include measures to assure restoration and must include a "reopener" for certain long-term damages.

**IMPLEMENTATION PROJECT 4, ACQUISITION OF HABITAT,
WARRANTS HIGHEST PRIORITY AND IMMEDIATE ACTION**

The Exxon Valdez oil spill was a colossal assault on the Prince William Sound ecosystem². As the eleven million gallons of oil spread through the Sound and into the Gulf of Alaska and other areas, a parallel assault began on the same ecosystem. In various locations across the Sound, logging activities were planned or initiated. Due to the steep slope of the forests surrounding Prince William Sound and the clear-cutting practices employed by loggers, this logging compounds the serious threat posed to the entire ecosystem. Critical components of the area's ecosystem brought to the brink of devastation by the spill could be overcome by the added environmental insults engendered by clearcutting.

Clear-cut logging causes erosion which threatens water quality and thus threatens fish that depend on the streams and

² This assault is more tragic because it was completely avoidable. Investigations concluded that Exxon's negligence in pushing its small crews to high-speed transit and exhaustion in dangerous conditions combined with disregard of Captain Hazelwood's severe alcohol problem contributed to the grounding. Further, documents recently released by California's Representative to Congress, George Miller, conclusively demonstrate that Alyeska Pipeline Service Corporation unilaterally abandoned its legally-binding obligation to fully protect Prince William Sound from spilled oil.

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coastal areas in the Sound. Logging also eliminates or degrades habitat for much of the wildlife hardest hit by the spill, including eagles, seabirds, anadromous fish, and other marine and terrestrial fauna. Summaries of natural resource damage assessment studies conducted by the Trustees and recently released by the Federal Trustees, while conclusory and not accompanied by actual data or studies, suggest the magnitude of impact from the spill and reveal the extent to which these effects are likely to last. These ecosystems are reeling from the effects of an eleven million gallon oil spill compounded by environmental degradation associated with extensive clear-cut logging.

Fortunately, the degradation caused by the logging is completely avoidable. As "Project 4" in the Federal Register notice makes clear, one of the principal restoration options available to the Trustees is acquisition of equivalent resources. 56 Fed. Reg. 8899 (March 1, 1991). As in the case of the Exxon Valdez spill, where damage to the natural resources is so extensive that direct restoration and replacement activities cannot fully put the ecosystem back on its feet, equivalent resources "that provide[] the same or substantially similar services as the injured resources" must be acquired. Id.; see also, Ohio case. And where the cost of direct restoration and replacement activities and acquisition of equivalent resources does not equal the total amount of direct, use and non-use damages caused by the spill³, the damages recovered for lost use and non-use value must be used to compensate the public and the injured ecosystem through additional restoration and acquisition.

One of the Trustee agencies, the Alaska Department of Fish and Game, recognized logging as a threat to the Prince William Sound and persuaded the Governor to request a \$40 million appropriation from the Alaska Legislature to acquire timber rights to the trees most likely to be felled. The Department's goal is to commence acquisition of equivalent resources in order to avoid the deleterious effects of planned logging. As the 1991 Work Plan Federal Register notice correctly explains:

Failure to undertake timely restoration may allow damages initiated by the spill to continue or

³ Recent press reports indicate that the economic use and non-use damages caused by the spill are in the range of \$3-8 billion. See Attachment A. "Non-use" damages, which are recognized by statute and by federal courts, are damages suffered by individuals through interference with their option to visit the injured resources or through destruction of those resources.

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accelerate, as in the case of the loss of stabilizing vegetation on beaches. In other cases, protection of strategic habitats, subject to land-use changes, can reduce cumulative stresses on injured resources and maintain, in the near term, a full range of restoration options. Finally, the importance of a resource for subsistence, commercial, or recreational purposes may justify prompt restoration action.

Id. at 8902.

The Governor's first proposal of this project to the Alaska Legislature, and a December 21, 1990 draft of the Federal Register notice on the 1991 Work Plan obtained by NWF, provided \$40 million for such initial acquisition. There are few differences between the December 21 draft and the final March 1, 1991 Federal Register notice; one critical difference, however, is that this \$40 million price tag for implementation project four, "Protection of Strategic Fish and Wildlife Habitats and Recreation Sites," has been deleted. NWF is deeply concerned that this deletion may signal a retreat from the Trustees' commitment to swift acquisition of critical habitat.

Experts who have analyzed restoration options recognize its importance and conclude that \$40 million could pay for no more than a pilot project. This sum would likely be able to protect only a small fraction of the most threatened habitats; at least \$300 million is needed in the short term just to protect certain Prince William Sound and upper forests from logging⁴.

Thus, the \$40 million price tag could have been deleted from the Federal Register notice because the Trustees recognized that the figure is too low. Unfortunately, it is probable that the number was deleted pending receipt of information regarding the amount of money which will be available from the proposed settlement.

Thus, it appears that the Trustees failed to analyze what measure of restoration is necessary; instead they are tailoring the restoration program to the small amount of funds projected to become available in the short term from the settlement.

⁴ A single study regarding the cost of purchasing timber rights for Prince William Sound and the Upper Kenai Peninsula concludes that \$200-300 million is needed. See Attachment B. N.B. this does not include timber rights for other areas and does not analyze threats to habitat other than logging.

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NWF strongly objects to this backward thinking. Instead of attempting to decide the extent of restoration and acquisition that is possible with the funds recovered through settlement, the Trustees are under an obligation to determine the costs of restoration, replacement, and acquisition necessary to return the ecosystem to full productivity and diversity, plus the lost value of the resources. Then, the next step is to ensure that funds are sought to fulfill these obligations. See, Ohio case.

The Federal Register notice states: "When the full amount of restoration funds that will be recovered has been resolved, final determinations will be made concerning the nature and scope of the remaining phases of restoration." Id. at 8899. Thus, due to the settlement's limitations, under the approach announced in the Federal Register notice, the Trustees may not be able to prevent extensive clear-cut logging from permanently crippling Prince William Sound's ecosystem and recreation values.

Contrary to the appropriate approach, the Federal Register notice also acknowledges that "[w]here the nature of the resource injury is reasonably clear, it may be desirable to begin restoration prior to receipt of funds from the parties responsible for the oil spill." Id. at 8902. NWF strongly urges the Trustees to proceed with a greatly expanded version of project four: the immediate threat of logging to Prince William Sound is clear⁵. This is, at a minimum, the fiduciary obligation of the Trustees.

THE SCIENTIFIC STUDIES OF THE SPILL'S IMPACTS MUST BE
RELEASED TO ALLOW MEANINGFUL PUBLIC PARTICIPATION AND TO
ENSURE PROPER RESTORATION.

One of the most important problems with the restoration plan is the complete failure of the Trustees to release the basic scientific data upon which any restoration plan must be based. Without the scientific analyses and data on the spill's impacts, the public and independent scientists who are not privy to the massive data banks accumulated by the Trustees and Exxon cannot provide meaningful comments on the plans for restoration, replacement, and acquisition. The data and analyses must be released now.

⁵ Logging is the most dramatic threat to the ecosystem. Similar protection should be applied in the context of existing and planned mining and development efforts. These additional threats underscore the insufficiency of the original \$40 million price tag attributable to Project Four.

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The federal government's recent decision to release a brief summary of these data as part of the settlement is a small step in the right direction. However, the information provided in this summary is oversimplified and conclusory, and is not accompanied by the actual basic data or scientific analysis necessary for the public and outside scientists to understand and comment upon the results. Without these data and analyses regarding the extent of the injuries to the important elements of the ecosystem at locations throughout the affected area, the public cannot assess likely past and future impacts of the spill. Therefore, in many cases it is impossible to advise the Trustees regarding the optimum restoration approaches. This is a violation of the legal requirements to provide opportunity for public participation in the restoration planning process pursuant to the Administrative Procedures Act, the National Environmental Policy Act, and the Clean Water Act.

**THE PROPOSED SETTLEMENT SHOULD NOT DISRUPT THE DAMAGE
ASSESSMENT AND RESTORATION PROCESS**

On March 13, 1991, the United States and Alaskan governments announced a proposed settlement agreement reached with Exxon Shipping and Exxon Corporation⁶. The prospect that the settlement may provide money to finance restoration activities should not short-circuit or distort the essential program of scientific studies of the on-going damage to the Prince William Sound caused by the Exxon Valdez. In the absence of this scientific program, comprehensive restoration is impossible. Furthermore, surrendering this program also surrenders the already very limited value of the rigid reopener provision contained in the Consent Decree.

The proposed settlement includes a criminal plea agreement⁷ and a settlement of civil claims memorialized in a Consent Decree and a Memorandum of Agreement. The agreements would allow Exxon to extend its payments, and the governments' proposal for implementing the agreements creates perverse incentives to short-circuit crucial elements of the damage assessment and restoration process.

⁶ Alyeska Pipeline achieves significant benefits from the settlement terms. The Company is relieved of criminal liability, despite recently disclosed evidence of criminal behavior in connection with developing its contingency plan. The Company is also absolved from paying damages pursuant to civil claims by the governments for natural resource damages.

⁷ See Attachment C -- NWF comments on the plea agreement.

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The Settlement Terms

If approved, the criminal plea agreement requires a criminal restitution payment of \$50 million to the State of Alaska. The plea agreement restricts use of the monies to restoration activities⁸. The civil Consent Decree also requires payments of monies which are limited to restoration expenditures⁹. According to the Decree, Exxon must pay \$900 million over a ten and a half year period. Theoretically, an additional \$100 million could be available via a narrowly drawn reopener provision. The governments are authorized to deduct up to \$134 million in costs incurred and paid in the past and most of these deductions would be applied in the first few years of the payout schedule.

The Consent Decree provides that the agreement can be reopened to pay damages discovered after the settlement is lodged with the court (between September 1, 2002 and September 1, 2006).

⁸ The agreement provides that the money is to be used:

exclusively for restoration projects relating to the "EXXON VALDEZ" oil spill. Restoration includes restoration, replacement and enhancement of affected resources, acquisition of equivalent resources and services, and long-term environmental monitoring and research programs directed to the prevention, containment, cleanup and amelioration of oil spills.

Plea Agreement at 8, United States v. Exxon Shipping and Exxon Corp., No. A90-015 CR. (D. AK March 13, 1991) ("Plea Agreement").

⁹ The Consent Decree requires that the settlement money be used:

to assess injury resulting from the Oil Spill and to plan, implement, and monitor the restoration, rehabilitation, or replacement of Natural Resources or natural resource services injured, lost, or destroyed as a result of the Oil Spill, or the acquisition of equivalent resources or resource services.

Agreement and Consent Decree at 10-11, United States v. Exxon Corp., Exxon Shipping, Exxon Pipeline, and T/V Exxon Valdez, No. A91082 Civil and State of Alaska v. Exxon Corp., Exxon Shipping, Exxon Pipeline, and T/V Exxon Valdez, No. A91083 Civil (D. AK March 13, 1991) ("Consent Decree").

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If the reopener is exercised, an additional \$100 million is provided to restore "one or more populations, habitats, or species which, as a result of the Oil Spill, have suffered a substantial loss or substantial decline in the area affected by the Oil Spill." Consent Decree at 17. However, reopener cannot be invoked unless the governments show that the cost of the remediation is not grossly disproportionate to the benefits to be achieved and that the injury "could not reasonably have been known nor ... anticipated by any Trustee from any information in the possession of or reasonably available to any Trustee" at the time the Consent Decree is approved. Consent Decree at 18 (emphasis added).

More Money Is Required For Needed Restoration

This proposed settlement may sound like it provides a lot of money for Prince William Sound, as much as \$1.1 billion, and the terms specifying uses for the money appear to limit the spending to needed restoration projects. However, after closer review a very different picture emerges.

In fact, pursuant to the agreement, only about \$55 million will be available for replacement and acquisition of natural resources from 1991 through most of 1992. Another \$15 million will be available for restoration planning and to initiate restoration projects.¹⁰

Thus, the Trustees have created a dilemma for themselves. The proposed settlement, with its small yearly payments, and the Trustees' apparent decision to recoup their past expenses from the settlement payments in the first few years¹¹, combine to prevent the Trustees from addressing the most critical threat to

¹⁰This amount includes the \$50 million criminal restitution payment, and the \$90 million first payment under the consent decree minus approximately \$45 million in past costs. Of this \$95 million, a NOAA fact sheet (Attachment D) indicates that \$25 million will be used to continue the science program and \$15 million will be used for restoration planning and to initiate restoration pilot projects. This leaves only \$55 million for any replacement or for acquisition of threatened habitat in 1991 through most of 1992 -- if the Trustees are willing to address these critical needs.

¹¹ According to NOAA, the deductions from settlement payments to recoup past costs, totaling \$134 million, will be exacted under the following schedule: 1991, \$45 million; '92, \$40m; '93, \$40m; '94, \$5m; '95, \$5m. (These amounts are approximate.)

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Prince William Sound since Exxon spilled eleven million gallons of oil: the clear-cut logging that threatens the ecosystem and recreation values of the Sound.

Alaska Trustees Want To Dismantle The Science Program

According to recent press reports (Attachment E), the Alaska Trustees are seeking to end the damage assessment and restoration studies so that more funds will be available to pay for restoration implementation. According to press reports, John Sandor, Commissioner of Alaska's Department of Environmental Conservation, and Carl Rosier, Commissioner of Alaska's Department of Fish and Game, argue that most of these studies are "litigation-driven" and must be cut. However, these studies are important. Completion of the studies will reveal information about the full impacts of the spill, enabling the Trustees to invoke the reopener in the settlement, if necessary, and to effectively carry out restoration.

The Science Program Is Essential

Ironically, the greatest threat to the restoration program has been the litigation process. Short-sighted lawyers have dominated the scientific program and prevented scientists from publishing results, prevented public review, and have cut or eliminated necessary studies. The lawyers, generally, have focused the program on counting dead bodies instead of looking at the whole ecosystem -- missing the forest for the trees. It would be tragic if a settlement should somehow create financial incentives to entirely eliminate an already narrowly drawn science program.

Abandoning the science program would be tantamount to abandoning any hope of making use of the narrow reopener provision in the proposed settlement¹². Any proposal to reopen the settlement in 2001 or 2002 has to be based on scientific data that could not have been reasonably anticipated by any Trustee as of the date of the settlement. If the science program is terminated, the narrow conditions of the reopener provision become completely useless. Thus, impacts of the spill which are presently unknown could not be remedied with settlement funds.

The science program must guide restoration planning. It is impossible to restore the ecosystem unless there is knowledge

¹² As is more fully discussed in our comments on the civil settlement, NWF is deeply concerned with the legality and appropriateness of the narrow reopener and the \$100 million cap on it.

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about the nature and extent of injuries¹³. Otherwise, restoration will be inadequate because of the small yearly payments this proposed settlement would provide. The Trustees can ill afford this approach.

The Solution

NWF urges the Trustees to adhere to the science program, and use all other available funds for acquisition of threatened habitat. It is urgent that the Trustees forego collecting previously incurred or paid costs until threatened habitat is protected and spend their own money NOW to protect habitat. The Trustees should postpone reimbursement of these costs until prospective payments are made in later years. Any other approach could doom Prince William Sound's fragile ecosystem.

**UNACCEPTABLE DELAY BY THE STATE CRIPPLES
PUBLIC PARTICIPATION IN DEVELOPING THE WORK PLAN**

On November 19, 1990 the Trustees published a Federal Register notice which announced that on December 28, 1991, there would be another Federal Register notice announcing the 1991 Restoration Work Plan. 55 Fed. Reg. 48160 (November 19, 1990). NWF applauded this November notice as an earnest effort by the Trustees to ensure meaningful public participation and comment on this important document. Unfortunately, this second Federal Register notice did not appear until March 1, 1991 -- two months late.

There is no substantial reason for delay which cripples public efforts to comment on the Work Plan and the Trustees' efforts to carry out critical restoration duties.

NWF has obtained a draft December 21, 1990 of the Federal Register which was planned to be published on December 28. There are few differences between this draft and the final version that appeared over two months later. Clearly, the December 21 draft could have been printed in the Federal Register on December 28 as planned.

¹³ In its state court lawsuit, NWF and its co-plaintiffs have asked the Court, by motion, to order all parties to submit their scientific data into a central, public repository. Attachment F is one of several affidavits which were filed in support of this motion. Paragraphs 3-10 are particularly informative regarding the value of open science and the need for broad, multi-disciplinary ecosystem studies.

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The delay remains unexplained. The result: the public has lost any meaningful opportunity to comment on the Work Plan and the Trustees will lose some of the scarce good weather available for conducting restoration studies and implementation projects suggested by the public¹⁴.

The 1991 Work Plan was not announced in the Federal Register until March 1, and the comments will not reach the Trustees until April 15 -- over a week after the 1991 NRDA Plan was released. The 1991 NRDA Plan contains no new information about restoration planning. The Trustees are currently hoping to publish an additional Federal Register notice regarding restoration plans by May 3, with comments due one month later, the same day as comments for the 1991 NRDA Plan are due. This new schedule will require the Trustees to digest all public comment received on the 1991 Work Plan and prepare a Federal Register notice in less than two weeks.

This skewed schedule places the Trustee agencies in a very difficult position. If they value public comment and their obligation as public servants to listen to public concerns, they risk delaying critical restoration projects. Every day they delay commencing needed restoration studies and implementation projects, is a day of loss to the environment of Prince William Sound.

NWF urges the Trustees to accept public comment regarding a revised restoration plan on an accelerated timetable so that the 1991 field season will not be missed.

ADDITIONAL NWF CONCERNS

The Restoration Program Should Focus on

¹⁴ The first opportunity for public comment on the natural resource damage assessment and restoration planning process occurred in August, 1989. The public "opportunity" was a comment period pertaining to a set of studies that had already been conducted the previous summer. Although the Trustees argue that they had little alternative given their immediate need to commence studies once the spill took place, this argument fails when applied to the 1990 studies; although a draft version of the document describing the studies was completed in the spring of 1990, it was not released for public comment until August -- again, too late for meaningful public comment. Nothing exonerates excluding the public in 1989; the Trustees could have used alternative means to solicit public comment, including holding public meetings and circulating draft documents.

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Species Most Affected By The Spill

The recently released damage assessment summaries suggest that the spill has had and will continue to cause dramatic impacts on several species. Because of the secrecy pervading the scientific damage assessment process, it is impossible for the public to assess the extent of damage and to comment upon the proposed program to restore the resources. However, from the limited summary information available, it appears that the most dramatic impacts are on the murre colonies. The summaries indicate that about 300,000 murrelets died and that at least 215,000 chicks were not born because of the spill's various effects. Prince William Sound eagles were also hit hard, and a very poor breeding season in 1989 will probably have long-term effects on the eagle population.

The summaries also indicate that the oil continues to effect many species including sea and river otters and harbor seals. In addition, work is continuing in terms of analyzing the effects of the spill on the sea lion population, which was already in decline, probably due to multiple development and pollution-related factors. Finally, the summaries describe very significant impacts in the intertidal and, to a lesser degree, the subtidal habitats.

NWF urges the Trustees to devote their energies to developing restoration and acquisition programs to address these significant injuries.

Factors For Evaluating Restoration Alternatives

The Federal Register notice sets forth several factors proposed by the Trustees to evaluate potential restoration alternatives. 56 Fed. Reg. 8899 (March 1, 1991). These factors include "adequacy of natural recovery." Id. However, the exigency of the restoration work is not included as a factor for evaluation.

NWF believes there are substantial difficulties associated with predicting future natural recovery. Therefore, NWF urges the Trustees to limit consideration of natural recovery as one of the routine factors used to determine restoration options. Any use of natural recovery in analyzing restoration alternatives should place a heavy emphasis on the burden of proving, through strong scientific evidence, that natural recovery would occur subsequent to the spill. Uncertainties about future recovery of the ecosystem should be resolved in favor of active restoration programs, such as acquisition of equivalent resources.

NWF urges the Trustees to include an additional key factor: exigency of the restoration work. Some restoration projects are

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more urgent than others due to prospective effects of outside events, such as actual and planned logging in the impacted area. The potential adverse environmental impact of outside events highlights the importance of timing restoration work to enhance benefits to the affected area.

In addition, the Federal Register notice suggests that the Trustees would evaluate the "reasonableness of the cost of the restoration project in light of the value of and ecological significance of the resource" 56 Fed. Reg. at 8899. This criterion may only be applied in accordance with the mandate of the Ohio case, which states that restoration or replacement is required when its cost is "grossly disproportionate to lost values."

CONCLUSION

NWF urges the Trustees act immediately and to ensure the availability of sufficient funding to protect Prince William Sound from the immediate threat of clear-cut logging. The Trustees also must release the scientific studies. Added to the significant insult from the Exxon Valdez oil spill, this logging could be fatal to the Sound's damaged ecosystem. The Trustees bear a special responsibility and have a unique opportunity to avert this additional tragedy. Furthermore, if the settlement is approved, the Trustees should first fulfill their obligation to protect the interests of the environment by deferring until later years recouping previously incurred or paid litigation and investigation costs.

Value of Intangible Losses From Exxon

Valdez Spill Put at \$3 Billion

By John Lancaster
Washington Post Staff Writer

Confidential government studies have estimated the "social cost" of the Exxon Valdez oil spill at \$3 billion, nearly three times the \$1.1 billion that Exxon has agreed to pay to settle criminal and civil charges arising from the accident.

The controversial economic studies, conducted for the state of Alaska and the federal government, are an attempt to assign a dollar value to intangible losses said to have been suffered by the American public as a result of damage to wildlife and natural habitat. Economists polled households nationwide to arrive at the estimate, which would have figured prominently in Exxon's trial had the case not been settled out of court.

There is no guarantee that a judge and jury would have accepted the \$3 billion estimate, which was provided to The Washington Post by one of the economists involved in the studies. Federal officials defended the settlement as a landmark penalty that avoids a costly and uncertain trial while providing immediate cash for cleanup and restoration.

But critics noted that several recent court decisions have upheld the validity of social cost studies for valuing environmental catastrophes, suggesting that Exxon may have gotten off too lightly. "The federal government has a fiduciary responsibility to the citizens to look out for these resources, to provide a market signal that if you do damage, this is what it's going to cost you," said an economist familiar with the studies.

In affirming the method two years ago, a three-judge federal appeals court panel ruled that although "the extent of damage to natural resources from releases of oil and hazardous substances varies greatly... it is in the mission of [federal law] to assess the public loss."

Exxon declined to comment on the studies.

William K. Reilly, administrator of the Environmental Protection Agency, said in an interview that while such studies "have their place

... they're new, there's not a lot of litigation, and courts haven't awarded anything on the basis of how much somebody says they're willing to pay to save a river otter."

State and federal officials, citing unresolved claims from third parties such as fishermen and Native Alaskans, have refused to make any information from damage studies available to the public. "We won't do so unless we get a commitment from the plaintiffs that they won't sue us with the information," said a spokesman for Alaska Gov. Walter J. Hickel (D).

If nothing else, the debate over the economic studies illustrates the difficulty of assessing damage to natural resources from accidents

such as the Exxon Valdez spill, the nation's worst. Some values, such as cleanup costs and measurable financial damage to tourism and commercial fishing, are relatively easy to calculate. But the question of intangible losses has proved harder to resolve.

What, for example, is the price of a dead sea otter or sea bird, both of which society presumably holds dear even though they have no commercial value?

In the past, the federal government has assigned market values to dead wildlife, such as \$15 for a fur seal or \$35.74 for a Canada goose. But the appeals court decision found that such methods did not adequately compensate the public,

and ordered federal agencies to give more weight to intangible losses in figuring the bill for environmental catastrophes.

Norman Meade, chief economist of the damage assessment branch for the National Oceanic and Atmospheric Administration, declined to comment on the substance of the economic studies and said he feels "fine about the settlement."

But he also defended the methodology of so-called contingent value studies, describing them as "the only way to get at these kinds of values." He added, "When these [resources] are interfered with, there is a social cost, the public has lost some general welfare, and that's what we're trying to estimate."

In evaluating the losses, economists hired by the state of Alaska developed elaborate surveys aimed at calculating the public's "willingness to pay" for a clean Prince William Sound. Beginning in 1989, the economists met with "focus groups" in Seattle, San Diego and Baltimore with the aim of exploring "how people think about the oil spill and its consequences," one of the surveyors said. "You use these to find out the language and assumptions people use so you can frame your questions accordingly."

After pilot surveys in San Francisco, Toledo and rural Georgia—"They're sort of middle America," the economist explained—the contractors surveyed 1,000 households

nationwide. Surveyors conducted face-to-face interviews in which they displayed photographs and other information about the spill, then asked respondents how much they would be willing to pay to protect Prince William Sound from future spills.

Preliminary results from the survey, conducted in January and February, showed a median amount of \$30 for each household, or—figuring there are 100 million households in the country—\$3 billion for the American public as a whole, according to one of the economists. Although the federal government had not progressed as far with its studies, a federal official said the \$3 billion figure was "in the ballpark."

Information believed to be in spill studies

By CHARLES WOHLFORTH
Daily News reporter

Studies commissioned by the state and federal government on the Exxon Valdez oil spill reportedly suggest serious, long-term damage to Alaska's coastal environment and an astronomical price tag for that damage.

The governments have spent more than \$70 million on the studies, but their results remain secret. But some information has leaked out, including these points:

- Seaweed beds in Prince William Sound that provide the basic fuel for the ecosystem of sheltered bays were badly damaged;

- Recovery is in doubt for colonies of murre on islands south of the Kenai Peninsula hit hard by the spill because the oil caused long-term disruption to their reproductive process;

- And economic surveys

designed to show the cost of the spill to society as a whole placed the price Exxon could be made to pay at \$3 billion to \$8 billion.

The economic studies used a method called contingent valuation to survey a cross-section of Americans on the value they place on natural resources. A federal court validated the method.

Workers on the studies anonymously told The Washington Post that one of the studies set a damage figure of \$3 billion, the newspaper reported March 20. That figure was partly confirmed when Tom Campbell, general counsel for the National Oceanic and Atmospheric Administration, told a U.S. House committee the study's \$3 billion to \$5 billion finding might be hard to prove in court, said National Wildlife Federation attorney Doug Wolf.

A source working on the case told the Daily News Friday those numbers were low. More recent data indicate damages of \$3 billion to \$8 billion would be defensible in court, the source said.

The information on murre colonies first was reported in a Post article Feb. 21. It cited leaked documents that said murre colonies had suffered a total reproductive failure and might not recover for 70 years. The cause of the failure was said to be a lack of adult birds to defend eggs.

David Nysewander, investigator of the colonies for the U.S. Fish and Wildlife Service, appeared inadvertently to confirm that conclusion when he explained murre reproduction to a reporter last week.

Nysewander said murre's reproductive success depends on synchronized egg laying, which allows them to band together to defend

nesting birds. Laying usually takes place all in one month. But his group has had to change plans, extending its visits to the colonies across several months — and that suggests the egg laying is no longer well-synchronized.

"If there were changes, you have to look at it differently," he said. "But I can't tell you about that."

The information on seaweed in Prince William Sound comes from environmental attorneys.

"It's only just very vaguely being leaked out by the concerned scientists involved," said Bill Rossbach, an attorney representing environmental plaintiffs against Exxon. "There are a number of scientists who are concerned."

"They're finding what the inside people say is very substantial deterioration of that crucial part of the food web," Rossbach said.

ATTACHMENT B

The Coastal Coalition

Box 2424, Cordova, Alaska 99574
907-424-5509 FAX 907-424-5246

Dear Friends,

July 4, 1990

Enclosed is a "Draft Proposal for a Comprehensive Settlement of Natural Resource Damages from the 'Exxon-Valdez' Oil Spill" and an attached discussion paper on the "Acquisition of Timber Harvesting Rights for Restoration".

This document was developed in response to requests from commercial fishermen, Alaska Natives, environmental groups, tour operators, recreationalists, and biologists that we now join together to formulate a constructive resolution to this disaster. It is intended to serve as a catalyst for settling natural resource damages in a fair and expeditious manner. As such, it is being circulated for review to the private and public plaintiffs and the defendants in the case.

It is hoped that a consensus will emerge among the parties involved to proceed in negotiating and finalizing such a settlement this year.

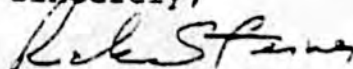
The Coastal Coalition is an informal network of concerned citizens that formed in response to the spill in order to provide a constructive focus for citizen input. Presently, our goal is to help formulate a comprehensive settlement for natural resource damages that is agreeable to all parties. Such a settlement would side-step years of costly litigation, provide for environmental restoration, and allow all of us to get on with life.

Our intent with this inquiry is to plant the seed and get some indication of your interest in having such settlement negotiations proceed. Please let us hear from you as soon as possible concerning any comments you might have on the enclosed document, and whether or not you agree to it in principle. Your thoughts are very important to this process. It is our intent that any final agreement should be molded to accommodate the most broadly based constituency possible.

We will be in touch with you regarding a meeting with other public and private plaintiff's representatives to discuss all of this, probably sometime in early August.

Let's join together to put this thing behind us.

Sincerely,



Rick Steiner, The Coastal Coalition

DRAFT PROPOSAL

for a

COMPREHENSIVE SETTLEMENT OF NATURAL RESOURCE DAMAGES FROM THE "EXXON-VALDEZ" OIL SPILL

TO: State/Federal Trustees for Natural Resources Damages

FROM: THE COASTAL COALITION
July 1990

It has become evident that all parties, both plaintiffs and defendants, involved in litigation for natural resource damages arising from the Exxon-Valdez oil spill would be best served by reaching a comprehensive settlement as soon as possible. This realization is predicated upon several considerations.

First, even after years of exhaustive impact assessment research, it would remain difficult to arrive at any consensus concerning how to quantify the extent of damage or how to value the damaged resources (i.e., how much to collect in damages).

Secondly, research should be driven by fundamental scientific interest in the behavior and response of this ecosystem to such a perturbation—not by the need to collect evidence for litigation.

Thirdly, restoration of the impacted environment can and should commence immediately. In addition to direct restoration efforts, there is an immediate opportunity to protect, through acquisition, threatened habitat within the region.

And, finally, expensive, drawn-out litigation would only prolong and exacerbate the degree of psychological, social, and political impact of the spill. A settlement will provide a sense of resolution and relief from an otherwise quite protracted and tense process.

In light of such considerations, it is proposed that the Natural Resource Trustees seek immediate settlement of all natural resource damages. Such settlement should extinguish all criminal liability (i.e., the Federal indictments) and all civil liability for natural resource damages. This settlement should be carefully structured so as not to influence the case for compensatory damages.

We respectfully suggest that a comprehensive disposition of this case should collect \$2 billion to endow an Alaska Restoration Fund.

The Alaska Restoration Fund should be managed by a non-profit corporation governed by a court-approved Board of Directors, so that people from the impacted region can be directly involved in the management of the Fund, and thus their own future.

The Fund should support the following principle elements:

1. Direct Restoration

The Fund should be used to support direct, on-site efforts to restore or replace damaged resources to their pre-spill condition. This would include such things as supplementing injured salmon runs, reinnoculating areas with herring, breeding and release programs for damaged bird populations, reestablishing plants in injured salt marshes, and improving or protecting the habitat of other spill-impacted species.

2. Acquisition of Equivalent Resources

The Fund should purchase or otherwise protect resources that are similar or related to the injured resource in terms of ecological value, functions, or services provided. Priority should be given to the acquisition of certain development rights (e.g., timber, minerals, oil, etc.) in order to protect threatened habitat. An example of such acquisitions is presented in more detail in the attached discussion paper.

3. Research

The Fund should support a broad array of scientific research projects that address critical resource issues and fundamental scientific pursuits within the region. A comprehensive program of baseline and monitoring studies should be initiated with which to more precisely understand the effects of future such events on this ecosystem.

4. Education

A variety of natural resource education initiatives should be supported by the Fund. Particularly, a scholarship Fund should be established to support the education of residents from the region in natural resource science, management, economics, and conservation.

5. Sustainable Economic Development

The final goal of the Fund should be to design and implement economic development projects within the region that are compatible with the natural and cultural environment, and that are sustainable over the long-term. Inherent in this is a larger economic theme--that Restoration should, in some sense, assist the region in attaining long-term economic stability through sustainability. An important component of this should be the establishment of an Alaska Native Employment Fund.

Valuing the Case

It will always be difficult to establish the value of natural resource damages with precision in cases such as this. We suggest that the amount of \$2 billion would represent a fair and equitable disposition of natural resource damages in this case for several reasons.

First, this amount represents a workable approximation of what damages would come to if calculated as the average of damages derived by three principle economic valuation methodologies—Contingent Valuation, value of charismatic species, and public use value.

Secondly, \$2 billion is approximately the amount of money that will be needed to accomplish the various objectives of the Fund. It is envisioned that of the total amount collected, a portion would be expended immediately for acquisitions. The remaining balance would be maintained as a permanent endowment whose inflation-proofed interest income would support the other elements of the Fund. Such an endowment, providing substantial annual interest dividends, would provide stable support in perpetuity for these other restoration, research, education, and sustainable economic development initiatives.

Thirdly, the severity of impact adds considerable support for a settlement of this magnitude. For instance, it is theoretically possible that this ecosystem will never return to its pre-spill condition. Even small perturbations in natural systems are known to produce large, unpredictable and long-lasting consequences. It is possible that the impacted system will stabilize at an entirely different equilibrium than that existing before the spill. Additionally, it is probable that the population structure of certain long-lived, less fecund species will take several decades to return to pre-spill conditions.

And lastly, this amount of money is entirely proportionate to the value that could be assigned to the permanent loss of the pristine quality of this ecosystem. That the area is an aesthetic resource of global significance is attested to by the extraordinary amount of public attention paid to this spill throughout the world. In the same way that a rape victim can not be "un-raped," the lost pristine character of this region is, unfortunately, irreplaceable.

Thus, this settlement will afford the impacted environment a sufficient amount of care and protection; it will give science a better understanding of ecosystem dynamics; and it will provide the impacted communities more economic and educational opportunity as well as a sense of certainty in looking toward the future. It is, quite simply, the right thing to do.

ACQUISITION OF TIMBER HARVESTING RIGHTS FOR RESTORATION

- A Prerequisite for Recovery -

- I. Introduction
- II. Biological Characteristics of the Forest within the Region
- III. Justifications for Acquisition
 - A. Biological
 - B. Economic
 - C. Psychological
 - D. Socio-Political
- IV. Timber Ownership
 - A. Prince William Sound
 - B. Lower Kenai Peninsula
- V. Additional Considerations

by
Rick Steiner

THE COASTAL COALITION

P.O. Box 2424
Cordova, Alaska 99574

I. INTRODUCTION

As the clean-up of the Exxon-Valdez oil spill progresses toward completion, we must now decide what more can be done to aid the recovery of the impacted environment.

In the context of the Clean Water Act and the more extensive damage provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as the Superfund, Federal law clearly directs that funds be collected from responsible parties to be used "to restore, replace, or acquire equivalent resources."

In the case of the Exxon-Valdez, in addition to what can be done in the way of direct restoration and replacement of damaged resources, the most practicable mechanism to compensate for natural resource damages is to offset this loss with a substantial "acquisition of equivalent resources." This entails purchasing or otherwise protecting resources that are similar or related to the injured resource in terms of ecological value, functions, or services provided.

The several hundred thousand acres of old growth forest along the coastline of the spill-impacted region, having been scheduled before the spill for logging, now represent an ideal opportunity to exercise this Restoration option. The following is an overview of the concept of acquisition and retirement of timber harvesting rights to protect the impacted ecosystem from any further deterioration. This discussion is meant to provide a basis for further development of the idea, and to serve as an example of how other such acquisitions might work.

Conceptually, before trying to treat anything that has been injured, we must first protect it from any further injury. In the spill-impacted zone, marine, freshwater, and terrestrial systems are tightly connected through biogeochemical cycles into a functionally interlocking ecosystem. Perturbations (i.e. injuries) in one component usually produce significant secondary effects in the others. What's more, compound injuries often operate synergistically—that is, their combined effect is much more than the sum of the two injuries occurring independently. And regardless of how carefully it is carried out, the planned removal of old-growth forests from several hundred thousand acres of the region's coastline cannot help but to have a profound effect on the ecosystem as a whole. The clearcutting proposed for the region would represent an ecological alteration unmatched since the glacial retreat at the end of the Pleistocene. It is widely felt that the scars from logging will be even more persistent than those of the oil spill. This sort of massive perturbation, superimposed upon the deleterious effects of the spill, is likely to produce significant biological, economic, psychological, and socio-political effects far beyond what either one might have caused alone. A consensus is now emerging among many fishermen, biologists, tour operators and other local residents that, while this ecosystem might have been able to recover from either one of these rather large impacts in isolation, their combination could so seriously weaken the health and integrity of the system that its ability to recover would be severely compromised.

CLEARLY, THE FIRST STEP TOWARD FULL RESTORATION AND RECOVERY IS TO PROTECT THE ENTIRE SYSTEM AS COMPLETELY AS POSSIBLE FROM ANY FURTHER SIGNIFICANT HUMAN-INDUCED DISTURBANCE. And, aside from the

threat of additional oil spills in the area, the most immediate threat to the integrity of this ecosystem appears to be the planned removal of over one billion board feet of old-growth timber throughout the coming decade. The acquisition of timber to protect undamaged but threatened wildlife habitat in the impacted region is considered by many to be the single highest priority for Restoration.

Biologically, timber acquisition would protect the terrestrial, freshwater, intertidal, and nearshore habitat of many populations impacted by the spill (e.g., sea otters, diving birds, salmon, herring, eagles, bear, deer, etc.). It would also prevent the diminution of the hydrocarbon metabolizing marine bacterial flora that depends upon natural hydrocarbons washing into nearshore waters from coastal forests. Economically, timber acquisition would maximize profits and minimize risk for timber owners, protect existing commercial and subsistence economies, protect the future of tourism and recreation in the region, and preserve other in-absentia values of the region. The acquisitions would also go a long way toward relieving an overwhelming sense of despair in the region's residents, and would clearly help mitigate other socio-political impacts of the spill.

It should be emphasized that before the spill, timber development represented a legitimate economic opportunity for the region. However, we must now reassess all prior development plans in terms of what is in the best interest of the impacted ecosystem.

Restoration without full protection would be as futile as applying band-aids on a victim with one hand while continuing to inflict serious wounds with the other. And, in a larger sense, Prince William Sound has come to symbolize a violated relationship between humanity and nature. The only way to regain this relationship is to protect the area as completely as possible. This is the least, and perhaps the most that we can now do. Without such protection, full recovery--biological, economic, psychological, and socio-political--will be impossible.

II. BIOLOGICAL CHARACTERISTICS OF THE FORESTS WITHIN THE REGION

These old-growth forests are stable biological communities that have developed over several centuries essentially free from catastrophic (including human) disturbance. They support a rich diversity of highly specialized and adapted organisms such as cavity nesting birds, canopy-dwelling animals, understory saprophytic plants, and epiphytic lichens. These undisturbed forests support two or three generations of dominant tree species, forming a highly partitioned, broken, multi-layered canopy. They are highly retentive of nutrients, both in living and dead organic matter, giving rise to significant detritus-based food webs. For example, small to medium sized streams depend almost entirely upon decaying forest litter as an energy base.

In addition to live spruce and hemlock, these forests are characterized by standing dead snags, and fallen logs on land and in streams. As such, they form a rather unique habitat for a large number of bird, mammal, fish and invertebrate species. With so much production high in their canopy, they provide ideal habitat for flying and climbing consumers, such as foliage-consuming insects, and insectivorous birds. Large snags are valuable as habitat for a variety of vertebrates (e.g. bald eagles) and invertebrates. Logs and bark slabs on the forest floor are important for small mammals that disperse seeds and fungi, for nitrogen-fixing bacteria, and as seed beds for trees and shrubs.

Fallen logs are also critical to the maintenance of the physical and biological stability of headwater streams. Debris dams, for instance, create stepped stream profiles that effectively dissipate energy that would otherwise go into transporting sediment, downcutting of stream channels and washouts. The associated pools and gravel beds provide a range of habitat requirements—temperature, shade, cover, current velocity, and oxygen - for a wide array of aquatic organisms.

The forests in the spill-impacted region are generally confined by steep mountain slopes to a relatively narrow band along shorelines. Three primary forest plant associations are found in the region:

1. The Sitka spruce series--occupies beachfront terraces and alluvial bottomlands. Common understory plants are blueberry, devil's club, skunk cabbage, lady fern, oak fern, and shield fern. Alder are dominant along streams.
2. The mountain hemlock series--found on lowland rolling hills, raised knolls in muskeg, and steep side slopes. Principal understory species on lowland hills are blueberry and devil's club; on raised knolls are copperbush, crowberry, bog blueberry, and deer cabbage; and on steep sideslopes are marten's cassiope, luetkea, shield fern, lady fern.
3. The western hemlock series--occupies some beachfront terraces and lowland rolling hills. It's understory consists of blueberry, rusty menziesii, devil's club, bunchberry, five-leaf bramble, and twisted stalk.

It is important to remember that the coastal forests of south central Alaska are rich, complex systems that produce more than just wood. They are important habitat for about one hundred species of birds, over 30 species of mammals, and several hundred species of invertebrates and plants.

III. JUSTIFICATIONS FOR ACQUISITION

A. Biological

There are seven principle biological arguments for using Restoration funds to retire timber harvesting rights in the region:

1. Protection of forest habitat for several spill-impacted species

Several of the bird and mammal species that depend to some extent on the old-growth forests in the region are known to have been impacted by the oil spill; (e.g. eagles, loons, murrelets, deer, bear, etc.). Removal of large tracts of this habitat through logging will only make it more difficult for these species to recover. (See #3 below)

2. Hydrological characteristics of watersheds

Regardless of how well buffer requirements are adhered to, the clearcutting planned for many steep sideslopes in the area would seriously alter the erosion, runoff, and sedimentation characteristics of entire watersheds. Watersheds disturbed by logging have dramatically altered hydrological characteristics. The removal of such large amounts of plant biomass, and

compaction of soils causes a dramatic reduction in the water-holding capacity of the area. This can affect the size and even timing of peak flows in nearby streams. This is evident where recent logging in Two Moon Bay has increased the frequency and magnitude of flooding, mudslides, soil erosion, and sediment loading in nearshore waters. Again, regardless of adherence to buffer requirements, percolation can still increase storm flow in streams, and the loss of forest shading will accelerate both the magnitude and timing of spring meltwater runoff. High storm flow can have devastating effects on salmon eggs and fry in streambed gravel.

Increased sedimentation of the intertidal and nearshore environments can be expected if upland forests are clearcut. These nearshore areas are critical habitat for outmigrant salmon smolts, herring spawning, clam and mussel production, and sea otter and bird feeding—all of which were impacted by the spill. Increased sedimentation of this environment could seriously reduce its biological productivity and habitability. Herring eggs and larvae, for instance, are very susceptible to reduced oxygen availability caused by increased sedimentation. Likewise, salmon fry migration and feeding can be affected by increased turbidity of nearshore waters. Also, any reduction in clam, mussel, or other invertebrate populations due to increased sedimentation from logging could have significant negative consequences for the recovery of sea otters, especially weanlings, and diving birds from oil spill impacts.

3. Habitat fragmentation

Logging causes a significant reduction in the most accessible, highest density timber stands, and as such, increases the fragmentation of old-growth habitat. Such habitat fragmentation is known to be a significant cause of reduced genetic variability within individual species. The theory of island biogeography substantiates the concern for reduced biodiversity caused by such habitat fragmentation. Because of their isolation from each other and resultant interruption in gene flow, habitat islands have been found to decline both in number of species present and genetic diversity. A reduction in genetic variability within certain populations of mammals, bird, and plant species would reduce the stability of that particular population, and the ecosystem as a whole. This means that the system would be much less capable of recovering from other perturbations such as insect pests, disease, earthquakes, etc.

It's important to realize that habitat fragmentation is a much more significant threat to the ecological stability of old-growth forests in this particular region because here, these forests constitute a smaller, patchier component of the entire ecosystem than do the forests in the Tongass, British Columbia, and the Pacific Northwest. Additionally, the high noise levels generated by logging operations expand the edge of habitat impacts far beyond the boundaries of the clearcut. Many mammals and birds will attempt to avoid such acoustic disturbance, and in so doing, be pushed further away from their preferred ranges and confined to progressively smaller refugia. Several forest species, such as deer, find it difficult to cross clearcuts, particularly during periods of heavy snow.

4. Regeneration

Because these forests are at the northernmost edge of their range, regeneration of critical habitat structure, composition, and functions in second growth forests is extremely slow. Such slow regeneration rates are due to short growing seasons, low solar irradiance, and soils with low fertility and poor structure due to comparatively recent glaciation. Soil fertility is further reduced by leaching of nutrients after logging. And, although there are a few isolated examples of clearcuts in the Sound that have regrown relatively densely within 50 years or so, these dense second-growth stands have been found to provide unsuitable habitat for many of the original bird, mammal, and plant species that inhabited the area before logging. With no snags, fallen logs, large live trees, or canopy heterogeneity for habitat, these second-growth areas are generally poor in species diversity.

5. Global significance

The forests in this region are unique globally in that they constitute the highest latitude temperate rain forests anywhere in the world. Temperate rain forests worldwide are rare and severely threatened ecosystems. In their original extent, they were distributed in 10 regions in the world covering an area of approximately 70 million acres; only 2-3% of the area of tropical rain forests. Four of the original areas in which they existed historically—western Scotland, Ireland, a small area in the French Alps, and the southwest coast of Norway have been eliminated entirely.

In addition to the forest system extending from Kodiak to central Oregon, the only other significant stands left are found along the coasts of southern Chile, southern Australia, Tasmania, New Zealand, and Japan. It has been estimated that 60-80% of temperate rainforests worldwide have been logged in recent history.

For this reason alone, the forest in the spill zone should be conserved as a precious representative of disappearing temperate rainforest ecosystems worldwide.

6. The forest/marine bacteria/oil-spill connection

Oceanographers now believe that the large populations of hydrocarbon metabolizing bacteria that have been so important in degrading oil from man-made sources in the region (e.g., the Exxon-Valdez spill and the effluent from the ballast water treatment facility at the Alyeska Terminal) flourish precisely because of the continuous input of biogenic hydrocarbons from the coastal forest. Measurements of the hydrocarbon terpene dissolved in the canopy drip from spruce trees and in nearshore waters suggests that this is the primary energy source for naturally occurring hydrocarbon-oxidizing marine bacteria in the region. In this sense, the coniferous forest actually "immunizes" or prepares this marine system for oil spills. Removal of large tracts of these forests would, theoretically, reduce terpene input and thus the bacterial populations depending upon this

input, causing the waters in the region to become less capable of self-cleansing or bioremediation.

7. Cumulative impact

And finally, all these biological effects need to be understood in the broader long-term ecosystem context. Many local residents and biologists have observed a gradual but continuous reduction of certain wildlife populations associated with increased human use of the region over the past 30 years. Superimposed upon this gradual deterioration in the environment of PWS, the Exxon-Valdez oil spill in 1989 threw the system into a profound state of disequilibrium. Shocking the system with yet one more massive human-induced perturbation—the destruction of vast areas of old-growth forest habitat—would likely produce such a destabilizing effect that the resiliency of the entire ecosystem will be depressed for many decades. Also, it must be remembered that despite how well we think we might understand a particular biological system, even small perturbations can have large and unpredictable consequences (i.e. Chaos Theory). Beyond any doubt, the health and vitality of this coastal ecosystem would be best served by preserving its existing flora and fauna intact, in full interaction.

B. Economic

The economic advantages of the acquisition of timber for Restoration purposes are quite straightforward:

1. Profit Maximization

The timber owners would simply make more money by selling their trees for Restoration purposes than by harvesting them. By having money from such a sale up front, the corporations and shareholders could enjoy perhaps 50% more profit over 10 years from reinvestment income. To begin realizing significant dividends from logging, they would probably have to wait several years. Such a windfall of profits would open up many other personal and corporate economic development options. Also, the owners would not incur the expense and risk of operation, and Native Corporations would not have to begin paying taxes on these tracts as developed lands.

2. Market risk minimization

Timber markets are extremely volatile. Though they are now relatively strong, they are subject to at least the same magnitude of reduction that they experienced in the mid 1980s. Purchasing this timber now will allow timber owners to avoid the substantial risk of softening markets in the future.

3. Protection of existing economy

Any potentially negative effect that logging might have on either commercial fisheries or on local subsistence economies would be avoided.

4. Recreation and tourism development

It is widely agreed that the development of recreational and tourism economic opportunities in this region would be seriously impeded by timber harvesting. The scenic/aesthetic value of the area would be reduced in proportion to the number of vistas containing at least one noticeable clearcut. And, because areas planned for logging are relatively steep, virtually all can be seen from afar. It is widely felt that, in addition to commercial fishing, the recreation and tourism industry offers the PWS/Kenai Peninsula area its best opportunity for sustainable economic development that is compatible with the local environment. What is already a multi-million dollar industry probably has, in the absence of timber development, the potential to triple in size over the next decade. Recreation and tourism would also provide more local jobs on a sustainable basis than would a short-lived timber industry.

5. Timber price support

Because this acquisition would take a substantial amount of timber off the market, it is reasonable to expect timber prices elsewhere in the State to be enhanced somewhat.

6. Noncommercial economic value

And lastly, in the context of current economic theory (i.e., "Contingent Valuation") the actual economic value of a resource like the old-growth forests in this region is much more extensive than just its immediate commercial value. In addition to the commercial value of on-site recreation and timber harvesting, these forests offer many off-site, or "in-absentia" user values, including option, existence, and bequest value. Option value is essentially what people would pay to insure the availability of the forest system for future recreational opportunities. Existence value is the benefit derived from simply knowing that the forest exists. And bequest value is the willingness to pay for the economic benefits of saving forest resources for future generations. Timber harvesting could conflict with all non timber values of these forests—subsistence, sport fishing and hunting, commercial fisheries, recreation, tourism, option, bequest, and existence value. And because the Restoration process should satisfy timber owners financially, it is clear that from a strict economic standpoint, it is in the highest public interest to preserve these forests. This acquisition would ensure a maximum flow of benefits to the greatest number of people.

C. Psychological

The psychological impact of the oil spill, has been, and will continue to be enormous. The pristine natural environment of the region comprises a powerful aspect of local residents' sense of identity, place, and purpose. Most of the people who make the region their home live here just because of its natural beauty, beauty, and wilderness quality. Native culture evolved within the fabric of forest and marine biological systems in the region. The area is, for many people, a sacred place.

The oil spill caused this sense of identity in local residents to rapidly disintegrate. Initial studies have clearly documented widespread perceptions of uncertainty about the future, deteriorating family relations, and Post Traumatic Stress Disorders in impacted communities. Even now, residents still feel a great deal of anger, remorse, and loss for what the spill did to their home. We must now allow these wounds to heal.

The most we can probably do to restore the psychological sense of well-being among local residents is to afford the impacted area as much protection as possible from further human insult. The psychological impact of clearcutting, superimposed upon that of the oil spill, would be devastating.

Prince William Sound has, in a very real sense, come to epitomize the plight of the Global environment. The phenomenal worldwide media attention given the area during the spill attests to the high degree of sympathetic identification felt by people throughout the world for such a spectacular pristine natural area essentially "lost" through corporate and governmental ineptitude. Many people, locally and elsewhere, express a sense of disbelief, indignation and even outrage that now, after perhaps the single greatest environmental disaster in our nation's history, humanity seems poised to inflict yet more environmental damage to the very same area through timber extraction, almost as if nothing had ever happened.

It is important to acknowledge that these are very real emotions and as such they must be addressed by the Restoration process. It should be a priority of the Restoration program to minimize any activity that might detract from an already damaged sense of psychological well-being throughout the region and the world. Another compelling reason, then, to retire timber harvesting rights in the region is to help restore the sense of solace and well-being that is so essential to the quality of life.

This acquisition would allow people to look forward with certainty to the full recovery of the natural environment, rather than despair over its continued degradation. This acquisition is absolutely essential for psychological recovery—without it, full recovery will be impossible.

D. Socio-Political

The oil spill has caused an overwhelming loss of faith in the institutions that manage our society.

The socio-political fallout from the spill has been characterized by bitterness and divisiveness within and between communities, anger toward the oil industry in Alaska and elsewhere, lack of confidence in government, and skepticism regarding economic development in general.

The social challenge for Restoration then, is to restore the cohesiveness within and between communities. Peoples within the impacted region now need a sense of solidarity, of being on the same side of an issue and of belonging to a joint enterprise together. It is now imperative to protect residents in the region from other highly divisive issues, such as logging.

The political impacts of this spill will undoubtedly reverberate through the halls of Juneau and Washington D.C., oil company board rooms, and the minds of voters for quite some time. If something powerful and persuasive isn't done to make amends for this environmental disaster, its dark shadow will continue to loom over such major public policy issues as ANWR, offshore oil leasing, and other important development proposals.

The public wants a clear sign that industry and government will make every effort to "right-their-wrongs." A positive outcome with the acquisitions set forth in this proposal would send a loud and clear message to people everywhere that corporate and political institutions can and do act responsibly--that they do indeed care about the natural environment. The public relations value of such an initiative would benefit the timber industry, Native corporations, government, and the oil industry.

It is increasingly evident that these acquisitions would be enormously popular throughout the nation, and would renew public confidence in our governmental and corporate institutions. Underlying such sentiment is the growing body of public opinion that old-growth rainforests worldwide are a precious, highly-threatened resource that deserve protection, and a greater sensitivity toward the environment in general, (e.g., "Earth Day, 1990").

In a very real sense then, this acquisition for Restoration has, for many, become the "canary in the mine shaft" concerning mankind's commitment to the environment. It's really quite simple--either we do care, or we don't. This will be the legacy we leave for future generations and should be pursued accordingly.

IV. TIMBER OWNERSHIP

The primary land owners in the region are the Federal government, Alaska Native Corporations, and, to a lesser extent, the State of Alaska. All own valuable tracts of old-growth forest. A decision to not allow timber harvesting on these public lands can be obtained simply through an administrative decision on the part of the U.S. Forest Service and the State of Alaska Department of Natural Resources. At this time, the Forest Service has no plans to sell or harvest any of the timber within the Chugach National Forest. The ADNRS is considering classifying several of its isolated land parcels within the region for timber harvesting. The Trustees should seek a Memorandum of Understanding or other legally binding agreement from these two agencies that, in the interest of Restoration, they will not permit any timber harvest on their lands in and around the spill zone.

The more important challenge for Restoration will be to retire the timber harvesting rights on the several hundred thousand acres of lands owned by Alaska Native Corporations in the region. Timber on these private lands is considered to be a valuable financial asset and thus timber owners will have to be sufficiently compensated in exchange for an agreement to extinguish any and all harvesting rights. The approach here should be to make it financially advantageous for the timber owners/land owners to enter into such an agreement, by providing them as much money as they would have earned in profits by harvesting their timber. The two principle areas of concern for acquisition purposes are Prince William Sound and the lower Kenai Peninsula.

Prince William Sound

The Native Corporations with land holdings in Prince William Sound itself are as follows:

Eyak Corporation PO Box 340 Cordova AK 99574 Phone: 424-7161	64,000 acres (Note: acreages here are approximate)
Tatitlek Corporation PO Box 650 Cordova AK 99574 Phone: 424-3777	65,000 acres
Chenega Corporation General Delivery Cordova AK 99574 Phone: 573-5118	76,000 acres
Chugach Alaska Corporation 3000 A Street, Suite 400 Anchorage AK 99503 Phone: 563-8866	57,000 acres in S.W. PWS

Approximate total area proposed for timber acquisition
in Prince William Sound = 262,000 acres

Most of the timber on these lands has been sold, in connection with Net Operating Loss Sale provisions of federal tax laws, and is now owned by the following companies:

Sherstone, Inc. PO Box 828 Cordova AK 99574 Phone: (907) 424-5524	Owens timber on Eyak lands
Citifor, Inc. 7171 Columbia Center 701 Fifth Ave. Seattle WA 98104-7090 Phone: (206) 622-3770	Owens some of the timber on Tatitlek lands between Fidalgo & Gravina
Koncor Forest Products, Inc. 3501 Denali Anchorage AK 99503 Phone: (907) 562-3335	(Timber Trading Company) owns timber on Chugach Corp. lands on Montague & Knight Islands and on Chenega lands

Tatitlek Corporation still retains title to some of their timber, and Chugach Alaska Corporation has purchased timber on Tatitlek lands at Fish Bay in Pt. Fidalgo.

Lower Kenai Peninsula

Beyond PWS itself, three village corporations on the Kenai Peninsula have considerable land holdings with timber that should be considered for acquisition:

English Bay Corp. PO Box 8058 English Bay via Homer Homer AK 99603 Phone: (907) 281-2220	45,000 acres at southern tip of Kenai Peninsula and 22,000 acres within the Kenai Fjords National Park
Port Graham Corp. PO Box PGM Pt. Graham AK 99603 Phone: (907) 284-2227	66,000 acres at southern tip of the Kenai and 55,000 acres also within the Kenai Fjords National Park
Seldovia Native Ass'n. PO Box 185 Seldovia AK 99663 Phone: (907) 234-7625	23,000 acres within Kachemak Bay State Park across from Homer and 423 acres on Island Peninsula

Approximate total area proposed for timber acquisition on
Lower Kenai Peninsula = 221,000 acres

These corporations have sold much of their timber, as in Prince William Sound, to the following companies.

Koncor Forest Products, Inc. 3501 Denali Anchorage AK 99503 Phone: (907) 562-3335	(Timber Trading Company) owns the timber on Seldovia Native Ass'n. land holdings within Kachemak Bay State Park
Chugach Alaska Corporation 3000 A Street, Ste. 400 Anchorage AK 99503 Phone: (907) 563-8866	owns the timber at Windy Bay, on Pt. Graham lands
Kolon California, Inc. c/o Ceretech International 515-16th Ave., Ste. 155 Bellevue WA 98004 Phone: (206) 455-4850	owns the timber on English Bay lands

This would also be the appropriate forum to consider purchasing timber and possibly certain other development rights from Native Corporations with lands along the coastline of the Kenai Fjords National Park. Together, the Port Graham and English Bay Village Corporations have selected approximately 77,000 acres of waterfront land surrounded by the Park. The Chugach Alaska Corporation will receive the subsurface rights. These selections are yet to be conveyed, pending negotiations with the U.S. Bureau of Land Management. The development of timber and minerals on these lands would seriously conflict with the quality of the area as a National Park. Thus, it should be a high priority for Restoration purposes to acquire at least the timber, and perhaps the mineral rights on these lands.

V. ADDITIONAL CONSIDERATIONS

1. Cost of Acquisitions

While it is difficult to estimate, the timber acquisitions outlined above would probably cost on the order of \$200-\$300 million. An independent timber appraisal should be conducted to determine fair market value of timber assets in the region.

2. Urgency

Timber harvesting has already begun on three parcels within the region: one near Cordova, at Two Moon Bay near Tatitlek, and at Windy Bay on the lower Kenai. Several more areas are scheduled to begin cutting within a year.

Additionally, foreign timber buyers, who might be less sympathetic to selling timber assets for Restoration purposes, are reportedly very interested in purchases within the region.

If the Trustees decide to pursue timber acquisition, it should be done soon.

3. Short Term Contracts

The timber owners generally have rights to the timber only over short-term (10-15 year) contracts. After these contracts expire, the timber rights revert to the land owners. Thus, in negotiating to retire timber harvesting rights in perpetuity, the land owners will also have to enter into any agreement between current timber owners and the Trustees.

4. Lands selected but not conveyed

An additional aspect that has to be considered is Native Corporation lands in Prince William Sound that have been selected but not yet conveyed. Some of these contain timber that should be purchased in the context of Restoration.

5. Individual Allotments

Funds should also be made available to Native shareholders with individual land allotments who might wish to sell their timber assets for Restoration purposes.

6. Displaced jobs

A very legitimate concern exists over the jobs, particularly of Native shareholders, that would be displaced by this acquisition for Restoration. This concern is addressed by the Sustainable Economic Development section of the proposed comprehensive settlement. An "Alaska Native Employment Fund" should be established to provide on the order of \$5 million annually to be used to employ shareholders in jobs that, as determined by themselves, are sustainable and compatible with their cultural heritage and local environment.

7. Seward Sawmill

Withdrawing these forests from timber production will reduce the flow of raw logs to the newly constructed Chugach sawmill in Seward. Clearly, the Chugach Corporation deserves compensation for this loss. Either a genuine offer should be made for an outright purchase of the mill, or some other subsidy/settlement must be offered.

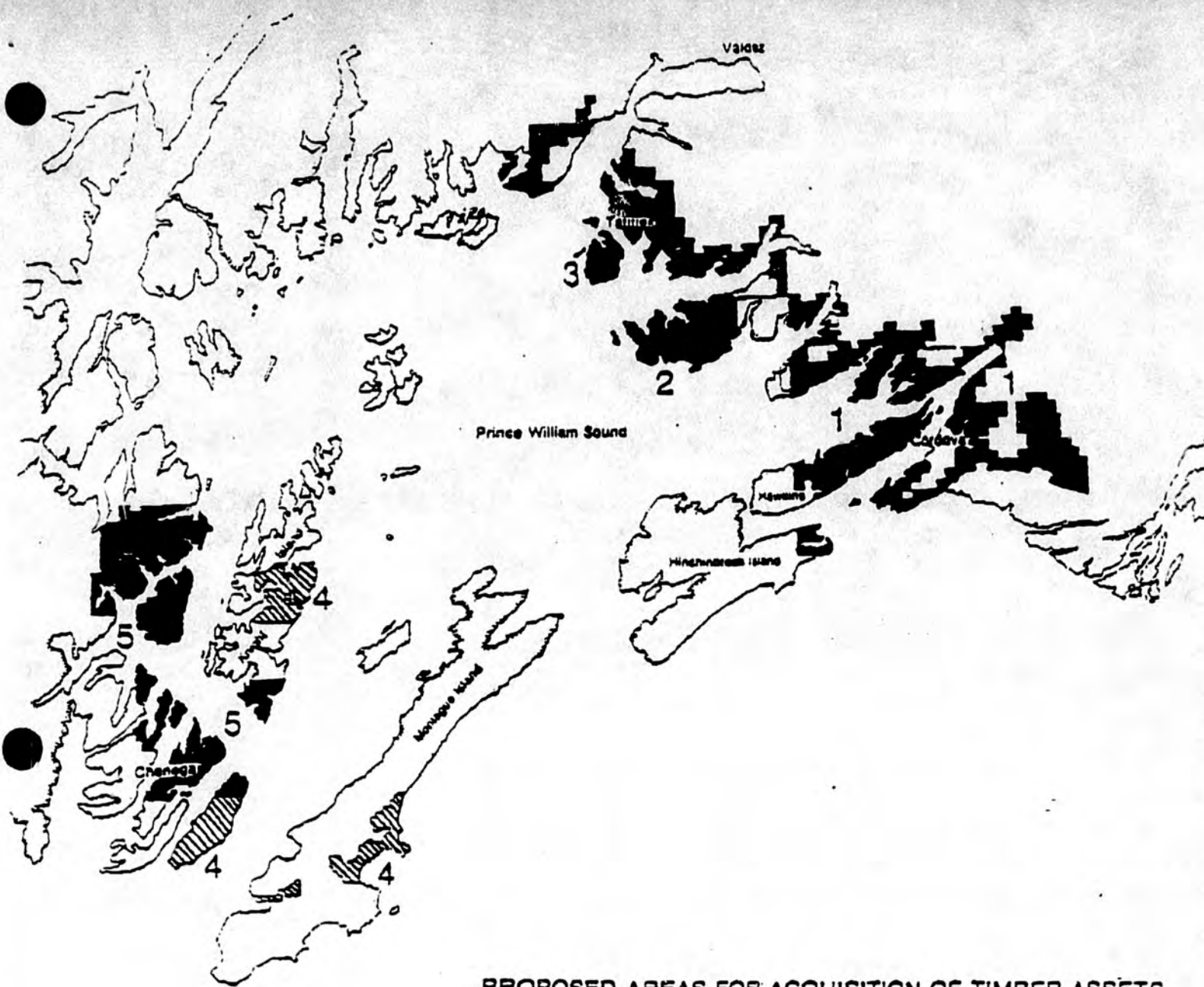
8. Protection of Native Sovereignty

One of the most important considerations for this initiative is to protect the right to self-determination of local Native people. As the principle private land owners in the region, they have the most at stake relative to this issue. It is essential that all the shareholders of each Native corporation in the region be fully informed concerning their options here, and that they come to some agreement among themselves as to what is in their own long-term interest. Presently, some shareholders support timber acquisition for Restoration, others oppose it.

It is incumbent upon the Restoration planning process to provide the corporations and their shareholders with an objective assessment of the implications of supporting or opposing such acquisitions.

IT IS ESSENTIAL THAT THE TRUSTEES REMAIN SENSITIVE TO THE DESIRES OF NATIVE SHAREHOLDERS ON THIS ISSUE, AND PURSUE ACQUISITIONS ONLY WITH THOSE CORPORATIONS THAT SUPPORT THE CONCEPT.

It should be recognized that, before the spill, timber development plans represented sincere and genuine commitment on the part of corporation managers to provide economic opportunity for their shareholders. Acquisitions for Restoration should be presented as a unique opportunity to redirect such development plans in light of the spill.

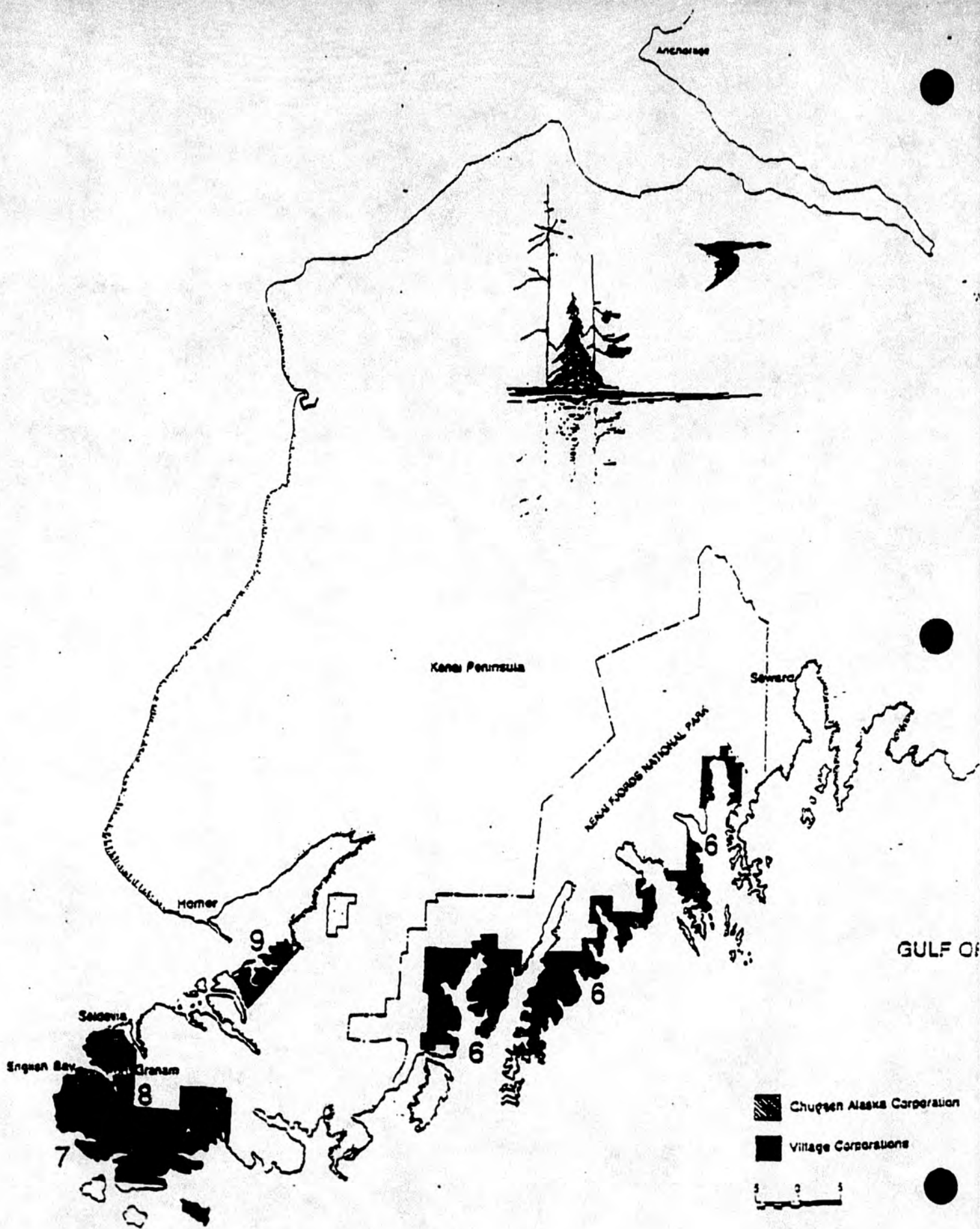


PROPOSED AREAS FOR ACQUISITION OF TIMBER ASSETS

1. EYAK/SHERSTONE
2. CITIFOR
3. TATITLEK
4. CHUGACH/KONCOR
5. CHENEGA/KONCOR
6. PORT GRAHAM/ENGLISH BAY SELECTIONS
7. ENGLISH BAY/KOLON CALIFORNIA
8. PORT GRAHAM/CHUGACH
9. SELDOVIA NATIVE ASSOCIATION/KONCOR

APPROXIMATE TOTAL AREA PROPOSED — 483,000 ACRES.

CA



GULF OF

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF ALASKA

UNITED STATES OF AMERICA

vs.

EXXON SHIPPING COMPANY, AND EXXON CORP.

)
)
) No. A90-015 CR.
)
)
)

COMMENTS OF THE NATIONAL WILDLIFE FEDERATION
ON THE PLEA AGREEMENT OF THE
UNITED STATES, EXXON SHIPPING, AND EXXON CORP.

Erik Olson
Douglas Wolf
National Wildlife Federation
1400 16th Street, N.W.
Washington, D.C. 20036
April 11, 1991

INTRODUCTION

The National Wildlife Federation ("NWF" or "the Federation"), the nation's largest private conservation education organization with 5.6 million members and supporters, welcomes this opportunity to comment on United States of America v. Exxon Shipping Company and Exxon Corporation (No. A90-015 CR.) (the plea bargain)¹. Such public comment is particularly appropriate given the overwhelming public interest in and concern with this oil spill and the important legal and public policy issues this plea bargain raises.

NWF is very concerned that the proposed plea bargain would let Alyeska Pipeline Service Company (Alyeska) off the hook entirely. This deal in Alyeska's favor was struck despite recent evidence of what a Congressional investigation has suggested was criminal behavior by Alyeska. NWF urges that the Court strike all provisions in the plea agreement which shield Alyeska from punishment. In addition, NWF urges the Court to require a magistrate investigation, or to name an independent counsel or special master to investigate the recent allegations of Alyeska's alleged criminal conduct, and recommend to the Court whether the plea agreement's immunization of Alyeska from criminal prosecution is justified and in the public interest.

NWF also urges that this Court order the government and Exxon to release all scientific and economic data documenting the extent of damage caused by the crimes, in order to assure the public and this court that the fines and restitution are appropriate to the offenses committed. These comments will discuss these and other concerns.

ALYESKA SHOULD NOT BE MADE IMMUNE FROM FUTURE PROSECUTION

In a very unusual provision which may be without precedent, paragraph III A of the Plea Agreement specifically waives the United States' right to prosecute a third party, Alyeska, which is not a defendant in this or any related criminal action, for any criminal violation of Federal law arising out of the Valdez spill, the cleanup, or its preparations for a cleanup. This unusual promise was made without any plea, fine, restitution, admission, or extraction of any other benefit to the public or to the government from Alyeska. Our research has been unable to

¹ NWF, with the Wildlife Federation of Alaska and the Natural Resources Defense Council, and represented by the Trial Lawyers for Public Justice, has sued Exxon and Alyeska Pipeline in state court in Alaska to seek creation of a trust fund which would help restore the natural resources damaged by this catastrophe. NWF has actively commented on the natural resource damage assessment process in response to the Valdez spill.

document any previous case in which a corporate defendant has been provided a promise of no prosecution for environmental or other crimes as part of a plea bargain with some other legally separate company, particularly when that third party corporation has failed to provide any benefit to the government for such a promise.

This provision is particularly troubling in light of recent evidence of Alyeska's alleged criminal conduct. If Alyeska is not punished, the fundamental retributive, rehabilitative, and deterrent goals of criminal law with respect to Alyeska's alleged criminal behavior will not be served.

Documents recently submitted to this Court by the U.S. House Interior and Insular Affairs Committee Vice Chairman George Miller (collectively, "the Alyeska materials") establishes that eleven months before the Exxon Valdez spill, Alyeska knew that it could not adequately respond to a major spill in Prince William Sound.⁴ In fact, these documents show that Alyeska unilaterally decided that it would only respond to spills in the Valdez Arm and Valdez Narrows and that it would rely on dispersants and cleanup efforts by the spiller to attempt to take care of any other spills³. In other words, Alyeska unilaterally abdicated a large part of its responsibility to protect the environment⁴.

The outrageous nature of this conduct becomes even clearer when one compares these internal statements with those Alyeska made in many public forums⁵ and makes in its Contingency Plan for Prince William Sound. In the Contingency Plan, Alyeska asserts that it can and will respond to all spills, no matter where they occur in the Sound and no matter what size⁶. The Congressional

² T.L. Polasek, [Alyeska] "Oil Spill Issues," (April 6-7, 1988) (filed with this Court with Alyeska materials).

³ See Cable from Stanley Factor, ARCO Marine, to Roger Gale, Sohio (July 6, 1988) (in Alyeska materials). Further, this document indicates that the Alyeska owner companies were unable to agree to even this incredibly low level of commitment.

⁴ In fact, Alyeska didn't even acquire and deploy the additional equipment that the documents indicate they were planning to purchase. Rep. Miller's April 8, 1991 letter to the Court, at 8-9.

⁵ Id. at 2-3 The misstatements made before the pipeline was approved are particularly significant as the pipeline was ultimately approved by only one vote in the United States Senate, with then-Vice-President Spiro Agnew casting the deciding vote.

⁶ Id. at 3-6.

investigators suggest that these were willful misstatements and probably were criminal violations of Alyeska's duty under the Clean Water Act and other laws.⁷

The plea bargain, in section III A, specifically exempts Alyeska from any criminal liability for any acts associated with the grounding of the Exxon Valdez as well as any "conduct in connection with the preparation or submission of oil spill contingency plans or related documents, by Alyeska Pipeline Service Company to the federal or state government." The plea bargain exacts nothing from Alyeska in return for this beneficence. Plea bargains often are described as contracts; Alyeska has been given all of the benefits of such a contract without having provided any consideration.

NWF invites the Court to examine its law books to find a similar example of a third-party, legally separate from the accused, gaining the benefit of the plea bargain without suffering any detriment. The governments appear to have surrendered all criminal charges for Alyeska's incredible conduct because Exxon insisted.⁸ The record before this Court at a minimum suggests that Alyeska likely is an appropriate target of a criminal investigation. The record is completely devoid of any support for the promise not to prosecute Alyeska. This Court, therefore, has insufficient information for it to evaluate, pursuant to its obligations under Federal Rules of Criminal Procedure 11 and 32, whether the plea is in the public interest and whether the sentence fits the crime.⁹ NWF urges the Court to

⁷ The Act makes "[a]ny person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under this chapter," such as the Contingency Plan, liable for fines and/or prison. 33 U.S.C. §1319(c)(4). See also 18 U.S.C. §1001 (penalties for knowingly submitting false information to any agency of the United States).

⁸ In public testimony before several of the House Merchant Marine and Fisheries Committee's Subcommittees, which met in joint session on March 20, 1991 to examine the proposed settlement, United States Assistant Attorney General, Richard Stewart, asserted that the negotiators for the governments added Alyeska to the plea bargain and the consent decree between the United States and Alaska governments and Exxon Corp. and Exxon Shipping, simply because Exxon insisted they do so.

⁹ See generally, J.E. Bond, Plea Bargaining and Guilty Pleas § 6 (1983 & Supps.); W. R. LaFave & J.H. Israel, 2 Criminal Procedure: Criminal Practice Series § 20 (outlining rights and duties of court in reviewing plea bargain).

strike these unjust provisions from the plea bargain. Alyeska's cavalier and criminal actions must not go unpunished.

THE COURT SHOULD APPOINT A MAGISTRATE, SPECIAL MASTER, OR INDEPENDENT COUNSEL, TO REVIEW ALYESKA'S ACTIONS

The Court should request that a magistrate, special master, or independent counsel¹⁰ review the allegations of Alyeska misconduct. The results of such an investigation would inform the Court's determination regarding whether the plea's provision exempting Alyeska from criminal prosecution is in the public interest and should be approved.

OTHER CONCERNS

1. Important Scientific Data Must Be Released

The plea agreement requires Exxon Corp. and Exxon Shipping to pay a total of \$100 million in criminal fines and restitution payments. However, there is no way the public or this Court can meaningfully assess the amount of restitution needed or economic impacts of the spill, to measure against this figure. The federal government's scientific study summary released this week regarding the biological impacts of the spill fails to include any estimates of the economic impacts of the spill or of the restoration costs. None of the numerous economic studies conducted by the government have been released, no information on the findings of Exxon's studies has been made available, and the public, independent experts, and this court are in no position to judge the accuracy even of the summary of biological impacts filed by the government since the studies themselves and all underlying data remain secret.¹¹

¹⁰ See, Bond, Plea Bargaining and Guilty Pleas § 6.18(c) (court may name special prosecutor in rejecting plea bargain as contrary to public interest); United States v. Cox, 342 F.2d 167, 179 (5th Cir.) (en banc), cert. denied, 381 U.S. 936 (1965) (Judge Griffin Bell and dissenters in part suggesting that where government decision not to prosecute is in bad faith or "irrational," court may be authorized to appoint counsel to prosecute case); United States v. Cowan, 381 F.Supp. 214, 223 & n. 11 (N.D.Tex. 1974), rev'd on other grounds, 524 F.2d 504 (5th Cir. 1975), cert. denied, 425 U.S. 971 (1976) (to same effect).

¹¹ What we do know is that Exxon says it has spent "in excess of \$300 million to claimants allegedly injured by the oil spill," Plea Agreement paragraph III C(3)(c), suggesting that under the Alternative Fines Act, 18 U.S.C. section 3571(d), if Exxon were convicted it could be subject to over \$600 million in fines, in addition to providing restitution. Thus, there is already substantial evidence of widespread injury from Exxon's actions, and there is suggestive evidence that the adequacy of

The Court should require that all these studies -- and not just the vague and conclusory summaries just released by the government -- be revealed by Exxon and the government so that the public can intelligently comment on this aspect of the plea bargain, and so that this Court can meaningfully exercise its duties to evaluate the grounds for and adequacy of this plea bargain, and the associated fines and restitution suggested in it.

3. Court Should Impose Prevention Measures

We hereby join in the comments of other conservation organizations before this court calling for the use of creative probation and other requirements requiring Exxon to take actions to prevent other environmental pollution and disasters.

4. Public Should Be Able to Challenge Use of Money

Paragraph IV B of the Plea Agreement purports to provide that Alaska can spend the restitution money it receives under the agreement "without objection, challenge, or judicial or administrative review." As much as the state and United States governments may want to insulate their actions from judicial or other review provided for under the Administrative Procedure Act and other laws, the governments simply cannot enter into a contract with Exxon that purports to eliminate the statutory and other legal rights of third parties to challenge government actions. Thus, this provision must be struck from the agreement as an ultra vires act that is contrary to law and public policy.

Respectfully Submitted,

Douglas Wolf, Esq.

Erik D. Olson, Esq.

the plea bargain can be questioned with respect to Exxon itself. This is particularly true in light of Exxon's widely reported statements in the wake of the settlement's announcements that the deal would have no effect on Exxon's financial position, suggesting the Company's management has no remorse for its actions and that there will be little or no deterrent effect from the fines imposed.

FACT SHEET

EXXON-VALDEZ OILSPILL SETTLEMENT

AGREEMENT HAS BEEN REACHED between Federal and state trustees and Exxon Corporation, Exxon Shipping Company and Exxon Pipeline Company for settlement of damages rising from the Exxon Valdez oilspill in Prince William Sound March 24, 1989.

The settlement, totalling \$1 billion, represents the largest environmental damage settlement in history—50 times the size of any other.

Highlights

- EXXON WILL PAY \$190 MILLION IMMEDIATELY, of which \$100 million is a criminal fine. Half of this fine will be remitted to the state of Alaska. Twenty-five million dollars of the first payment will be used to continue the science program, and \$15 million will go to restoration planning and to initiate restoration pilot projects. The balance will be used to begin to reimburse most of the trustees and the Coast Guard for past expenses.
- EXXON WILL PAY \$150 MILLION IN FISCAL YEAR 1992, but this amount and future amounts will be usable beginning in October 1991. The major part of these funds will be used in restoration efforts aimed at returning Prince William Sound to its pre-spill condition.
- EXXON WILL PAY \$660 MILLION OVER A PERIOD OF YEARS beginning in FY 1993.

If significant new injury arises after the 10-year restoration period, which is based on previously unknown information, the trustees may reopen the matter up to a cap of an additional \$100 million.

Interagency Administration

The agreement will be administered by a group of trustees comprising the Administrator of the National Oceanic and Atmospheric Administration (NOAA), the Secretaries of the Departments of the Interior and Agriculture; the Commissioner of the Alaska Department of Fish and Game, and the Commissioner of the Alaska Department of Environmental Conservation, and the State Attorney-General. The U.S. Environmental Protection Agency has been designated by the President to coordinate restoration activities for the U.S.

The trustees will act jointly in the collection and joint use of all damage recoveries. Decisions on use of recovered funds will be made by unanimous agreement; the funds are to be held in a joint trust fund under the supervision of the U.S. District Court for Alaska.

(more)



EXXON VALDEZ FACT SHEET

(cont.)

Cooperative Restoration Efforts

THE GOVERNMENTS WILL CONTINUE TO WORK COOPERATIVELY conducting scientific studies and restoration efforts approved by the trustees for the 1991 field season. Among those under consideration are:

- RESTORATION OF THE BEACH WILDRYE COMMUNITY, to stabilize sites where natural or cultural resources are at risk,
- A PUBLIC INFORMATION AND EDUCATION PROGRAM, to lessen the potential for further human disturbances,
- HABITAT RESTORATION FOR PINK AND CHUM SALMON, using proven fisheries enhancement techniques,
- PROTECTION OF STRATEGIC FISH AND WILDLIFE HABITATS AND RECREATION SITES.

Indian Tribes' Rights Protected

THE AGREEMENT WILL BE ENFORCED by the U.S. District Court for Alaska in conjunction with its supervisory powers over a consent decree entered in the litigation.

The agreement does not affect rights and obligations of third parties with interests in the situation, including those of Indian tribes to act as trustees for asserting claims, or those of any others who are or become successors to any federal or state interest, or holders of present or future rights in land or resources affected by the spill. Also unaffected are U.S. or state rights or obligations relating to Indian tribes.

The memorandum of agreement, and the settlement agreement, will be published in the Federal Register and public comment will be sought for a period of 30 days. Broadly based public participation will be an integral part of the program.

Each government has the right to withdraw its consent to the settlement agreement within 15 days after the close of the public comment period if the comments disclose facts indicating the agreement is not in the public interest.



Deal OK could halt studies

Cole: \$1-billion pact approval
may cut spill damage probes

By DIRK MILLER

TIMES CAPITAL BUREAU

JUNEAU — Attorney General Charlie Cole said Friday state and federal governments could halt some economic-damage studies of the Exxon Valdez oil spill if a proposed settlement is approved.

Cole made the statement after questioning by a House panel reviewing the \$1-billion settlement of state and federal claims against Exxon from the March 24, 1989, oil spill. Lawmakers are considering whether to approve or reject the settlement by a May 3 deadline.

He also said there were concerns about naming Natural Resources Commissioner Harold Heinze to a panel of six federal and state trustees to oversee spending of a \$900 million trust fund created by the settlement.

Heinze is a former ARCO Alaska Inc. president and spent 20 years with the company, which is one of the major producers on Alaska's North Slope.

"That's one of the reasons he's not (on the panel) now," Cole said.

Cole also released confidential details of the \$72 million the state says it has spent on the spill in cleanup, legal and study costs. The state spent \$64.5 million on spill response, of which Exxon paid back \$30 million; \$23.2 million on damage studies, on which it was reimbursed \$5.7 million; and \$19.8 million on litigation.

The state is to be reimbursed the \$72 million over five years as part of the settlement.

The state's studies have been a controversial part of the debate over the agreement. Some lawmakers say Cole should release the state's economic and resource damage data for use by private parties against Exxon, the state and Alaska.

See Studies, page B7

Trustees consider further Exxon spill assessment studies

By DANIEL R. SADDLER
TIMES WRITER

The proposed settlement of state claims for the Exxon Valdez oil spill has prompted state and federal trustees to reconsider spending any of \$35.6 million planned for 1991 spill assessment studies. Fish and Game Commissioner Carl Rosier said Saturday.

State and federal agencies last week unveiled their 1991 plan for studies to determine how much the spill damaged Alaska's environment and resources. The studies, funded by the governments and by Exxon, are aimed at setting a dollar value on the impact if Exxon were found liable for the damage.

But with the possibility of a negotiated settlement, the council of trustees

responsible for overseeing the studies and restoration is wondering whether money for a third year of assessment could not be better spent on restoration, Rosier said.

At a Thursday meeting, the Trustees Council of state and federal land officials overseeing the studies decided to ask for a review of the planned studies.

"The mission in reviewing them is to see if there are projects or programs here that lean more toward damage assessment rather than restoration," Rosier said. "The basis for these studies in many cases was litigation, and now we're looking at the studies and work to be done (as) being more directed toward restoration."

Scientists and agency officials over-

seeing their work must complete their review by May, and make their recommendations to the council for the final decision, Rosier said.

Attorney General Charlie Cole said Saturday that studies of the economic damage of the spill clearly driven by legal concerns might be stopped if the state wins approval of the \$1 billion settlement of its claims against Exxon.

But no decision has been made on the studies, or can be made, until the settlement is either approved or rejected by the May 3 deadline, he said.

Meanwhile, some of the studies have already begun, said Mike Dean, acting director of Fish and Game's division of oil spill impact, assessment and restoration.

The department has begun to hire workers, buy equipment and set up field camps for continuing studies of the oil's impact on herring, trout and salmon, said Dean. Other studies on river otter and mink, and on sea birds are due to start soon.

The schedule lists studies focusing on several areas of biological and environmental concern, including marine and terrestrial mammals, birds, fish, coastal habitat, air and water conditions and archaeological resources.

The studies range from monitoring fish, birds and mammal populations to track recovery, to creating computer models showing the relationship between oil and injury, to measuring levels of oil on cleaned beaches.

About \$2.3 million in studies aimed at finding ways to restore or replace damaged resources already have received tentative approval from the Trustees Council, Dean said.

Dean questioned whether the well-planned science program should be halted in face of a settlement.

"You have to know what was broke before you can fix it, and we're still doing that," he said.

Dean said no studies planned for this year would involve killing sea birds or mammals. The U.S. Fish and Wildlife Service has denied applications to do so after public outcry last year over studies in which researchers killed about 170 sea birds in a test of their ability to survive immersion in oil.

Exxon deal may affect studies

By MATT KOHLMAN
The Associated Press

JUNEAU — The state and federal governments may suspend some of their studies of oil-spill damage to Prince William Sound if the \$1 billion Exxon Valdez settlement is approved, state officials say.

Environmental Commissioner John Sandor made the suggestion at a recent meeting of a federal-state council established after the Exxon Valdez spill in March 1989.

The state and federal governments plan to spend \$35 million next summer for damage assessment and restoration. But some of those studies, particularly on economic effects, were started because of Exxon Corp. claims and may be unnecessary with a settlement, Sandor said Friday.

Sandor said he suggested the agencies identify those projects before the group



meets again in May or June.

"We did not say, 'Hey the settlement has been made, thus we're cutting those out completely,'" he said. "We're keeping our bases covered."

About \$18 million of the summer expenses will go toward restoration, and several million more could be used if the settlement makes some studies unnecessary, he said.

"We want to concentrate on restoration," Sandor said.

Sandor also is one of three state representatives

on the six-member trustee board that would be established to oversee spending the settlement money.

Fish and Game Commissioner Carl Rosier and Attorney General Charlie Cole also will be trustees, Cole told lawmakers Friday.

Representing the federal government will be John Knaus, administrator of the National Oceanic and Atmospheric Administration, Interior Secretary Manuel Lujan and Agricultural Secretary Edward Madigan.

Cole said that if the agreement becomes official, he may be replaced by Harold Heinze, natural resources commissioner and former head of Arco Alaska Inc.

"In the course of time, we would suggest DNR be appropriate because we're dealing primarily with natural resources," Cole said. Heinze has not been involved in the settlement so far because of a conflict of

interest, Cole said.

Cole also gave lawmakers a breakdown on the \$72 million that will be used from the settlement to reimburse the state for unpaid costs.

About \$20 million would go toward litigation costs, \$34.5 million would cover oil-spill response costs through February, and \$17.5 million would be used for damage-assessment expenses.

Legislators have formed special committees to review the spill settlement. The agreement would require Exxon to pay a record \$100 million fine. Exxon also would pay \$900 million over 11 years to settle civil claims, with the money going into a trust to pay for cleanup and restoration of Prince William Sound.

The tanker Exxon Valdez spilled nearly 11 million gallons of crude oil into Prince William Sound when it ran aground.

IN THE SUPERIOR COURT FOR THE STATE OF ALASKA
THIRD JUDICIAL DISTRICT AT ANCHORAGE

EXXON VALDEZ OIL
SPILL LITIGATION

3AN-89-2533 Civil
(Consolidated)

This Document Relates To:
Case No. 3AN-89-6957 Civil
National Wildlife
Federation, et al. v.
Exxon Corporation, et al.

AFFIDAVIT OF DR. JOHN M. TEAL

I, Dr. John M. Teal, after being first duly sworn, state as follows:

Introduction

1. My name is Dr. John M. Teal and I am over the age of twenty-one. I am a biological oceanographer with extensive professional experience in marine ecology, marine pollution and biogeochemistry. I am a senior scientist in the biology department at the Woods Hole Oceanographic Institution. My curriculum vitae is attached as Attachment 1.

2. I have read and endorse Attachment 2, "The Problem of Secrecy: Science Under Wraps In the Wake of the Nation's Largest Oil Spill." This statement represents many of my concerns about the current regime of secrecy imposed by the parties to this lawsuit.

Need For Open Exchange of Data

3. Many examples illustrate my concerns about the effects

Affidavit of Dr.: John M. Teal
Page 1

of secrecy on the quality of scientific research on oil spill impacts. One example comes from the investigations of the effects of the tanker "Tsesis" spill in the Baltic. In the affected area the hatching success of herring eggs was drastically reduced. But the oil did not seem to have a large effect on the ratio of normal to malformed herring larvae, indicating no very large direct effect of oil on the eggs, though such a direct effect was the expected result, the logical first hypothesis.

4. Research on other aspects of the affected ecosystem, when combined with the results on herring, suggested the complex pattern of interactions that led to the failure of the herring eggs. A certain type of adult amphipod normally keeps the growth of fungi on herrings eggs low through feeding on the fungi, and thus enhance the survival of the herring eggs. The oil spill virtually wiped out these amphipods which, in turn, allowed fungal growth on the eggs to proceed unchecked. The effects of oil on the adult populations of the amphipod, by preventing their normal interaction with herring eggs, dramatically reduced the survival of herring eggs.

5. Only free interchange of research results and hypotheses by scientists of various disciplines studying the impacts of this spill allowed these scientists to make the necessary logical connection required to understand the cause of the loss of the herring eggs.

6. Without similar opportunities for free interchange of

scientific results, hypotheses and assumptions from research regarding the impacts of the "Exxon Valdez" oil spill (see Attachment 2), many similar complex relationships may never be discerned and the full causal network and/or extent of damage and long-term impacts may never become clear.

Secrecy Hamstrings Other Government Bodies

7. From 1978 to 1990, I have been a member of the Scientific Advisory Board ("Board") to the federal Minerals Management Service ("MMS"). The Board's role is to advise MMS on its scientific studies program. The scientific studies program's purpose is to develop the scientific basis for MMS decisions regarding outer-continental shelf ("OCS") leasing for oil exploration and production.

8. Although the Exxon Valdez spill did not involve OCS oil and did not occur in OCS waters, the Board felt that the results of the spill are very relevant to the decisions MMS makes in regards to the costs and benefits of oil exploration and production.

9. Unfortunately, the secrecy surrounding the Valdez spill effectively prevented the Board, and thus the MMS, from gaining any useful information of this type -- even though it would have been directly relevant to the mission of the MMS.

10. For example, during a meeting of the Board in Juneau, the Board invited representatives of the trustees to attend and discuss the scientific studies being conducted on the "Exxon Valdez" spill. Though the invitees came they were accompanied by

Affidavit of Dr. John M. Teal

Page 3

a government lawyer who sat amongst them and frequently told them not to answer the questions we put to them.

Important Research Opportunities Will Be Lost

11. The Exxon Valdez Spill offers a rare and significant opportunity for marine scientists to answer important questions about marine environments. In essence, the significant deposition of oil, which has components that are relatively long-lived and which will remain relatively toxic over time, in the Prince William Sound ecosystem acts as a marker or tracer which would allow scientists to follow the pattern of movement of various elements of the ecosystem just by following the movement of the oil over time.

12. This would also advance our current knowledge of long-term effects of oil spills. For example, this could allow scientists to expand upon the work that I have done with Dr. John Farrington and Bruce Tripp, also of Woods Hole, into the long-term effects of oil in the West Falmouth Harbor ecosystem. In that study, we have been able to trace the long-term movement of oil throughout an ecosystem which was disturbed by a 1969 oil spill.

13. In the wake of the "Exxon Valdez" spill, I am interested in studying the long-term ability of various sea plants and grasses to transmit oxygen to the sediment layers in which their roots are imbedded. The disturbances created by the oil spill and the way in which these disturbances affected and continue to affect this ecosystem would allow me to better

understand the relationship between these plants and their immediate environment.

14. However, I have not been willing to do this work and many other scientists have been deterred from undertaking similar research which would add to our understanding of marine environments in general, as well as our understanding of the long-term effects of oil spills in particular, because most of the data that has been collected is being kept secret.

15. Because so much of the basic data regarding the oil spill is not currently available, it is much more difficult for outside scientists without access to this data to conduct competent scientific investigation. There are so many ways in which one's hypotheses could be significantly in error, just because basic data upon which these hypotheses need to be built are not available, that I and many scientists like me are not willing to risk wasting our time or damaging our reputations (and, thus, our ability to fund the work we want to do) by conducting this type of speculative research.

16. I am also not interested in doing research if I must be bound by a secrecy agreement. If I were to agree to do this type of work I would not be able to publish my results until after the lawsuit was resolved (though a settlement, by its terms, might prevent any data from ever being published). I depend upon being able to publish my work for many reasons: Not only is it the best means of communicating with my peers and benefiting from their ideas and experience, but publishing allows me to advance

my scientific reputation which allows me to obtain funding for the projects I am interested in and to help support Woods Hole and the other scientists I work with.

17. If I know that I will be publishing the results of my investigations, I always have a stronger incentive to carefully and clearly think through my program of research. This is because I know that my work will be subjected to careful scrutiny by the most qualified reviewers possible.

Secrecy Must End Now

18. The longer this secrecy lasts, the more difficult it will be for outside researchers to commence meaningful studies after the existing data is released for public review. Time is of the essence to research on an environmental impact like the "Exxon Valdez" oil spill. Knowledge of the conditions at the time of the spill, details of the initial effects, and of the areas affected are essential to planning and conducting such research.

19. Knowledge made available only months or years after the event may show how one should have planned and conducted the research into that event, but could be useless for actually doing it. If this data is to have maximum value to outside scientists it must be released as soon as possible.

Conclusions

20. The current secrecy of science in Prince William Sound will keep many interested and qualified scientists from studying the effects of the Exxon Valdez oil spill, despite the fact that

this spill offers an unique opportunity to expand our knowledge of the long-term effects of oil spills as well as the basic rules that govern such marine ecosystems.

21. It is very important that this secrecy end immediately so that outside scientists can review the work already done and take steps to correct errors, limitations, and/or gaps in this work and/or initiate their own research on the effects of the spill.

ANYTHING FURTHER THE AFFIANT SAYETH NOT.

John M. Teal
Dr. John M. Teal

STATE OF MASSACHUSETTS)
COUNTY OF Barnstable) ss.

On this 11th day of September, 1990, the Affiant Dr. John M. Teal personally appeared before me and signed the foregoing Affidavit after first having sworn that the information contained therein is true and correct to the best of his knowledge and belief. Witness my hand and official seal. My commission expires on 26 August 1991.

[SEAL]

James J. Klein
Notary Public

RESUME

JOHN M. TEAL
Senior Scientist
Woods Hole Oceanographic Institution
Woods Hole, MA 02543

1 January 1990

Birth date: November 9, 1929.
Omaha, Nebraska
Nationality: U.S.A.
Social Security 507-32-0538

President: Teal, Ltd., environmental consultants associated with Aubrey Consulting Inc.

EDUCATION

B.A., Harvard University, 1951
M.A., Harvard University, 1952
Ph.D., Harvard University, 1955

ACADEMIC POSITIONS

Assistant Professor, 1955-1959, University of Georgia Marine Institute.
Assistant Professor, 1959-1961, Department of Biology and Institute of Oceanography,
Dalhousie University
Research Associate, 1961-1963; Assistant Scientist, 1963-1965; Associate Scientist, 1965-1971.
Senior Scientist, 1971-present; Chair, Biology Dept., 1982-1985; Seward Johnson Chair
Biology, 1986-1989; Woods Hole Oceanographic Institution.

PROFESSIONAL SOCIETIES

Sigma Xi; Phi Beta Kappa
Ecological Society of America (Certified Senior Ecologist)
American Society of Limnology and Oceanography
American Association for the Advancement of Science
Estuarine Research Federation
Society of Wetland Scientists
International Ecological Society

BOARD & COMMITTEE MEMBERSHIPS

Editorial Board: Ecology, 1960-1963, 1967-1969; Biological Bulletin 1983-1986
Marine Biological Laboratory: Instruction Committee 1968-1971; Instructor, Marine Ecology,
1976-1983; Corporation member 1983-present, Joint Library Committee 1988-present.
Conservation Commission, Town of Falmouth, 1971-1977.
Study Committee, Ecol. Soc. Amer., 1971-1974.
Conservation Law Foundation of New England: Board of Directors, 1978-present; Vice-chairman
of Board, 1980-present.
Scientific Advisory Committee, Outer Continental Shelf program of U.S. Mineral Management
Service, 1979-1981, 1984-1989, Chairman 1987-1989.

Scientific Advisory Subcommittee of Massachusetts DEQE Wetlands/Wildlife Technical Advisory Committee 1987

Lloyd Center Scientific Advisory Committee

Scholarly Studies Review Panel, Smithsonian Institution. 1988-1990

PUBLICATIONS

I am the author and/or co-author of c.125 scientific papers; 3 encyclopedia articles; 6 children's articles on oceanography; 4 trade books: "Portrait of an Island", Atheneum and Univ. Ga. Press, "Life and Death of a Salt Marsh", Atlantic-Little Brown and Ballentine, "Pigeons and People", Atlantic-Little Brown, "The Sargasso Sea", Atlantic-Little Brown and narrative for the film "Salt Marshes"-Jeff Sim Harper Row.

CONSULTING

I have served as a consultant on salt and freshwater wetlands, hydrocarbons, pollution, sewage treatment and pollution, coastal ecology, and groundwater protection to:

Conservation commissions: Towns of Mashpee, Falmouth, Barnstable

Massachusetts Towns: Cohasset, Duxbury, Falmouth, Harwich, Kingston.

Environmental organizations: Science Applications, Inc.; Energy Resources, Inc.; The Parks Council, New York; Hackensack Meadowlands Commission, New Jersey
Natural Resources Defence Council:

U.S. Govt. Agencies: President's Council on Environmental Quality; Mineral Management Service; Bureau of Land Management; National Oceanic and Atmospheric Administration; Environmental Protection Agency; National Research Council
Smithsonian Institution;

Universities: Univ. of Texas, Louisiana State, Univ. North Carolina, Stanford;

Other companies: McAbee Real Estate; The Green Company; Boston Gas; De Matteo Construction Co.; Land Use Associates; Peters-Hartell Corp.; Malcolm Pirnie Inc.; LEA Group Inc.; Weston & Sampson Engineers Inc., Ecological Engineering Associates

EXPERT TESTIMONY

I have been an expert witness in wetlands and pollution cases in state and federal courts including:

CLF vs. US-Dept. Interior (Park Service) re ORV permits on Nat. seashores;

Mass. MacGibbon vs. Duxbury, re wetlands protection;

New York vs. US-Dept. Interior re Mid-Atlantic oil leases;

Corps of Engineers vs. Swan Pond Golf Club, NY, re wetland protection;

U.S. vs. (barge company), U.S. District Court, VA, re oil pollution effects;

I have testified as an expert witness at numerous hearings before:

Mass. Dept. Environ. Qual. Engineering;

Rhode Island Coastal Resource Management Council;

Local conservation commissions, zoning boards, boards of public health, etc.

PROFESSIONAL EXPERTISE

I have scientific expertise in most aspects of coastal ecology and coastal pollution: including wetlands ecology, groundwater pollution, eutrophication, wastewater treatment with wetlands, hydrocarbon pollution, nutrient dynamics, ecology of shallow waters, birds, and coastal and dune vegetation.

I have been an invited participant and speaker at meetings on many aspects of marine science and management including:

Research for the '90's, Prince William Sound and Copper River Delta, Cordova, AK, 1990
West Falmouth Oil Spill, 20 years after, 1989;
Effects of OCS oil and gas activities on submarine canyons, 1989;
NAS panel on use of dispersants on oil spills, 1988;
Third International Wetlands Conference, Rennes, France 1988;
NATO Ocean Dumping Options Conference, Portugal, 1985;
SCOPE Toronto Conference on Nuclear Winter, 1984;
CEQ Conference on Long-term Environmental Research and Development, 1984;
SCOPE meeting on wetlands, Tallin, E.S.S.R., 1983;
SCOPE Musselwatch II, Honolulu, 1983;
NOAA Ocean Dumping, Napa, 1983; Crystal Mt., 1979, Estes Park, 1978;
Conference on Coastal Productivity, Pollution and Protection, Rio Grande do Sol, Brazil, 1982;
NAC Petroleum in the Marine Environment, 1982, 1975;
International Wetlands Conference, New Delhi, India, 1980;
NATO Benthic Boundary Layer, Les Arcs, France, 1975;
Global Ecology Problems: Man in the Living Environment, section on aquatic resources;
NAS report on National Minerals Policy, section on ecological impacts;
California Coastal Zone Management Conference on Wetlands Protection;
Salt Marsh Conference, Univ. Ga, 1954;
Coastal Zone Workshop, steering committee member; "Critical Problems of the Coastal Zone" 1972;
Hackensack Meadowlands Commission meetings on wetland management;
Coastal Recreation in an Urbanizing Environment, U. Mass. Cooperative Extension;

RESEARCH INTERESTS

Wetland and coastal ecology: especially salt and brackish marsh ecosystem structure and function; fish nursery value, nutrient cycling, hydrology, productivity; groundwater influences on waterbodies, groundwater contamination with nutrients; wastewater treatment by wetlands; petroleum pollution and hydrocarbon biogeochemistry; marine birds and over-ocean migration of land birds; coastal marine ecology including dune and beach ecology; physiological ecology of fishes; aquaculture and fisheries.

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Third International Wetlands Conference, Renne, France 1988;
NATO Ocean Dumping Options Conference, Portugal, 1985;
SCOPE Toronto Conference on Nuclear Winter, 1984;
CEQ Conference on Long-term Environmental Research and Development, 1984;
SCOPE meeting on wetlands, Tallin, E.S.S.R., 1983;
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NOAA Ocean Dumping, Napa, 1983; Crystal Mt., 1979, Estes Park, 1978;
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NAC Petroleum in the Marine Environment, 1982, 1975;
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NATO Benthic Boundary Layer, Les Arc, France, 1975;
Global Ecology Problems: Man in the Living Environment, section on aquatic resources.,
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The Problem of Secrecy: Science Under Wraps
In the Wake of the Nation's Largest Oil Spill

Introduction

1. As scientists who have worked in the field of oceanography and have studied in particular the effects of hydrocarbon spills on marine and coastal ecosystems, we are gravely concerned about the secrecy and confidentiality that has surrounded the scientific study of the impact of the Exxon Valdez oil spill on the ecosystem of Prince William Sound.
2. Scientific analysis of the short and long-term impacts of an environmental disaster in a marine, near-shore and coastal environment such as Prince William Sound is exceedingly difficult, involving multiple ecological systems and complex interrelated ecosystem effects. As such, it necessarily requires both short and long-term multi-disciplinary study.
3. Full data sharing, and open discussion of scientific data regarding spill impacts with scientific experts from all relevant disciplines is fundamentally important and critical to assuring that scientific investigators and those analyzing the data get a full picture of the impacts and do not overlook important potential impacts or gaps in the data. Without open data sharing and discussion, subtle potential impacts may not be recognized and new investigations of key ecological perturbations may not be commenced. In addition, ongoing studies may be terminated before ecological injuries are documented due to a lack of a full understanding of the complexities of the ecological response to the catastrophic addition of oil to the ecosystem.

Need for Initial Data

4. After a massive oil spill such as this, the greatest amount of gross ecosystem impact occurs during the initial period. In this spill, significant direct damage to flora and fauna was immediately caused by the massive introduction of foreign and toxic material into the ecosystem and food web.
5. Because of this, all data collected which records the initial damage to flora and fauna and the movement and evolution of the hydrocarbons into the ecosystem is crucially important to both short and long-term evaluation and analysis. The data collected during the acute phase of massive injury to flora and fauna is the starting point for all other analysis.

6. Without complete and detailed information about this initial acute phase, it is difficult to predict or analyze the future impact the spill may have.

Importance of Peer Review

7. If these data are not made public immediately, the ultimate assessment of damage will be hindered and the amount of damage inadequately assessed.
8. Science works well and most effectively when it is conducted in open dialogue, among scientists within a given discipline and among scientists of multiple disciplines. This is particularly so where questions require complicated ecosystem analysis and evaluation, such as is required by a massive spill like the Exxon Valdez oil spill.
9. The conclusions of science are deemed credible only when there is independent and open review through a peer review process. Scientific literature based upon data and research not subjected to peer review is suspect. A study or one person's analysis of data will not be widely accepted in science until the study and analysis have been exposed to criticism and the concerns raised by the critics have been addressed. The entire system of scientific research depends upon the checks and balances provided by discussion and criticism of important ongoing work.
10. Without early feedback, open discussion, and integration of results and ideas from different disciplines, individual scientists or scientists working in one or two disciplines may well miss key parts of the entire picture. Scientists studying some portion of an ecosystem have misunderstood entirely the significance of the data they were collecting until practitioners of another discipline had been brought in to consult.
11. When scientists are talking to each other about their research they can integrate the information, note the type of sampling that is being done and be able to work with comparable data. A shotgun, unintegrated approach which is detached from the findings of others studying a similar subject will ultimately lead to greater cost and less reliability. Unless complete information about all studies is shared and integrated, there may be a tendency for "mindless measurement" while the larger picture is missed. Studies may be redundant or there may be gaps. It would clearly be more cost effective to share from the outset.

Peer Review of Initial Data is Critical

12. It is important to have open and frank discussion among scientists about the data gathered from the earliest impacts of the spill. Given the fact that the initial stages of

this type of disaster involved the greatest and most rapid change, it is clearly detrimental to the scientific investigation of the spill to wait until all the data are gathered before engaging in open dialogue and multiple disciplinary review. The situation is changing quickly in space and time while these studies are ongoing. Open dialogue and communication should be concurrent with the studies, not subsequent to them.

13. Science is enriched by constant feedback and refinement. Scientists never know what they may find when they first start looking. The first protocols used may be inadequate. The methodology or the detection limits may not be appropriate. It may well be that the questions need reframing, or methodologies need to be changed, based upon the initial results.

These Critical Data Should Be Public

14. Due to the passage of time since the spill, the important initial data regarding the Alaska spill are not available now except from those who actually collected data at the critical times. Thus, the data cannot be reproduced or gathered from any source other than those who actually collected it and who have the knowledge that has come from the data. We cannot state strongly enough that these data should be available for scientific and public review.
15. In addition, it is essential to know the following: What questions were the scientists asking when they did the studies? What procedures were they using to answer those questions? How did those procedures change or how did the questions change during the time that the initial data was coming in? Was there any feedback or modification in the study done during the course of the study?

Conclusion

16. Humankind, and in particular scientists working on environmental and ecosystem problems, need to know the effects of the Exxon Valdez oil spill on the environment. The effects cannot be known adequately without making the data available to everyone with the interest and the expertise to evaluate what it means and what it portends for the future.

FILED

APR 08 1991

UNITED STATES DISTRICT COURT
DISTRICT OF ALASKA

Re _____ Deputy

RICHARD B. STEWART
Assistant Attorney General
Environment & Natural Resources
Division

STUART M. GERSON
Assistant Attorney General
Civil Division
U.S. Department of Justice
Washington, D.C. 20530

JOSEPH W. BOTTINI
Assistant United States Attorney
222 W. Seventh St.
Anchorage, Alaska 99513
(907) 271-5071

RECEIVED

APR 15 1991

PRESIDENT

Attorneys for Plaintiff United States of America

UNITED STATES DISTRICT COURT
DISTRICT OF ALASKA

UNITED STATES OF AMERICA,

Plaintiff,

v.

CIVIL ACTION

NO. A91-082

Exxon Corporation, Exxon Shipping
Company, Alyaska Pipeline Service
Company, Amerada Hess Pipeline
Corporation, ARCO Pipe Line Company,
Exxon Pipeline Company, Mobil Alaska
Pipeline Company, Phillips Alaska
Pipeline Corporation, BP Alaska
Pipelines, Inc., Unocal Alaska
Pipeline Company, and the T/V
EXXON VALDEZ), in rem,

Defendants.

NOTICE OF LODGING OF UNITED STATES' SUMMARY OF
EFFECTS OF EXXON VALDEZ OIL SPILL ON NATURAL RESOURCES

PLEASE TAKE NOTICE that the United States is lodging

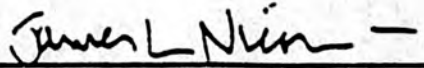
NOTICE OF LODGING OF SUMMARY OF EFFECTS - 1

with the Court the attached Summary of Effects of the EXXON VALDEZ Oil Spill on Natural Resources and Archaeological Resources (the "Summary"). The United States is lodging the Summary to assist the Court in evaluating the proposed Consent Decree lodged with the Court on March 13, 1991. The Summary is based on scientific studies conducted by the Departments of Agriculture and the Interior, the National Oceanic and Atmospheric Administration, and the Environmental Protection Agency to assess the injury to natural resources resulting from the oil spill.

The Summary is being lodged in advance of a motion to enter the proposed Consent Decree in order to give the Court additional time to consider the nature of injury to natural resources resulting from the oil spill.

Dated: April 8, 1991

JOSEPH W. BOTTINI
Assistant United States Attorney
222 W. Seventh St.
Anchorage, Alaska 99513
(907) 271-5071


JAMES L. NICOLL, JR.
U.S. Department of Justice
Environmental Enforcement Section
NOAA GC-DOJ DARC BIN C15700
7600 Sand Point Way NE
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SUMMARY OF EFFECTS OF THE EXXON VALDEZ OIL SPILL
ON NATURAL RESOURCES AND ARCHAEOLOGICAL RESOURCES
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INTRODUCTION

The T/V Exxon Valdez ran aground on Bligh Reef in Prince William Sound on the night of March 23-24, 1989, spilling approximately 11 million gallons of North Slope crude oil, making this the largest oil spill in United States history. The oil spread through Prince William Sound, the Gulf of Alaska, and lower Cook Inlet. More than 1,200 miles of coastline were oiled, including portions of the Chugach National Forest, Alaska Maritime, Kodiak, and Alaska Peninsula/Becharof National Wildlife Refuges, Kenai Fjords National Park, Katmai National Park and Preserve, and Aniakchak National Monument and Preserve. Oil from the T/V Exxon Valdez impacted shorelines nearly 600 miles from Bligh Reef.

The magnitude of efforts of the state and federal governments, the public, and Exxon to contain and clean up the spill, rescue wildlife, and study the effects of the spill is unprecedented. Among those efforts are the state/federal natural resource damage assessment studies designed to measure injuries to natural resources including birds, mammals, fish and other wildlife, and marine and terrestrial habitats. These studies are intended to provide the information necessary for the Trustee agencies to manage and restore injured resources appropriately and to provide necessary documentation to enable the governments to present a claim for damages to the responsible parties. This summary briefly describes the area affected by the spill, the chronology of the spill, and the process developed to implement and manage the injury assessment studies. It focuses, however, on what has been learned over the past two years about the effects of this oil spill on natural resources.

DESCRIPTION OF THE AREA AFFECTED BY THE SPILL

Prince William Sound lies near the top of the Gulf of Alaska (see map), an 850 mile arc extending from the Aleutian Islands on the west to the islands of southeast Alaska. The gulf coast is remote, rugged, and scenic. Its maritime climate nourishes a lush, green landscape in the summer. The area is snow covered in the winter. Bears, whales, bald eagles, puffins, seals, sea lions, and sea otters are among the abundant wildlife of the area. Storms that cross the Gulf drop as much as 300 inches of rain and snow annually in the high coastal mountains. Glaciers descend from permanent ice fields capping these coastal mountain ranges, continuing to carve intricate fjords and send icebergs floating out to sea. These are the largest glaciers outside Antarctica and Greenland.

Prince William Sound is one of the largest relatively undeveloped marine ecosystems in the United States. It has one of the continent's largest tidal estuary systems. Prince William Sound has rich commercial herring and salmon fisheries. The open water of the Sound is about the size of Chesapeake Bay. Its many islands, bays, and fjords give it

more than 2,000 miles of shoreline. Prince William Sound is surrounded by land, most of which is part of Chugach National Forest.

To the southwest of Prince William Sound is the Kenai Peninsula, home of the Kenai Fjords National Park, various units of the Alaska Maritime National Wildlife Refuge, and, among others, the cities of Homer and Seward. Numerous seabird colonies are located along the coast of the Kenai Peninsula, including those most frequently visited by tourists in Alaska. Both Prince William Sound and the Kenai Peninsula are accessible by air, boat, and on a limited basis, by automobile from nearby Anchorage, Alaska's major population center. State ferries that run among the larger communities and many charter boats make it easy for people to visit the heart of the Gulf coast. In recent years, there has been a steady increase in the number of wilderness seekers, kayakers, cruise ship passengers, and other tourists visiting the area.

The Kenai Peninsula points southwest to Shelikof Strait and Kodiak Island. Shelikof Strait lies between Kodiak Island, on the south and the Alaska Peninsula on the north. Shelikof Strait is the source of a very productive commercial pollock fishery. The Kodiak National Wildlife Refuge is located on the Kodiak Archipelago and Katmai National Park and Preserve, Alaska Peninsula/Becharof National Wildlife Refuge, and Aniakchak National Monument and Preserve are located along the coast of the Alaska Peninsula. The Alaska Peninsula tapers, then scatters into the islands of the Aleutian chain.

CHRONOLOGY OF THE EXXON VALDEZ OIL SPILL

For the first three days of the spill, the weather was calm and the slick lengthened and widened amoeba-like and generally stayed in the vicinity of the grounded tanker and off the beaches. Even with these seemingly ideal circumstances for oil recovery, the amount of oil in the water completely overwhelmed efforts to contain and recover the oil. A major windstorm on March 27, 1989, pushed the oil in a southwesterly direction and oiled beaches on Little Smith, Naked, and Knight Islands. The oil continued to spread, contaminating islands, beaches, and bays in Prince William Sound. Four days into the spill, oil began to enter the Gulf of Alaska. The leading edge of the slick reached the Chiswell Islands off the coast of the Kenai Peninsula on April 2, 1989, and the major seabird nesting colonies on the Barren Islands on April 11, 1989, nineteen days into the spill. By May 18, 1989, oil had moved some 470 miles and had fouled shorelines of Prince William Sound, the Kenai Peninsula, the Kodiak Archipelago, and the Alaska Peninsula. Oil subsequently reached shorelines on the Alaska Peninsula nearly 600 miles from Bligh Reef.

During 1989, the response to contain and cleanup the spill and rescue oiled wildlife involved a massive effort. Skimmer ships were sent throughout the spill zone to vacuum oil from the water surface. Booms were positioned to keep oil from reaching important commercial salmon hatcheries in Prince William Sound. A fleet of fishing vessels, known as the "Mosquito Fleet," played an important role in protecting these hatcheries, in corralling oil to assist the skimmer ships, and in capturing oiled wildlife and

transporting these animals to rehabilitation centers. After oil contaminated shorelines, a beach cleanup program was activated. Various local committees, with community and government agency participation, provided recommendations to the U.S. Coast Guard about areas that should receive priority for cleanup. An army of workers cleaned shorelines, using techniques ranging from cleaning rocks by hand to high pressure hot water washing. Fertilizers, sometimes in a chemical base, were applied to some oiled shorelines to increase the activity of oil-metabolizing bacteria, in an experimental procedure known as bioremediation. When deteriorating weather brought an end to cleanup work in the fall of 1989, a great amount of oil remained on the shorelines. Although winter storms proved extremely effective in cleaning many beaches, spring shoreline surveys indicated that much work remained to be done in 1990. Crews operating from boats and helicopters cleaned oiled shorelines in Prince William Sound, along the Kenai and Alaska Peninsulas, and on the Kodiak Archipelago. Manual pick up of remaining oil was the principal method used during 1990, but bioremediation and relocation of oiled berms to the active surf zone were also used in some areas.¹ Another shoreline survey will be conducted during May 1991, to determine the need for additional cleanup work.

INJURY ASSESSMENT PROCESS

The Exxon Valdez oil spill occurred just prior to the most biologically active season of the year in southcentral Alaska. During the two month period after the spill, seaward migrations of salmon fry, major migrations of birds, and the primary reproductive period for most species of birds, mammals, fish, and marine invertebrate species took place. The organisms involved in these critical periods of their life cycles encountered the most concentrated, volatile, and potentially damaging forms of the spilled oil. As will be discussed in this summary, the oil affected different species differently. Whereas, for example, it directly killed large numbers of birds and sea otters that encountered oil on the water surface, it did not prohibit in and out migration and spawning of large schools of salmon and herring.

The state and federal Trustee agencies were forced to mobilize field studies rapidly with little time for planning. Through intensive efforts, studies were designed, administrative processes were accelerated, and 58 field studies were carried out. Additionally, technical services programs were organized to provide hydrocarbon analysis, histopathology, and mapping support for the field studies. Initial decisions on the types and scope of studies conducted were made by agency experts familiar with the resources and the environment. Even with the rapid deployment of studies, however, some opportunities to gather injury data were irretrievably lost during the early weeks of the spill.

A legal framework was subsequently established and studies were reviewed and modified according to their likelihood to document resource injury. Expert peer reviewers were retained and study plans used during 1989 underwent scientific review for possible

¹Exxon has represented that it has paid over \$2.0 billion to conduct cleanup activities during 1989 and 1990.

modification in 1990. Some studies were discontinued or modified if they were unable to further document resource injury, and some new studies were initiated to fill identified information needs. Status reports prepared in January 1990, were used to guide the development of plans for the second year of studies. Thirty-nine studies and three technical services programs were continued in 1990. Scientific review was again used to plan for the upcoming 1991 field season, during which 29 studies and two technical services programs will be conducted.

This summary of the effects of the Exxon Valdez oil spill on natural resources is preliminary, as studies are still underway and available data are not fully analyzed and interpreted. However, the injuries to natural resources that have been documented to date are summarized herein. This summary also addresses studies that were discontinued. It should be noted that studies were discontinued for a variety of reasons, such as the determination that field work had been completed, that there was no practicable way to measure injury, or that no injury was documented. Even though some studies failed to identify injury and were discontinued, this does not necessarily mean that the resources were not affected by the spill. Certain injuries (if present), such as possible latent or sublethal effects on reproductive or other systems in animals, might not become fully evident for a number of years after the spill. At present there is no significant indication of long-term injury to resources other than those specifically noted below. Although studies indicate that there are continuing injuries to certain resources, natural recovery may also have begun. As petroleum hydrocarbons are broken down in the ecosystem, plant and animal communities begin to reestablish themselves. This recolonization has already been observed in some of the more lightly oiled areas. In the more heavily oiled areas, this natural recovery process is expected to take longer. As this natural recovery occurs, many of the birds and mammals that feed in these areas are expected to begin recovering.

MARINE MAMMALS

Following the spill, studies of humpback whales, Stellers sea lions, sea otters, harbor seals, and killer whales were started. The humpback whale and Stellers sea lion studies were discontinued following the 1990 field season. Humpback whale investigations were limited to photo identification of whales, estimations of reproductive success, and possible relocations of whales. It was not possible to take tissue samples for petroleum hydrocarbon analysis to document exposure. The study did not show direct oil spill mortalities or reproductive failures.

The sea lion study is being completed following the 1990 pup counts. Some tissue samples were analyzed for petroleum hydrocarbon concentrations, and although there was some indication of exposure to oil, it was difficult to determine what populations were affected because of the sea lions' active seasonal movements. Because of an ongoing pre-spill population decline and premature pupping of sea lions, it was not possible to distinguish post- from pre-spill population effects clearly.

Studies of killer whales, based on observations only (because tissue sampling was not an

option), have indicated that killer whales are missing from at least one and possibly two pods in Prince William Sound. Injuries to harbor seals and sea otters have been clearly indicated and studies of these species are continuing.

Sea Otters: The population of sea otters in Prince William Sound before the spill was estimated to have been as high as 10,000. The total sea otter population of the Gulf of Alaska was estimated to be at least 20,000. Statewide, the sea otter population is estimated at 150,000. Sea otters were particularly vulnerable to the spill. As the oil moved through Prince William Sound and the Gulf of Alaska, it covered areas used by large numbers of otters. When sea otters become contaminated by oil, their fur loses its insulating capabilities, leading to death from hypothermia. Sea otters also died as a result of ingestion of oil and perhaps inhalation of toxic aromatic compounds that evaporated from the slick shortly after the spill. The effects of oil were documented by surveys of wild populations; analysis of tissues for petroleum hydrocarbons and indicators of reduced health; by tracking sea otters outfitted with radio transmitters (including those released from rehabilitation centers); and estimating total mortality from the number of sea otters found on beaches. These studies concentrated on developing an estimate of sea otter mortality in Prince William Sound and along the Kenai Peninsula, the population most affected by the spill. During 1989, a total of 1,011 sea otter carcasses were recovered in the spill area, cataloged, and stored in evidence trailers. Of these, 876 were recovered dead from the field and 135 died in rehabilitation centers or other facilities. The total number of sea otters estimated to have been killed directly by the spill ranges from 3,500 to 5,500 animals throughout the spill area.

Initial results indicate significant differences in hematology and blood chemistry parameters between sea otters in oiled and unoiled areas. Greater variation was observed in DNA content of blood lymphocytes of sea otters from oiled areas, but sperm and testicular cells showed no indication of DNA damage resulting from oil exposure. It cannot yet be determined whether these differences affect sea otter health or survival. There are indications that sea otters continue to be exposed to petroleum hydrocarbons in oiled areas. Analysis of blood and fat samples collected from animals during 1990 found elevated concentrations of certain aromatic compounds in sea otters from heavily oiled areas and elevated concentrations of petroleum hydrocarbons continue to be documented in food items eaten by sea otters in oiled areas. Additionally, other damage assessment studies have documented a decreased abundance of mussels in oiled areas, a key prey species for sea otters.

Studies have documented continuing injury to sea otters. Normally, very few prime age sea otters (animals between 2 and 8 years old) die each year and most mortality occurs among very young and old age classes. The high number of prime age sea otter carcasses found during 1990 indicates that the pattern of sea otter mortality in heavily oiled areas continues to be abnormal. Results of boat surveys indicated continued declines in sea otter abundance within oiled habitats in Prince William Sound. Preliminary results indicate that pupping rates in oiled and unoiled areas are not significantly different. However, the first information available for the spring of 1991 shows higher yearling mortality rates in oiled areas than in unoiled areas. Studies of the survival and reproductive success of sea otters released from rehabilitation

centers indicate a high level of mortality of adult animals and significantly lower pupping rates than the pre-spill mortality and pupping rates in Prince William Sound. Of the 193 sea otters released from rehabilitation centers, 45 were fitted with radio transmitters. Sixteen of these animals are still alive, 13 are known to be dead, and 15 are missing. One radio transmitter is known to have failed.

Harbor Seals: There has been no census of harbor seals in Prince William Sound since the mid-1970s when the population was estimated at 3,000 to 5,000 animals. Since that time, the harbor seal population in Prince William Sound and the Gulf of Alaska has declined substantially. A population census of Prince William Sound is planned for the summer of 1991.

Two hundred harbor seals are estimated to have been killed by the spill. Only 19 seal carcasses were recovered following the spill, since seals sink when they die. Population changes were documented by summer and fall aerial surveys of known haulout areas. Toxicological and histopathological analyses were conducted to assess petroleum hydrocarbon accumulation and persistence and to determine toxic injuries to tissues.

Population surveys, which are reliable indicators of population trends, conducted in 1984 and 1988 indicated that harbor seal populations in Prince William Sound had declined prior to the spill, with similar declines in what were subsequently oiled and unoled areas. From 1988 to 1990, however, the decline at oiled sites (35 percent) was significantly greater than at unoled sites (13 percent).

Severe debilitating lesions were found in the thalamus of the brain of a heavily oiled seal collected in Herring Bay 36 days after the spill. Similar but milder lesions were found in five other seals collected three or more months after the spill. During 1989, oiled harbor seals behaved abnormally, being lethargic or unwary. Petroleum hydrocarbon concentrations in bile were 5 to 6 times higher in seals from oiled areas one year after the spill. This indicates that seals were still encountering oil in the environment, were metabolizing stored fat reserves that had elevated levels of petroleum hydrocarbons, or both.²

Killer Whales: Approximately 182 killer whales forming nine distinct family units or "pods" resided in Prince William Sound before the spill. This count is based on pre-spill documentation. These whales were studied intensively before the spill and their group composition and dynamics are well known. Damage assessment studies of killer whales involved extensive boat-based surveys in Prince William Sound and adjacent waters. Whales were photographed and the photographs were compared to the Alaskan

²Harbor seals are taken in some Alaska villages for subsistence. The State of Alaska conducted a program, separate from the damage assessment program, to test subsistence foods potentially affected by the spill to insure that they were safe for human consumption. The State of Alaska determined that harbor seals in the affected area were safe for people to eat (Oil Spill Health Task Force, July-August 1990 Report and September-October 1990 Report. Alaska Department of Fish and Game, Division of Subsistence).

killer whale photographic database for the years 1977 to 1989 to determine changes in whale abundance, seasonal distribution, pod integrity, and mortality and natality rates.

The AB pod of 36 individual whales was sighted intact in September of 1988. When sighted on March 31, 1989, seven days after the spill, seven individuals were missing. These whales remain absent and six additional whales were missing from the AB pod in 1990. Several of the missing whales are females who left behind calves. It is unprecedented for females to abandon calves, therefore their prolonged absence implies that these adult females are dead. In addition, nine individuals from AT pod were missing in 1990. Explanations for the possible causes of death of these missing whales, including explanations apart from the effects of the spill, are being explored. Killer whale surveys will continue in 1991.

TERRESTRIAL MAMMALS

Studies were conducted on terrestrial mammals that may have been exposed to oil through foraging in intertidal habitats. These species included brown bear, mink, black bear, Sitka black-tailed deer, and river otters.

Brown bears are long-lived animals and forage seasonally in the intertidal and supratidal areas of the Alaska Peninsula and the Kodiak Archipelago. Preliminary analysis of brown bear fecal samples and some tissues show that some brown bears were exposed to petroleum hydrocarbons, but no conclusive injury has been documented. Radio-collared brown bears along the Katmai coast and at a control site on the Alaska Peninsula will continue to be monitored while the transmitters remain active.

Mink and other small mammals that are known to feed and spend part or all of their time in the intertidal zone are difficult to study. They are known to crawl off into burrows or the brush if sick or injured and carcasses are unlikely to be found. Also, information on pre-spill populations of these animals is minimal. Scientists developed a laboratory study to test reproductive effects of oil on ranch-bred mink, in which they were fed food mixed with small, non-lethal amounts of weathered oil. Although changes in reproductive rates or success were not documented, it was found that oil-contaminated food moved through the intestines of the animals at a more rapid rate than did clean food, possibly providing less nutrition to the animals. No field studies were carried out for black bear due to the difficulty of finding, collaring, or otherwise investigating these animals in the dense underbrush in which they reside. However, a literature search confirmed that these animals do forage in the intertidal zone in the spill area.

The deer study found no evidence of injury based on intensive searches of beaches that revealed no mortality attributable to the spill. However, deer taken for purposes of testing for safety for human consumption (not part of the damage assessment process) found slightly elevated petroleum hydrocarbons in some tissues in deer (which feed on kelp in intertidal areas) but it was determined that the deer were safe to eat.

River Otters: A few river otter carcasses were found by cleanup workers. River otters forage in streams and shallow coastal habitats that were contaminated by the spill. Analysis of river otter bile indicated that petroleum hydrocarbons are being accumulated by this species. Studies of radio tagged animals in Prince William Sound showed that home ranges are larger, movements more erratic, and body weights are lower in oiled habitat. Field work is continuing in 1991 to further assess the status of this species, including analysis of blood samples to measure the health of these animals.

BIRDS

Among the most conspicuous effects of the Exxon Valdez oil spill was the injury to birds. Seabirds are particularly vulnerable to oil as they spend much of their time on the sea surface while foraging. Oiled plumage insulates poorly and loses buoyancy and birds die from hypothermia or drowning. Birds surviving initial acute exposure may then ingest oil by preening. Approximately 36,000 dead birds were recovered after the spill; at least 31,000 of these deaths were attributed to the effects of oil. In addition to the large number of murres, sea ducks, and bald eagles, carcasses of loons, cormorants, pigeon guillemots, grebes, murrelets, and other species were also recovered (see attached comprehensive list of bird carcasses logged into evidence trailers by September 25, 1989). Only a small proportion of the total number of birds estimated to have been killed were recovered, as many undoubtedly floated out to sea, sank, were scavenged, were trapped and hidden in masses of oil and were not visible, were buried under sand and gravel by wave actions, decomposed, or simply beached in an area where they were not found. Additionally, it is known that, in a number of cases, carcasses found shortly after the spill were not turned in to receiving stations. Preliminary analyses provided by computer models that account for some of these variables estimate that the total number of birds killed by the spill ranges from 260,000 to 580,000 with the best approximation that between 350,000 and 390,000 birds died. Following peer review, the model will be run again to provide a more refined estimate of total mortality.

Common and Thick-billed Murres: Murres are the third most abundant seabird in Alaska (after tufted puffins and black-legged kittiwakes). A total of approximately 1,400,000 murres reside in the Gulf of Alaska (Unimak Pass to the Canadian border in southeastern Alaska). The total population of murres in Alaska is approximately 12,000,000. The murre colonies on the Chiswell Islands are the most visited by tourists in Alaska. In 1989 and 1990 murres were the most heavily affected bird species. Murre colonies impacted by the spill lost 60 to 70 percent of breeding birds. Oil in Prince William Sound affected major wintering areas of murres and other species. As oil moved out of Prince William Sound and along the Kenai Peninsula and the Alaska Peninsula, it hit major seabird nesting areas such as the Chiswell and Barren Islands, as well as numerous smaller colonies. The oil hit these areas outside Prince William Sound at the same time that adult murres were congregating on the water near colonies in anticipation of the nesting season. Approximately 22,000 murre carcasses were recovered following the spill. Colony surveys indicate that an estimated minimum of 120,000 to 140,000 breeding adult murres in the major colonies that were surveyed were killed by the spill. Extrapolating this information to other known murre colonies hit by

the spill (but not specifically studied), the mortality of breeding adult murres is estimated to have been 172,000 to 198,000. However, area-wide, including wintering and non-breeding birds, the total mortality of murres is estimated to be about 300,000. Murres exhibit strong fidelity to traditional breeding sites and infrequently immigrate to new colonies.

Normally, murres breed in densely packed colonies on cliff faces. Each murre colony initiates egg laying almost simultaneously. This synchronized breeding behavior helps the birds repel predators such as gulls and ravens. In oiled areas, murre colonies have exhibited a much lower populations than before the spill, breeding is later than normal, and breeding synchrony has been disrupted. These structural and behavioral changes in colonies have caused complete reproductive failure during 1989 and 1990, and thus lost production of at least 215,000 chicks. Murre colonies in unoiled areas displayed none of these injuries and had normal productivity. Monitoring of reproductive success of the colonies will continue in 1991.

Bald Eagles: Of the estimated Alaskan bald eagle population of 30,000 birds (20,000 adults and 10,000 fledglings), an estimated 2,200 reside in Prince William Sound. One hundred forty-four (144) dead bald eagles were found following the spill. Although there is considerable uncertainty regarding the total mortality of bald eagles, it is estimated that several times this amount may have been killed by the initial spill. Approximately 90 percent of radio-tagged bald eagles that died during subsequent studies were not found on the beach but in the brush back from the beachfront. This suggests that most of the eagles that died in the spill would not have been found by surveys typically restricted to beach areas. To assess injuries to bald eagles, helicopter and fixed-wing surveys were flown to estimate populations and productivity. Radio transmitters were attached to bald eagles to estimate survival, distribution, and exposure to oiled areas. Bald eagles in Prince William Sound were most intensively studied. Productivity surveys in 1989 indicate a failure rate of approximately 85 percent for nests on moderately or heavily oiled beaches compared to 55 percent on unoiled or lightly oiled beaches. Bald eagles have a delayed sexual maturity and have a relatively long life span under normal circumstances. Consequently, although reproduction apparently rebounded to more normal levels in 1990, population impacts as a result of poor productivity of nestlings and the death of hundreds of adult eagles in 1989 may not be readily apparent for several years. Fewer bald eagles were sighted in 1990 than in 1989, however this change was within the expected error of the survey method. An additional survey will be conducted in 1991 to see if there is a downward population trend.

Sea Ducks: More than 2,000 sea duck carcasses were recovered after the spill, including more than 200 harlequin ducks. Studies concentrated on harlequins, goldeneyes, and scoters, species that use the intertidal and shallow subtidal habitats most heavily affected by the spill. Harlequins were most affected, consistent with the fact that they feed in the shallow water area of the intertidal zone. This is the only species of sea duck studied that both nests in the spill area and feeds in the shallow intertidal zone. All of these species feed on invertebrates such as mussels and are likely to continue to be exposed to petroleum hydrocarbons through their food. About 33 percent of the harlequins collected in the spill area had poor body condition and about 40 percent had

tissues contaminated with petroleum hydrocarbons. Preliminary surveys also indicate harlequins may have failed to reproduce in the spill zone in Prince William Sound during 1990. These injuries will be investigated further during 1991.

Other Birds: Surveys and studies indicate reduced numbers of black oystercatchers, pigeon guillemots, and marbled murrelets in oiled areas. Black oystercatchers and pigeon guillemots use inshore and intertidal areas for feeding and nesting. Reduced breeding success of black oystercatchers was documented in oiled areas, largely as a result of loss of chicks along oiled beaches. It is estimated that between 1,500 and 3,000 pigeon guillemots were killed by the spill, representing as much as 10 percent of the catalogued population in the Gulf of Alaska. This species is susceptible to continued exposure to petroleum hydrocarbons because it uses intertidal rocks and waters within 200 meters of shore. Petroleum hydrocarbons were found in eggs and tissue in 1989.

Marbled and Kittlitz's murrelets represented a high proportion of the dead birds recovered in oiled areas of Prince William Sound. The reduction in the number of murrelets observed in oiled areas during cleanup in 1989 and the return of many of these birds in 1990 suggest disturbance associated with cleanup activities affected these birds. The extent of injury to certain species, including loons, cormorants, and gulls will probably never be known because pre-spill information on numbers of these birds in the spill area are not available. Data on bird distribution and abundance data gathered during aerial and boat surveys remain to be fully analyzed and interpreted. Boat surveys will continue during 1991. Studies did not document injury to certain bird species such as Peale's peregrine falcons or songbirds.

FISH/SHELLFISH

No massive die-offs of adult fish were found following the spill, and adult salmon, for example, were evidently able to migrate to spawning areas after the spill. However, fish are most vulnerable to oil contamination during the early stages of their life cycles. Accordingly, most fish studies initially focused on this phase of fish life history. During 1991, scientists will begin to be able to assess affects on adult fish such as salmon that would have been exposed to oil as eggs or larvae. Species most often affected by the spill were those that inhabit and spawn in the intertidal zone (salmon) or in the shallow areas next to shore (herring and Dolly Varden).³ Less than ten dead rockfish were found during the spill and their deaths were attributed to oil. Several species of coastal and offshore fish (pollock, halibut, sablefish, cod, yellowfin and flathead sole, and rockfish) show evidence over a large geographic area of continuing exposure to petroleum hydrocarbons in areas affected by the spill, but significant injury has not yet been documented. Exposure to petroleum hydrocarbons does not necessarily lead to

³The State of Alaska imposed the highest possible standards for commercial fishery openings and for processing plant inspections to insure that all commercially harvested salmon were free from contamination. Salmon subject to commercial harvest in the spill area were rigorously tested to insure that the catch was safe for human consumption.

injury, since many animals have the capability to physiologically "manage" the exposure with no resulting harm. In particular, salmon and other fish can metabolize petroleum hydrocarbons so that these contaminants are unlikely to be found in edible fish tissues. Indicators of exposure among fish include bile metabolites and mixed function oxidases. Since injuries from chronic exposure to oil may not manifest themselves for a number of years, it is premature to conclude that coastal and offshore species were not injured; therefore certain studies are continuing.

Pink Salmon: The full extent of short term injury to pink salmon cannot be assessed until after the 1991 run returns to spawn in the summer. Although the overall catch of pink salmon in Prince William Sound during 1990 was an all-time record (as predicted before the spill), this was primarily due to strong runs of hatchery-produced salmon. Salmon survival associated with the Armin F. Koerning hatchery, located in the middle of a heavily oiled area of the spill zone, was half that of Ester Hatchery, located outside the area of the spill. Wild production of pink salmon did not mirror the record production of hatchery fish.

Seventy-five percent of wild pink salmon spawn in the intertidal portion of streams in Prince William Sound. Wild stock salmon did not shift spawning habitat following the spill and deposited eggs in intertidal areas of oiled streams. Preliminary analyses indicate a 70 percent greater mortality of pink salmon eggs laid in the summer of 1989 and a 50 percent greater mortality in the summer of 1990 in oiled streams as compared to control streams. Larvae from heavily oiled streams showed gross morphological abnormalities, including club fins and curved spines. The pink salmon that returned to Prince William Sound in the summer of 1990 were exposed to oil as larvae as they swam under the slick, but not as eggs which were more directly exposed to oil than the larvae. Fish returning in 1991 will be the first that were exposed to oil as eggs. Eggs and larvae of wild populations continue to be exposed to oil in intertidal gravel in oiled areas.

Sockeye Salmon: Commercial harvest of sockeye salmon was curtailed in portions of Cook Inlet, Chignik, and Kodiak in 1989 because of the spill, resulting in an unusually high number of adults migrating to spawn in certain lake spawning systems (returning adults that arrive at the spawning areas are referred to as the "escapement"). Overly large spawning escapements may result in poor returns in future years by producing more juvenile salmon than can be supported by the nursery lake's productivity. Preliminary data indicate that overescapement degraded rearing habitat in lakes and that sockeye salmon survival and growth rates are lower than usual. Further study is needed before the extent of these injuries can be determined.

Dolly Varden and Cutthroat Trout: Prince William Sound is the northern extreme of the range of cutthroat trout. Both cutthroat trout and Dolly Varden use nearshore and estuarine habitat for feeding throughout their lives (in contrast to salmon which migrate out to sea). The highest concentrations of bile petroleum hydrocarbon metabolites in all fish sampled were found in Dolly Varden. Tagging studies have demonstrated that the annual mortality of adult Dolly Varden was 32 percent greater in oiled areas than in unoiled areas. The larger cutthroat trout showed similar levels of mortality in oiled and unoiled areas. Additionally, cutthroat trout growth rates were reduced in oiled areas.

Studies are continuing to measure impacts on populations of these popular sport fish species.

Pacific Herring: Populations of Pacific herring were spawning in shallow eelgrass and algal beds at the time of the spill. The effects of oil on egg survival, hatching success, larval development, and recruitment to the spawning population were studied. Study results show a large increase in the percentage of abnormal embryos and larvae in oiled areas of Prince William Sound during the 1989 reproductive season. Larvae in oiled areas also had a greater incidence of eye tumors. These effects continued but at somewhat lower rates in 1990. Results also showed greater egg mortality in oiled areas as compared to unoiled areas. Whether the adult population has been affected by these larval injuries will not be determined until the 1989 and 1990 cohorts return to spawn in 1992 and 1993.

COASTAL HABITAT

The coastal tidal zone, commonly known as the "intertidal zone," was the most severely contaminated habitat. Intertidal habitats are highly productive and biologically rich. They are particularly vulnerable to the grounding of oil, its persistence, and effects of associated clean-up activities. An interdisciplinary team with expertise in plant and systems ecology, marine biology, and statistical analysis, was established to conduct field studies to assess the effects of oil on intertidal ecosystems.

Supratidal: Results of studies in the Kodiak/Alaska Peninsula area suggest that oil in the supratidal habitat and beach cleanup disturbance decreased the productivity of grasses and other vegetation including beach rye grass, that help stabilize beach berms. In one instance, cleanup activities completely removed the vegetation. Increased production of supratidal vegetation was found in Prince William Sound in 1989. This finding corresponds with information from other oil spills. It is not known whether this increased production was a result of decreased browsing by terrestrial mammals or a fertilizer effect of the oil.

Intertidal: Natural populations of intertidal organisms were significantly reduced along heavily oiled shorelines such as Herring Bay. Densities of intertidal algae (*Eucus*), barnacles, limpets, amphipods, isopods, and marine worms were decreased. Although there were increased densities of mussels in oiled areas, they were significantly smaller than mussels in the unoiled areas and the total biomass of mussels was significantly lower. Intertidal organisms continue to be exposed to hydrocarbons from the more heavily oiled sediments. Petroleum hydrocarbon accumulation in filter feeding mussels experimentally placed in oiled areas indicate that oil remains available for uptake by other organisms. Initial findings also indicate that oiled surfaces retarded settlement by juvenile barnacles when compared to unoiled sites. In addition to direct mortality, the reproductive cycle of mussels at oiled sites in the lower Cook Inlet/Kenai Peninsula and Kodiak/Alaska Peninsula regions was delayed by several months.

Intertidal fishes were less abundant in oiled areas than in unoiled areas. In addition, gill