RPWG
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF WATER

March 2, 1992

MEMORANDUM

SUBJECT: RPWG Documents--Restoration Following the Exxon Valdez Oil Spill: Proceedings of the Public Symposium and Draft Restoration Framework

FROM: Susan MacMullin Susan

TO: Barbara Iseah

Barbara, as I go through my files I will send things to you for the Restoration files. Today I ran across two documents. The first is the **camera-ready copy** of the Proceedings of the Public Symposium. The second is the February 14th draft of the framework. This draft and the one to the Trustee Council should be filed to be used as part of the administrative record. Don Bravaro and I gave Dave Gibbons a notebook on compiling an administrative record. Ask him if you can review it. I think that the notebook anticipates a much more detailed "record" than what will really be developed, however, it will give you an idea of what to look for and make sure is in the file somewhere.

Please call me if you need anything.

Camera ready copy of progress report given to OSPIC 11/4/93

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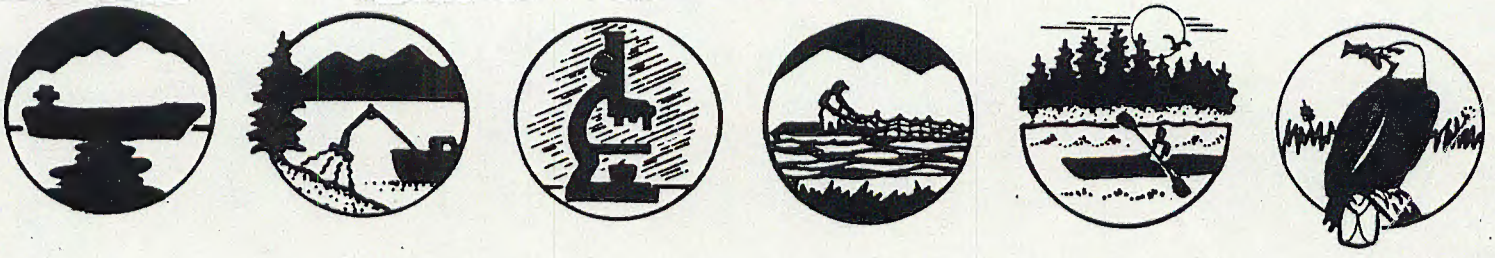
RESTORATION
FOLLOWING THE
EXXON VALDEZ OIL SPILL

Proceedings of the Public Symposium

Camera-Ready

Prepared by the
Restoration Planning Work Group



DISCLAIMER

The comments and recommendations appearing in this document are those of the speakers making presentations at the Public Symposium on Restoration Following the Exxon Valdez Oil Spill, and should not be construed as representing the position or policy of state or federal governments.

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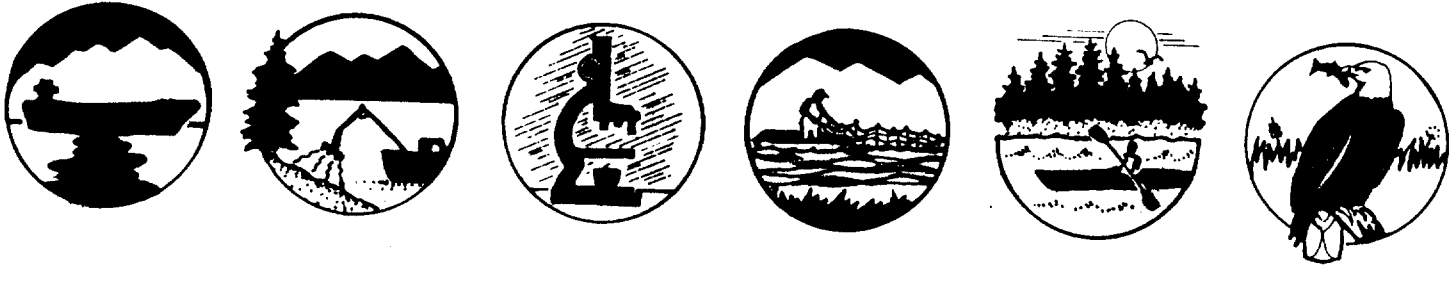

RESTORATION
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EXXON VALDEZ OIL SPILL

Proceedings of the Public Symposium

Prepared by the
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RESTORATION
FOLLOWING THE
EXXON VALDEZ OIL SPILL

Proceedings of the Public Symposium

Held in Anchorage, Alaska, March 26-27, 1990

Prepared by the

Restoration Planning Work Group

Alaska Departments of Fish and Game, Natural Resources, and Environmental Conservation;
U.S. Departments of Agriculture, Commerce, and Interior;
and the U.S. Environmental Protection Agency

July, 1990

SELECTED QUOTES FROM SPEAKERS ...

"The spill gives us the unfortunate opportunity to...reevaluate our environmental policies locally, nationally and in a broader arena. It gives us the opportunity to strive to become better stewards of our environmental resources".

- David Anderson

"I could take you right now to beaches three blocks away from me, and the smell of death is there. If anybody worked the oil spill last summer I know you know that smell. The smell of death in the back bay areas."

- Bruce Cooper

"What we really ought to do after picking up as much oil as possible, is to do nothing. I wonder ... about our believing that we know how to fix things, where in reality we do not, and may end up doing more harm than good."

- John Teal

"In terms of cause and effect, we are now looking at and treating the symptoms, not the illness. We need to seek a cure for the illness itself. In this case, the illness is our gluttonous use of oil. It is evident in our national energy policy and our regulations - or lack thereof."

- Robert Adler

"Complacency is dangerous. There is a prevailing illusion that because of cleanup operation and the cleansing action of the winter storms that the environment is returning to normal."

- Arthur Buikema

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INTRODUCTION

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The March 24, 1989, grounding of the tanker *Exxon Valdez* in Alaska's Prince William Sound caused the largest oil spill in U.S. history. A slick containing about 11 million gallons of North Slope crude oil covered the western portion of the Sound and moved for over 500 miles along Cook Inlet and the northern Gulf of Alaska. Over 1,000 miles of shoreline were heavily coated. The spill damaged areas extremely rich in natural resources. It injured fish, birds, mammals, intertidal plants and animals and their associated habitats. The area's important archaeological and historical resources, not widely known about before the spill, also were damaged as a result of oiling, cleanup activities and subsequent incidents of vandalism. The oil affected important recreational areas, as well; a national forest, national wildlife refuges, a national monument, national parks, and state parks, as well as private recreational areas, were impacted.

Soon after the spill occurred, President Bush and Alaska Governor Cowper declared the goal and intent that the ecology and economies of Prince William Sound and the Gulf of Alaska be fully restored. Full restoration of these natural resources and the services they provide is in turn the responsibility of the federal and state agencies which manage and protect them on behalf of the public. As authorized by federal law, the state and federal governments intend to present claims to the responsible parties for the injuries caused to natural resources and their uses. The funds received from these claims must be used to restore the natural resources and services injured by the spill.

A two-day symposium was held at the Egan Civic and Convention Center in Anchorage on March 26-27, 1990. The purpose of this public symposium was to provide a forum for scientists, Alaskan Natives and other residents of the affected areas, environmentalists, government officials, representatives of the fishing and tourism industries, and other interested people to exchange views on the restoration of resources damaged by the *Exxon Valdez* oil spill. The symposium included panel discussions on restoration of coastal habitats, fisheries, mammals, birds, recreational and cultural resources followed by question and answer sessions to encourage public comment. This document records the presentations given and comments aired at the symposium. The symposium agenda and handouts are included as appendices.

Definition of Restoration

Restoration is specifically defined under the Natural Resource Damage Assessment regulations, as follows:

> "Restoration" or "rehabilitation" means actions undertaken to return an injured resource to its baseline condition, as measured in terms of the injured resource's physical, chemical, or biological properties or the services it previously provided...

Restoration actions fall into three general categories: direct restoration, replacement, and acquisition of equivalent resources.

- "Direct restoration" refers to measures taken, usually on-site, to directly rehabilitate an injured resource.
- "Replacement" refers to substituting one resource for an injured resource of the same type.
- "Acquisition of equivalent resources" means to purchase or otherwise protect resources that are the same or substantially similar to the injured resources in terms of ecological values, functions, or uses.

The Restoration Planning Process

The goal of the restoration planning effort is to identify appropriate measures that can be taken to restore the ecological health and uses of natural resources affected by the *Exxon Valdez* oil spill. Specific objectives include:

1. Encourage, provide for, and be responsive to public participation and review during the restoration planning process.
2. Identify or develop technically feasible restoration options for natural resources and services potentially affected by the oil spill.
3. Incorporate an "ecosystem approach" to restoration (i.e., where appropriate, broadly focus on recovery of ecosystems, rather than on individual components).
4. Determine the nature and pace of natural recovery of injured resources, and identify where direct restoration measures may be appropriate.
5. Identify the costs associated with implementing feasible restoration measures, in support of the overall Natural Resource Damage Assessment process.

In late 1989, an interagency Restoration Planning Work Group (RPWG) was established to develop and coordinate restoration planning activities in support of these objectives. The RPWG includes representatives of the following agencies:

- Alaska Department of Fish and Game (ADFG)
- Alaska Department of Natural Resources (ADNR)
- Alaska Department of Environmental Conservation (ADEC)
- U.S. Environmental Protection Agency (EPA)
- U.S. Department of Agriculture (DOA)
- U.S. Department of Commerce (DOC)
- U.S. Department of Interior (DOI)

It is important to understand that a full damage assessment is not yet complete. The Restoration Planning Work Group, therefore, is developing the broadest possible list of potential restoration activities for resources that may have been injured. Once the damage assessment process is complete, appropriate activities will be recommended and incorporated in a detailed restoration plan. Such a plan could be implementedonly when restoration funds become available from the responsible parties or the state and federal governments.

Public Participation

The restoration planning process emphasizes public participation. Active public participation provides the greatest potential for long-term benefits in both an environmental and social sense. Just as the spill impacted the social and economic nature of the Prince William Sound, Cook Inlet and Gulf of Alaska area, restoration activities also will have social and economic effects. Public involvement throughout the restoration planning process is needed to responsibly balance potentially conflicting biological, social and economic objectives.

The Restoration Planning Work Group encourages continued public participation and input. Comments, and requests for additional copies of this report, should be sent to:

Restoration Planning Work Group
437 E Street, Suite 301
Anchorage, Alaska 99501

Introductory & Keynote Speakers

DENNIS KELSO

Mr. Kelso is the Commissioner of the State of Alaska's Department of Environmental Conservation (DEC). Harvard educated, he has formerly held positions with the Alaska Department of Fish & Game as Deputy Commissioner and as Director of the Division of Subsistence. Mr. Kelso has been DEC's Commissioner since January, 1987.

Last fall we literally walked every mile of shoreline in Prince William Sound that was significantly affected by the spill. Where the beaches were too steep, or inaccessible, we surveyed by skiff. We also reviewed conditions in other areas affected by the spill. Based on that assessment, about 119 miles of shoreline were either heavily or moderately oiled, in both sheltered and exposed areas. That is not a continuous area, but represents an aggregate total of the areas affected. We do not expect this number to be static; however, we were surprised at how stable it had remained over the winter. As the weather warms, we are now beginning to see sheening from heavily oiled and exposed areas. The oil is beginning to thaw and soften, causing the oil to become more mobile, and slowly move down the slope toward the water.

As a result of the fall surveys we have about 2,500 pages of shoreline maps showing the location of surface and subsurface oiling. The next step is to build on the data acquired during those fall surveys. It is now time for us to begin the spring surveys, and get ready for the summer treatment efforts. We have already begun training personnel for spring surveys, and will continue the surveys until mid-April. This work will be a joint effort including State, Exxon, and Coast Guard personnel, and land owners and managers. These surveys will lay the foundation for this year's shoreline treatment.

What I observed this week was that some areas looked pretty good, at least on the surface, as a result of last summer's treatment activities and winter storms. This is encouraging. However, in many areas, there is still a lot of oil, both above and below the surface. Some places appear absolutely saturated with oil, and frankly do not look much different than last summer. It can be very discouraging to see that, but we must be straightforward about what we find there, the good and the bad, and figure out our strategy accordingly.

Here is how I think shoreline treatment should proceed this year:

- Complete the spring surveys;
- Determine the location and characteristics of the oil; and
- Overlay the locations of resources and uses of those resources in order to help us set our priorities.

Our overall objective needs to be long term restoration of whole ecosystems. However, we need to select our priorities in order to protect as many of those resources and uses of those resources as we can.

When we select shoreline treatment techniques we must base our decisions on conditions at particular sites. We must identify:

- The type of shoreline (substrate, exposure, etc.);
- The characteristics of the oil (asphalt, surface mousse, surface pools, subsurface, pooled on bedrock, interstitial, etc.);
- The sensitivity of the affected environment (what kind of ecosystem, i.e., salt marsh, freshwater estuary, marine intertidal, etc.); and
- The resource functions or uses which could be potentially impacted by the treatment process, in addition to being impacted by oil (marine mammal pupping areas, salmon spawning areas, etc.).

Most importantly, we need to choose techniques that will produce the highest potential for long-term recovery, not just improvement in 1990. If our emphasis is only on environmental benefit in a single season, we may miss the opportunity to achieve greater long-term recovery. The goal of long-term maximum recovery may lead us to consider treatment techniques which may have greater impact on the environment initially, but lead to more complete recovery in the long term. It is very important to choose treatments on a site-by-site basis, and match treatment techniques to the actual site conditions, based on what can lead

to the most complete long-term recovery. In doing this, we will need the help of the public, particularly those who were affected by the spill and live in the area.

We have three major steps ahead of us. First, we must remove as much of the oil from the environment as possible. Second, we must complete the damage assessment using the best scientific methodology. And third, we must restore the damaged resources by using a strong restoration program.

Removal of the oil is not the same as restoration of resources. Removal means getting oil out of the water, and off the shoreline by a variety of methods. These methods may include:

- Mechanical pickup (breakup and rake asphalted areas);
- Mechanical rock washing;
- Some combination of excavation and rock washing;
- Flushing (as long as we can keep the oil out of the water);
- Tilling and flushing;
- Fertilization for bioremediation; or
- Some combination of tilling and fertilization.

The combinations are numerous, but the objective, long-term maximum recovery, should drive the methods or combinations we select. Restoration, to me, means action to restore ecosystem functions after as much of the oil as possible has been removed. In my view, bioremediation is a removal technique, not a restoration technique. I think we need to keep those distinctions in mind; however, some people may disagree with where I have drawn the line (between removal and restoration).

This is how I see the upcoming restoration phase, and the role of the public. Removal is difficult at best, and the task sometimes seems discouraging because it is just damage reduction. Restoration is a positive step, and is forward moving. It builds on the removal; rebuilding ecosystems, rebuilding resource productivity. And frankly, it strengthens the ability of the biological communities to support the human communities that depend on them. For that reason, I see this symposium as a first step in an important opportunity for all of us to be directly involved in the choices - to look ahead - to make commitments that will help to rebuild our damaged natural resource assets. And, very importantly, to work together.

One of the best things we did during the first year of the oil spill response was to rely on the public, local officials, fishermen and other volunteers. When we needed to protect hatchery sites in Prince William Sound, we teamed up with the fishermen and other local folks, and we just went out and did it. When we were frustrated with the effectiveness of Exxon's on-the-water spill recovery, we put a team of local folks, fishermen, and our people together, and went out and conducted our own operation, the "mosquito fleet." Saturday I visited another local effort put together by volunteers, coordinated by Nancy Lethcoe from Valdez. That group is conducting a debris pickup operation on Disk Island.

The public is essential to what we are doing, and has been essential throughout the spill response. The importance of local knowledge, the fact that people have to live with the results; the direct effects on the future of local communities; and the wisdom, the sound pragmatic advice we get from the local folks, really makes a difference.

The State is committed to full public participation in the restoration planning process. This symposium is an important step in that direction, and we have a long way ahead of us.

In conclusion, I would like to say that it is clear that the spill caused severe environmental damage. Some of this damage is obvious, some of it is not yet understood. It hurt people and their communities, as well as biological resources. So far we have been fighting to slow the damage, to stop it where we can. It is now time to look ahead and choose a vigorous, positive course of action. To do this work well, we will need not only to work together, but to think broadly. What will be involved in the restoration phase? Here we are charting new territory. Let us keep our horizons wide enough, and consider all possible choices. Let us pay full attention to the people that live in and know the areas affected by the spill. Let us set as our goal achieving full recovery for the spill area. Let us bring our resolution to this task, and stay until the job is done.

THOMAS DUNNE

Mr. Dunne is the Acting Regional Administrator for the U.S. Environmental Protection Agency's Region 10 Office in Seattle. He is responsible for all of the agency's programs in Alaska. Prior to his work with the agency, Mr. Dunne was the Administrator of the Federal Disaster Assistance Administration from 1973 to 1978. He also served as the Deputy Assistant Secretary for operations in the Economic Development Administration at the U.S. Department of Commerce from 1971-72.

Before I left Washington D.C., William K. Reilly, the Administrator of U.S. Environmental Protection Agency (EPA), reminded me of President Bush's commitment that the ecology and economies of Prince William Sound and the Gulf of Alaska should be fully restored after the *Exxon Valdez* oil spill. The fact that he appointed EPA Administrator William Reilly to help coordinate restoration planning is very significant because, as you know, EPA is not a trustee for natural resources. The federal trustees are the Departments of Agriculture, Commerce and Interior. In the case of this oil spill, the State of Alaska is also a trustee. The fact that we are not a trustee agency places EPA in a very unique role. I think it was the President's view when he put William Reilly in the position of coordinating restoration planning, nearly a year ago, that long-term restoration should address the ecosystem as a whole - not just individual agencies' responsibilities. So, an interagency work group has been formed to carry out a coordinated restoration planning effort. The Restoration Planning Work Group (RPWG) includes EPA, the federal and state trustee agencies, and other state resource agencies. It is up to the RPWG to come up with a restoration plan. I understand that this symposium is the first step in identifying a broad range of restoration activities including: ecosystem reconstruction, species reproduction and enhancement, species replacement and acquisition of equivalent resources. The planning process encourages public involvement, and I believe that today's symposium marks the beginning of that process.

I understand that the initial literature review has been completed and copies are available for your review. In addition, the Restoration Planning Work Group has scheduled seven public meetings to be held in the communities most affected by the oil spill. A report will be prepared and distributed to the public sometime this summer - I believe the target date is July. This report will summarize the presentations and comments made at this symposium along with ideas and comments brought forth during upcoming public meetings.

The upcoming report will also present the RPWG's initial proposals for testing potential restoration projects. Some potentially beneficial restoration options defined during this planning process will be ready for small-scale testing later this summer. Whenever methods are identified that are ecologically sound and cost effective, the agencies can begin to actually implement restoration projects, although, of course this will depend on funding sources.

As mentioned before, the public process is well underway and this symposium is the beginning of what will lead to long-term restoration of the ecosystem affected by the oil spill. We want the process to reflect the best thinking of public, academic and government resource managers. Again, we would like to stress our commitment to coordination and partnership. We encourage public input at any time during this restoration planning process and look forward to your participation.

ROBERT ADLER

Mr. Adler is a senior staff attorney with the Natural Resources Defense Council in Washington, D.C. and directs their clean water program. He is involved in Alaskan land issues, particularly the Arctic National Wildlife Refuge and the EXXON VALDEZ oil spill.

Before working for the Natural Resource Defense Council, Mr. Adler was the Executive Director of Trustees for Alaska, and was an attorney with the Pennsylvania Department of Environmental Resources. He recently coauthored the National Resource Defense Council report: "Ebb Tide for Pollution: Actions for Cleaning Up Coastal Waters."

I would like to thank the sponsors of this symposium for beginning the restoration program as an open public process. Many of you know that we (the Natural Resources Defense Council) have been somewhat critical of the Trustees for having what we felt was an unduly closed natural resource damage assessment process - so it's nice to see that we are starting out here on the right foot. I will have a few ideas later about how we can keep this an open process.

What I would like to do this morning is to take a practical approach. I am going to do three things: first, very briefly outline the statutory scheme. Next, as I was specifically asked to do, I will address a major court decision that came down last summer, the State of Ohio case, and what the implications are for the restoration process. Then, based on those two foundations, I will give you my interpretation of how the restoration process should work.

In regard to the statutory scheme, we are dealing with two laws. First, the Superfund law, known as CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) and second, the Clean Water Act. One thing you should bear in mind is that Congress expressly said that, when the two laws conflict, CERCLA overrides. And you will note there are some apparent conflicts between the two laws. I don't think there are significant conflicts, but if there is any doubt, CERCLA applies.

The first basic underpinning is who is responsible to pay for restoration. CERCLA says that the responsible party, which we view as Exxon, Alyeska and the other oil companies who are involved in the pipeline, are liable for injury to, destruction of, or loss of natural resources. The liability is to the United States, the State of Alaska, and the Indian tribes. The trustees are authorized to collect those damages, but for what purpose? The law says that natural resource damages shall be used by the trustees only to restore, replace, or acquire the equivalent of the damaged natural resources.

The Clean Water Act sets forth a very similar scheme. Under Section 311 of the Clean Water Act, the responsible parties are liable for the actual cost of removal. Now you might say that removal, as Commissioner Kelso said, is different from restoration. The Clean Water Act proceeds to define removal costs to include the costs incurred by the federal or state government in the restoration or replacement of the natural resources damaged or destroyed by the spill.

First, the statute says restoration or replacement - then the statute says that the president or any state shall act on behalf of the public as trustee to recover the cost of replacing or restoring (Congress flip/flops these terms). Sums recovered shall be used to restore, rehabilitate, or acquire natural resources. First we get restore-replace, replace-restore, then we get restore with replace, replace with rehabilitate, then we add acquire - so what does this mean? You remember that I stated earlier that CERCLA overrides the Clean Water Act and in the amendments to CERCLA in 1986, Congress said, "oops! We goofed in the Clean Water Act." Restore and rehabilitate really mean the same thing. So they took out "rehabilitate," replaced it with "replace" and established the trilogy "restore, replace, or acquire" the equivalent of those resources.

The major points I want to focus on from those two statutory schemes are the words "trustee" and "shall." "Trustee" comes from the notion of public trust. The trustees are working on our

behalf to put the ecosystem back together. It's not a discretionary function, it's a mandatory function. So we members of the public have the right to expect that all of the monies that are collected from the responsible parties actually are used to "restore, replace or acquire" equivalent resources.

Now I would like to discuss the State of Ohio decision. A little bit of background - CERCLA required the Department of the Interior to write a set of regulations to outline how they would do the restoration process. The regulations are long and complex and I am not going to discuss them. They were stricken in any event, by the State of Ohio decision, so strictly they won't apply here. But what are important, are some of the principals that were announced by the Washington D.C. circuit court last summer. They had some very important philosophical underpinnings that I think can drive our damage assessment process.

What was known as the "lesser of" rule was invalidated. The Department of the Interior regulations said that liability was limited to the lesser of the cost of restoration or the value of the resources lost due to the spill or other release. A major problem is that we felt they undervalued those resources. A bigger problem was the "lesser of" rule which essentially said that if the economic value of the resource was less than what it cost to restore, the restoration would not occur. A good analogy is to think of what would happen if you had a used car that was worth $1,000 and you had an accident which totaled the car and the cost to fix it would be $2,000. Well, the Department of the Interior was saying it doesn't make economic sense to spend $2,000 to replace a car which is only worth $1,000. What is the problem with this philosophy? After all, we have no blue book for the environment. You can look up the value of a car in a blue book and know with a fair amount of certainty how much that car is worth; however, you cannot do that with an ecosystem. Cars are fungible commodities. There is nothing particularly unique about a car, but there is something very unique and very special about each ecosystem. So, you can't just say it is not worth enough to restore. So we have this very strong philosophy of the court that you don't do this sort of cost benefit analysis. We have a duty to do everything we can to restore that ecosystem. In fact, the court found that rather than this "lesser of" rule, that restoration cost is the preferred evaluation method under CERCLA. On top of that restoration cost, you add any cost for loss of use. The importance of that decision is that Congress expected restoration to occur in the vast majority of cases. Why do I say vast majority of cases? There is a footnote in the decision that says that restoration might not occur where it is either technically infeasible or where the cost of doing so would be grossly disproportionate to the value of the resource. I personally feel that footnote is somewhat gratuitous and somewhat inconsistent with the rest of the opinion. It seems, at best, to be a very narrow exception. I think it challenges the restoration planning work group to think flexibly and broadly to make sure that no one can argue that restoration is either infeasible or grossly disproportionate to the cost of the resource.

This leads to the second major ruling in the decision which was how you value an ecosystem. The Department of the Interior rules had contained something known as the market hierarchy. The rule said that you just look to the commercial value of the resource. If there was a valid market for that resource you wouldn't look any further. This is the rule which was spoken of prominently in the press where the value of the sea otter was $15 to reflect the market value of the pelt and if there is a fair market in sea otter pelts, you wouldn't look any further. The approximate 1,000 sea otters that were known to be lost by the spill, then, would be worth no more than $15,000. That is an utterly repulsive notion to me and I'm sure to anyone else who has kayaked or has otherwise enjoyed the company of that particular resource. The court agreed saying from the bald eagle, to the blue whale, to the snail darter - natural resources have values which are not fully captured by the market system.

I hope everyone in this room agrees roughly with that notion, although I think others have stated it better than the court. Professor David Ehrenfeld at the symposium on Biodiversity in Washington, D.C. a few years ago put it slightly differently, "If we persist in this crusade to determine value where

value should be evident, we will be left with nothing but our greed when the dust finally settles." I agree with that philosophically, as well, but I believe Dr. Ehrenfield was saying that you simply can't put any economic value on an ecosystem. In a utopian situation, I agree, but we are not in a utopia right now. We are in a very difficult situation where if we don't do our best to value those resources, we won't have enough money, in damages from Exxon, to do a proper job of restoring the environment.

The court, in their decision on economic value of resources, said that Congress intended to capture all aspects of loss of use in the ecosystem and to sum them all up as long as you don't double count them. Some examples are option value and existence value, that is, not just the raw commercial value of the resource but also the inherent value of the resource to society.

I seem to be straying into the size of liability and away from restoration. So what does this all have to do with restoration? First of all, what Exxon is liable for includes both restoration costs and any additional loss to its value. The more we can value that resource, the more funds you'll have available to restore, replace or acquire equivalent resources. Secondly, if you think about the grossly disproportionate test, the lower the commercial value of the resource, the less you really would be allowed to do in the way of restoration (before the cost becomes grossly disproportionate to $15,000 for 1,000 sea otters). So by valuing the ecosystem a lot higher, this crude cost-benefit test becomes even less significant.

One final thing that the court decision said, which also is relevant in another court decision in a Superfund case in New Bedford Harbor, is that all final Superfund settlements must include full restoration costs with full participation by the trustees. Even if the federal or state cases settle, we members of the public have a right to expect full restoration, and not some sell out with Exxon where less than full restoration costs are recovered.

So based on those two underpinnings, let me outline how I think restoration should proceed. Let's return to our trilogy of restoration, replacement and acquisition. Not only is it a trilogy of restoration, replacement and acquisition, it is an ordered trilogy. First you restore to the fullest extent possible. To the extent you can't restore the ecosystem to a full vital ecosystem, next you talk about replacement. To the extent that you still can not make the ecosystem whole, you talk about acquiring equivalent resources. We are not talking about a temporal hierarchy. You don't first do restoration, wait for two years, see how well it worked, and then talk about replacement. I'm talking about a planning hierarchy, where you predict how much restoration would be feasible, how much you need to fill in the gaps with replacement, and how much you need to fill in the gaps with additional resources.

In addition to restoration costs, there is the value of the lost use of the resource. Those funds as well are to be put toward acquisition of yet more equivalent resources. Because the law says there is a public trust duty, all of those monies have to go either to put together this ecosystem, replace it, or acquire the equivalent.

This concept is borne out in the legislative history of CERCLA and the Clean Water Act. There are citations in legislative history that make this hierarchy very clear. Representative Jones said it on the floor of the House. Senator Mitchell said it on the floor of the Senate. The conference report on the Clean Water Act also sets out this ranked hierarchy.

I would like to talk about a few of the philosophical underpinnings of that hierarchy. One is the notion that ecosystems are unique. We can't just say that it is very hard to restore an ecosystem so we are going to take the damages and do something else with them. We cannot simply choose acquisition first, we need to do the best we can to restore this ecosystem before we look elsewhere. The second is that even though we want to do that first, there is an understanding that full restoration of an ecosystem is really impossible.

No matter what we do to Prince William Sound, we all know in our hearts that it will never quite be the same. So we need to go beyond restoration, to compensate the ecosystem and to compensate the public, through replacement and acquisition of equivalent resources.

I would like to talk a little bit more about what the three members of the trilogy mean. What does restoration mean? My hope is that question can be answered primarily by scientists and almost not at all by lawyers. In fact, there is very little guidance in the legislative history as to what restoration means.

So my best answer is to leave it to sound scientific judgement. The lawyers really cannot tell you what it means. But let me tell you what I think it doesn't mean. Restoration is not cleanup. Cleanup is getting the oil out of the ecosystem and by that I include scrubbing rocks and bioremediation. It is not replacement. Replacement is restocking, reseeding, etc. So maybe we are talking about repairing physical damage, maybe we are talking about limiting use of areas to allow them to recover more quickly, maybe we are talking about removal of weed species that may have come in due to the spill. But we are not talking about cleanup or replacement.

The harder issues on restoration are how far to go, when to stop, what is "restored." Here is the best formulation I can come up with. Again, I think it is more a question of sound scientific judgment. I think you ought to have the flexibility to use any methods to restore the abundance or health of naturally occurring populations and to restore natural diversity and community structure. I use the word natural a lot, because I think we need to use care when we get this big chunk of money and want to spend it on things that might do more harm than good. We want to be careful about replacing the system with nonnatural genetic stocks that might change the ecosystem as much or more than if we just left it alone. Understand that I'm far from an advocate of just letting the system take care of itself, but we do want to make sure we do not do things that do more harm than good.

Replacement is a little bit easier concept. We are all familiar with restocking, transplanting, reseeding of shellfish beds, etc. But we do need to be cautious in this approach. This will be controversial. I am certainly an advocate of trying to do as much as we can to restore or replace fisheries in southcentral Alaska. But I really don't think anyone wants Prince William Sound to be nothing more than the largest fish hatchery in the world.

Acquisition, again, is a fairly easy concept and I hope we get a lot of variation on this theme at this symposium. We are not just talking about whole acquisition of land, but things like purchase of conservation easements, development rights, buying back of oil leases and timber rights. These are the types of acquisitions we can use to help out this ecosystem. The harder question is that we're talking about acquisition of equivalent resources we can use to help out this ecosystem. Unfortunately, equal does not make ecological sense. When we are talking about unique ecosystems, there is no equal to Prince William Sound. So we need to be talking about a concept that is necessarily more flexible than strictly "equal" or "equivalent." Congress clearly intended to compensate the public and the ecosystem where full restoration or full replacement is impossible.

For instance, there may be parts of migratory species habitat that are elsewhere in Alaska, or outside the state, that are critical points in the life cycles of those species. I think we have the flexibility to acquire nonlocal habitat critical to migratory species affected by the spill.

We may want to improve other similar habitats such as Bristol Bay, which is currently threatened by oil and gas leases. It is not the same, but it is similar, having many resources in common. We can put our resources into acquisitions of other critical resources that may not have been damaged directly by the spill, but by prior events, for example, high seas driftnet fisheries may have caused damage for years before the oil spill. We could use some monies to help out that situation.

Finally, the public process - I really hope we keep this an open public process. I am glad to hear that there will be a report. I think that report ought to be aimed at public comment. The public meetings which will occur over the next several weeks are good, they are early in the process. But they are uninformed opportunities for public comment. The report due out in July should set out for the public the largest possible range of restoration options available. And the public should have the opportunity to comment on those options at that time. The report will be similar to a scoping document. Then we would like to see a draft restoration plan as soon as possible, open for public comment as early as possible, and before key decisions are made.

The year since the spill has been a year of confrontation. Here, we finally have the opportunity to start the healing process, both the physical healing of the ecosystem and the spiritual healing of those people most affected by the spill. I hope that we can all continue to work together to achieve that goal.

WILLIAM R. JORDAN III, PH.D.

Dr. Jordan managesthe publications and outreach program of the University of Wisconsin-Madison Arboretum and Center for Restoration Ecology which has pioneered work in restoration ecology since the early 1930s. He also has participated in a number of national programs including: the National Forum on Biodiversity, the National Park Service Task Force on Biodiversity, and a joint meeting between the U.S. and Soviet Academy of Sciences in Moscow.

The response to the oil spill of the *Exxon Valdez* will be the first anywhere to go beyond cleanup and to include active efforts to restore ecological communities disrupted by the spill. This provides those involved with a novel opportunity to learn something about ecosystem restoration in the aftermath of a major marine oil spill - and no doubt to learn a great deal about the affected ecosystem as well. It also provides an opportunity to demonstrate in a dramatic way and in a peculiarly conspicuous situation the great value of restoration, not merely for the natural environment itself, but as a way of establishing a healthy relationship with it.

It is this second opportunity I want to discuss here: the opportunity the restorers of Prince William Sound will have to help fashion a new and more intimate relationship between this vast and complex ecosystem and its human inhabitants.

Briefly, I think I have two things to contribute here. First I can reflect on the business of restoration, based mainly on my experience as an observer of restoration in a variety of non-marine ecosystems (notably the tallgrass prairies and oak openings of the upper Midwest) during the past decade. Second I can suggest how this experience might be put to use, and how the value of the Prince William Sound restoration project for its human participants, and for humanity generally, might be enhanced through a novel program linking restoration with public education.

Basically, what I want to draw attention to is the immense value restoration has, not merely as a way of repairing or reassembling damaged ecosystems, but as a way of establishing an intimate, constructive relationship with them.

This is a lesson that has emerged very clearly from a half-century of restoration on our Midwestern grasslands. One of the first things the early restorers learned when they began this task back in the 1930s was that in order to reconstruct a system you had to understand it fairly well. Nature will pull you along, covering up your mistakes, but only up to a point. Generally speaking, it is harder to put something back together than to take it apart, or to observe and describe it, however critically. And as a result restoration - the deliberate reassembly of communities and reconstruction of ecosystems - provides a test, frequently a critical test, of generalizations arrived at by observation or analysis.

Thus the restoration of our grasslands has led to a succession of insights into their structure, their dynamics, even their composition. The earliest restoration efforts led directly to classic experiments on the role of fire in grassland ecosystems, for example. And more recently attempts to restore oak opening or savanna communities following classic descriptions as guidelines have led to a radical revision of those descriptions, and a whole new concept of the composition and dynamics of these systems.

Thus restoration, though usually undertaken for purely practical reasons, has proved to be a powerful technique for basic ecological research. This, however, only hints at the broader heuristic value of restoration and, even more broadly, its value as a way of establishing an intimate physical and emotional relationship with the natural landscape.

Briefly, the experience of restorers in our area suggests that restoration provides a means of establishing a rich relationship with nature in two dimensions - that of space (what we might call the "landscape" or "ecological" dimension) and that of time.

As for the first, ecological dimension - space, restoration offers a relationship with the landscape that is unlike any other in that it admits us as full, that is, ecologically active, members

of the land community; we influence the landscape, change it as the other members do. Yet, restoration engages all our capacities, including our skill as scientists, our innate creativity and assertiveness, and our understanding of nature gained in the course of cultural evolution. In short, restoration enables us to, in Loren Eiseley's words, "reenter the . . . forest . . . without setting aside the lessons learned on the pathway to the moon."

And at the same time restoration provides us with a way of exploring the second dimension of experience in our relationship with nature - that of time. It does this because restoration is, quite simply and obviously, a form of time travel. This is true in at least two senses. First, since restoration is in effect an attempt to reverse change by compensating in a precise way for our influence on a particular landscape, it becomes a way of exploring the history of our relationship with the landscape: we learn about the history precisely by trying to undo or reverse its consequences. (Prairie fires provide a pertinent example: deliberate burning of the prairies compensates for the cessation of fire brought about by the early European settlers, and at the same time reenacts and pays tribute to the aboriginal practice of managing prairie systems with fire.)

And second, in a deeper sense, restoration provides an opportunity to recapitulate the various stages of cultural evolution, reexperiencing in some measure the kinds of relationship with nature characteristic of each stage. Thus, the restorer, who begins as a hunter-gatherer, then is a farmer, and finally may need to be a scientist, remains a complete person in his or her exploration and reinhabitation of the natural, historic or "classic" landscape. This adds a dimension to the entire experience of nature, and our relationship with nature that other species, being nonhistorical, do not require, but that we, being historical, do.

In this way, I believe restoration provides a means of exploring, defining and ultimately celebrating the constantly changing terms of our membership in the land community. It provides the basis for the continual working out and dramatizing of an ecological definition of who we are as a species - that is a definition composed of statements about our relationship with other species and with entire ecosystems.

Thus the fires on our prairies each spring say, in effect, that we are the species that once burned the prairies and so helped shape them as a community; we are members of the culture that stopped the fires, and doomed the prairies to vanish in the shade of trees; and, finally, we are the people who now burn the prairies to bring them back. All these are critical elements in that ecological definition of who we are.

This is no small thing. It is at least part of an answer to the dilemma of our place in nature. And to the extent we now dominate the landscape, so that the landscape eventually comes to reflect the precise nature of our relationship with it, I believe it is the key to the health and well-being of the environment.

That the act of restoration has some such transcendent value is attested by the experience of a rapidly growing number of restorers - many of them volunteers who engage in this sometimes grueling and always self-effacing work without financial remuneration.

This being the case, it is critical that we do all we can to take advantage of restoration projects as a way of raising public awareness and understanding of the environment and the possibility of a positive relationship with it. One program being developed specifically for this purpose is EARTHKEEPING, a program being developed by the Society for Ecological Restoration with the University of Wisconsin-Madison Arboretum specifically to provide the public with opportunities to participate in restoration work. As suggested above, Earthkeeping has two objectives - to carry out ecological restoration on an environmentally significant scale and over an extended period of time, while at the same time using this experience as a way of learning about restoration, as well as about the history, natural history and ecology of the area being restored. Since projects are expected to become self-supporting, principally through participants' fees following a brief start-up period, we expect the program to become a powerful force for restoration and for public education in project areas. Projects themselves will vary widely because they will be developed in response to the need for restoration, and also the interests of potential participants. The pilot project, which we expect to have underway by early this summer, will be carried out at the extreme

opposite corner of American territory, on the tiny island of St. John in the U.S. Virgin Islands. We are also exploring the possibility of projects at Walden Pond in Concord, Massachusetts; in Madison, Wisconsin; and, possibly even at the small lake on the outskirts of Moscow in the U.S.S.R.

I would like to close here with the suggestion that those responsible for the oil spill restoration in Prince William Sound consider the possibility of developing an Earthkeeping project to help with the work. Especially now that it has become clear that the effort will go beyond cleanup to include active restoration work in affected areas, this seems to be a plausible idea. Volunteers working with Earthkeeping field managers would be able to help with many aspects of restoration work both in impacted areas and possibly in other ecologically degraded areas that might be restored as part of the mitigation process. They could help with seed collecting and planting. They could help with the trapping suggested by Stan Temple's proposal to remove foxes from some islands to restore populations of birds. They could help with data collecting and monitoring, and perhaps even to some extent with the oil cleanup itself.

An especially attractive feature of such a project, in my view, would be the opportunities it would offer for involvement at all levels by Native inhabitants of the area. These people know the ecosystem. They know its history. And their cultures embody an ancient wisdom that I believe is likely to prove invaluable to us in efforts such as these. Moreover, by participating in this project as instructors and administrators, the Native inhabitants could contribute directly to their own local economies - certainly an important consideration, especially now that the base of the subsistence economy has been reduced by the oil spill.

As planning for this restoration effort continues, I hope those responsible will keep this suggestion in mind. I and my colleagues in the restoration community would welcome an opportunity to explore this possibility further.

PANEL PRESENTATIONS

Panel #1 - Coastal Habitats

JOHN TEAL, PH.D.

Dr. Teal is a senior scientist at Woods Hole Oceanographic Institute and an expert on wetland and coastal ecology. He has published well over 100 scientific articles; served on numerous boards and committees; and, participated in several conferences related to oil and other pollutants in the marine ecosystem.

I am not a government official and I am free to take a position and suggest to you the sorts of activities, or lack of activities that I think you might undertake. My point of view is that of a coastal marsh ecologist, with an ecosystem perspective rather than one solely dealing with birds or mammals. I do have a position of hope. I think there is a great hope for Prince William Sound, particularly if we are not too arrogant about what we can do.

We heard from an earlier speaker that the President said the ecology of Prince William Sound should be fully restored. This has a couple of implications. It implies that there is a possibility of us doing something to fully restore the ecology of Prince William Sound. It also suggests that we, as human beings, through various types of technology have the ability to restore Prince William Sound to what it was previously.

I am going to take the position that what we really ought to do after picking up as much oil as possible, is to do nothing. Physically we should leave it alone. Don't mess with it. I think nature, particularly nature in the oceans, is much more capable of doing restoration than we are. I worry about technological solutions that are going to do more harm than good in the restoration of Prince William Sound.

Part of the reason for this is that the ocean is highly mobile and interconnected, with currents carrying things throughout. It is hard to imagine very much of the ocean, for example, that would not get new larvae of what ever species was killed off (by an oil spill) to replace that organism, once a little time has gone by.

Unlike man's control of fire in the prairies, man cannot control the natural forces, storms and currents that make the ocean, and the coastal waters in particular, what they are. For that reason, the ability of the ocean to repair itself is much greater than any other environment with which we are familiar.

As a marine biologist I wonder about the limit of our knowledge of the oceans, about our believing that we know how to fix things, where in reality we do not, and may end up doing more harm than good.

Let me now just say a few words regarding the oil spill I know most about - a spill that occurred in West Falmouth about 20 years ago. This was a spill of number two fuel oil, more environmentally damaging than Prudhoe Bay crude oil. It is much more toxic. In the area I looked at fairly carefully, which was a marshy area impacted by that spill, the environment recovered over time without restoration. In the first year, the spill killed much of the grasses and animals. The oil penetrated 20 to 30 cm into the soils, which is an anoxic sediment - a perfect place to preserve oil. After a year, there were signs of the beginnings of recovery. Some of the more opportunistic animals and plants, the types of organisms that thrive in disturbed areas, began to colonize. The animals and plants which normally occupied this area were still being killed. In the third year, the marsh began to return. The marsh grasses began to re-invade areas where they had been killed. In fact, it looked greener and healthier than it did in neighboring environments, almost certainly because it was living off the nutrients released by decomposition of species killed by the spill. After six years, there was still significant oil in the mud, which was probably still killing organisms which burrow into the mud. But on the surface of the marsh, from the viewpoint of a casual observer, the marsh appeared to have recovered. We went back there this year, after twenty years. We can still find oil in the mud. In fact, if you dig down a bit, you can still see the oil or the sheen it produces. But the concentrations are now only a small fraction of what they were initially. I don't know that it is having any deleterious effect anymore. There is still oil there, no question about that. I can't conceive how it is doing that marsh ecosystem any benefit, but I am not sure it is doing any damage.

When I was in Cordova a couple of weeks ago, we heard some description of the *Amoco Cadiz* oil spill from a French scientist. He said that oil has visually disappeared from an area previously having very thick oil accumulations. He said you would have to be a fairly sophisticated observer on the coast of Brittany to find places where there was still oil, or where it appeared that there was still a significant effect of that spill.

What I am saying is that oil spills, given enough time, clean up themselves. Oil is, after all, not an unnatural contaminant in the marine environment. Systems to degrade oil exist in the ocean and systems to resist oil are present in organisms.

Many of the most important and sensitive stages of marine life are the pelagic larval or metamorphic stages. I worry that actions that might be taken in regards to restoration and cleanup are more likely to damage the system by remobilizing the oil back into the water. I think it is impossible to measure what impact the remobilization of oil would have on fish stocks. However, just because it cannot be measured, doesn't mean it won't occur.

I do not live in Prince William Sound, nor do I have much experience in Alaska. I don't know at what point, according to my philosophy, you should stop trying to clean things up and let nature heal itself. So I'm not trying to give you specific advice. However, I am perfectly certain that there is a point where the transition should take place. I urge you not to go too far. The places you can clean up are the places you can see. The places and systems you can damage are less obvious, and we have less knowledge about them, and they may well be the most vulnerable.

LEE HARDING

Mr. Harding manages the Marine and Estuarine Program for the Canadian Department of the Environment. His group assesses impacts of pollution on the marine environment. In 1989, when oil from a spill in Grays Harbor, Washington, appeared along the Canadian coast, he coordinated the environmental assessment.

I came here today to share my experience with a spill that occurred primarily along the west coast of Vancouver Island. We thought it was quite a bad spill when it first hit the coast. There was a lot of oil and it was widely distributed. The spill originated from a barge located off Grays Harbor, Washington, and dumped about 850 metric tons of Bunker C oil into the water. Approximately 50 to 100 metric tons were estimated to have landed along the Canadian shoreline.

The spill occurred on December 23, 1988. It first hit Vancouver Island on December 31, and had reached some small islands just north of Vancouver Island by mid-January. Cleanup operations continued for another three weeks.

Most of the oil landed along the outer, exposed headlands and islands, and did not go into the sheltered estuaries or the long, deep fjords to any appreciable extent. A few sheltered areas were impacted; however, most of the oil landed on the sharp, rocky outer coast, which is exposed to heavy wave action. Approximately 350 locations were known to have been contaminated by oil along Vancouver Island.

The outer coast of Vancouver Island is an area of immense scenic beauty and contains a wealth of natural resources. The area contains important fish and shellfish resources, marine mammal haul out and feeding areas, migration routes, and shorebird feeding and nesting sites. The three units of the Pacific Rim National Park, several Ecological Reserves, important Native harvest areas, and many salmon and shellfish mariculture operations are also located along the west coast.

The environments impacted by the *Nestucca* spill (the *Nestucca* was the barge which created the spill) are quite similar to environments you have here; however, they are probably more exposed than many areas of Prince William Sound.

The oil had come a long way (several hundred kilometers) before landing on the island. The spill occurred during cold winter conditions and the oil tended to congeal and land in cohesive mats. These mats of oil could be physically picked up, moved off site, and the beach would be virtually clean. When the oil landed on the rocks, it could be simply peeled off, and the rocks would be clean. If the mats were too large to move, we could break them up with an ax, and remove the pieces. After physically removing the oil, there would be no visible trace of oil on the surface except a wee bit of sheen.

That was the situation when the oil first hit the shore. If we missed the first tide after the oil landed the surf mashed the oil around and mix it with debris. However, we could still physically remove the oil and debris mats, and have a pretty clean beach. Some exceptions to this general trend included rock and cobble beaches protected from heavy wave action by offshore reefs where the oil coated rocks and logs, making removal of the oil much more difficult. Approximately 450 metric tons of oil and debris were removed from the beaches, of that, about 10 percent was oil.

Approximately 180 kilometers of Canadian shoreline had some degree of contamination from this spill. However, only about two kilometers were heavily oiled in the aggregate. The mats usually stranded in the high intertidal zone. Most of the oil landed as patches between several centimeters and two meters in diameter. There were not any areas noted with thick, continuous oil cover. Very little contamination occurred in the lower or middle intertidal areas. However, it was inferred that some oil was deposited subtidally. In subtidal areas, the oil appeared to be deposited in the form of specks and droplets. I say that the subtidal depositions were inferred because we found crabs (which inhabit depths to 50 meters) with oil on their carapaces. In fact, the crab fishery was closed because the contaminated crabs were not marketable. In some areas, 100 percent of the crabs were oiled. By March, this number was reduced to between 4 to 16 percent.

As time progressed, we saw much smaller patches of oil and oil mixed with debris hitting the shoreline. We continued to see this for about 1.5 months following the spill. Most of these smaller patches could also be visually removed. However, just because the surface was clean did not mean that there was not some oil below the surface. We conducted some quantitative sediment sampling about every two months following the spill between January and September. It was evident that tidal pumping had drawn oil subsurface in some areas.

The cleanup policy was to be as thorough in removing the oil as possible, and clean the beaches quickly. In addition to physical removal of oil patches, other methods were also used in some locations. Logs contaminated with oil were usually picked up and burnt. Petromesh was used to capture oil at some locations. At one site, some rocks and gravels were burnt in a reciprocating kiln to remove the oil, but this method had only limited success.

Most of the initial cleanup operation was completed by the end of January; however, some sites required subsequent cleanup of smaller deposits in March and April. By June, there was no oil showing up in our quantitative samples. In September, we found only three areas at which physical deposits of oil were evident. These deposits were small, approximately one-half meter diameter patches of oil mixed with debris.

In summary, there was some impact on intertidal plants and animals from the spill. Both lethal and sublethal effects were noted. By June, the biological cycles were getting going, but there was virtually no oil left in the environment, and it was expected that any impacts occurring at that time would be trivial or insignificant at the population or community level in a regional ecological context.

The restoration of the shoreline and other intertidal habitats was limited to physical removal of oil. Once that was accomplished, we felt that the environment was restored to its original condition for all intents and purposes. Mind you there were some exceptions.

Factors that reduced the impact of this particular spill included the time of year it occurred, the distance the oil traveled before landing on the Canadian shoreline, the rapid cleanup program, and the exposure of contaminated areas to strong wave and tidal action. Because the spill occurred in the winter, air and water temperatures were cold; the oil tended to congeal and could be easily picked up. Plant and animal populations were low in the winter and metabolic rates were at their lowest. Most species were not in the breeding phase of their life cycle. Seabirds and other migratory animals were on their wintering grounds, and not exposed to the immediate impacts of the spill. However, I do not want to minimize the overall impact resulting from the spill. Depending on which estimate you use, between 20,000 to 50,000 birds were killed. Coastal plants and animals were also impacted, particularly in the more heavily oiled areas.

The cleanup effort was rapid and thorough, and most of the oil was removed from the coast. The exposed location of the contamination on the coast obviously limited the impact where natural self-cleaning was at a maximum because of wave action. The organisms in these locations are also very hardy and adapted to extreme environments.

Anyone interested in learning more about this spill, should request a copy of the Regional Program Report 89-01, "The Nestucca Oil Spill: Fate and Effects to May 31, 1989", from the Department of the Environment, West Vancouver, British Columbia, Canada.

STONEY WRIGHT

Mr. Wright manages the Alaska Plant Materials Center, a unit of the Alaska Department of Natural Resources. He is responsible for cultivating plants and developing techniques for erosion control and reclamation.

This report will give an overview of the Alaska Plant Materials Center's work with beach wildrye, Elymus arenarius (E. mollis). Beach wildrye is a common coastal species associated with sandy beaches and foredune areas. It is a strongly rhizomatous species and can spread by these underground stems at rates up to five feet per growing season.

The Plant Materials Center's (PMC) first experience with beach wildrye was on Shemya Air Force Base in the Aleutians. The air base had a 27-acre parcel adjacent to the runway which had been cleared of vegetation and contoured to a uniform ten percent grade for safety reasons. The construction extended from the runway to tide water. This caused severe sand erosion and safety problems associated with blowing sand. The Air Force's initial attempts to revegetate using standard methods were without any success. The PMC plan relied on an unproven method using beach wildrye. The first order was to modify the existing equipment so mechanized plantings could be accomplished. Trenches and furrows were cut for the transplanted sprigs. A simple "drop and stomp" technique was developed for the labor crew. This technique worked well and revegetation efforts moved at a rate of one acre for 60-man-hours.

The Shemya project began in May 1987, and by September of that year beach wildrye had become well established. The seeded grasses were also performing well. The erosion problem was under control. After the second growing season, a very good stand of wildrye continued to flourish. Also, an understory of hairgrass (Deschampsia) and red fescue (Festuca) had become established. The project started as an erosion control effort but as the native species spread, it became more than a simple erosion control project. After three years the site resembled a natural coastal community.

Another example of restoring native communities with beach wildrye occurred on Adak. Once again, the idea was to control the sand and keep it out of sensitive equipment. The PMC established the wildrye community by means of transplants and other associated coastal species followed. It also found that marginally damaged beach wildrye communities can be restored to full cover simply by using commercial fertilizer.

On St. Paul Island the PMC learned that, even though ryegrass is a very aggressive species, it will not tolerate traffic. A restoration plan for a trail called for fertilization of existing beach wildrye stands. This effort failed due to continued traffic on the site.

Beach wildrye probably was not impacted to a great extent by the *Exxon Valdez* spill, as the species tends to occupy areas above the high tide. But, it is a species that is important for controlling erosion on shore areas and therefore, requires attention and protection. The cleanup activities will probably cause more damage to these communities than actual oil contamination has or will. If damage to the beach wildrye communities does occur, it is suggested that remedial actions to correct the damage be undertaken to prevent unnecessary coastal erosion.

JAY MCKENDRICK, PH.D.

Dr. McKendrick is a professor of agronomy at the University of Alaska-Fairbanks. He conducts research through the Agriculture and Forest Experiment Station at Palmer. His research has focused on the revegetation of tundra habitat damaged by oil spills. Currently, he is involved in a ten-year study of revegetation of gravel pits around Prudhoe Bay.

Crude oil spills vary in their effects on plant communities depending on the moistness of the site. Wet sites appear most messy following an oil spill, but wet sites recover more quickly than dry sites. On a wet site, vegetation begins to return within a few years following the spill, depending on the degree of oil removal and soil moistness. If sites are fertilized vegetation returns more quickly. Mosses and sedges are among the first to recolonize an oil-damaged site when fertilizer is applied. The rate of recovery is comparable to that of naturally drained lake basins. Burning to remove the oil helps the site become vegetated again more quickly. Phosphorous has generally been the most beneficial nutrient of vegetation recovery at Prudhoe Bay on physically disturbed areas as well as oil-damaged sites.

Oil-damaged, dry sites recover much more slowly than wet sites. Burning to remove the oil and fertilizing the soil seems to improve the rate of vegetation recovery on dry sites, but the responses are less dramatic than on wet sites.

Naturally occurring events periodically produce barren sites on the Arctic Coastal Plain; seawater inundation increases salinity and boron levels of soils, and lakes drain leaving barren basins. Secondary and primary succession naturally generates plant cover on wet soils of drained lake basins in 20 to 30 years. Salt-damaged sites and dry, sandy soils remain barren or only partially vegetated for much longer periods, from a practical view, indefinitely.

Man-made disturbances that remove vegetation by disrupting soils and terrain will revegetate naturally in a manner and time frame similar to that which occurs in wet lake basins, if the soil remains sufficiently moist following the disturbance(s). If disturbances alter the soil moisture to a dry state, the return of vegetation is slower and less dense. As with salt-damage, these dry sites appear to remain barren almost indefinitely.

Fertilizing soil with phosphorous and sometimes other nutrients accelerates return of indigenous vegetation on moist and mesic sites. Fertilization of soils improves the establishment of seeded or transplanted vegetation on such sites. It also enhances the recovery of sites damaged by crude oil spills.

COMMENTS FOLLOWING PANEL #1 - COASTAL HABITATS

COMMENT (to Lee Harding):

What was the date of the spill described?

RESPONSE (Lee Harding):

The spill occurred in December of 1988 off of Gray's Harbor, Washington, a little over one year ago.

COMMENT (to Lee Harding):

Was there any follow up in terms of longer term monitoring?

RESPONSE (Lee Harding):

No. The studies planned have been completed.

COMMENT (to Stoney Wright):

Could we get a brief summary on the importance of the Elymus community, a lot of which was damaged by cleanup activity.

RESPONSE (Stoney Wright):

Elymus is the protection of the foredune. It keeps the sand in place. Once the sand starts moving, it progresses back from the coast and simple erosion will occur by coastal winds. A lot of damage caused by the cleanup crews will probably repair itself in the long run, once the traffic is stopped. This regrowth can be quickened with fertilizer. In areas where there has been massive damage, it may be necessary to transplant, every three foot on center. That would be enough to let it take its own course. It's very important to prevent erosion if the dunes are damaged.

COMMENT (to Dr. Teal):

You were advocating a "no action" option. Would this be forever?

RESPONSE (Dr. Teal):

If you start out with no restoration, then I wouldn't advocate going in with any restoration unless we learn a lot more than we do now. I don't see any way of going back sometime after the damage has been done.

COMMENT (to Dr. Teal):

I have been involved in cleanup activities before and disagree with the do-nothing approach, particularly in marsh areas. In Patagonia, Chile there was damage to a marsh on the order of a two-inch layer of asphalt. Even today there is a latex layer over the marsh. The do-nothing approach did not help. With the Amoco Cadiz the situation was less simple. There were one to two inches of oil over the marsh. Unfortunately, very heavy cleanup activity was undertaken at the marsh. Afterwards there was an extensive and successful grass replanting. So here we have two situations which warranted doing something to get the oil off and following up with some type of restoration program.

RESPONSE (Dr. Teal):

I did not suggest that you shouldn't try to take massive amounts of oil away.

PANEL PRESENTATIONS

Panel #2 - Fisheries

BRIAN ALLEE, PH.D.

Dr. Allee directs the Fisheries Rehabilitation, Enhancement and Development Division of Alaska Department of Fish and Game. He is a member of the Alaska Science and Advisory Commission and served as president of the Prince William Sound Aquaculture Association for five years.

We have developed innovative arctic and subarctic rehabilitation and enhancement technologies here in Alaska. These technologies are not new. Our enhancement programs were developed in the early 1970s, when salmon runs were low statewide. The programs were designed to produce salmon in a variety of ways, from hatcheries to lake fertilization, in order to contribute to the common property fishery, which is composed of commercial, sport, subsistence, and personal use fisheries.

The technology for fisheries enhancement is well-known for some species and is currently being developed for others. The technologies for enhancing species such as Pacific salmon, a number of trout species, black cod, halibut, rock fish, herring, king crab, shrimp, mussels, scallops, clam and marine plants are in various stages of development.

The enhancement technology can be applied to the restoration of oil spill-affected environments in three ways:

- Production of juvenile stages for restocking impacted natural habitats or augmenting existing populations in stream, lake, estuarine or marine environments.
- Rehabilitation of habitats in stream, lake, estuarine or marine environments, through methods such as fertilization, and creation of artificial habitats and spawning channels.
- Conservation of natural genetic resources by culturing unique populations in hatcheries or nursery areas until natural habitat quality improves.

Perhaps the best example of enhancement is the development of Alaska's Pacific salmon program. The rationale for salmonid enhancement was the need for more salmon when natural salmon runs were depleted statewide. Since then, the technology has been applied for hatchery production, lake stocking, lake fertilization and habitat rehabilitation.

Currently, the Alaskan enhancement program is the largest in North America and second only to Japan in output. We enjoy a worldwide leadership position in the technology of producing sockeye salmon, both in terms of hatchery culture and rehabilitation of underutilized lake systems.

Aside from the biological achievements, salmon enhancement has had a profound impact on the economic and social structure of Alaskan communities. The economic impact of the salmon enhancement program has been evaluated with an impact model developed by the Institute for Social and Economic Research (University of Alaska-Anchorage). A recent economic simulation using this model for the fiscal year 1990 program showed that enhancement projects would result in over 3,500 resident jobs and $102 million in personal income to resident Alaskans.

The salmon enhancement effort is an example of what is possible using existing technology. I am very confident that the application of technology to other species can be adapted to small or large-scale projects in order to restore or replace resources following the E*xxon Valdez* oil spill.

LEN VINING

Mr. Vining directs the Natural Resources Department of the North Pacific Rim Corporation., a regional, Native corporation. He has conducted several studies on salmon enhancement, mariculture and subsistence.

I am going to give you some background on the North Pacific Rim Corporation, what we're doing, how we fit into the region, and what our needs are, as well as some data gaps which I feel are still existing.

The people of the Chugach Region have created several different organizations. The North Pacific Rim is the regional nonprofit corporation. The Chugach Corporation is for profit. The village areas are distinct entities with their own governing bodies composed of elders and Indian Reorganization Act village councils. The villages include Chenega Bay, Tatitlek, Port Graham, English Bay and Cordova. Two years ago the Chugach Regional Resources Commission (CRRC) was formed. This group is composed of representatives of each village, and serves to review and decide on regional natural resource issues. The purpose of the CRRC is to:

- Protect subsistence as a way of life;
- Promote environmentally sound economic decisions;
- Ensure participation in research decision making; and
- Promote educational and training opportunities for future generations.

As subsistence economy forms the social fabric of the Native community, it is our economic foundation. The timing of the seasons drives the communities in their hunting, fishing, and ceremonial services.

The villages are dependent on subsistence activities for survival. Studies show that the villages within the Chugach region consume a much higher level of meat, fish and waterfowl than the average American household. All of this goes to show our dependence on this base subsistence economy. Operating on the assumption that there is damage to the resource base (as from the oil spill), that damage will disrupt subsistence activities and the local economy.

Part of our subsistence economy is in commercial fishing. There is a great deal of competition for this resource from the outside. We need to either diversify or revitalize our involvement in the commercial fishing area. We need to enhance the local subsistence food base. This problem is compounded because transportation access to the villages is very difficult.

Prior to the spill, we had begun some fish rehabilitation in the English Bay lakes. The stocks there had been reduced, and we were trying to rehabilitate them at the time of the oil spill. This effort was dropped because of the spill. But it is now more critical than ever to continue the rehabilitation effort because of the significant losses suffered from the spill.

Shellfish mariculture also presents good opportunities for rehabilitation. One such study was being done, but it was dropped because of the spill. This area presents opportunities for employment, food, and the possible transfer to another economic base.

There was a pink salmon cannery in Port Graham which experienced serious losses. It will not be open this year, and that means a lot of lost jobs.

We do have an ongoing project with the English Bay sockeye. They have a longer life history. This project is now in its third year. This year we will release the salmon into the bay, but returns won't come until at least a few years from now. We are also currently training some of our people to equip them with the skills which will be necessary if we are to diversify our economic base.

In terms of our needs, there isn't enough existing information about the dynamics of the village economy. We need studies on how subsistence and cash economies integrate. Also, very little attention has been given to social disruption. Subsistence is the "nerve network" of the village community; it involves sharing your catch with your elders for respect, sharing your catch with your neighbors, and passing on knowledge of the natural resource areas to younger people.

Another issue which deserves more attention is human health. Exxon has already said that they

will not continue toxicity level testing, and ADFG will be running out of funding in June of 1990. Data are missing here. The village people depend on the consumption of regional resources, and need to know about toxic effects. NOAA has identified the following areas as key, and in need of further research: marine mammals, shellfish, bioaccumulation and heavy metals.

JANE GORHAM

Ms. Gorham represents the Homer Charter Association. She also serves as Secretary-Treasurer of that association and owns Deep Sea Charters in Homer, Alaska.

All of my information is derived from the International Pacific Halibut Committee's Stock Assessment documents, meetings and questionnaires issued to charter boat operators, as well as local businesses.

Following the oil spill of the *Exxon Valdez* a study was undertaken to determine whether to delay, or possibly close, the May 15 and 16 commercial halibut season opening, and to see whether sport closures would be necessary. Grid sections of the areas affected made up the sampling area. Special attention was given to heavily oiled areas. A clean area was fished as a control group. Gall bladder, liver, and stomach tissue from the fish were all examined for evidence of petro-hydrocarbon contamination. Additionally, suspicious areas of pigmentation were scraped and examined. A visual examination also looked for evidence of contamination. Some flesh was taken, sealed in bags, and cooked in microwave ovens to determine if any trace or scent of oil contamination was present. In all, 900 fish were sampled. No visual evidence of contamination, or negative effects from the oil spill were observed. The smell and taste tests also proved negative.

Based on the above, it was concluded that the halibut had not been exposed to appreciable levels of oil in the short term. However, long-term contamination remains a concern, primarily because of fear of contamination of the nursery areas, which would have a deleterious effect on the young. Based on experiments, captive English sole exposed to substrate contaminated with Alaskan crude oil were shown to be smaller than their counterparts raised in non-contaminated conditions. The contaminated sole also had much higher rates of infestation from parasites, and were much less active in feeding. In general, they were shown to be at a disadvantage, and suffered a higher mortality. It takes 6 to 7 years for these results to manifest.

Additionally, it has been shown that the substrate will retain petro-hydrocarbons for 6 to 7 years. This means that the benthic organisms, on which the halibut feed, are heavily contaminated. The halibut, even if not rearing on contaminated substrate, risk secondary exposure through consumption of contaminated benthic organisms. Monitoring must be established to document these concerns.

Last season was a good one for charter opportunities. Many people found employment through Exxon; there were actually more customers who wanted to fish than could be taken out. In the law of supply and demand, however, this ultimately results in more boats per customers, decreasing opportunities for existing charters.

The adverse publicity showered on us by the media certainly did us no favors. This is something which needs to be assessed in the next few years. There seems to have been little adverse impact to the halibut in 1989, and there is no existing restitution. But we concur with the International Pacific Halibut Commission's decision that we need to establish monitoring to ensure quality control in the charter industry.

KEN KASTNER

Mr. Kastner is currently the Executive Director of United Fisherman of Alaska, an organization that represents over 18,000 fishermen. He is also an active seiner and gillnetter in Cook Inlet.

Thank you for inviting me here today to represent the views of the commercial fishing industry of Alaska in the restoration of the fisheries that were damaged by the wreck of the *Exxon Valdez*.

Restoration is certainly a very broad term. There is the obvious restoration, or the attempt anyway, to restore the fish and wildlife and their habitats that were altered or damaged by the impact of oil. However, there is another restoration that must also occur. That is the restoration of faith in the function of government by the people for which the government was formed to serve.

Following the spill one year ago, a lot of time, energy and study has been done as to the oil's effect. This is the assessment process. Commercial fishermen, obviously the most economically impacted by oil, both in the short and long term, have depended on the state and federal government to provide the research necessary to support their claims of damages against Exxon and Alyeska. To date, all of that information has been kept secret.

Is keeping assessment data confidential a legitimate function of the government? It could only be legitimate if the government was intending to settle the case on behalf of the commercial fishing industry. It was recently disclosed that the United States Department of Justice has a proposed settlement with Exxon which may have included, by way of both criminal and civil law, settlement for the damaged common property resources for which fishermen were also seeking restitution.

Subrogation of the legitimate individual claims of fishermen by the expedient mechanism of a lump sum settlement will, in the case of the *Exxon Valdez* disaster, be met with outrage.

All of America benefits from the development of Alaska's oil resources. While the benefits are equal, the assignment of risk is not. The coastal communities of Alaska share an unproportionate amount of the risk. Cordova, Valdez, Whittier, Tatitlek, Chenega, English Bay, Port Graham, Seldovia, Seward, Homer, Kenai, and Kodiak are all communities that suffered severe economic hardship that was the direct result of this oil spill. The herring, crab, shrimp, rockfish, and salmon that provide the economic mainstay for these communities were also affected. To what extent is unknown because the scientific information is being kept secret - a new oxymoron, by the way, secret scientific data.

Alaska's Commissioner of Fish and Game, Don Collinsworth, stated in a presentation to Congress that:

- Based on a recent analysis of some samples of herring larvae hatched from eggs collected near oiled shorelines in Prince William Sound, we found up to 90 percent with abnormalities in comparison to only 6 percent with abnormalities from unoiled areas, and;
- In the intertidal portion of salmon streams where we would normally find tens of thousands of eggs or juvenile forms, our biologists have been unable to find even a single egg, alevin or fry.

You can see from those two disclosures why fishermen with hundreds of thousand of dollars of capitalizations in the herring or salmon fisheries may feel that individual claims should not be swept into a lump sum settlement, and why fishermen object to placing a very high priority on restoration projects that are far removed from the damaged resources.

It has become the prevalent practice for those settling large scale environmental cases to place the entire settlement amount, which may also include the money for claimants, into one or more accounts that are administered and dispensed with little public review. The settlement of the United States, et al. V. Shell Oil Company and Sierra Club V. Union Oil Company of California have both led to deposits into special general funds that have been designed specifically to administer out of court decree settlements. The funds are available, however, only for a select

number of projects; there is no provision for the settlement of individual claims.

Look at the direction the U.S. Justice Department was heading in its out of court settlement of criminal charges before the charges were even filed. A special general purpose fund was proposed. Look at the proposed wording of Senate Bill 686: a special fund would be created that administers claims while subrogating the rights of individuals to file direct action claims against the defendant. Look at this report prepared for the World Wildlife Fund entitled, "Establishing the Fund for Alaska, the Procedural Programs and Legal Options." This report recommends that a special board of trustees be established to administer the settlement, from Exxon and Alyeska. And look at the words of Don Collinsworth in his testimony to Congress that:

- The state is of the view that the natural resources damages recovered in the *Exxon Valdez* case should be deposited in a single jointly-managed trust fund, regardless of which government receives the recovery. We believe the federal government generally concurs with this notion. This would allow us to set aside the issues of resource ownership.
- If the restoration planning process is leading us to the creation of a lump sum common property settlement then it is time to refocus. When public policy is being driven by litigation; when public information is being suppressed because of litigation; and when the damages to individuals are combined into a fund for the convenience of the litigators; I would say it is time to put on the brakes and reexamine the process.

Nobody said that justice in America was an easy process. But it was always meant to be an open and fair process. The people of Alaska may have lost something if there is never a settlement of the *Exxon Valdez* disaster. But the United Fishermen of Alaska, believe a lot more will be lost if an all inclusive settlement is made with Exxon and Alyeska in secrecy, and the restoration projects that follow are chosen and negotiated without public review.

Fishermen feel that the first restoration should be the restoration of faith in government. There should not be another oil spill. All preventive remedies should be applied. The government should insist upon only the highest standards and best technologies from the oil industry. Safeguarding against another spill is the best remedy of restoration.

The second restoration should be of the resources that were impacted. The damage assessment information should be released and publicly attended planning efforts for enhancement, mitigation and recovery should begin.

The third restoration should be of the reputation of the resource. The state and federal government should undertake a program of quality assurance that protects the markets and reputation of Alaskan seafood.

The fourth restoration should be of the coastal communities of Alaska. The oil industry, and the state and federal governments, should design and build whatever facilities, and provide whatever training it takes to continue oil exploration, while reducing the risk to the coastal communities.

The fifth restoration should be to compensate individuals whose businesses and lives were significantly disrupted or harmed by the oil spill. The state should defend the individual rights of its citizenry and provide the scientific data that supports their claims for damage.

Then, the very, very, last item of restitution should be those restoration projects which involve the acquisition of equivalent resources that are far removed from the resources damaged.

So that's our view on restoration and I would be happy to answer any questions.

COMMENTS FOLLOWING PANEL #2 - FISHERIES

NONE

PANEL PRESENTATIONS

Panel #3 - Birds

STANLEY A. TEMPLE, PH.D.

Dr. Temple is a Beers-Bascom Professor in the Department of Wildlife Ecology at the University of Wisconsin-Madison. He specializes in the biology and management of endangered species, especially birds. His interests in conservation biology extend to the restoration of non-endangered species as well. He teaches the wildlife biology courses originated by Aldo Leopold fifty years ago.

All bird populations are periodically subject to catastrophic losses. Following these setbacks most populations recover, but the course of recovery differs substantially according to the life history of the species. There are three basic population rates that are important in determining the rate of recovery: birth rates, immigration rates, and death rates. All of these processes will play a role in the recovery of bird populations from the oil spill. Species with high rates of reproduction and immigration obviously recover more quickly than those with lower rates. The recovery time for a species depends not only on these biologic rates, it also depends on the magnitude of the setback in population size. The loss of a substantial portion of a population takes longer to recover from than the loss of a small portion. When assessing the course of recovery it is also important to define the size and distribution of the population. Is the "effective" population a local one confined to a small geographic area or a regional one that covers a large area? To define the effective population we need to know about dispersal patterns and the extent to which local populations are effectively isolated from other local populations.

I have evaluated possible scenarios for recovery of three different species populations affected by the oil spill: the peregrine falcon; the bald eagle; and the common murre. All three species have different life histories and effective population sizes, and therefore different faculties of recovery. My information is based on known survival, reproductive and immigration rates.

We know a lot about peregrine falcons. Much of what we know came from studies of pesticide problems which caused catastrophic losses for the species. Peregrine falcons breed at two years of age, have a fairly high reproductive rate, and a good survival rate. They can recover readily after a catastrophe. Peregrine falcon populations in Great Britain were able to double their size every eleven years after the ban on pesticides allowed them to reproduce normally. Looking at the first graph (Figure 1), you can see that the optimistic curve, that is, the curve which indicates the highest rates of reproduction and survival, also includes an immigration rate of 2 percent per year. The vertical dotted line in the center of the graph assumes a 50 percent population loss, so at the end, we effectively have a doubling of the population. The next curve (optimistic - no immigration) estimates the rate of recovery

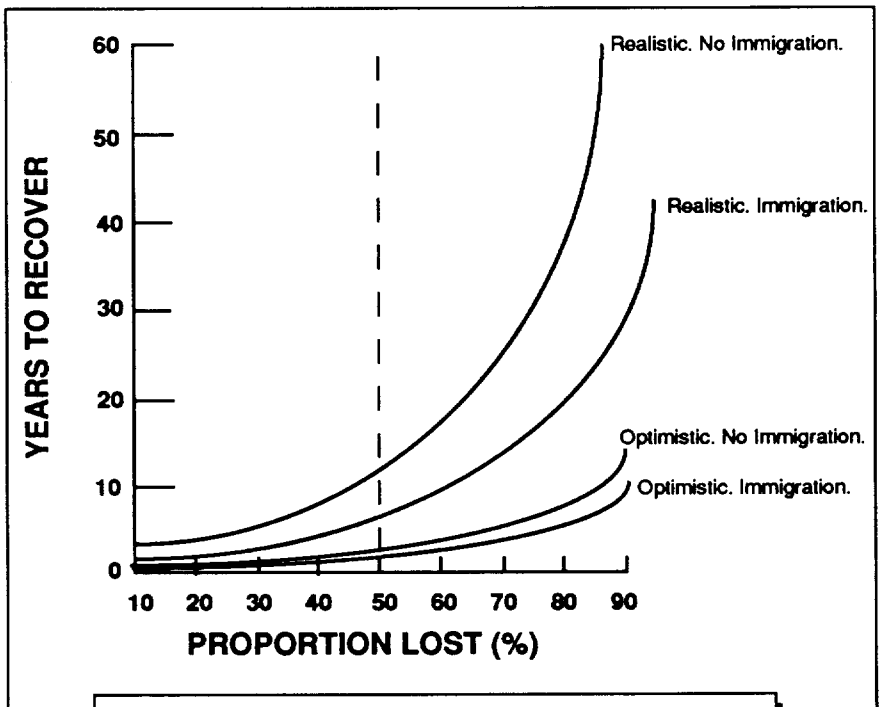

FIGURE 1
Projected Recovery of a Peregrine Falcon Population after Disturbance

without immigration, and we can see that population recovery would take a little bit more time, but overall, the relative recovery rate is fairly quick. The other two curves are more realistic; they don't use the highest rates of reproduction and survivability, which is probably accurate considering that the affected species will not be at its peak because of oil impacts.

One of the crucial factors in assessing recovery rates is that you have to know the proportionate loss of the effective population. We don't have this information for falcons. We know that the regional population is large and mobile. Falcons lost in the oil spill area are certainly a relatively small proportion of the regional population and I would therefore expect the recovery to be fairly rapid as soon as the environment is restored to a condition suitable for peregrines.

Bald eagles, because they have a different life history, will take longer to recover, but we can again estimate the possible time to recovery. Bald eagles are slow to reach sexual maturity (breeding at five years of age), have a lower reproductive rate than peregrine falcons, but a higher survivability rate. Their populations are mobile with a large interchange of birds.

Overall, bald eagle populations take more time to bounce back. The graph for bald eagles (Figure 2), shows that, under the four scenarios, populations will double their size in 5-70 years. In the midwest, for example, following the pesticide era, it took 14 years for eagle populations to double. What proportion of the effective population was lost due to the spill is still a key question. We do not really know, but it was likely a small portion of the population in the large and healthy Alaskan population.

Like bald eagles, common murres do not reach sexual maturity until they are five years old. Additionally, they have low rates of reproduction, and high rates of survivability. Breeding populations, however, have displayed strong philopatry, that is, the tendency to return to their place of birth to nest. The populations rarely disperse, unlike the peregrine falcons and the bald eagles. The recovery time for a local murre population is therefore likely to be long. Murres on Skomer Island in the North Atlantic had a doubling time of about 17 years following a natural catastrophe, a severe storm. If left to recover without immigration, the graph (Figure 3) indicates that a local murre population could take up to 200 years to double in size. Clearly, immigration is an important aspect of the recovery of a local murre population.

Both the bald eagle and the peregrine falcon populations have a good probability of recovering quickly if left alone, because they both have fairly high immigration rates from surrounding areas. The recovery of the local murre population however, will be slow without the help of immigration from other populations which is not likely to happen given the species' strong philopatry. There are several ways in which we could help the recovery of the local murre populations by encouraging immigration. For example, several nesting islands near the oil spill area have been severely affected by introduced predators, such as foxes. If we could rid these islands of introduced predators, the populations' would have higher reproductive rates, and they would, therefore, produce more emigrants that might colonize affected islands in the oil spill area. Also, we could make an effort to reduce murres losses from capture in fishing nets; this would also increase the likelihood of other populations in the region being able to produce a surplus of individuals that could colonize impacted islands.

Again, missing from the equation is a true estimate of the proportion of the population lost. We know the number of oiled murres collected on the shore, but this number is not indicative of the overall loss, and we can't accurately predict recovery without knowing the whole picture. The populations on several islands, however, seem to have suffered very high losses.

There seems to be little biological justification for specific interventions to speed the recovery of the bald eagle and peregrine falcon populations; the losses to the regional populations were small and there will be natural immigration; the populations should recover fairly promptly, if we simply let nature take her course in an environment that has been restored to pre-spill conditions. This is not true with the murre population. The local populations of common murres will need help and encouragement if their recovery is to be effected in time frames of less than several decades.

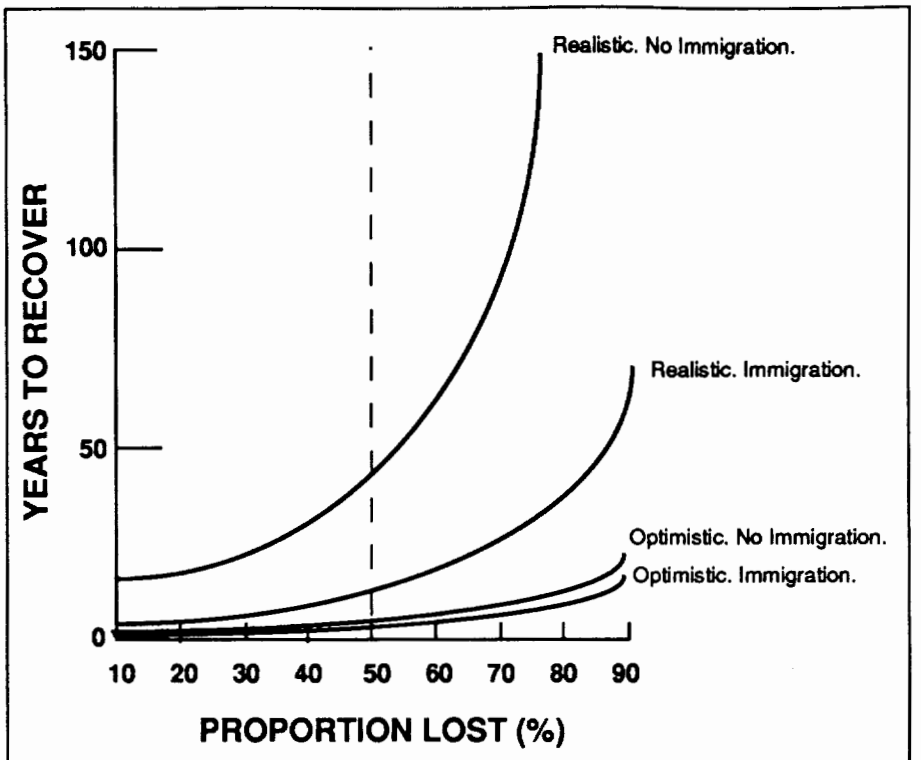

FIGURE 2
Projected Recovery of a Bald Eagle Population after Disturbance

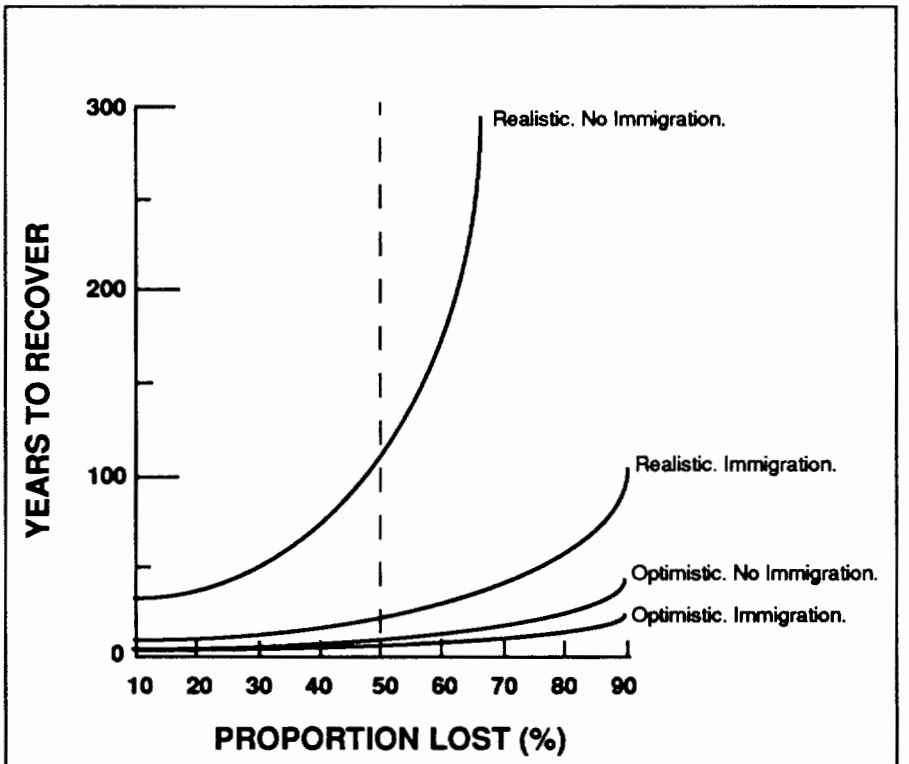

FIGURE 3
Projected Recovery of a Common Murre Population after Disturbance

DAVID R. CLINE

Mr. Cline is the Regional Vice President of the Audubon Society and is responsible for coordinating the Society's diverse conservation programs in Alaska and Hawaii. Formerly, he was a wildlife biologist with the U.S. Fish and Wildlife Service for eleven years.

Thank you, Mr. Chairman.

On behalf of the National Audubon Society including its 2,600 members in Alaska, I would like to thank the Restoration Planning Work Group for holding this symposium and providing an opportunity for diverse interest groups to participate.

In the interest of time, I will only highlight a few of our major concerns and recommendations regarding the restoration of birds and their habitats damaged by the catastrophic *Exxon Valdez* oil spill. I would like to make you all aware, that the National Audubon Society, in close cooperation with the Tri-State Bird Rescue and Research Center, submitted recommendations on the State/Federal Natural Resource Damage Assessment Plan for the *Exxon Valdez* Oil spill last October 27, 1989. Since that document contains detailed comments on the subject being addressed by this panel, I would like to provide a copy for your close examination.

As you work together to design an overall strategy for bird studies, I urge you not to view the oil spill as a one time event, or in isolation from other man-caused impacts that may be stressing bird populations along Alaska's coasts. After all, it is the cumulative effects of these impacts that will have the most serious and lasting impacts on those populations.

We recommend that you concentrate on studies of species and populations that will be the best biological indicator of ecosystem recovery and the overall health of the marine environment. While I know that you must give special focus to direct affects of the oil spill, I think it would be a serious mistake to pass up the opportunity to take a broader ecological perspective in bird study design.

For example, overfishing, entanglement in fishing gear, extensive clearcut logging and coastal settlement could well have much more serious long-term impacts on seabird populations than would a single catastrophic oil spill. And future oil spills could result in more serious consequences for bird populations if added to already existing stresses such as those resulting from seriously reduced food supplies.

All studies undertaken should be continued for as long as necessary to achieve the desired results. Let me make it clear, however, that Audubon does not advocate long-term research for the sake of long-term research. Rather, all bird research related to restoration should be realistic in its expectations about the time scale of ecological impact. Sufficient investment in time and resources must then be made to accomplish all research goals.

Termination dates for the various studies should be identified based on a scientific determination of the length of time required to assess projected impacts being studied, not upon other considerations such as available funding.

In research design, we would like to see potential chronic impact from the spill on birds, such as teratogenic, mutagenic and carcinogenic effects, given close examination. For example, to accurately assess injury to bald eagle and Peale's peregrine falcon populations, and eventual recovery of these populations, toxic effects of oil on the birds should be determined. This will necessitate collecting feather, blood, fat, dead bird and addled egg examples to examine chlorinated hydrocarbons. The aim in all this is to accurately determine which contaminates are responsible in cases where reproductive failure occurs.

We also recommend that more work be focused on habitat impacts as opposed to a predominately single-species orientation. A great deal of attention should be given to integrating single-species studies with habitat and ecosystem work.

Rather than designing separate bird studies in isolation and without rigorous thought to their ultimate integration, a synthesis process should be developed early on that integrates the individual studies into an overall damage assessment and bird conservation plan for the future.

Criteria and standards should be established in order to monitor and test the success of individual restoration plans. This should include thorough examination of the possible need to acquire replacement habitat.

Too often overlooked in major research undertakings such as this is assuring there will be accountability and benefits to the public whose resources are at stake. It is, therefore, incumbent on all researchers and agencies to submit their findings for peer review, and then make them available to the public in a timely manner. Not to be overlooked in this regard is the opportunity to develop educational materials for our schools so young people grow to better understand the adverse impacts of oil spills on the natural world and how to avoid them in the future.

Finally, I urge all parties involved in oil spill restoration to recognize the opportunity now before us to obtain more adequate funding for wildlife conservation in Alaska. This could be accomplished by committing a substantial portion of out-of-court settlement monies or fines eventually collected from Exxon to an Alaska Wildlife Conservation Fund. Primary purposes of such a fund would be to acquire high quality wildlife habitat, provide a permanent funding source for the Alaska Nongame Wildlife Program, and support other activities - including research - that furthers the conservation of the fish, wildlife and plant resources of Alaska.

Thank you very much for your consideration.

PETER MICKELSON, PH.D.

Dr. Mickelson is a research associate at the Prince William Sound Science Center. He is the former head of the Wildlife and Fisheries Program at the University of Alaska-Fairbanks, and was a wetlands biologist with the U.S. Forest Service in Cordova. He has authored a book and several papers on the wildlife of Prince William Sound, and has conducted several wildlife surveys following the oil spill.

According to Piatt et al. 1990 in their paper on "Immediate Impact of the *Exxon Valdez* Oil spill on Marine Birds" at least 30,000 birds and perhaps up to 300,000 were oiled and lost. The most vulnerable species were loons, grebes, sea ducks and alcids. Full recovery may take 20 to 70 years for some seabirds. In addition, production was below normal for bald eagles, peregrine falcons, glaucous-winged gulls, black oystercatchers and other seabird species. This paper discusses options for enhancing populations and improving habitat for birds.

In the Prince William Sound (PWS) to Kodiak Island region (northern Gulf of Alaska) there are over 240 species of birds (Isleib, 1981, Mickelson, 1989). Over 40 species of birds were affected by the oil spill (Piatt et al. 1990.) Some of the most affected species were overwintering or migrant birds which nest in interior and western coastal Alaska.

Broad habitat conservation measures include protection and enhancement of breeding habitats. Sea ducks have some breeding habitat protection in the form of the Yukon Flats National Wildlife Refuge (NWR) in interior Alaska, and the Yukon Delta and Togiak NWR in western Alaska. Possibly other private lands in these sea duck nesting areas should be acquired for the refuge system. Likewise, some seabird colonies on islands could be acquired. Another approach is to obtain conservation easements which would include sea duck breeding habitat on Doyon and Calista Corporation lands. Migrant dabbling ducks affected by the spill would be benefitted by acquisition of wintering habitats farther south along the Pacific Coast, particularly in Oregon and especially in California. Consideration should be given to habitat conservation measures in southeastern Alaska where some dabbling ducks and many seaducks winter. Priority should be for acquisition of lands first in PWS and the adjacent Copper River Delta, then along the northern Gulf of Alaska coast, then in Alaska, and finally in the U.S.

Further restriction on the high seas drift net fisheries would benefit seabirds, primarily alcids wintering in the northern Pacific Ocean; there would be a reduction of population losses due to gillnet entanglement.

Locally in PWS and along the northern Gulf of Alaska coast, oil must be removed from shorelines, where feasible. Gravel and rocky beaches which continue to bleed oil from deeper deposits will cause further habitat degradation. Contaminated substrate needs to be cleaned, or removed and replaced with clean substrate. This should occur in 1990 at most sites, except perhaps salt marshes where more harm than good would be accomplished by cleaning operations. Care should be taken to conduct cleaning activities as efficiently as possible and during noncritical time periods (for instance, before ducks bring their newly hatched chicks to saltwater).

To evaluate avian habitats we must have an inventory, such as a geographic information systems (GIS) data base. The Alaska Department of Natural Resources, U.S. Forest Service, U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration through Resource Planning Institute, IACs and the National Park Service are working on a GIS inventory of the northern Gulf Coast and PWS. The Prince William Sound Science Center together with the Copper River Delta Research Institute jointly are planning detailed inventories of PWS, its drainages, and the Copper River systems using GIS. Planning is underway, but funding is needed for detailed inventory not only of the marine environment, but of the entire drainage basins.

If necessary, waterfowl nesting populations could be increased through provision of nesting islands and improvement of food sources in brood-rearing areas, such as on Hinchinbrook and Egg Islands, and the Copper River Delta near PWS, and the

Fox River flats in lower Cook Inlet. The Chugach National Forest has been investigating water bird habitat improvement techniques since 1973 on the Copper River Delta. I directed those studies in the mid-1970s and continued evaluation into the early 1980s (Mickelson 1986). Pond water manipulations and nesting islands (as developed by the Forest Service and Ducks Unlimited) can improve habitat for ducks, geese, shorebirds and larids. The Copper River Delta could serve as a production area for release in PWS of nearly fledged loons, grebes, waterfowl, gulls and terns.

In PWS, nesting islands for the above mentioned species would improve production. Sites which would be considered are located at Hells Hole, Hawkins, Hinchinbrook, Montague, Green, Knight, and Perry Islands. The GIS mapping of habitats approach in PWS, and nearby, is necessary to inventory habitats for potential manipulation.

Seabird introductions would reestablish or enhance production at colonies affected by the oil spill. This technique has been successful with Atlantic puffins in Maine. Production from colonies in eastern and southern PWS and colonies farther south could be a source. For example, nearly all of the tufted puffin production at Tanker and most at Fish Islands in the Wooded Island group in 1976 and 1977 was lost to river otter predation (Mickelson et al. 1978). If this technique is needed, young from these colonies could be a source for introductions to colonies affected by the spill. Live capture and transplanting of river otters and removal of other predators may be necessary.

Introduction of peregrine falcons and bald eagles using hacking techniques would enhance populations in PWS and along the northern

Gulf coast. This approach may not be cost effective on a large scale, but should be considered for nest sites of high public viewing potential - that is near towns with tourist traffic. There are numerous unoccupied, but suitable cliffs for nesting peregrine falcons, from Perry Island in PWS to Kodiak Island. Bald eagle nest platforms and preservation of timber along the coast could enhance nesting populations. Retention of shoreline buffer strips (perhaps 220 yards wide such as on the Tongass National Forest) are desirable for nesting eagles and for other species, such as passerines, deer, bear and fur bearers. Buffer strips of timber would stabilize shorelines, some of which are above intertidal spawning areas used by pink salmon and by herring, both important food sources for a variety of birds and mammals.

The timber fringe along the tree line in Prince William Sound should remain undisturbed to preserve marbled murrelet nesting and brood-rearing habitat. Disturbance between 20 May and 5 August could be restricted. Since buffer strip set-asides may preclude cutting of most of the commercial timber, possible conservation easements should be considered on private lands of high value to birds (and mammals, including humans). The Chugach National Forest should place higher value on wildlife and recreation sites in forested areas of high value to wildlife. Surveys of bird populations and habitat use need to be undertaken to determine valuable sites for a variety of wildlife.

Consideration should be given to providing more foods for seabirds over the next few years. For instance, isolated, low effort, short-term mariculture projects for mussel production could serve as a food source for sea ducks (and sea otters). Hatcheries in PWS produce millions of salmon fry. Additional fry production for seabirds has some merit. Consideration also should be given to a larger allocation of herring and herring roe to birds instead of commercial fishermen. Of course, compensation for fishermen would need to be arranged.

We should evaluate disturbances to existing seabird colonies and other bird production sites. Disturbances due to intense boat traffic at Gull Rock in Kachemak Bay could reduce production. Likewise, tour boat traffic in Kenai Fjords National Park and the Alaska Maritime Refuge might affect seabird production. Possibly a biologist on board a tour boat could record and analyze seabird reactions, then make recommendations to prevent loss of production. More interpretation and education regarding birds along the northern Gulf of Alaska coast also is desirable. Ecologically sound tourism should be encouraged.

Expansion of natural history interpretation on the State of Alaska ferries, cruise ships, and tour boats should be undertaken. An education and interpretation endowment and research trust fund should be established.

Obviously, prevention of oil spills is the best approach. One of our next concerns should be for tankers in the Gulf of Alaska. Fatigue cracks in rough seas will likely cause a spill which will affect the outer Copper River Delta, Hinchinbrook, Montague and Elrington Islands, possibly inner PWS, plus the Kenai Peninsula, outer Cook Inlet, Kodiak and the Alaska peninsula. We need boom materials and skimmers ready at Cordova, Hinchinbrook Entrance, Seward, Seldovia, and Kodiak, near, but not in, ecologically sensitive areas. With the aid of GIS inventories, sites for placement of emergency supplies for spill containment and cleanup, plus habitats for restoration can be identified.

The Prince William Sound Science Center is ready to contract with agencies regarding inventory of habitats and populations, and to investigate population enhancement and habitat restoration techniques.

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COMMENTS FOLLOWING PANEL #3 - BIRDS

NONE

PANEL PRESENTATIONS

Panel #4 - Mammals

ANCEL M. JOHNSON

Mr. Johnson is a wildlife biologist who has studied marine mammals for 25 years. He is the former head of the U.S. Fish and Wildlife Service-Alaska Marine Mammals Research Program. He did research on sea otters in Prince William Sound for twelve years and is a member of the Hawaiian Monk Seal Recovery Team, National Marine Fisheries Service.

Among marine mammal species, sea otters are expected to suffer the greatest mortality from the oil spill. Soiling of their fur and contamination and destruction of food sources will cause immediate and continuing mortality.

In Alaska, sea otters are in the final stages of reinhabiting historic ranges from which they were extirpated by hunting late in the last century and early in this one. Translocation of sea otters speed-ed population expansion in Alaska. Outside of Alaska, most of the historic habitat from British Columbia to Mexico is still without otters. A low reproductive rate and fidelity to a relatively small individual range are characteristics of sea otters, resulting in slow population increase and range expansion.

Even though sea otter populations within the area contaminated by oil may be greatly reduced it appears likely that at least some will survive. When the affected habitat recovers, which may be a considerable period of time, the surviving otters will increase to previous levels. Therefore, efforts to restore sea otter populations should be limited to protection from hunting. If, however, sea otters are eliminated from large areas then otters could be translocated to selected prime habitat when the habitat has recovered. An example of such habitat surrounds Green Island in Prince William Sound. This area contains the largest beds of emergent kelp in the Sound, has numerous bays where sea otters seek shelter from high seas, and has substantial shallow water that provides good foraging, and sea grass beds that support small crabs that are critical to the survival of young otters. In PWS, young otters that have recently separated from their mothers depend to a large extent on easy to obtain foods, such as mussels and small crabs, for several months while developing additional foraging skills.

Several alternatives to sea otter restoration should be considered immediately while studying sea otter populations in the impact area to determine long-range effects. One of these is the acquisition of alternative resources. These resources should be selected to benefit populations of marine mammals that are declining or of low abundance. Areas that are ecologically or aesthetically of exceptional value should also be included. Examples of these areas include haulout areas used by northern sea lions and harbor seals. These areas should receive maximum protection from human disturbances. Other potential areas are polar bear coastal denning areas along the north and west coasts of Alaska, and walrus haulout, mating and calving areas in Bristol Bay and the Bering Strait.

Population status, that is, whether the species is listed as threatened or endangered, should be a primary selection factor for determining areas to be acquired.

JAY BARLOW, PH. D.

Dr. Barlow is a research analyst with the National Marine Fisheries Service. He specializes in the dynamics and assessment of marine mammal populations and has authored over twenty-five publications in marine mammal biology.

Thoughts on Restoring Marine Mammal Populations to Prince William Sound

As head of NOAA research on coastal marine mammals in California, I have had some experience with restoring marine mammal populations that may have been depleted by human disturbance other then oil spills. I think, however, that my experience may have some applicability to the situation in Prince William Sound. First I will report on a brief history of marine mammal restoration in a region with which I am familiar. I will then discuss the lessons learned from both the successes and failures at restoration. Finally, I will address how those lessons might be applicable to promoting natural recovery of marine mammals in Prince William Sound. The opinions I express are my own and do not necessarily express the policy of NOAA Fisheries.

Before discussing the restoration of marine mammals, however, it is necessary to mention the dismal status of three of the most common pinniped species in Alaska prior to the oil spill. The fur seal has been decreasing in abundance since the late 1970s and is listed as depleted under the Marine Mammal Protection Act. The harbor seal has been declining in Alaska for many years prior to the spill. Northern (Stellar) sea lions have been declining precipitously and recently have been listed as a threatened species under the Endangered Species Act. The reasons for the depleted status of these three species is not completely understood, but the likely causes (entanglement in active or discarded netting, loss of forage due to intensive fishing, and direct shooting by fishermen) are all related to fishing activities in Alaska and in the high seas surrounding Alaska. Any methods used to restore pinnipeds lost due to the oil spill are likely to fail if they do not address the causes of the general declines that have been occurring in Alaska as a whole.

Three examples of the successful restoration of marine mammal populations are found in what may be considered by Alaskans to be an unlikely location - California. Despite the obvious urbanization of coastal regions of that state and heavy fishing pressure, three species of pinnipeds have been increasing rapidly. At the turn of the century, the northern elephant seal population was reduced to fewer than 100 animals, and perhaps as low as 10-20, primarily because of harvesting for oil found in the blubber. After eight decades their current abundance is estimated as 50,000 breeding in southern California and perhaps another 35-50,000 in Mexico. Population growth rates have been measured as high as 14.5 percent in California (although approximately one-third of this may have been due to immigration from Mexico). California sea lions were also depleted by direct harvest. Their breeding population increased from an estimated 2,000 in the 1920s to approximately 90,000 currently, and population growth rates averaged 6.4 percent from 1972 to 1986. Similarly, harbor seals in California appear to have increased approximately tenfold following the passage of the Marine Mammal Protection Act in 1972. The first two of these species breed almost exclusively on the more remote and protected Channel Islands. Harbor seals breed there and elsewhere along protected regions of the California coast.

Although it is too early to be called a success story, another example of an attempt at marine mammal restoration is found in the northwest Hawaiian Islands. The endangered Hawaiian monk seal occurs only on these isolated islands. Despite protection from direct harvesting, by 1980 there was evidence that the population was declining and was in serious trouble. This was particularly noticeable in the westernmost portion of their range. Through the work of Bill Gilmartin, Karl Kenyon and Tim Gerrodette, much of decline of this species on Kure Atoll was ultimately

traced to the frequent disturbance of haulout sites by Coast Guard personnel. Now this disturbance has been curtailed and the population is showing signs of growth. The prospect of recovery seems more likely.

A final example that I wish to discuss is that of the harbor porpoise in several locations. At one time this species was described as the most common cetacean in southern Puget Sound, San Francisco Bay, the Baltic Sea and the Wadden Sea. Now this species is essentially absent from all of those areas, despite being found in surrounding waters. Thus, this is an example of a marine mammal that has failed to reestablish itself after being depleted in one part of its historical range. The hypotheses that have been most often cited for this failure include severe pollution (in all areas); avoidance of regions with heavy vessel traffic (in Puget Sound and San Francisco Bay); and continued gillnet mortality (in the Baltic). Of these, the only hypotheses consistent between all areas is that of pollution, however, multiple factors may be involved in each location. This final example may be especially pertinent to Prince William Sound because it is likely that harbor porpoise are (or were) the most common cetacean there, too.

For pinnipeds, the lessons learned from the above examples are simple. To promote recovery one should remove sources of direct human-inflicted mortality and protect the rookeries and haulouts from harmful disturbance. During the periods of greatest population growth in California, incidental mortality of pinnipeds in fishing nets was relatively insignificant. (In recent years, however, the incidental mortality has been increasing due to increasing effort in drift and set gillnet fisheries.) Similarly, human-inflicted mortality of monk seal in the northwest Hawaiian Islands remains low due to the remoteness of this area. The largest rookeries in California occur on San Nicolas and San Miguel Islands and access to these areas is limited by the Navy and the National Park Service, respectively. On Kure Atoll, recovery of the monk seal was dramatically improved by limiting disturbance of the haulout sites. It is likely that depleted pinniped populations elsewhere would recover naturally if human-caused mortality was eliminated and, when a problem, if rookery disturbance was curtailed.

Much less is understood about promoting recovery of dolphins and porpoises. In fact, there are no examples of a depleted Odontocete population recovering. Part of this lack of evidence may result from problems in documenting increases that have occurred. In the harbor porpoise examples cited above, however, I believe that recoveries would have been noticed if they had happened. Little advice can be given on promoting porpoises: eliminate direct sources of human-caused mortality and reduce toxic contaminants in the food chain.

There is little that can (or probably should) be done to artificially relocate marine mammals to regions affected by the oil spill. If relocated from other areas, most marine mammals would try to return to their home range. Also, immediate relocation to affected areas might result in mortality due to toxic hydrocarbons in the food chain. The history of marine mammals populations in other areas has shown the ability of marine mammals (particularly pinnipeds) to repopulate their historical ranges if human impacts are minimized. Emphasis, therefore, should be put on making the environment affected by the oil spill as attractive as possible to the marine mammals species.

Given that direct relocation is not practical, I have several suggestions regarding how money recovered from those responsible for the oil spill could be used to promote the recovery of marine mammals. First, pinniped haulout sites and rookeries within and near the Sound should be protected from disturbance. Possible methods would be to publicly acquire the land and put it under the protection of the National Park Service, State of Alaska, or another agency, and/or post signs or guards to discourage disturbance. Second, direct mortality due to shooting by fishermen should be eliminated. This is a potentially serious problem for sea lions and harbor seals throughout Alaska. Shooting of sea lions is already illegal, and shooting of harbor seal is permitted only if they are immediately damaging catch or gear. Enforcement of these laws is limited by insufficient funds. Additional money could be used for enforcement efforts in the vicinity of the Sound and nearby rookeries. Third, fishing methods that do not cause marine mammal mortality should

be promoted over those which do. Often the same fish species can be taken by several alternative fishing methods. The allocation of catch to various methods is typically made without consideration of the level of bycatch of marine mammals. Money recovered from the oil spill could be used to research and implement alternative gear technologies which do not kill marine mammals. Gear such as gillnets can probably be eliminated without reducing total harvest and without developing totally new methods of fishing. Finally, I would recommend that other resource users, such as fishermen, who suffer losses due directly to oil spill restoration actions should be compensated for their losses. Likewise, however, to the extent that fishermen are themselves responsible for the depleted status of marine mammals in Alaska, the fishermen should be expected to pay the cost of marine mammal restoration.

DAVID KLEIN, PH.D

Dr. Klein is a professor of wildlife management at the University of Alaska-Fairbanks. He has served as the leader of the Alaska Cooperative Wildlife Research Unit since 1962. He has studied the dynamics and ecology of several ungulate species in Alaska, Canada, Greenland, Scandinavia and the Soviet Union. Currently, he is studying the habitat relationships of caribou, musk oxen and blacktailed deer.

I would like to address the semantics of "restoration" before getting into specific approaches to restoration. Yesterday we heard Mr. Adler discuss restoration in legal terms, and today we've heard Mr. Allee discuss restoration in terms of enhancement of fish and wildlife habitats. When discussing on-site activity, restoration is the generally applied term. Off-site activity is more appropriately termed enhancement. Enhancement is based on social judgments and how humans evaluate natural resources. The values we place on resources can be material and measured in dollars or nonmaterial and measured in aesthetic or psychological rewards. I resent being forced into evaluating natural resources only from an economic perspective.

Part of enhancement activity can and should be directed toward increasing the appreciation of wildlife in the eyes of the public, in a nonmaterial sense. This is possible through education and interpretation work. Although some of the benefits of this effort would be measured in nonmaterial values, it would ultimately benefit the economy through increased tourism.

What criteria should we use in assessing costs of the oil spill and should restoration costs deal only with present day values of resources or should potential future values be considered as well? How do we contrast economic value with cultural value? We know the importance of mammals such as the bear, the fox and the killer whale in native American cultures, but how do we assign quantitative values to them? Additionally, there is also aesthetic value, which is difficult to assess, because so many of our natural resources are as yet unknown to the general public, and so not appreciated. We need to make a greater effort to educate the public about wildlife. This would lead to a greater appreciation of wildlife and support for the environment. A tremendous opportunity exists for enhancement of wildlife through education, both in public schools and for the general public. Interpretive trails and signing, pullouts along roads are examples of cost effective opportunities to increase public understanding and appreciation for wildlife.

Individual species are often the focus of our concerns, for example the damage assessment efforts on mammals have been directed toward river otters, mink, bears and deer. Small mammals have been largely overlooked, and no work has yet been directed toward them. If we knew more about the ecology of small mammals in Alaska, we would undoubtedly have greater appreciation for them. For example, why is the arctic hare no longer present in its historic North Slope range? Is it because of human influences; global changes; natural changes? We just don't know. The ecological role of small mammals within ecosystems is not understood. Small mammals such as voles, lemmings and shrews are important in the transfer of energy between trophic levels. Within Prince William Sound there are over 30 species of terrestrial mammals.

In summary, I would like to highlight some general categories for which restoration funds should be used:

- Protection of critical habitats for mammals outside of the spill area;
- Education, research and interpretive programs through various state and federal agencies and school systems throughout the state;
- Inventorying and research on small mammals, which have been largely ignored up to now. The most efficient way to do this would be through a small grants program; and
- Enhancement of environmental values both directly through habitat improvement work and by increasing public appreciation for wildlife.

DAVID ANDERSON, PH.D.

Dr. Anderson is the regional supervisor of the Wildlife Conservation Division of the Alaska Department of Fish and Game for southeast Alaska. He has conducted research on heavy metal uptake by deer.

Terrestrial mammals are not, as species, dependent on marine or intertidal ecosystems, but could be seriously and adversely affected by oil contamination of these areas. A few species which frequent Alaska's intertidal zones include:

- Sitka blacktailed deer,
- Black and brown bear,
- Wolves and foxes,
- Mustelids, such as minks and otters,
- Shrews, voles and other small mammals.

Although these mammals do not spend most of their time in a marine environment, there are several ways in which they may be impacted by marine oil spills. These include:

- Direct exposure to oil: Deer have been observed with oil on their legs on Kodiak Island. Other terrestrial mammals have also certainly been affected from direct oiling;
- Consumption: Black and brown bear will eat oil directly, not only from oiled prey, but also will consume oil found on rocks, and plants;
- Disturbance: Cleanup crews are often disruptive, displacing bears and other terrestrial mammals from the beaches. Also, there is a great increase in human interaction with bears; and
- Biological Amplification: Levels of some contaminants in some body tissues will multiply as they move to higher trophic levels. This can result in changes to ecosystem interactions.

Seasonal components also determine the extent to which terrestrial mammals are impacted. For example, during high snowfall years, deer use beaches for foraging. Wolves, who prey on deer, will also frequent beaches. During spring, brown or black bears forage on grass flats. Just as a bit of a digression, although not much research has been done, it's usually not a fruitful line of endeavor to try to keep bears or other intelligent carnivores out of an attractive area by using deterrents such as noisemakers, visual stimuli, etc.

In terms of restoration and replacement, there are several ways in which we can act. These include the establishment of a trust fund to purchase habitats of high value to wildlife. We could purchase surface rights, fund research studies for both non-game and traditional game species. Such a fund could also be used to support an economic valuation of wildlife. The Division of Wildlife Conservation (Alaska Department of Fish and Game) is beginning an economic valuation study for Alaska wildlife, including such things as "existence values." We will attempt to measure, for example, what people are willing to pay just to know that these resources exist.

Other specific ideas include the purchase of timber rights. South Montague Island, for example, is valuable winter deer habitat. Logging is an incompatible activity. It will impact valuable bear and murrelet habitat as well.

We also could entertain the idea of purchasing habitat outside of Prince William Sound. Lake Florence, for example, has a very high value for wildlife species such as deer, bear and mustelids. We need to look into broad options, because the impacts of the spill went beyond Prince William Sound, beyond the region, and beyond the nation.

In summary, we need to maintain a holistic approach to the issue. We need to avoid thinking in terms of one species or another, but rather focus on the ecosystem and systems which are interdependent. The spill gives us the unfortunate opportunity to focus or reevaluate our environmental policies locally, nationally and in a broader arena. It gives us the opportunity to strive to become better stewards of our environmental resources.

COMMENTS FOLLOWING PANEL #4 - MAMMALS

COMMENT (to Jay Barlow):

A comment to Jay Barlow's presentation. Based on what you said, it appears that extraordinary restoration projects may not be necessary for most marine mammals. From what you showed it looks as though most of these populations have an inherent capacity to replenish their numbers, some at very high rates. The most effective way to restore marine mammal populations, in this case sea otters, may be to change current hunting and fishing policies that routinely cause mortality. However, I really wonder whether people living and working in oil-impacted areas are willing to accept this alternative, but very effective, approach to restoration?

RESPONSE (Jay Barlow):

I wonder too.

COMMENT (to Jay Barlow):

You talked about the harbor porpoise declining in numbers, possibly because of exposure to pollution. But the bottlenosed porpoise is also exposed to the same types of pollution and I don't think it's declining in numbers. Why is that?

RESPONSE (Jay Barlow):

I can't really explain that, although I wonder a lot about it. The bottlenosed porpoise doesn't occur in the places I listed. Although Southern California is polluted with high DDT levels and bottlenosed porpoises do exist there, it's nothing compared with the industrial pollution of the Baltic, or the high PCB levels of southern Puget Sound due to Naval spills. It may just be that different contaminants have different effects on different marine mammals. But I'm really at a loss as to how to explain that.

COMMENT **(to Panel):**

I want to give you a couple of bits of information as everyone is trying to determine what to do about restoration. I've been assessing the damage to sea otters over the last year. Most of the animals died in the first two to three weeks following the spill. Of the tissue we've analyzed for hydrocarbon toxicity, one of the highest values we saw was not for an animal impacted by the oil spill, but for an animal that was living in the harbor in Cordova. So look to other areas than those immediately impacted by the spill when you're talking about restoration in Prince William Sound. I agree with Dr. Klein's statements on enhancing rather than just restoring. There could perhaps be a teaching/educational facility to do this. There could be a facility for rehabilitating animals in case of emergency, if a spill should occur again, as well as a facility for research.

COMMENT (to Ancel Johnson):

Please comment on the status of knowledge of the sea otter food base in Alaskan waters and the merit of launching a systematic inventory as a precursor to any restoration or recovery effort.

RESPONSE (Ancel Johnson):

There have been several studies that addressed what sea otters feed upon in various parts of the state. It varies depending on the habitat. Basically, in the Aleutians, sea urchins are a very important part of the food chain, and from what we've studied in PWS, sea otter prey species are different. It is fairly easy to know what to look for, based on the type of crustaceans present as potential prey. References to rates of increase were relevant to species reoccupying vacant historic habitat and we can expect that here, too, when the habitat becomes suitable again within the area of oil impact.

COMMENT (to Jay Barlow):

Dr. Barlow, do you know if the harbor porpoise, which you say is slow to re-invade an area, was affected by last year's spill?

RESPONSE (Jay Barlow):

I have no information pertaining to that.

KEYNOTE SPEAKER

ROGER CLARK, PH.D.

Dr. Clark is a research social scientist employed by the Recreation Research Project, part of the U.S. Forest Service, Pacific Northwest Station. His research has centered on improving information and approaches for integrating recreation with other resource uses. In particular, he focuses on alternative timber management practices which could mitigate adverse impacts as well as provide enhancement to recreation opportunities.

THE PUBLIC'S ROLE IN THE EXXON VALDEZ OIL SPILL RESTORATION PROCESS

We are at a critical time in the oil spill restoration process. This is when public expectations will be formed about what the cleanup efforts will and will not accomplish. It is also when expectations form about how closely Prince William Sound and other oil-impacted areas will be restored to their pre-spill condition. Both aspects of the spill are complex and there are no easy answers, and the solutions offered sometimes carry risks. A key focus as we set the stage for the restoration is to develop clear expectations, expectations of the planning team, the experts, and the public. How well we clarify the expectations we have for the planning process and the actual restoration will determine whether we succeed in achieving the goals we set.

One of the first challenges for all of us is to beware of personal biases as we debate issues related to the spill and assess the viability of options for the restoration. We all have biases because of our training and experience and, in this case, feelings about the oil spill. When I think of the spill, the first image that leaps to mind was from a story on national TV shortly after the event occurred. I vividly remember the pictures and the mournful cry of an oiled loon on the beach. I also recall my first impressions from a trip to oiled beaches - the smell, the unnatural silence due, I think, to the absence of bird life, and the uneasy feeling that never in my lifetime would the area again be as it was. As a professional I must be objective, but I admit it is difficult. But objectivity is fundamental to developing an effective and socially responsible process for the restoration. We are all challenged to critically examine ourselves and others in this regard.

The context of this meeting became clearer to me when I was speaking to a colleague recently. He expressed concern about what good the symposium would do because it would be "so political." What he did not recognize was that when the *Exxon Valdez* hit the reef and began to spill oil, the event was immediately a political issue. It is important to understand that the spill has a political (as well as a legal) dimension; but it is equally a technical, social and cultural issue. As we discuss the spill, its effects, and the restoration alternatives, we must keep all of these perspectives clearly in mind.

We face a serious problem of communication. Yesterday was a classic example of how hard it is to communicate even the most simple ideas. For example, we had all sorts of problems with definitions of what restoration meant. There was no common definition and that made understanding difficult. Rectifying this problem is a major challenge to the planning team. Issues must be presented so that we can all easily understand them.

Another concern I have is the appearance of competition between agencies that represent the interests of national, state, and local citizens. This competition (perceived or real) is counterproductive to finding effective solutions to problems we collectively face in responding to the effects of the spill. I hope the interagency planning team will show how effective collaboration can be achieved.

In my opinion, there are several requirements for developing and implementing an effective restoration process:

- We need a clear and comprehensive definition of what the process is, what it is not, and a description of the goals to be achieved.

- The process must be understandable, open, visible and traceable. We all must be able to see how decisions were reached and how information the public provides is used.
- We must have clearly stated assumptions and unambiguous restoration objectives for all the values affected. This will require collaboration between experts and the public to define a common vision about desired future conditions and the acceptability of changes in the impacted areas. This collaboration must begin now and continue through the entire restoration process.
- The approach must be holistic and integrative. We must begin to focus on broad interdisciplinary questions and solutions. Single discipline approaches to restoring values lost because of the spill will be less effective than integrative solutions. Analysis must go beyond the economic effects and deal with the noneconomic loss to physical and biological resources and to social and cultural values as well. We must maintain a sensitivity to all values to insure that attempts to restore one value do not inadvertently affect others.
- Aggressive monitoring and evaluation at each step in the process are needed. The planning and implementation process must be dynamic and able to incorporate new information as it becomes available.

A major challenge facing the planning team is to develop an effective approach for the public to participate in the restoration process from beginning to end. In doing so, it is important that we keep the appropriate roles of the public and the experts in mind. The classic paradigm where professionals "solve" complex social problems via the rational scientific approach will not work in my opinion. A new paradigm in which professionals recognize the legitimacy of power sharing with affected publics and the legitimacy of many social and cultural values is more likely to be successful. Commenting by the public to a plan developed by "experts" is not sufficient. Providing opportunities for people to comment is necessary, but there must be more to it. We need to build a creative approach to incorporate a cross section of values - both from local communities affected by the spill and from the state and national level. Interested citizens and, most importantly, citizens directly affected by the effects of the spill must be included as full partners in the process.

In her book, Public Lands Conflict and Resolution - Managing National Forest Disputes (Plenum Press, 1988), Julia Wondolleck has some observations about planning on the National Forests that seem pertinent here.

> Planning arguably poses a critical and incredibly complex problem to which there are no technically or silviculturally "correct" solutions. ...At no point does the Forest planning process acknowledge that the problems to be addressed are mutual problems shared by the Forest Service and all groups with a stake in National Forest Management. As a result, at no point does the process provide for mutual efforts toward developing solutions for these problems. ...Whereas the agency outwardly tries to build trust, cooperation and faith, the process used undermines their hopes by eroding all three. Whereas the planners promise opportunities to reach consensus, the process provides no forum. Whereas individuals and groups involved keep raising what they feel are the underlying issues that need to be grappled with in developing the plans, the process encourages them to adopt positions and pursue adversarial avenues in hopes of, indirectly, satisfying their concerns.

This is a key point for the keepers of the oil spill restoration planning process to consider. The process itself may result in unintentional negative effects if not carefully designed. Perhaps citizens should be included in designing the process to insure that it meets public needs. Wondolleck suggests the following:

- The process' demise is rooted in the overriding attention given to the final planning document, rather than to the process of planning.
- Alternative forums can serve to resolve differences in a manner acceptable to all parties.
- Doing so at this point, though, requires supplementing more traditional review and analysis procedures with more direct, collaborative efforts involving concerned forest users.

To improve the process of decisionmaking and public participation, Wondolleck proposes that it needs to be reformed around five objectives:

- To build trust;
- To encourage broad understanding;
- To incorporate value differences;
- To provide opportunities for joint fact finding; and
- To encourage collaboration and cooperation.

To make the process effective, the public must have accurate and complete information on which to make knowledgeable judgments and decisions. Unfortunately much of the information available to the public comes through the media. This is unfortunate because so much of what the press and television covers is incomplete. Sadly, much of the rich detail that is critical to understanding the effects of the spill, cleanup, and possible restoration approaches is not newsworthy. A major challenge to the public agencies is to develop (I hope in a collaborative way) informative public education programs.

We need to develop an integrative approach to facilitate the restoration process. We have heard about "holistic" approaches at this meeting. But the speakers who discussed this concept were talking about the natural environment, that is, not just focusing efforts on one high profile species, but taking the whole natural system into account. That is certainly appropriate, but there is more to it. We must deal with the full range of values, including social, cultural and economic. We cannot deal with these issues one at a time and in isolation one to the other. Although it is tempting to treat them separately to simplify a complex task, it is in my judgment inappropriate to do so. Some values may take precedence, but this is an issue best determined through comprehensive evaluation and debate.

Those of us speaking at the symposium have only begun to touch on the complex issues concerning the restoration. There are many experts each representing a part of reality. We need to understand each of these points of view. It will be the job of the planning team to pull these ideas together, a difficult task to say the least.

We must recognize that in many cases there are no absolutes. "It depends" will often be the right answer to many of the complex questions we will face in the months and years ahead. The public must speak for the collective and individual values it holds for how the areas affected by the spill should be restored. As concerned citizens we need to ask all the relevant questions from our many points of view and demand all the answers. We need to focus on points of agreement, not just disagreement. We must listen to everyone, but remember to depend on no one to have our personal concerns in mind, or to represent our interests accurately.

It is the job of the planning team to facilitate the process, to make sure that important social, economic, cultural and other values are considered. This will require integrative approaches throughout, with partnership between experts, planners, communities and the public. The rational scientific decisionmaking approach will not work - it has failed in forestry and in other areas because we have not recognized the sociopolitical context surrounding the complex issues and decisions we face.

In closing, I recommend another book to the planning team. I suggest you study Murphy's Laws because they are the only guarantee you will have in the days ahead of you. Good luck!

PANEL PRESENTATIONS

Panel #5 - Recreation

BRUCE COOPER

Mr. Cooper is a lifelong outdoor enthusiast and sport fisherman. He also owns "Y Knot Halibut Charters" and the Port William Wilderness Lodge on Shuyak Island near Kodiak.

We of Port William hope to assist you in your effort to restore the Kodiak area's pristine and life-supporting condition; that which existed before the Exxon oil spill.

We urge you to prohibit hunting of all bird species and to limit deer hunting drastically in oil-damaged areas or adjacent areas until extensive surveys can be made of wildlife losses.

Collaborative survey teams from state and federal agencies should be organized into small, efficient groups to avoid distress of wildlife. Preferably, local residents should be consulted and asked to participate when they are intimately familiar with a survey area. I urge this not only for their knowledge of local oil damage, but for purposes of safety and efficiency as well. Travel on bays, inlets or open waters should not be attempted in unknown areas without benefit of knowledge of climate, terrain and the prevailing dangers.

Survey crews should travel in skiffs outfitted with small engines to avoid disturbing wildlife. Aircraft should be restricted to flying altitudes of three hundred feet or higher. Choppers have created a negative impact; pilot's habits of hovering between five to 50 feet over bird nesting areas and beaches should be forbidden. This practice severely endangers survival of the young. We certify that we have suffered massive losses of bird and marine life in our area.

Results of surveys of large areas should never be depended upon because those results may not necessarily be true of the local areas. Inspections and studies should be conducted over very small affected areas. Individual studies should be made of mollusks and herring. Backwater marshes and lagoons should not be ignored because much life originates in these places.

Cook Inlet is also in danger. What rapid response program exists for the Kennedy and Stevens Passages?

Conflicting statements made to the public by state and federal agencies have done untold damage. ADEC says we are hard hit; Division of Tourism says we're clean. We've also been told that we are prepared for future oil spills; and, that we are not prepared. This conflicting information has resulted in public distrust in government guarantees of rapid response to future oil spills. Still another example is fear of wildlife consumption by humans. The Anchorage Daily News has quoted the Department of Fish and Game as saying that Shuyak Island, which boasts a large deer population, was the third hardest hit area, and that prudent deer hunters should hunt elsewhere, because of the possibility of contaminated meat. Yet, no official tests or surveys were conducted of Shuyak deer that we know of, and deer hunting on Shuyak Island has not been cancelled or even restricted. And the list goes on. These rumors, spread by officials, are counterproductive; findings should be carefully authenticated, compared and studied so that honest, candid statements may be made.

Concerns and constructive ideas of the public and small associations and cooperatives should be heard. Fear is rampant among the people we know; fear of tainted meat and other foods is only one example. We ourselves have repeatedly sent food samples to agencies for analysis and no response has been received. We are among a very few tideland property residents who have been directly hit by Exxon oil, and we have never had any inquiry, save yours, from any state or federal agency, or Exxon.

The Alaska Division of Tourism, the Alaska Visitor's Association, the various Visitor's and Convention Bureaus, and the Chambers of Commerce need some kind of overall unified guidance in order to promote Alaska tourism effectively rather than each organization desperately denying Exxon oil damage any way they

can. In addition, Alaska needs representation in Europe to market local products not only in Germany but in the entire European market, indeed the world market.

Alaska tourism personnel should not be political appointees, but rather, well trained, experienced tourism experts. The governor could appoint a special advisory committee of tourism related business owners to work with a qualified state staff which would keep the Division of Tourism more in touch with the special needs for promoting tourism in Alaska. These businessmen could be tour operators, travel agents, hotel and airline representatives, lodge owners, and/or charter boat operators.

The Exxon oil spill in Prince William Sound can be a vehicle to a valuable learning experience for everyone in the tourism industry in Alaska. We are far too dependent on too short a tourist season; every possible effort should be focused on expanding public interest in visiting Alaska during winter months. There is much to be learned from the State of Florida - committee approaches, common goals, campaigning, and advance planning. They have fifty years of hard experience behind them.

Exxon must not be held solely responsible, for business is known to be single-minded and must be regulated, but business should (and usually does) risk loss of license to operate when it violates the rules and regulations to which it is subject.

We look forward to working with the Department of Fish and Game in this huge and challenging team effort of so many able, determined people.

STAN STEPHENS

Mr. Stephens is a charter and tour boat operator from Valdez. He is presently serving as a board member of the Prince William Sound User's Association, the Prince William Sound Tourism Coalition, the Prince William Sound Conservation Alliance, the Alaska Victory Association, the Alaska Tourism Marketing Council, Alaska '92, and the Valdez Fisheries Board.

I am very concerned about restoration, but one thing we have to remember is that prevention should go hand in hand with any restoration. The problems we have now are the same as those we faced one year ago. It is easy to look at the statistics; today large, 700-1000-foot, tankers have stress-cracked hulls. We talk about prevention, but just last week a tanker was brought into the dock in 40 knot winds. By the time it had docked, the winds had risen to 80 knots. It took three tugs to hold it, and yet they continued to fill it. In 80 knot winds!

Alyeska has to be concerned. We have to be concerned about what they're doing. They talk about their ballast treatment plant, and how well the bacteria are working. But it badly needs repair. If you are running 2,400 gallons of ballast water through per hour, there is no way the bacteria can effectively attack that. Especially in cold water. This has to change.

Every two years, the vapors released from tanks equals the amount of pollution released by the *Exxon Valdez* oil spill. This has got to stop. Unless we work on prevention first, all of our restoration efforts will be lost.

This region has been affected by more than just this spill. We need to restore the environment of thirty years ago, when the Sound really was pristine. We need to find out what's happened in the past thirty years to cause all of the degradation, and get back to that pristine condition.

In terms of tourism, we have had a major image problem ever since the spill. If any of you saw the film "Black Tide" you know what I mean. Who's going to want to come up here after seeing that film? Most of the media coverage was sensationalist and discouraged tourism. Our rates this year were 50 percent below what they were in the year previous to the spill.

We need to restore the image of the area - it is still a very beautiful place. We need to increase legislative funds for areas which were badly hit. We need better protection and ability to watchdog the oil companies. Unfortunately, the bills which would allow this are losing in the legislature, because the oil lobby is too strong.

Restoration funds should be used only in oil impacted areas. I'm not sure if some of you have heard about this, but three weeks ago President Bush, the Attorney General and Exxon were working, behind closed doors, on a plea bargain agreement to eliminate the chance of civil suits and direct restoration claims against Exxon. Doug Bailey stopped this, but what they were contemplating was a $500 million general fund created by Exxon for all national spills. So if a spill occurred in Texas or the east, they would have as much claim to this as the people affected by the spill in Prince William Sound. This is ridiculous. The restoration money for this spill needs to go to Alaska.

PAUL TWARDOCK

Mr. Twardock is the coordinator of student activities at Alaska Pacific University. He has worked for the National Outdoor Leadership School and is a kayaking instructor and enthusiast.

We have definitely seen the impact of the spill in areas where we give our courses. We had to cancel about half of the courses last year. In terms of the impact to kayakers, it is pretty hard to camp in oil, and that's basically what we've had to do. We've camped close to the cleanup effort, if you can call it that. It's almost worse than the oil itself. You've got the helicopters and the jet boats. It definitely affects our clients.

When we are out there, we try to keep our impacts to the beaches low. We do most of our activities right by the water. So we are now having immediate contact with the oiled areas, which makes it pretty hard to have a "wilderness experience course" out there. We cannot use a lot of the areas that we previously used to because they are all oiled.

The cleanup activities have had an impact. They ruin the "wilderness experience." There was one time where I was out there with a class, giving a talk on whales, and this helicopter flew in, right near us, so that kind of interrupted my talk. Then it left, and five more helicopters came in and landed all around us. These guys with orange suits hopped out, and some of them were carrying shot guns. There are not even any bears on this island. One of the guys in my group said it reminded him of Vietnam.

Our clientele is now back up to 80 percent of what it was before the spill, but I can't really understand why anybody would want to come up here. I know for sure that you don't see nearly as much wildlife as you used to. I don't know whether it's because of disturbance, or because they are dead, or just avoiding the area, but that used to be a big part of the experience, and it's definitely changed. It's going to hurt us.

In terms of restoration, it's really important to get rid of all the oil on the beaches. It doesn't matter if they get rid of most of it, and just leave a sheen, because you can't camp in a sheen. It ruins all your gear. And the cleanup is so disruptive, you've got to ask if it is worth it. I guess if it prevents wildlife contamination and re-oiling, then it is. But we use a lot of State land to camp on, and some of the beaches that were not oiled were ruined by the cleanup effort.

The Sound has been slowly degrading for at least the last decade. The spill just speeded it up. There has been more trash, more logging, and less wildlife, and a slow decline of the wilderness value. That really needs to be addressed.

Opportunities exist to slow this degradation of the Sound. We should make Knight Island a wilderness area. There should not be any development at all. We need to prevent logging here and on Montague Island. They want to put in roads to access logging areas there, and we use that island now. We definitely couldn't use it if they put the roads in because the impact would depreciate the quality of Montague Island. So I think we should look at what has been causing all the degradation, and try to get it back to the way it used to be.

COMMENTS FOLLOWING PANEL #5 - RECREATION

COMMENT:

My name is Dick Bower and I am here as a concerned Alaska resident. I would like to make my comments with Bruce Cooper's presentation in mind. Over the last year, as we followed what seemed to be the posturing, excuses, and rationalization that one sees coming from industry, government, and political leaders, it is very easy for people who have knowledge and a concern for what's going on to become frustrated. For many of us this degree of frustration has reached a point where we are speechless. I see that as being one of the major restoration challenges. Thank you. (applause)

COMMENT (to Stan Stephens):

My first trip to the Sound was on your boat on Saturday. Could you comment on how what we saw compares with what you would have expected to see in the past and give us a perspective of your years here as compared to now.

RESPONSE (Stan Stephens):

There have been a lot of changes. Some of them are natural, like the glacier, which is now in normal retreat and losing an eighth of a mile of ice per year. On the trip that you took we were trying to find goats, and I had beaches that I was sure I was going to see goats on, but I didn't and it was quite a while later in the trip before we did see some goats. It used to be there were goats everywhere. They used to be everywhere you looked, and all the places I tried to find them, they were always there. So that's one change. The amount of bird life is definitely different. Even though they're just starting to arrive around this time of year. It used to be that, on the way out and on the way in, the boat would be followed by porpoises. We didn't have that. A good part of the time you would see humpbacks and killer whales. We didn't see either of those. We did see a few of the stellar sea lions, but normally, we see them in both areas that we travelled in. There's a definite difference in the feeling of the areas. I could take you out to the Knight Island area, where the oil was spilled, and you would think it's the most beautiful spot in the world, but having spent a good part of my life in the area, the stillness, the quietness that's all there is definitely different. A lot of this started to occur long before the oil spill, and that's something that we need to look at. We're having constant damage in the Sound. The Alyeska pipeline is very dangerous and until they make some changes, the environment is threatened. We have very large duck flats we must protect. I would like to see some way of buying them to protect them. There are a lot of things that have to be changed and it's people like us that are going to have to make those changes. The trip that you made was definitely different than the trip that you would have made ten years ago.

COMMENT (to all panelists):

Can each of you give me some perspective on positive things that can be done to restore the damages that you've talked about. What things can be done specifically to benefit the recreation and tourism community where the spills occurred? For example, could you change your outdoor leadership program to instruct people on the damage that occurs during, and following an oil spill so that they could have a learning experience where oil damage does occur? Is increased use appropriate or should it be mitigated against?

RESPONSE (Paul Twardock):

We did try to "utilize" the oil spill, if you can call it that, as much as possible. To teach them first hand, all you have to do is take them there, but that doesn't always work too well. As far as cleanup is concerned, from a kayaker's stand point, it has got to be all or nothing. I don't know, from a scientific perspective what

a good cleanup is and what isn't, but I do know that even if there's a little bit of oil on a beach, it's really hard to use. I haven't seen anything yet that took all the oil off. You've got to be able to get rid of the gross contamination. That's the first step. As far as getting rid of everything else, you've got to look at the long range and realize that it's going to be there longer than any of us can even imagine, and we have to protect areas from logging, and things outside of the spill, or more spills. We have to keep it from sliding down hill anymore, and let nature take its course as much as possible.

RESPONSE (Bruce Cooper):

My problem is more unique: we're stationary. Kayaks and boats can move. I cannot. Our beaches were totally contaminated around the whole island. A little bit of oil goes a long way, and it's a messy job. We are trying to come back. The big problem we are having right now is with two agencies. One is saying that 895 miles of our coast line is totally contaminated. The other agency, the tourist department, is saying that it is clean, and people should come on up. We have got to make up our mind on which way we are going to go. Are the beaches clean? Or are they still filthy? My beaches are still filthy. I've got pictures, I've got dead deer, I've got records of hundreds and hundreds of birds picked up every day. Not just a few birds, hundreds. If you look at my records, on the last day in August, they were still picking up one to two hundred birds a day. They quit September 15, and the Viper (a vessel) came in and picked up one hundred bags of oil from us. I also have records on a new deal with Exxon called OPPS, sounds just like "oops." That is whose in charge of winter cleanup. Appropriate name isn't it? They picked up eleven thousand pounds of mousse and oil from me January 26th. January 26th. We recovered this stuff in November and December, and it was impossible to pick up. This was out at Shuyak Straits, a three mile stretch of beach. That gives you an idea doesn't it? Basically, I am out of business for the next couple of years. I am trying to get back one way or another. I am guaranteeing that if the oil affects you, or bothers you in any way, I will reimburse all your money including your air fare. Because if I don't get customers, I'm going down the tubes. The social problems we've had out there have been immense. Animosity between family members because of lack of money - the oil has ruined a lot of people's way of making a living - you can't exactly feed it to your kids. How do you restore this? With faith. Convince me that we're going to clean it up and I can convince the others.

There are records that would blow your mind on how cleanup was carried out, and the attitude they had out there. I could take you right now to beaches three blocks away from me, and the smell of death is there. If anybody worked the oil spill last summer I know you know that smell. The smell of death in the back bay areas. I can take you in Shuyak Harbor and it still stinks of the smell of death. I don't know what else to say.

RESPONSE (Stan Stephens):

As far as usage goes, we have about 400 miles of shoreline used out of about 3,000 miles. Prince William Sound covers about 15,000 square miles, and then there is the Kenai Fjord area and the Kodiak area. There are areas where, if you have a boat, then you probably can stay away from the oil if you want to take people places where they won't see it. We have a major problem with increased use. I don't want to see development. We have a problem with tour boats getting too close to bald eagle nests. Also, during seal pupping, you have to stay away because the pups can get hypothermia from being in the water. Tour boat operators have to be educated. There's a lot we all have to learn. If we are going to come down on the oil companies, we have to come down on ourselves. We are all polluting the water. Tour boats are noisy - the more noise, the less porpoises, the less whales. It is an educational process for everyone who uses the Sound. Your question is well taken, we all need to address those issues.

COMMENT (to all panelists):

Do any of you have suggestions on how we can make restoration a collaborative process so that we can improve our planning process in relation to the public?

RESPONSE (Paul Twardock):

Let the public know what is happening. There needs to be more publicity for events like today. Also, have them during times when people can show up.

RESPONSE (Stan Stephens):

The educational process is very important. Whether it be through brochures or pamphlets or whatever. The public needs to be included in the planning process, maybe we should take suggestions and input. A lot of the public are recreational users and are just as concerned as we are. I don't think we have the means to communicate with them now. We need to open up that means.

RESPONSE (Bruce Cooper):

My problem is that this is the first time I have heard anything about the oil spill and I've been involved in it from day one. Knowledge and information sure would be nice. But I am out there and I have sent in everything from livers, and dead birds and even deer. I have not received back one bit of information . There are rights. I understand that knowledge is key, but you have to feed back what we feed to you, and I have received nothing.

COMMENT:

We need a shadow cabinet to oversee the party who is in power, to literally snap at their heels to keep them in line. I would like to suggest such a shadow restoration group selected from the public.

PANEL PRESENTATIONS

Panel #6 - Cultural Resources

PAUL GLEESON, PH.D.

Dr. Gleeson is with the Alaska Regional Office of the National Park Service. He is responsible for compliance archaeology and evaluates potential impacts to cultural resources in national parks throughout Alaska. Prior to working in Alaska, he spent fifteen years studying the Coastal Archaeology of Washington State.

The Gulf of Alaska is one of the richest natural habitats for coastal life. At one time, it was home to what was probably one of the largest Eskimo populations in the world. Estimates of this coastal population range from fifteen to twenty thousand people. These people were hunters, fishermen, and gatherers of intertidal resources. This area is part of their cultural heritage.

Over ten thousand cultural and archaeological sites may exist in this area. Most of them are little known for a variety of reasons. There is very little access to most of the sites, and little money has been allotted to study the sites. No documentation exists for most of these sites, many of which are hundreds, and sometimes thousands, of years old.

These sites are vulnerable to glaciation, to changes in the sea level, to earthquakes, and now to damage caused by oil spills. It came as a surprise to most people how many sites are in this area, from Prince William Sound down through the Kodiak area. Many artifacts on beaches are now oiled, and altered as a result. This may alter the record of these nonrenewable resources. The possible impacts are several:

- We currently date many archaeological sites through radiocarbon dating - with the chemical balance of the analyzable specimens altered as a result of the spill, accurate carbon dating may no longer be possible;
- The physical covering of the oil has altered, and possibly hidden "trails" or surface indications which may have been helpful to archaeological studies;
- The chemical alteration of the artifacts affects how we understand them;
- The change in vegetative patterns could lead to accelerated erosion, further exposing artifacts; and
- The cleanup itself disturbs the sites, and also exposes the sites to looting.

Many of these sites have been documented, but only by rudimentary surveys. The past summer was "combat archaeology" if you will. No comprehensive plan for cultural resources exists. In the context of the cleanup itself, there really hasn't been a plan of operation. We have been playing catchup with cleanup operations, just trying to protect the resources, let alone document them properly.

To date, the cultural resources have suffered unknown injuries. Thorough documentation of area sites is set to begin in the summer of 1990. Our plan is to treat the spill as a large undertaking. We will try to inventory as many sites as possible in the path of the oil.

This is a new area of interest for CERCLA and the Clean Water Act. With respect to protecting cultural resources, their purpose is to develop approaches to restoration which are both appropriate and reasonable. Restoration must rely on a credible injury assessment, without which it is impossible to determine the nature of the injury or the extent of the damage. Our first step then, will be to gather this solid knowledge, upon which we can base our restoration plan.

ROBERT M. THORNE, PH.D.

Dr. Thorne is the director of both the Center for Archaeological Research and the National Clearing House for Archaeological Site Stabilization. He is also a professor of anthropology at the University of Mississippi.

Archaeological sites are a legacy passed on for the use of succeeding generations. The content of these sites provide the basis for interpretations about past lifestyles and the environment in which these human activities occurred. Archaeological sites are nonrenewable resources, and we have both a legal and moral responsibility to use and manage them in a wise and judicious manner. The fact that archaeological sites are an important aspect of the environment has been recognized by the Congress on several occasions. That body, and a number of the various states, have formally acknowledged the worth of archaeological sites through legislation, regulation, and executive order. When archaeological site destruction is either in progress or is imminent, we now have the statutory ability to counter these adverse effects. Almost every piece of federal enabling legislation indicates that the preferred mitigation choice is preservation; if not of the site, then the materials that the site contains.

American archaeologists credit Thomas Jefferson with the first scientific study of prehistoric North American cultures because of his mound excavations that were completed in 1784. Many people do not realize that archaeological site stabilization and preservation projects have almost as long a history - the Ohio Land Company began mound and earthworks stabilization efforts in 1788. These initial preservation efforts were not completed by archaeologists, but by interested concerned citizens.

Site preservation and stabilization is possible in many instances and frequently can embody techniques that are compatible with the surrounding natural environment. In fact, a properly designed archaeological site stabilization project can serve to enhance and provide habitats for a variety of species, both plant and animal.

The techniques that are used to stabilize archaeological sites are highly variable and must be selected on a site specific basis. Some are standard engineering designs and include such techniques as riprap, various forms of prefabricated gabions, levees, dikes, and retaining walls. Some techniques that can be employed rely on the use of synthetic products such as filter cloths and fabrics, or natural products that are designed to accomplish the same purposes of their synthetic counterparts. These synthetic materials tend to have a finite life span and often cannot be viewed as a permanent solution. The former techniques are frequently spoken of as a hard approach to the solution of a site loss problem.

At the other end of the spectrum is the soft approach. Soft techniques generally rely on the use of vegetation or a combination of one of the hard approaches and vegetation. This is referred to as a biotechnical approach. The technical aspect is used in conjunction with, and as an aid to, the vegetation. Simply put, a selected hard technique is put into place to hold things together until the vegetation cover is mature enough to do its job. Whenever possible, the biotechnical or a purely floral approach is preferred because it fits better with the surrounding environment. Environmental compatibility is an integral part of archaeological site stabilization and prior experience has shown that sites can be stabilized while enhancing other aspects of the environment. In some settings, the best approach to site stabilization is to duplicate healing processes that occur naturally.

In some cases cost considerations become the determining factor in the selection of a way to protect a specific site. Generally speaking, standard engineering procedures have the highest initial cost and require regular maintenance. The biotechnical approach or the use of vegetation without mechanical aids can be the least expensive in the long term, even though the initial cost may appear high because vegetation efforts tend to be labor intensive. Once established, however, vegetation stabilization should require little in the way of maintenance. Some of the initial cost of a vegetation project is offset in calculating the

cost:benefit ratio. When archaeological sites are stabilized through the use of naturally occurring vegetation, it is difficult to assign a monetary value to the advantages that will accrue to the various forms of wildlife that benefit from the improved environment.

While the stabilization and protection of archaeological sites is my primary concern, I do believe that a multidisciplinary approach is the best. Project design must include input that will speak to the interests of the biotic community, erosion specialists must have their say, as must hydrologists and land managers and planners. After all, these latter individuals or agencies will ultimately be responsible for the continuing management of these resources.

Finally, all sites are not suitable for stabilization, so excavation is sometimes the appropriate mitigation approach. When excavation, analysis and report preparation is completed, the results of the recovery efforts should be made available to the public. This can be accomplished through the preparation of reports written in layman's terms, through video presentation, or through museum displays. Excavation is an ultimately destructive form of mitigation and must be considered only after all potential stabilization options have been rejected.

EDGAR BLATCHFORD

Mr. Blatchford is the chairman of the board of the Chugach Alaska Corporation, which is the regional Native corporation for Prince William Sound. He is also the owner of a newspaper, the ***Seward Phoenix Log.***

The Chugach Alaska Corporation is a native profit corporation organized in 1971, as one of thirteen profit corporations created by Congress. These corporations were created in fulfillment of land settlements. Chugach is the eleventh largest of these corporations with approximately 2,000 people (3,000 including shareholders).

The Native corporations were formed by Congress to bring Natives into the mainstream, and to reap some of the benefits of western civilization. Alaska is the historic melting pot of many different peoples, the Eskimo, the Aleuts, and the Indians.

Chugach owns 378,000 acres of land in the Prince William Sound, (600,000 acres including the villages). Most of our people come from fishing backgrounds; for a long time fishing was the only economy in the area.

From 1971 to 1983, the region was under federal designation. Chugach spent money trying to receive land. We were near the brink of bankruptcy several times, and had spent nearly all of our entitlement. Much of this was spent working or fighting environmental organizations and federal agencies. Finally, some friends of Natives in Washington D.C. lobbied the federal government to negotiate a land settlement.

When the oil spilled in the Sound, Chugach was on the scene quickly. We were shocked and disappointed that we had not been informed of the spill immediately after it happened. As you know, the spill occurred on Bligh reef, just off Bligh Island, which is owned by our shareholders, and maintained for subsistence purposes only.

Immediately after the spill, the Chugach board met in special session because we were worried about the rediscovery of the region, of Chugach Alaska, and the Chugach people. We were worried about what all of the attention from the media and the environmental community would mean for the Chugach people. Especially since our cultural sites had for the most part been considered secret. Most of the sites are known only to the elders, or the village peoples. Now, access to these sites have exposed them to the threat of vandalism.

The Chugach people just do not have the financial resources to monitor the cleanup activity. Yet, Chugach has a moral and social obligation to the shareholders and their descendants to protect their cultural heritage. So we are really caught between a rock and a hard place. Our long-range business plans had already been implemented when the spill occurred. We were asked to take the lead on cleanup, and we did so, although we did not have the financial resources to cover all this work. We did the best we could, although it was not up to the best standards of what the Chugach board would have wanted.

But now we are worried, because a lot of our cultural and historical burial sites, long considered confidential, have become exposed to the media, and the environmental and academic communities. They could now become public, and the remains could be removed and sent to Universities around the country for study and exhibit.

Chugach Alaska has a cultural resource officer whose major objective is to preserve our cultural heritage, and to promote the heritage of the region. We also have the Chugach Heritage Foundation which also serves to promote this purpose. We have to live with the international attention that was focused on Prince William Sound as a result of the spill. We will work with the academic community regarding the study of our heritage; we intend to play a major role.

We have established the North Pacific Rim and the Heritage Foundation, and expect these foundations and Chugach to play a major role in the treatment of cultural heritage sites. The Chugach board has developed a comprehensive plan to protect cultural and historical sites. The plan is still under review by the board, and so is not yet available to the public, but it will be soon.

It must be remembered, as we look into the 21st century, that Chugach Alaska is a small corporation, organized for profit, but has a moral and social responsibility to its shareholders and their descendants to protect its cultural history. We, the Chugach people, have seen much change over the past 300 years. We have seen the sea otter hunters come and go. We have seen the copper miners come and go. We have seen the gold miners come and go. We have seen the whalers come and go. And now we have seen the oil spill workers come and go. But the Chugach people will remain. So we ask you to work with us.

When we consider Chugach, realize that there are a lot of pressures, pressures of government, state, shareholders and village councils. We look forward to working with people in the academic community and the environmental community. But we ask that you remember that we are always going to be here.

BRENDA SCHWANTES

Ms. Schwantes represents the Kodiak Area Native Association (KANA). A native of Kodiak, she served on the Oil Spill Health Task Force and is currently the Tribal Operations Coordinator.

My name is Brenda Schwantes. I will begin by explaining my background, what subsistence is, what subsistence means to some people, what has been done to make restitution so far, and last, share some ideas on what should be done to restore any damage that has occurred.

My lineage has been traced and I'm sure goes back farther than five generations. I am a product of thousands of years of lifestyle and values. I continue to represent the Native tradition of subsisting on natural resources. Our freezer is filled with fish, crab, clams, deer and lots of vegetables from our garden. This lifestyle has taught me values like hard work, humility and appreciation.

An eighty-four year old Native lady lives on Anton Larsen Island. Laura Olsen, my grandmother, lives without running water, electricity, and many of the conveniences of an "urban" lifestyle. She spends most of her day on her beach gathering wood. She loves it although to the average person it is work. She has stated many times that if she came into town to live she would die. She remains in excellent health. She loves the land and it has treated her very well as a livelihood fishing and farming when she was younger, and now providing an aura of amity.

On August 9, 1989 I was employed by the Kodiak Area Native Association as the health educator. My job specifically focused on health related issues pertaining to the oil spill and the effects of subsistence foods. I attended many meetings but became mostly involved with a group that played a large role in trying to design a testing program and decipher test results. The Oil Spill Health Task Force (OSHTF) is composed of representatives of the Indian Health Service, the Governor's Office, the Department of Fish and Game, the Department of Health and Social Services, the Department of Environmental Conservation, the National Oceanic and Atmospheric Administration, the North Pacific Rim, the Kodiak area Native Association and Exxon. It focused on studying the toxicity of oil released from the *Exxon Valdez* and its potential effects on human health. It is because of my background and involvement throughout the year in the oil spill that I feel qualified to share my ideas on possible restoration projects.

Dr. Tom Nyswander related his ideas of subsistence at a conference on Alaska Crude Oil Spill and Human Health held on July 30, 1989. He says this, "These villages are almost exclusively Alaska Native. The lifestyle is subsistence. There are generally very moderate to no incomes. And there is what I would describe a religious attachment to the land. A couple of examples are helpful. If you live by the Yukon River and you die, you're buried by the river with your feet downstream so you can see the returning salmon coming upstream every season. The traditional world view is different. Our world view suggests we go from A to B to C; B is better than A, C is better than B. Among the Native communities, it is more of a circular world view. And in fact, the best of all possibilities, next year happens just the same way this year happens. If the caribou is your brother, and you're living off the land, you want a consistent pattern of living year after year. It is quite a different way of viewing the world."

Others I have listened to explain subsistence in these ways. In the middle of July 1989, one lady with tears running down her cheeks stated that she was afraid to eat fish, clams and do the activities that made her feel like a whole person. One man said, "When I came back I felt my home was ruined, what do I do?" Another woman, "Will those beaches sustain marine life again?" She lived in Kodiak when the tidal wave hit in 1964. She said, "It's (the oil spill) not like the earthquake. After the quake people starting picking up the pieces and went on with life." She said, "A way of life is gone - just like that and for some it may never return."

Dr. Nyswander also made another very important point which is "public perception is reality." That no matter what the tests say, or what public health officials say, their perceptions direct their actions. It is one archaeologist's opinion that if the sub-

sistence lifestyle isn't practiced for four to five years the tradition will be lost. This would be a bigger tragedy. Subsistence is more than just food, it is an economy. Their beaches are like our meat section in a grocery store. Seafood provides approximately 80 percent of these people who live off the beaches diet.

What has been done to try to restore resources and perceptions. Remember, "perception is reality." To date there have been a number of tests done on finfish, shellfish and invertebrates. Two major studies are being conducted to provide information on the effects of the spill on Alaska Natives' resources. One is the Alaska Department of Fish and Game's study which will end after Spring if funding isn't appropriated by the legislature. This study is looking at trend assessments which compare sample results over a period of time to monitor levels of hydrocarbons, and they are also testing requested species. The test design is good yet lacks two essential components, normal background levels of hydrocarbons in non-contaminated species, and volume. The other is an Exxon-NOAA study which ended in December of 1989. Neither study addresses the possibility of bioaccumulation over a period of one year.

Another effort to restore resources was made last summer when over 10,000 people worked toward removing oil. The actual amount of oil recovered was very small.

Restoration, or to restore means to make restitution, return, revive, recover, reestablish, reconstruct or to bring back to health. The question is what needs to be done to bring the beaches back to an unimpaired or much improved state. Beaches and land should be restored as nearly as possible to their pre-spill condition. We would like to see whatever effort is needed to accomplish this. This is our first preference for restoration. For the sake of industry, the State and its inhabitants, the responsible party(s) need to establish the integrity of our seafood, game, creatures and their habitats. How can this be accomplished? First, as I mentioned efforts should be made to remove all oil. Further cleanup efforts should not impose health or safety hazards to those involved or cause further damage to the environment. Second, a thorough assessment of oiled areas must be made. Beaches need to be given ratings or a grade which identifies the condition pertaining to safety of subsistence foods in that area. Monitoring to keep the condition current should also continue. An ongoing educational program informing or teaching the subsistence users of the condition of the resources should be implemented. That program should remain until the natural resources have been restored to their original condition and can be given a clean bill of health. Once a thorough monitoring and an assessment is made restitution can be determined. If an area cannot be given a clean bill of health it must be replaced with resources naturally found there. Monetary assistance should be provided for subsistence users to obtain their foods. If a boat and a skiff is needed to travel to other beaches that should be provided. The gas and storage facilities for that food should also be provided. Until the resources are restored to their pre-spill condition, monetary compensation when deemed necessary should be provided for these people to live their traditional subsistence lifestyle. Culture and tradition must not only continue but now be facilitated so it is not lost.

Subsistence is a lifestyle. There has been some effort to restore resources but more can be done. Removal of oil from beaches, continued testing of subsistence foods, monetary allowance to facilitate subsistence users to obtain their traditional food and mariculture developments may all be needed to restore the resources whether real or perceived.

MARTIN MCALLISTER

Mr. McAllister is an archaeological consultant to the National Park Service. He manages Archaeological Resource Investigations, a Missouri-based consulting firm. Formerly, he was an archaeologist with the U.S. Forest Service.

The legal basis for restoring damaged cultural resources (archaeological sites) is provided by federal law, the Archaeological Resource Protection Act (ARPA) of 1979 (P.L. 96-95). ARPA is the principal law which protects archaeological sites on federal and Indian lands from unauthorized damage. The act recognizes the concept of restoration and repair of damaged sites and its 1984 uniform regulations identify a basic set of approaches for such actions (e.g. Department of the Interior, 43 C.F.R. Part 7). Because ARPA has existed for over 10 years and has a well established legal record, it may provide a useful model for developing legally acceptable ways to restore archaeological sites damaged by oil spill related activities.

The discussion presented here will identify the specific restoration and repair strategies found in a subsection of the ARPA regulations and explain how they have been interpreted in relation to criminal cases involving archaeological site damage. Examples of their possible application to oil spill damage are hypothetical illustrations of how they could be employed.

Strategy 1:

Reconstruction of the archaeological resource
(.14 (c)1)

This restoration action involves returning a damaged site to the condition it was in prior to the damage to the extent possible. Reestablishing the characteristics of a site as they were before the oil spill would be the goal here. It should be noted that while reconstruction is a highly desirable strategy, it may be difficult or impossible for three reasons:

- the condition of the site prior to the damage may not be known accurately;
- the site may be so heavily damaged that reconstruction is impossible; or,
- the cost of reconstruction may be prohibitively high.

Strategy 2:

Stabilization of the archaeological resource
(.14 (c) (2)), and

Strategy 3:

Ground contour reconstruction and surface stabilization
(.14 (c) (3))

These two strategies are dealt with together because they both entail repair measures to prevent further loss of a site due to conditions resulting from the damage. If oil spill cleanup activities washed away surface archaeological deposits exposing previously buried portions of a site, the affected areas could be covered over using appropriate stabilization methods to help keep the remaining materials intact. Despite the confusing use of the term ground contour "reconstruction," stabilization is not analogous to Strategy 1 because a damaged site would be repaired but could not be restored to its prior condition.

Strategy 4:

Research necessary to carry out reconstruction or stabilization
(.14(c) (4))

In the case of reconstruction, some level of research obviously will be necessary to attempt to determine the condition of a site before it was damaged. In addition, research is always a necessary first step to identify the most appropriate reconstruction or stabilization methods prior to their actual application at a damaged site. Methods which have not been properly researched may not be the best available or may actually cause additional damage to a site. For example, stabilization of oil spill related damage to archaeological sites in beach environments should not be carried out using methods which have failed to effectively repair sites of this type elsewhere.

Strategy 5:

Physical barriers or other protective devices, necessitated by the disturbance of the archaeological resource, to protect it from further disturbance (.14(c) (5))

Instead of actual restoration or repair of a damaged site itself, this strategy involves the use of external measures to prevent further loss of archaeological materials. Fencing to restrict access to a site might be an appropriate measure if oil spill cleanup activities have made its surface more fragile than it was previously. Similarly, more law enforcement monitoring might be necessary if sensitive site locations are known to a larger number of people due to oil spill related activities.

Strategy 6:

Examination and analysis of the archaeological resource including recording remaining archaeological information, where necessitated by disturbance, in order to salvage remaining values which cannot be otherwise conserved (.14(c) (6))

Damage to a site may be so extensive that none of the restoration and repair measures discussed so far will prevent the potential loss of part or all of the archaeological materials present. Extensive subsurface oil saturation of site deposits or substantial disruption of such material by cleanup activities might create this type of situation. In such instances, the only viable option may be for archaeologists to scientifically recover the remaining site materials and data about them so that at least some portion of their information value is retained.

Strategy 7:

Reinterment of human remains in accordance with religious custom and State, local or tribal law, where appropriate, as determined by the...land manager (.14(c) (7))

If oil spill related activities have disturbed human remains, properly conducted reinterment would be a necessary component of restoration and repair strategies. This process normally involves efforts to identify the origin of the remains followed by consultation with relative, descendants or tribal groups to determine how they should be reinterred.

Strategy 8:

Preparation of reports relating to any of the above activities (.14(c) (8))

Report preparation is a necessary component of all restoration and repair strategies for damaged archaeological sites and any measures carried out must be fully documented. One important use of such reports is evaluation of the long term effectiveness of the methods employed. Reports on restoration and repair of oil spill related damage to archaeological sites will be extremely critical because of the special type and magnitude of these impacts.

These eight strategies or measures identified in ARPA's uniform regulations are not necessarily an exhaustive list of all potential restoration and repair actions which might be applied to archaeological sites. They provide at least a basic set of options for attempting to develop a successful program to deal with the damage caused to such sites by oil spill related activities. The ARPA legal model for archaeological restoration should receive careful consideration in addressing cultural resources in the Alaskan oil spill situation.

COMMENTS FOLLOWING PANEL #6 - CULTURAL RESOURCES

COMMENT (to Mr. Blatchford):

Were any of the sites vandalized by any of the cleanup workers or any of the work related to the oil spill?

RESPONSE (Edgar Blatchford):

Yes. There were several incidences of vandalism by oil spill workers walking on historical and burial sites. Let me give you an example of what happened this summer. Around the middle of June there was the removal of some skeletal remains from one of the burial sites. We did not find out about this until about the Fourth of July. What happened was that an oil spill worker had ventured beyond the beach area, and had gone into one of the caves. He then disturbed some of the remains. A state trooper was called in and it may have looked like a recent death. In any case, the remains were removed to the Anchorage crime laboratory. It was then that we learned of the remains being removed from the burial site. Chugach of course was very upset. The villagers were very upset. We did our best to get the remains back into the cave as quickly as possible. When we asked the elders of the villages how we should handle this, their statement was that it was a Chugach reburial and that they didn't want the news media or any outside people there except a National Forest representative because it did happen on National Forest land. We had a wonderful opportunity to gain widespread publicity had we chosen to do that. But we didn't. We chose to follow the instructions of our elders.

There have been other reported incidences of vandalism, and of violation of skeletal remains.

COMMENT(to other panelists):

I also had a question for Mr. McAllister and Mr. Gleeson. Was anyone monitoring the beaches where they knew there were archaeological finds or sites? Would it be possible in the future to put a readiness team together so that the sites wouldn't be violated?

RESPONSE (Paul Gleeson):

We did have some archaeologists monitoring beaches. Forest Service personnel were well briefed on procedures. I understand the cleanup crews were also briefed that they were not to go above the beaches or into certain areas. So although there was nothing in place in the beginning, there was a multitiered effort to go ahead and try to protect the resources. Obviously with something as big as this there will always be problems. But having something in place now should make it easier next time around, and would reduce even the number of incidents below that which occurred this time.

COMMENT (to Mr. Blatchford):

Do you feel that the needs of the Native community have been met through the public process and how could we improve on this?

RESPONSE (Edgar Blatchford):

Thank you for the question, it's a very good one. I think we're moving in that direction. I think that when we're talking about the Chugach people, the region and the villages, you have to understand that we prefer to do things quietly and subtly. The reburial, for example, could have been an international news event. There was a public hearing going on during this time in Cordova, and several congressmen and media representatives were in the area. But we are working in the direction of being more involved in the public process. I think more and more agencies, both at the state and federal levels, and even the environmental community are now realizing that the Chugach Alaska Corporation and its villages have been there for a long time, long before the oil spill, and we'll be there after the oil spill workers go home.

COMMENT:

Are the Native Associations doing any quantitative damage assessment of your cultural resources? If so, what is the program? Does anyone else on the panel know of other

damage assessment programs of cultural resources around the country or around the world?

RESPONSE (Edgar Blatchford):

Damage assessment has continued since day one. People on staff at Chugach are considering the impacts of the oil spill. As for determining what's appropriate for the future, Chugach's program, and I think I have the concurrence of the villages on this, is that we try to maintain confidentiality of the sites. The sites are emotionally and socially important to the Chugach people. One of the problems with the public process is that those Chugach burial sites may become known to the public and they may be desecrated. We've already seen that in several instances during the oil spill. We would like to work with agencies and the academic community to evaluate some of the larger archaeological sites. At some point in time, maybe we can develop some displays. But when we talk about the remains of cultural sites we have to be careful because we're talking about something very personally connected to the Chugach people. There was quite an uproar among our villages, especially among older people, when it became known that there would be public display of Chugach remains and artifacts. The villages reacted very quickly. It was the fastest reaction I've ever seen from the villages. They asked that the public display be postponed, at least until we could see what was going to be put on display. But I think when we talk about a program for Chugach, the main emphasis has to be that we want to maintain confidentiality of the sites.

RESPONSE (Martin McAllister):

I will speak to the general issue of damage assessments. The reason the concepts that I discussed (cost of repair, archaeological value, and commercial value) are built into ARPA is to facilitate determination on whether an alleged violator will be prosecuted for either a felony or a misdemeanor; it is based on how much damage, in a monetary sense, has been done. If you have done greater than $500 worth of damage to an archaeological site in terms of those values, then you are prosecuted for a felony, otherwise you are prosecuted for a misdemeanor. So every ARPA case that is prosecuted in the U.S. must, from the legal standpoint, have a damage assessment associated with it. So there is now a legal ten year record of damage assessments on archaeological sites under ARPA, and these could be referred to as examples of how damage assessment could be done in this situation here in Alaska. The National Park Service sponsors classes on archaeological resources protection, in which an important aspect of training is damage assessment. We will be teaching this class in the first week of May this year, so if you're interested in damage assessment, that training session might be well worthwhile for you.

PANEL PRESENTATIONS

Panel #7 - Alternative Restoration Approaches

CHARLES NASH

Mr. Nash is the general manager of Timber Trading Company, a wholly-owned subsidiary of Koncor Forest Products. He is also the project manager of the timber sale on Montague Island.

I'm here today because of our company's timber holdings within Prince William Sound, and our existing proposal to log our purchased timber on Montague Island. To give you some background on my company, we are wholly a subsidiary of Koncor Forest Products, and we own timber within the Sound. The Timber Trading Company is native owned and was established as a joint venture by four village corporations: the Yukutat Quan, the Kodiak natives, the Ouzinkie, and the Chenega Village Corporation. We have been around since 1977, and are a timber management company. Most of our shareholders are fishermen and timber owners. We have received several awards for excellence in our field.

We own timber on Knight Island and Patton Bay on Montague Island. This we purchased from the Chugach Corporation in a major financial investment three years ago. We are now working on acquiring permits and moving ahead on the timbering.

We have recently been approached by various interests and asked if our land was for sale, and if it were, whether or not we would sell it. The answer is yes, I think we would be open to that idea. But a purchase would definitely have to be at fair market value, because we have a responsibility to our shareholders.

As far as our plans for timbering at Patton Bay are concerned, we plan for a temporary access road from Cloud Harbour to Patton Bay, and that is currently in the permitting process. This road would be temporary, but one of its benefits for the Alaska Department of Fish and Game is that it would provide access to 27 different habitat areas. These include stream blockages as a result of the 1964 earthquake. Most of these could be cleared of debris and would provide habitat for anadromous fish.

As far as the Company is concerned, we, like everyone else, were a victim of the oil spill. The Patton Bay timber sale is really unrelated. It has been put on hold for one reason or another for the last three years, and at this point, we would just like to start moving ahead, and getting a return on our investment. If anyone has any specific questions, I would be glad to answer them later.

Rick Steiner

Mr. Steiner is the University of Alaska Marine Advisory Agent for Prince William Sound and is based in Cordova. He has assisted Congress with spill legislation, developed programs to educate the public about the spill and initiated the role of the Alyeska Citizen's Advisory Committee which oversees the transportation of oil through Prince William Sound.

The restoration effort presents us with a spectacular opportunity to "do the right thing" as Spike Lee would say. We need to involve the rural people in this restoration, and the people of Prince William Sound, and it looks like we are moving in the right direction.

The Prince William Sound spill really punctuated twenty to forty years of cumulative environmental degradation in the Sound. We now have a chance to restore the region, not just to its pre-spill condition, but hopefully to its condition twenty or thirty years ago.

In doing this we are faced with the challenge and the opportunity to change some of the institutions - social, political and economic - which precipitated the spill. This goes beyond Alaska to issues such as energy consumption on a national and international level, population increases and the like. These are issues which we will eventually have to address, otherwise we are really just squirting water on top of the flames in an effort to put out the fire.

I'd like to throw out a few ideas, just briefly, and focus on one of those. We have heard of:

- The acquisition of timber rights;
- The "do nothing" approach;
- Establishing wildlife and/or environmental trust fund(s);
- Research endowments (possible through ADFG);
- Salmon and bird rehabilitation;
- Mariculture development;
- Control of high seas intercept fisheries;
- Natural resource scholarship funds for high achievers
- Permit buyback programs for native communities and villages;
- Environmental education classes, regionally and nationally;
- Energy conservation;
- Ecotourism; and
- Seafood market rehabilitation.

And moving a little further out in the spectrum:

- Day care assistance;
- Establishing Native art and music foundations; and
- Establishing recycling programs.

The challenge is to "keep our eyes on the prize," and by that I mean that we need to focus first on Prince William Sound and the impacted environment. The process of restoration is of paramount importance, and I think it would be a good idea to include scientific peer reviews of all restoration proposals. We could also have a political review body, composed of citizens, similar to a community advisory committee. The important issue we are faced with is where to spend the money from restoration. I think most of it should stay in the area immediately impacted by the oil.

There have also been legislative proposals as far as land acquisition goes. Jeff Parker is an attorney for the Alaska Sport Fisheries Association. He recently wrote some proposed legislation which could financially benefit private property owners who sold their land rights. There are three major aspects to this legislation:

- It would provide habitat conservation tax credits;
- It would allow script bidding; and
- It addresses the "debt for nature" swap that is now occurring in some third world countries.

Habitat conservation via the purchase of timber rights is a valuable use of restoration funds. The basic theoretical concept behind this idea is that we have to prevent further damage before we can move on to restoration in the true sense. We need to allow the land to heal, and protecting it through purchase is a good way to do that. We have seen support for this idea from private timber owners, and that is encouraging. If we can extract a promise from the Forest Service that they too would protect their lands from further degradation through timbering, I think protecting the land by purchasing the timber rights would

be a biological, economical and psychological solution.

First, the biologic perspective. Timbering often causes siltation and can clog or degrade aquatic habitats, particularly spawning habitat, which can obviously affect salmon. We have heard that many wildlife species are dependent, at least partially, on old growth forests. We also need to maintain biodiversity. Purchasing the land would protect all of the above.

Second, in terms of economic value, if we look at a one hundred year period, I think we would see that one of the highest sources of economic revenue is the scenic and touristic value of the land. This too would be maintained through a land purchase.

Third, the psychological value. This is an aspect of restoration that seems sometimes to have been overlooked. When you mention that this is an area which will be addressed by restoration to Cordova residents, you can literally hear a sigh of relief - relief that this problem is acknowledged and will be addressed. It is emotionally significant not only to impacts sustained in the region, but in the state and nation as well. It is almost like atonement for our sins. In the greater picture, we all have a sense of identification with Prince William Sound, and the restoration process gives us the opportunity to rectify the damage that has been done.

SUSAN RUDDY

Ms. Ruddy is the director of the Nature Conservancy of Alaska. Before joining the Nature Conservancy she was president of an Alaskan communications company and a reporter for the Juneau Alaska Empire.

Judy Maxwell asked me to address two items today; the first has to do with prioritizing the application of time and resources vis a vis acquisition of equivalent resources, the second with various methods of acquisition. She asked that I address each within the context of The Nature Conservancy's experience and practice.

First I would like to talk about prioritizing. As many of you know, the Conservancy is very focused: our mission is to preserve biological diversity, and we do this by maintaining, in their natural state, habitats and systems critical to the protection of rare and endangered plants and animals and communities of species. Early in our history it became clear that we could not protect the entire landscape, so we set up a system for prioritizing allocation of our own resources. The system is our Natural Heritage Program which is basically a biological inventory; the information which comes out of this system helps us decide, in terms of the Conservancy mission, whether this piece is a higher priority than this or this or that.

Now our system has, as I said, a very particular, rather narrow focus. Given the fact that more than a few respected scientists estimate that we are losing a species an hour, we believe that doing what we can to protect the critical biological balances is essential to the future of life on this planet. But that is just our focus. The point I want to make is that without having clearly defined our focus, and then having put together a system for equally clearly defining our priorities for application of finite resources, we wouldn't have been successful.

As we reach the acquisition phase of this restoration process, I would advocate that first off we need to design a system for determining allocation of whatever financial and human resources we have. For instance, rather than simply asking interested parties to come up with a list of candidate sites and then authorizing some group to select among them, I think it is essential that a general acquisition plan be based on priorities which are determined in advance.

The Conservancy's priority is protecting biological diversity. Of course, I believe that this should be high on the list of those priorities which evolve during the restoration process, but it is also obvious that economic and commercial interests such as fishing, timber and tourism need to be right up there along with other cultural, environmental and lifestyle considerations. Once these priorities have been clearly defined, then I believe it will be critical to develop a process by which these priorities can be applied to acquisition decisions.

We do this with what we call our scorecard system. It consists basically of the information generated by our heritage programs and looks at each site which surfaces with significant numbers of significant species. Then the system ranks each site according to the rarity of the species found there, the uniqueness of the communities and so forth. This gives us a product which is quantified and which helps us objectify our decisions. While the information base for prioritizing acquisitions during the restoration process would obviously be different and considerably broader, I do believe that some sort of a "scorecard" system could be developed and would be invaluable in helping us make wise - and acceptable - investments.

One element of this prioritizing process which I believe is absolutely essential is involvement right from the get go of all interested parties. The first to my mind are those who live in the Sound - the indigenous peoples and those who live in the newer communities. Then there are those others who live off the resources of the Sound - the fishermen, the loggers, those in the tourist industry. And then there are the rest of us - Alaskans who have a stake in the future of our home, who are committed to protecting our very special environment as well as assuring an economic base which will provide a good quality of life for all of us who live here.

The second item which Judy asked me to address is that of the various methods by which equivalent resources may be acquired. The

Conservancy likes to boast that we protect 2,000 acres every day. While acquisition is the most basic arrow in our quiver, we couldn't afford to buy that much land every day, 365 days a year. So we have come to rely on a whole spectrum of protection activities, ranging from voluntary membership in what we call our registry program through cooperative management agreements with landowners (both public and private) to acquisition.

Even acquisition has a variety of interpretations. As you know, "real estate" refers to land and its physical elements - its minerals, its trees, its air space, its buildings. "Real property" is actually a bit broader and includes both the land as a physical object and the rights which accompany it. What all this means in application is that there are a whole bunch of different things relating to land which can be bought and sold.

Here in Alaska we are particularly familiar with surface and subsurface rights because of our mining history, our experience with oil and gas, and more recently ANCSA. The buying and selling of timber rights is something we all know happens at least, even if we do not know how, in detail. In the West, water rights have been bought and sold for generations, and in urban areas, air rights are frequently marketed.

Last year the Alaska legislature passed a conservation easement act, giving us a process by which a landowner can transfer (sell or donate) not the land itself, but certain rights in the land to another. The owner thus remains free to sell, lease, or will his property, but the restrictions set forth in the easement remain in effect for future owners. They travel with the land, as it were. There are some tax implications in this which are often beneficial to the owner - the value of the gift, for instance, is deductible, and in some cases property taxes may even be lowered because the economic value of the land is limited.

So my point with all this is that when we actually get down the road to the acquisition phase of the restoration process, we have a wide variety of methods available to us, not all of which require that the entire fee interest in the land be purchased. These variations on the acquisition theme should be carefully considered and evaluated in each instance for the obvious reason that buying less than fee will cost less than buying fee and may in many cases be more acceptable to the landowner.

This has barely scratched the surface on either of the items Judy asked me to address - that of prioritizing acquisitions or methods by which those acquisitions might be accomplished - but I hope it gives us some food for thought and a framework within which to take our first steps.

ROBERT ADLER

Mr. Adler is a senior staff attorney with the Natural Resources Defense Council in Washington, D.C. and directs their clean water program. He is involved in Alaska land issues, particularly the Arctic National Wildlife Refuge and the EXXON VALDEZ oil spill.

Before working for the Natural Resource Defense Council, Mr. Adler was the Executive Director of Trustees for Alaska, and was an attorney with the Pennsylvania Department of Environmental Resources. He recently coauthored the National Resource Defense Council report: "Ebb Tide for Pollution: Actions for Cleaning Up Coastal Waters. "

We have heard a lot of talk about a "holistic" approach to restoration of Prince William Sound. But what exactly is a "holistic" approach? I have chosen to define, and discuss it in three different aspects: spatial; temporal; and cause and effect.

The main issues of contention seem to be where to spend the restoration monies and what should be our primary focus. In spatial terms, I believe we need to focus on restoring natural resources in the Sound, resources which use the Sound and deserve our protection. The most obvious of these resources are:

- Salmon - they deserve and need protection from the headwaters to the high seas;
- Migratory Birds - they need overwintering habitat, so resource acquisition may be logical in Oregon or California to protect habitats critical to the existence of the species; and
- Marine Mammals - Whales in particular use this zone during migration. It may be that we need to protect their habitats not only in Prince William Sound, but along their entire migration route.

From the temporal perspective, we need to look at both long and short-term approaches. In the short term, we have in the Sound a sick and ailing patient. What the Sound needs immediately is care and rest which can be provided in the form of imposing immediate land use restrictions on timber rights and the like, to allow the ecosystem time to recover. Certainly users deserve compensation for these impacts, but the priority is to preserve and protect the system now to ensure its ultimate recovery.

In the long term, we need to preserve as many resources as we can. We need to do a quick inventory of existing resources, and identify immediately the ones we need to protect. Where timber harvest will occur, we need to get immediate stays on these permits until long-range decisions are possible.

We need to identify the sustainability of the ecosystem - what is its carrying capacity? We can help preserve this by establishing protection through wildlife preservation and land use restrictions, or by implementing buffer strips along anadromous fish streams and the like. We need to work towards nondestructive economic sustainability in the area. This can be done through conservation, scientific research and public education, for which precedence has already been set in such states as Virginia.

In terms of cause and effect, we are now looking at and treating the symptoms, not the illness. We need to seek a cure for the illness itself. In this case, the illness is our gluttonous use of oil. It is evident in our national energy policy and our regulations - or lack thereof.

Oil industries need to support spill prevention. It should not be the responsibility of the citizen to pay for Exxon's double-hulled tankers. It is the obligation of the industry to cover these preventative costs.

Alaska state enforcement efforts need money so that we can ensure that our regulations are strictly enforced.

In terms of our energy policy, we can organize statewide planning efficiency. Several steps need to be taken to ensure this:

- We can reduce dependence on oil, while building towards a healthy economy, by developing other sources of revenue;
- We can retrofit existing government buildings to be more energy efficient; and
- We can buy timber rights, enforce buffer zones, and replace these natural resources by making recycling mandatory among agencies, and printing all permit applications on recycled paper.

ALLEN SMITH

Mr. Smith is currently the Alaska Regional Director for The Wilderness Society. He has also served as Vice President for Internal Operations at the Washington, D.C. office of The Wilderness Society, President and chief executive officer of Defenders of Wilderness, Executive Officer of the Land and Natural Resources Division of the U.S. Department of Justice, and Chief Financial Officer for the Sierra Club.

The year since the *Exxon Valdez* oil spill happened has given us all time to reflect on what should be done to restore the once pristine environment of Prince William Sound and the Gulf of Alaska. While we will never know the full scope of the environmental damages that are occurring there, as a basis of forming a complete range of restoration strategies, we must start with what information we have, and that is our purpose here today.

Yet, we can not totally ignore the events and information that has been released this past week about continuing damages to the natural resources of the Sound. First, the shrimp fishery has just recently been closed in the Sound. Second, an oiled, dead bald eagle was recently picked up off the shore in the Sound. Third, the State of Alaska released information and Congressional testimony that they are finding abnormalities in nine out of 10 herring eggs, the absence of whole salmon hatches, tumors in bottom fish, and more. Whatever restoration strategies are adopted must recognize and cope with the reality that the damage continues.

The Alaska Oil Spill Commission concluded that only 5 percent of the spilled crude oil had been recovered, and the U.S. Congressional Office of Technology Assessment has a report pending that concludes a similar low level of recovery. That means that one way or another we have 95 percent of 11 million spilled gallons still at large in the environment, even after Exxon's monumental two plus billion dollar effort of last summer. Even with the best expectations for natural deterioration of certain of the more volatile and toxic compounds of the crude oil over time, we have yet to see the damages fully manifest themselves.

Extrapolating from his experience with an oil spill that occurred 20 years ago at Falmouth, Massachusetts, Dr. John Teal, Senior Scientist of Woods Hole Oceanographic Institute, recently told a conference of scientists in Cordova that if the oil got into the muds we could be finding oil in Prince William Sound for at least 30 to 40 years.

Clearly, the damage will continue to accrue for a long time, and any restoration strategy must consider cumulative impacts.

These issues reflect the major reasons why many were critical of the August, 1989 public review draft of the State/Federal Natural Resource Damage Assessment Plan for the *Exxon Valdez* Oil Spill, because it presumed an ability to ascertain the extent of the oil spill damages by February 28, 1990, thereby failing to recognize the need for several annual biological cycles to fully comprehend and measure the level of natural resource damages. Restoration must be driven by a thorough accounting of what has been lost and the replacement cost of those losses, not by a litigator's arbitrary timetable that may overlook whole classes of lost resources. The American people deserve to know what has happened to the waters and fisheries, the national parks, refuges, and forests, Alaska's state lands and parks, and the Native lands and subsistence resources of this once pristine area. If Exxon does not fully pay for it, you and I as taxpayers certainly will. We can not know the requirements of restoration without a fully open and extended damage assessment process.

If we are to be serious about restoration, we must also be equally serious about protecting the environmental integrity of the lands and waters affected by the oil spill from additional pollution impacts. We all know that this spill could happen again, even before restoration is under way, because we have not yet fixed the causes. A week ago The Wilderness Society released a report cataloging the 100 worst spills, including the *Exxon Valdez*, out of an estimated 10,000 reportable U.S. spills that occurred during this past year and spilled approximately 15 to 20 million gallons total. The most troubling conclusion from several years of data examined is that it was not an unusual year. This forces us to conclude that any restoration strategy should put a very high priority on protecting the investment in the restoration. We believe that this is the context to address restoration strategies.

RESTORATION FRAMEWORK

Restoration of Damaged Resources

We are concerned about the process moving too quickly to the restoration phase, when more cleanup may be called for first. Recent reports by the state indicate that there is still sufficient oil and oiled debris accumulating in surface situations that could impede restoration to warrant significant site-specific mechanical cleanup activity. Restoration should not begin on any given site until it is reasonably clean, otherwise the restoration funds will end up paying for cleanup.

Restoration of damaged resources should take an ecosystem approach and use only species native to Prince William Sound. Plantings of natural grasses, shrubs, and trees may be needed in certain areas. Marshes and estuaries are particularly vulnerable wildlife areas deserving top attention. In the final analysis, however, adequate cleanup and natural restoration may be most desirable.

Replacement of Damaged Resources

Where whole populations of wildlife, such as fish and birds, have been reduced or destroyed by the oil spill, reintroductions may be called for as well. In all such situations, native stocks and species should be used in such efforts. This is an area of study and planning that demands the availability of very specific biological information and very specific feedback from the damage assessment process to approach correctly. Both aquatic and terrestrial species could require such attention.

Acquisition of Equivalent Resources

Ironically, the most innovative opportunities for restoration in Prince William Sound and the Gulf of Alaska may well exist in the fact that not all of the damaged natural resources can be restored or replaced. Clearly, the acquisition of equivalent resources should become a very high priority to fill that void, and there are many suitable conservation lands and values to fill it.

While ANCSA and ANILCA resolved many things, these two landmark statutes created a patchwork of land status that many of the owners - federal, state, and native corporations alike - would like to see taken to further resolution. The recent example of the Seldovia Natives trying unsuccessfully to find trading stock for their 20,000 acres of selected lands in Kachemak Bay State Wilderness Park is a critical case in point. Absent that trading stock, the transaction is now headed toward an outright purchase by the state.

Other available inholdings in both state and federal conservation system units could be approached in the same manner, where willing sellers exist, to acquire equivalent natural resources for those lost to the oil spill. While not all private and native owners approach this matter the same way, there are several that wish to sell their timber rights and conservation lands to capitalize their corporations. This is an opportunity to use trust funds from Exxon for significant conservation and restoration purposes; to flesh out the ability to protect the whole ecosystem to allow recovery a chance to happen without conflicting developments.

Besides outright land purchase, there are several other land protection vehicles that should be thoroughly explored to acquire equivalent natural resources. A partial list would include the following:

- Land exchanges - although there is a recognized shortage of trading stock;
- Purchase of development rights;
- Purchase of timber rights;
- Leases and lease-backs;
- Creation of tax incentives such as habitat tax credits, the reverse of a net operating-loss sale approach;
- Reacquire Bristol Bay oil leases;
- Purchase of options to acquire wilderness designation; and
- Research "Natural Area" designations.

In summary, I would like to urge the restoration task force to move ahead in planning all three areas of restoration strategy at the same time. This will enable you to take advantage of all opportunities for restoration and replacement of damaged resources, as well as the acquisition of equivalent resources. Thank you for this opportunity to present our views.

COMMENTS FOLLOWING PANEL #7 - ALTERNATIVE RESTORATION APPROACHES

COMMENT (to Susan Ruddy and Robert Adler):

Please discuss the use of a restoration trust fund in a rotating manner, as the Nature Conservancy does, to roll over the money through eventually selling the asset that is acquired, whether it is a conservation easement, or a title. Also, please address acquisition of equivalent habitat. In this instance, because the injured resource is below the ordinary high tide line, the equivalent resource is all public land, so we have to step outside of the equivalent habitat which takes us to - how far do we go? Where does that stop? Do we let species or use values govern it? To Bob Adler, in regards to acquiring oil leases on Bristol Bay, the money on those oil leases is already in federal hands, would it be preferable to use that money that is already in federal hands to acquire those leases, or should we supplement it with restoration money, or money from the environmental trust fund if necessary?

RESPONSE (Robert Adler):

On the oil leases in Bristol Bay, we have been trying to convince Congress to appropriate the necessary funds to buy back those leases. At least at this point, we have not been successful politically. So I would invite you come back to D.C. to see if you can try to help us convince them that is a good thing to do. I agree that if we can get that money shaken loose at the federal level, it would be better, but short of that, this is an alternative.

RESPONSE (Susan Ruddy):

The way the Conservancy does the rotating fund is that if we find a piece of land which we think is of value, and which an agency also thinks is of value, then we are in a position to move much more quickly. It takes a very short time for us to go through our national board of governors to come up with the cash to put down on a project like that, we can do that. We can do it if the federal or state agency gives us a letter of intent saying they are going to take us out of it at a certain time, or a certain amount, so it doesn't give us a whole lot of flexibility. The reason for that, of course, is that the federal or state agency relies on the legislative appropriation process to come up with the funding to pay us back. And that is something that one would want to be aware of in the same manner, in the type of fund that you are discussing here. You do not want to get this money, put it into something assuming that you will get paid back, and then have the legislative body say that the property has already been protected and we do not need to appropriate money for it. Then you are out of pocket. When it works the way we like it to work, what we do is require that it be paid back within two years plus interest. Our interest rate is prime plus one. So we can approach the revolving loan fund in this way, in which it grows and grows and grows, and enables you to buy more and more and more of that kind of land. So it can be a very useful tool if it is structured properly.

I would like to support the notion of making a rotating trust fund. We are in the 25th year of the Land and Water Conservation Fund, which is the basic driving fund that acquires inholdings in lands, park, refuges, and forests, nationwide. The rotating trust fund that The Nature Conservancy works because you cannot get all the money appropriated in one year. So I think the idea of rotating trust fund is a good one to explore. As to Jeff's thought about equivalent habitat already being owned, if you say you are looking at the water only, I agree - it is owned. But, we have to take a total ecosystem approach and look at the uplands in conjunction with the water. I think if you do this there are several potential acquisitions of equivalent upland habitat for the ecosystem as a whole.

RESPONSE (Charles Nash):

One final remark in regards to script bidding. I think you have to be careful of refocussing the intent of the ANCSA legislation which was really designed to create land and resource-based economies for village corporations. I know that

my people would not be interested, from what I've seen of the asset material of the Resolution Trust Fund to date. From what I know about it, it would be a far cry to trade off some of our timber and land resources in the Sound and other areas of Alaska, for some of the real estate in the Resolution Trust Funds. I think that script bidding may have broad appeal in philosophical terms, and it may even have some specific application in some areas, but I do not think it should be looked at as a cure-all. We need to work more closely together. I do not think this idea of wholesale buyout is going to fly.

COMMENT:

Focus on energy, recycling, transportation (dirigibles for timber harvest) use tidal flow to generate electricity, etc.

PANEL PRESENTATIONS

Panel #8 - Alternative Restoration Approaches (continued)

ROBERT WEEDEN, PH.D.

Dr. Weeden is a professor of wildlife management at the University of Alaska-Fairbanks. He has served as director of Policy Development and Planning for the Governor's office, and has served as on many boards and commissions including the National Marine Fisheries Advisory Committee of the U.S. Marine Mammal Commission.

Restoring the earth is the project of the 21st century which will bring humanity together. It will be the major cohering principal for the next 100 years. As long as people use technology, are numerous, and demand resources, destruction of the environment is unavoidable. But this must be paired with inevitable restoration. As we have come to accept destruction as a part of the process of living, so we must also accept restoration.

Restoration is not a new idea, but is being rediscovered in a context of adversarial politics and money transfers. We must remember that we cannot afford to focus our notion of restoration on money paid those who break the rules. To do this would leave us hoping for law violators, so their apprehension would support our favorite programs. Many interests would be partially, or even wholly dependent on these finances, including bureaucracies set up to administer these regulations. Restoration cannot be dependent upon disaster for its funding source.

We desperately need to keep the process of restoration simple. Otherwise we run the risk of a similar situation to that which happened recently to the Forest Service. They had invented a planning mechanism which incorporated nearly everything in the universe, and was supposed to give planners the answers to their questions. This planning mechanism was so complex that ultimately, the Forest Service itself could not identify one single person who could explain how the whole system functioned. Various people could identify the meanings of different sets and subsets, but no one knew the whole picture. This is obviously not a precedent which we want to follow.

We need to keep the mechanisms of restoration simple and flexible. This allows for the admission of ignorance; we really do not know how to restore the earth. We run the risk of focusing on individual "popular" species without understanding how they fit into the whole.

Instead, restoration must focus on allowing nature the possibility to recover. Nature is above all an adaptive and flexible mechanism. It is a nested set of processes, all of which are important. Restoration strategies must concentrate on creating conditions allowing nature's basic agenda of nutrient cycling, water cycling, sunlight capture and decomposition to begin anew. In most cases, especially in Alaska where pioneering is such a fine art among plants and animals, and where disturbed areas are usually not far form undisturbed environments, we can stand aside and let nature do her work for free.

EDGAR BLATCHFORD

Mr. Blatchford is the chairman of the board of the Chugach Alaska Corporation, which is the regional Native corporation for Prince William Sound. He is also the owner of a newspaper, the Seward Phoenix Log.

The Chugach Alaska Corporation is a Native corporation created by Congress in 1971. Approximately 85 to 95 percent of our revenue comes from fish processing plants, two of which are located in Prince William Sound (one is in lower Cook Inlet, and one in Uganik Bay on Kodiak Island).

The Chugach Alaska Corporation is also a timber company. We have heard talk here of buying out timber rights. This is not looking at reality. We have not put a value on one million acres of land in the Sound, we cannot put a value on the meaning of having a job, and living in this environment. Indigenous people have been faced with joblessness since the state implemented the limited entry program. Since that time, it has become increasingly difficult to find work in the Chugach Region.

I was recently in Washington, D.C., speaking to a senator about our social concerns. I thought, in light of the recent attention given to the plight of the fish and the sea otters in the Sound, it would be a good time to attract attention to the social ills of the natives, which are not so evident as the troubles for sea otters. Do you know what the senator said to me? He pointed at me and he said, "You're not as cute as a sea otter."

I would like to read to you a portion of an article written to the environmental community, just a couple of paragraphs.

> We, the indigenous peoples, have been an integral part of the biosphere for millions of years. We use and care for the resources of that biosphere with respect because it is our home, and because we know that our survival, and that of future generations, depend on it. We are concerned however, that you have left us, the indigenous peoples, out of your vision of the biosphere. The focus of concern of the environmental community has typically been the preservation of tropical forests, and plant and animal inhabitants. You have shown little interest in their human inhabitants, who are also a part of the biosphere. We want you, the environmental community, to recognize that we, the indigenous peoples, are an important part of the Amazonian biosphere.

This was written by the president of an organization which represents 1.2 million Indians in Peru, Bolivia, Ecuador, Columbia and Brazil. It could have been written for the Chugach people.

Any talk about oil spills, contingency plans or restoration must take opinions of local people into account. The Chugach Alaska Corporation does not say that it is our decision alone - it is everybody's decision. But we want to be a part of the whole in the decision making process.

The environmental plan must include cultural and economic aspects such as the fishing, logging and tourism industries - it must be a balanced approach. It should also examine the social impacts - joblessness; and what comes from joblessness: alcohol abuse, drug abuse, and all other ills which we are trying to combat, and the Lyndon B. Johnson Great Society programs have tried to remedy.

Chugach has been trying to build a sawmill for some time now. In 1983 we received $25 million for a land settlement. In other words, we were 11 years behind other corporations in Alaska in generating economic investment. We had been forgotten. But on March 24, 1989, the environmental community rediscovered Prince William Sound when 11 million gallons of oil spilled from the *Exxon Valdez*. It is my fear that once again, the international media and the environmental organizations will leave the Chugach people out.

I am encouraged by being invited to speak here. I have hope that the Chugach people will be heard, because economic opportunities must be generated in areas where Natives live. We cannot and will not allow Prince William Sound to be put into a deep freeze for only those people who hold limited entry permits - permits which are transferable to anyone. The greatest resource of Prince William Sound is no longer within reach of the local people. Boats come from out of state to take the immediate renewable resource - the salmon.

I would like to return for a moment to the words of the Amazonian Natives, "We propose establishing a permanent dialogue with you to develop and implement new models for using the rain forests. We propose joining hands with members of the worldwide environmental community to recognize our historic role as caretakers of the Amazon Basin." Chugach would insert Prince William Sound here. Support our efforts to defend our traditional territories. Accept our organizations, Chugach, the North Pacific Rim, the Heritage Foundation, as legitimate and equal partners.

Twenty-one years ago the Chugach Alaska Corporation was founded. Previously, we were the Chugach Native Association, and fought for native land use claims. On March 8, 1969 there was such a claim for the Prudhoe Bay pipeline which was to terminate in Valdez. The Natives held the claim for the terminal site. This they gave up, in exchange for local jobs, contract considerations, and protection of the environment. The Chugach Native Association gave up those claims for protection of the environment. They gave this up all for one dollar. This was far before any other "environmental concerns" had been expressed by anyone.

The Chugach people are still here. Like the forest people, we will continue to be here. Treat us as legitimate and equal partners.

Steve Colt

Mr. Colt is a visiting professor of economics at the University of Alaska-Anchorage. He is also a member of the Institute of Social and Economic Research (ISER), which studies a variety of public policy issues in resources development and regional economics.

Since my prepared remarks would needlessly repeat the previous presentations of others, I will discard them in favor of the following comments. First, we must remember that the resources we are considering expending on restoration are our money, not Exxon's. As taxpayers (Exxon's expenses are deductible) and as consumers of oil we will ultimately pay the social bill for whatever restoration takes place. This is the price we pay for consuming oil the way we do.

We might consider the concept of "restoration of opportunity" as a goal for the entire process. By this I mean opportunities for fishermen, charter operators, subsistence users, recreational users, and even armchair travelers ("contemplators") to continue to receive the same benefits from the natural environment as they did before the spill. Under this concept I might also emphasize the need for psychic restoration. Some actions will do a better job than others of addressing the real feelings of grief and loss felt by people all over the world. I am thinking here of concrete, "bold strokes" of land acquisition or protection. The results of such actions may be hard to scientifically measure, but the actions themselves may have great psychic value.

In line with these concepts, I suggest the following guidelines:

- Keep most of the spending within the geographic realm of Alaska. An obvious exception to this guideline would be the acquisition of out-of-state migratory bird habitat for species hurt by the spill.
- Stay out of State energy policy, recycling programs, and other attempts to change the way we consume natural resources. These are important issues, but addressing them with restoration monies is a "band-aid" approach to these problems.
- Avoid subsidies to induce environmental conservation. Many people would have done the "right thing" without them. Money given to these people is wasted, while others become dependent on such subsidies.
- Hedge against uncertainty by committing resources to some sort of environmental trust fund.
- Approach timber buyouts with extreme caution, remembering that timber rights may be part of a much larger economic and social system. Tampering with such a system could remove an entire web of economic opportunity from an area.
- Consider restoring economic opportunity by such measures as buying up limited entry fishing permits and transferring them to local residents.

As a rough-cut allocation of funds, Lee Gorsuch (Director, ISER) and I suggest the following:

- One third of the funds should go toward direct mitigation of further damage and restoration of specific species and resources;
- One third of the funds should go to the restoration of opportunities (eg, equivalent habitat, riparian uplands, economic development);
- One third of the funds should go into an environmental trust fund to be held as a hedge against uncertainty as to where conservation and preservation is most needed in the future to balance irreplaceable direct losses from the spill. This allocation should be limited to use within Alaska, with an exception for appropriate out-of-state migratory bird habitat.

CLIFFORD EAMES

Mr. Eames has been with the Alaska Center for the Environment for the last six and one-half years, working primarily on state land use, local wetlands, and Chugach National Forest issues. He has also worked for the Trustees for Alaska and the National Wildlife Federation.

Using the words of some of the printed materials provided by the symposium organizers, I am going to concentrate this afternoon on "otherwise protecting," often in "indirect ways," other resources that are similar or related to the injured resources. Mostly, I will talk about changes in land management policies, primarily on public lands, and focus on state-owned public lands. I apologize in advance, incidentally, for emphasizing Prince William Sound. This is because the Sound is the area I know best by far.

At the risk of being repetitive as a member of such a large panel, I would nevertheless like to start off with some general remarks. Then, I hope to perhaps add something new by focusing on state-owned lands to which other panelists might have devoted less attention.

One additional apology. I have not worked closely on the spill, and probably know less about it than anyone else in this room. I am very interested in land management issues, however, and hope that if some of my comments seem a bit wide of the mark, they will nevertheless not be entirely irrelevant. I am also happy to have the opportunity to ride a few of my hobbyhorses.

My general pitch, not surprisingly, is that the land use management designations for Prince William Sound - almost entirely multiple use designations - are far less protective than they should be. (I include both lands and waters in the phrase "land use.") And in fact, although of course it provided no protection from the spilled oil, many other coastal lands in Southcentral Alaska affected by or in the vicinity of the oil are designated state park and state park wilderness, national park, or national wildlife refuge. Strengthening land use designations in the Sound is not just a restoration tool; it provides a level of protection the Sound clearly deserves and that, but for historical accidents, it would have been granted.

Are there not coastal resources in Prince William Sound that are equally deserving - or virtually so - of the protection accorded Kenai Fjords National Park, Kodiak National Wildlife Refuge, and Kachemak Bay State Wilderness Park; or in Southeast Alaska, Admiralty Island and Misty Fjords National Monuments, Glacier Bay National Park and Preserve, the substantial wilderness overlays in those conservation units, and Tongass National Forest Wilderness? Following the spill, it is not a cynical political maneuver to take advantage of the greatly increased state and national awareness of the exceptional natural values of the Sound; it is a rectification of a serious oversight.

Multiple use management is not adequate to protect the extraordinary values in the Sound. That all of the uses potentially (and of course actually) allowed on multiple use lands are compatible is a fiction. For example, the development of a coal mine is not compatible with the protection of wildlife habitat or tourist and recreational use of an area. What happens in effect in some cases is that we decide that we are willing, perhaps eager, to "sacrifice" a certain portion of our lands for an activity that is incompatible with a number of other resources and uses; we make an economic or political, not a wildlife or recreation management, decision. De facto zones separating incompatible activities are in fact always ultimately established on multiple use lands; it is just that the zoning is deferred until a later planning stage or until the time when a proposal for an incompatible activity or project requires the making of an ad hoc decision. Multiple use management is incapable of protecting the exceptional fish and wildlife, scenic, recreation and tourism values of the Sound from the incompatible uses that would inevitably encroach upon them.

A number of possible designations might be suitable for appropriate public lands in the Sound, such as federal or state wilderness, national park

or monument, national wildlife refuge, or national recreation area. Clearly, whatever designations might be chosen, we need to allow people to continue to live and recreate in the Sound. But we should not - as we sometimes do in this state - automatically reject wilderness for portions of the Sound as being incompatible with use by people. We can look especially to Southeast Alaska, where many local residents and communities, and not just card-carrying environmentalists, support additional wilderness designations as a way to protect both traditional means of making a living and the quality of life in the area.

The need for people to make a living but also to preserve their quality of life leads to another broad theme regarding land management in the oil-affected areas. We can "otherwise protect" other resources in the area by searching for ways to make economic use of our lands that are less environmentally destructive and more sustainable than our traditional modes.

1. We can reduce our demands on our natural resources by, as several people at last week's Eco 2 conference said, "redefining success" to include other satisfactions and values besides the accumulation of the greatest amount of money and the largest number of material goods. This of course applies primarily to those of us - but there are many such in Alaska - who are fortunate enough to have satisfied our minimal needs for food, shelter, productive leisure, etc.
2. We can make quality of life an important factor in all of our land use decisions, which in many cases will mean that we will decide not to undertake major activities that have a substantial adverse impact on the natural environment. We can recognize that quality of life brings people to and keeps people in the state; that people will sacrifice higher salaries or wages to live in an area with a high quality of life; and that those people can then, in many cases, save money by not having to travel as far to tour or recreate in a wild, natural environment.
3. We can search out and identify alternative, sustainable, appropriately scaled means of economic development - including fully recognizing that subsistence is an economy. We can focus less on worldclass or mega projects and on gross economic product, and more on high quality, sustainable jobs that require less capital, have less impact on the environment, and allow those who want to remain or live in rural communities to do so. Elstun Lauesen, with the Department of Community and Regional Affairs, is doing this sort of work right now, but my guess is that the percentage of the state (or university) economic development budget devoted to this type of work is minuscule. As an immediate, practical matter we need to redirect some of our monies and hire many more Elstun Lauesens.

Management of State-Owned Lands.

The amount of state-owned uplands in the Sound is relatively small, although many of the parcels are strategically located and choice. State-owned tidelands, on the other hand, are extensive. Since the use of them is critical to many resource development activities, and also to many existing economic and noneconomic uses of the area, the State will have a major role in determining the future of the Sound.

The existing State management scheme is not fully adequate. Although a lot of good work went into the plan, it appears to provide far more protection than it does, it by no means guarantees environmentally sound management. Plans are changeable; they have to be. But they rarely, especially perhaps at the state level, are changed to provide more resource protection. And proposed changes to authorize economic development projects rarely will not be adopted, whether adoption comes over the objection of the general public, as in the case of the proposed South Denali resort; or whether many members of the public decide, in the face of the possible materialization of temptingly large amounts of money or jobs, that development has subsequently become more important than environmental protection, as in the case of the Eagle River and Hatcher Pass resorts.

Additionally, most plans, including the PWS plan, rely heavily on guidelines and therefore postpone many decisions, including some of the most important ones. As a consequence, many fail to provide the predictability that would seem to be the major benefit of planning. They seem

to work well for many day-to-day, relatively minor decisions; for the major decisions that could really have a substantial impact, they are likely to be much less useful. Only legislative designations can more permanently protect valuable resources from the short-term temptations and pressures and provide the necessary predictability.

I would recommend several things:

House Bill 320 would establish the Alaska Coastal Biological Recovery Area; its benefits would apply to most oil-affected areas (not just Prince William Sound). The bill would give ADFG a major role in decisions affecting these lands and waters. Unfortunately, it appears to be stalled.

A State Wilderness Act would be a benefit statewide and provide one more necessary option for the legislative protection of state lands in the coastal areas. Lands needing protection include, ironically, state marine parks that could now be threatened because of their inclusion in a state park system whose mission has become fuzzy, and that has become a magnet in recent years for overly ambitious commercial resort projects. These projects, initiated by the Division of Parks as well as by the private sector, could better be steered to private lands - and of course there are many private lands potentially available on the coast - or to state multiple use lands.

The state should also be a good neighbor to adjacent federal land managers. An example of this need concerns proposals for the collection of glacier ice. Depending on the location, timing, and magnitude of the operation, glacier ice harvesting could be either a relatively benign and beneficial new industry or a totally unnecessary intrusion on far more important resources and uses. For example, is it really appropriate for the State, over the objection of the National Park Service, to authorize glacier ice harvesting in the waters of Kenai Fjords National Park during the summer tourist and recreation season in order to provide the luxury of exotic ice for trendy cocktail drinkers? I obviously do not think so.

Finally, again looking beyond Prince William Sound, we can take a major step towards protecting the fish and wildlife and scenic beauty of Kachemak Bay, and their many human uses, by completing the proposed agreement between the state and the Seldovia Native Association (SNA). Putting Kachemak Bay State Park back together again would not only benefit the SNA, but would also demonstrate that we are willing to devote state monies to it - and not just to traditional and too often ill-conceived schemes for resource development or extraction. And of course - and this is more that just an incidental comment - we very much support substantial efforts to explore the possibility of purchasing from willing sellers both other private inholdings, such as the ones within Kenai Fjords National Park, and private timber rights, such as those in Kachemak Bay State Park and in Prince William Sound.

Thank you.

DOUGLAS MILLER, PH.D.

Dr. Miller is with the National Wildlife Federation.

We have come here to examine restoration questions and we have looked at them in three different ways:

- Restoration of damaged habitat;
- Replacement of damaged habitat; and
- Acquisition of equivalent habitat.

We know the abstract, but are here to discuss the specifics of implementation, which we do not know. First of all, the information gathered on the damage caused by the spill needs to be openly shared. It has been gathered by several sources, the federal government, the State, Exxon, and various local interests. Everyone needs to have access to that information, because one of the main problems we are facing is that no one has had a comparable experience and no one has been able to examine all the data that is being collected.

We have heard several people address different aspects of the issues which we are facing. Yesterday Bob (Robert Adler) addressed the issues in a legal context. Dr. John Teal gave us an overview of his experience with spills, and cautioned us that you can do too much, and there may be cases where it's best just to leave the environment alone. We have also heard concerns on subsistence and commercial fisheries; that there has not been enough sharing of information. It was also mentioned that we need to address the whole biological picture and its interrelationships, and not just focus on a few "high profile" species like the sea otters, or the bald eagles.

One of the major questions we're left with is where will the monies for restoration come from? In August, the National Wildlife Federation, the Natural Resources Defense Council and the Wildlife Federation of Alaska filed a joint suit in the Superior Court of Alaska against Exxon, Exxon Shipping and Alyeska to establish a trust of up to one billion dollars which would go towards restoration. The monies would be managed as a foundation or trust, and would support studies by experts appointed by the court on both the short and long-term effects of the spill, as well as addressing continuing impacts. We are being asked to decide upon restoration techniques when we still do not know the extent of the damage! We need to look at the restoration and replacement of lost natural resources. Where that is not possible, we need to look at the possibility of acquisition of habitat for fish, wildlife, and other biota lost due to the spill as possible replacement of the ecosystem's productivity. The acquisition of additional natural land to compensate for the loss of the natural resource in the Sound is also something which has been brought up, but again, we still do not know the extent of the damage. The removal or containment of the oil is still an issue which needs to be addressed.

We have certainly learned a lot from the spill, now what we need is to work out the details of the plan. We have a great deal of interest in doing the right thing, we just don't know what that is. In closing, I would just like to relate a story that somewhat parallels our current situation with the restoration process. The story is attributed to Will Rogers, who, unfortunately had been dead for about four years when this supposedly took place.

Apparently there was a big cocktail party in Washington D.C. around 1939, just before our involvement in the war. A lot of bigwigs were assembled there, cocktail parties being where a lot of issues are settled in D.C. One of the issues which the senators were discussing was the problems we were facing with the Wolf Pack, the German submarines patrolling the Atlantic. What were we going to do about the German submarines patrolling the shipping lanes? It just so happened that Will Rogers was at this party, and he overheard the conversation. He was generally known to have an answer for almost everything, so one of the senators leaned over to him and asked "Mr. Rogers, what would you do?" and he responded, "Well, it's really very simple, all you need to do is drain the Atlantic, then the submarines will be stranded and you can fly over them and bomb them." Well, the senator scratched his head for a moment, and then asked, "But Mr. Rogers, how do you propose to drain the Atlantic?" to which Rogers replied, "I gave you the plan, it's up to you to work out the details." I think that pretty well summarizes where we are at this stage of the restoration process.

COMMENTS FOLLOWING PANEL #8 - ALTERNATIVE RESTORATION APPROACHES

COMMENT (to Edgar Blatchford):

Your comments are well taken in that the conservation community needs to be very sensitive to the rights of private landowners, private land ownership and the need for generating economic considerations from those resources. Do you have any suggestions to the conservation community to create structural links so that those problems of insensitivity can be worked out? It is an error on the part of the conservation community to think that we should try to buy vast amounts of Native land. I think what we have been trying to focus on is the question of whether there are conservation easements, narrow strips of timber along anadromous fish streams, worth purchasing. Do you have suggestions to create such a structure for land buyouts?

RESPONSE (Edgar Blatchford):

Thanks for the question, it is a good one. The best way to do this, and I do not mean to seem patronizing, is for all of us to go back and read the Alaska Native Claims Settlement Act (ANCSA). The study of Native American history was required in high school because the Natives in Alaska are the biggest landholders in the State and everyone who is in a public policy position knows something about ANCSA corporations and the goals and the intents of the U.S. Congress in creating this bold and noble experiment during the Nixon administration. Under the Settlement Act a whole bunch of organizations cropped up to address Native claims and Native problems. Do not ever make the assumption that because you have talked to one group of Native people, you have got the consent of the entire Native community. For example, in dealing in the Chugach Region, we have The North Pacific Rim which takes care of social questions. They are nonprofit and address issues like education, standard of living, etc. Then you have the Chugach Alaska Corporation. It addresses how to take a profit corporation and generate economic opportunities so that local people have an economic opportunity to make their own living, to receive a paycheck if that is what they desire. Under the regional profit and nonprofit corporations there are the villages with their own local government. It is much the same as if you would go to New York to talk to Exxon, but also realize that New York has a mayor. The same holds in dealing with the Natives. You have to realize that there are Native corporations and local governments, the village councils. Become familiar with the system.

One of the major problems we had in the early days after the oil spill, was that very few people knew about us. We had the Chugach map, and it was the only map available of Prince William Sound. We had just run off 2,000 copies to mail to our shareholders because we were preparing to deal with the 1991 issues, which have now been put on hold. The problem back then was that very few people knew about us, or how to deal with native corporations. First, we have to educate everyone. It is a constant reeducation process. If people are dealing with Prince William Sound, they should know the various Native organizations.

The day the oil spilled, we had planned an all-Chugach summit conference. It was postponed because we could not bring anybody in. Chugach began to realize that in dealing with the 1991 issues, we would have to bring in the Indian Reorganization Act village councils, the village corporations, and the other Native corporations of the region. So we had organized a meeting where all the people came in, the decisionmakers, the public policymakers of the Chugach region. Perhaps this could be the vehicle where the environmental community could come in. We have invited and talked with both State and oil industry representatives.

COMMENT (to Edgar Blatchford):

I am sure you have taken into consideration that the European peoples were also one time an indigenous group, and so you wish to affiliate with those people concerned about your sovereignty, right?

RESPONSE (Edgar Blatchford):

Chugach Alaska Corporation's goal is to fulfill the intent of the Congress of the United States. The Congress created the Native corporations when they passed the Alaska Native Claims Settlement Act in 1979, which said we should not create Indian reservations in Alaska, because in the lower 48 Indian reservations have become pockets for poverty. They did not want to go through that experience again, so they created free enterprise entities utilizing money from the federal government to create the economic opportunities for the Alaskan-native indigenous peoples. That is the mission of Chugach, to fulfill the intent of the Congress.

COMMENT:

Can we reduce our need for resource extraction by applying already extracted resource monies to the time payment plan imposed on individual and corporate entities to satisfy the reinsurers bottom line?

RESPONSE (Steve Colt):

Do you mean that corporations have to generate cash flow to cover their debt? It is possible to use restoration funds to retire debt on assets which in turn depend on resource extraction to cover their debt. One example of that is that any serious discussion about buying timber rights has got to take into account the investment in the Seward sawmill and to what extent those payments have to be covered by a cash flow continuum. You can do it, and we will have to do it if we want to pursue some schemes, but whether we want to do it or not is a policy call, and a question of values. But certainly it is possible, and will be required in many cases.

SUMMARY KEYNOTE SPEAKER

ARTHUR L. BUIKEMA, JR., PH.D.

Dr. Buikema is a professor of zoology at Virginia Polytechnic Institute and State University. He is also a senior scientific consultant to the U.S. Environmental Protection Agency, Office of Pesticides. His research focuses on the development of toxicological methodologies, biological monitoring and assessments of pesticides, oil products and hazardous substances.

SUMMARY OF OIL SPILL RESTORATION SYMPOSIUM

Introduction

To be discussing restoration is a simple admission that environmental quality was not protected! A badly damaged ecosystem is highly visible evidence of misplaced values (Cairns 1982). It addresses not only the ethical anesthetization of society, but also poor management. I remember my feelings when I first heard of the Valdez oil spill. Quite honestly, my feelings were driven by fear, fear of the unknown borne out of a lack of knowledge. Our knowledge of recovery and restoration processes after an oil spill, or many episodic events for that matter, is limited. Fear because I knew that probably there would not be answers to questions such as these:

- What will be the total ecological and societal impact of the spill?
- What do we know about the ecological systems that will be impacted? Without this information, how will we assess damage or identify restoration needs?
- What restoration methods can be used in Prince William Sound? What assurances are there that recovery efforts will be successful?
- What will be the ramifications of this oil spill on a society so dependent upon fossil fuel energy?

I also feared that any efforts to assess damage would be thwarted by denial of agencies, industries and individuals who may not have done their job properly and who would "point the finger" at everyone else involved without accepting some of the responsibility themselves. I was reminded of my young son who was "encouraged" to obtain cookies for his older siblings; a role inspired perhaps by greed and lax family values. When the cookie jar broke, no one was at fault, involvement was denied by all, and the blame was obviously projected to others. In the interim, we lost sight of the task at hand, i.e., to cleanup the mess on the floor and restore order.

In denial, communication ceased and trust among people was violated. The same usually happens among people who should be working to prevent spills, and who need to work together to contain and assess damage, begin restorative activities and prevent future accidents. In denial, each party invents their own "sense of reality" of what really happened and what can be done to restore a sense of stability. Like the cookie jar incident, these issues lead to further dysfunction and lost time in dealing with the problem at hand. In other words, all relevant parties act like a dysfunctional family that remains stuck in their fabricated reality, close-minded and not sharing.

Ultimately, my pessimism gave way to a sense of optimism and hope. But such optimism requires risk taking, i.e., opening lines of communication among all parties and sharing in the development of realistic goals and objectives. This symposium, and the series of public meetings which are to follow, are an attempt at opening up the process of identifying restoration needs to the public at large, especially those peoples whose livelihood and heritage are an integral part of Alaska. Mr. Blatchford (Chairman, Chugach Alaska Corporation) read a statement from the ative peoples whose life is a central component of the rainforests of Central and South America indicating their desire to be involved in the process or restoring these forests. The same concern needs to be addressed here. I know from my own experiences, that the most knowledgeable persons about a particular environment are usually not the academicians and public servants, but those whose livelihoods or personal sense of well being are intimately associated with that environ-

ment. These people must be included as an indispensable part of any restoration effort.

A good definition of restoration ecology does not exist because it is an emerging field. There is a paucity of basic information that would make restoration efforts efficient and expeditious. Even less information exists for recovery after oil spills. Part of this problem stems from the fact that many ecologists are studying already damaged systems and we do not know what was the original condition of these systems. Further, much information on restoration ecology and recovery does not appear in scientific journals, but appears in limited distribution reports or gray literature usually not subjected to anonymous peer review in the same fashion as it would be for a scholarly journal. Further, there are no standard methods available in the field of restoration ecology. Each locality, especially in the marine environment, is a unique environment and, consequently, little of restoration ecology is routine.

- **Restoration:** attempts to return an injured resource to its baseline condition or function.
- **Replacement:** substitutes a new resource for an injured resource.
- **Acquisition of equivalent resource:** purchases or protects other resources that are similar or related to the injured resource in terms of ecological value, functions or services provided.

I was invited to summarize the proceedings of this symposium and to discuss the results of an earlier symposium on the restoration of habitats impacted by oil spills. Many of the previous speakers have adequately summarized the comments made at this symposium. If a natural system is altered, its ecological role could be either eliminated or substantially changed. The change may be temporary or permanent. In a worse case situation, restoration to the original condition may be impossible. However, without adequate information on damages, especially long-term damages, it is difficult to talk about restoration needs except in generic terms.

Background

In 1980 Exxon asked John Cairns and myself to conduct a literature review on the restoration and recovery of habitats impacted by oil spills. The concern was, and continues to be, real. At that time worldwide, there were over 600,000 wells, 700 offshore oil rigs, 179,000 miles of pipe lines, 700 tankers, and 800 refineries. With these numbers and the extensive activities associated with the oil industry, the probability of an accidental major oil spill was, and is, great. In addition, there are thousands of "minor" (<10,000 gallons) spills each year. For example, upwards of 1,000 spills occur in the Chesapeake Bay each year. Approximately 70 percent of the oil spills in the United States occur in coastal waters and most of these spills occur while the oil is in transit (NAS 1975).

Our literature search provided very little useful information. Most of the literature dealt with prevention, containment and cleanup of oil spills. Unless an oil spill occurred in the vicinity of a marine biological station, there were no ecological studies with baseline information and/or long-term monitoring of recovery and restoration.

We convened a symposium in 1981 on the restoration of habitats impacted by oil spills (Cairns and Buikema 1984). To accomplish our mission, we invited scientists from academia, industry and regulatory agencies, and other interested parties, to review the problem of oil spills, share their experiences and by consensus determine which courses of action may work for the restoration and recovery of impacted habitats.

The symposium began with a summary of the vulnerability of habitats impacted by oil spills (Table 1). Panels were convened to evaluate:

a) rocky shores, sandy beaches, tidal flats and shallow subtidal bottoms;
b) seagrass ecosystems;
c) salt marshes and mangroves;
d) coral reefs;
e) tundra and taiga; and
f) fisheries.

No panels were convened specifically for freshwater or temperate terrestrial systems because even less information existed for these systems. However, many participants had experience in freshwater and a consensus was reached for freshwater systems (Table 2). More information is needed for these habitats since a recent study by the Wilderness Society indicated that of the ten major oil spills reported in the last year, over half were in freshwater or on terrestrial habitats.

As expected, several panels at the symposium had very spirited discussions. No attempts were made to predict the number and timing of catastrophic oil spills, i.e., no predictions were made of whether an episodic spill like the Valdez spill would occur once every 240 years. However, everyone agreed that oil spills may occur without warning at any time or place in the world and that an appropriate course of action must be taken immediately to reduce the environmental impact.

The first conclusion of this symposium was that most of our efforts should be directed at the prevention of oil spills by whatever means available. However, it was acknowledged that, even with the best of efforts to prevent them, oil spills will occur.

The second conclusion of the symposium was that mechanisms must be in place to control and contain oil spills. But this is not always possible because of weather, the type and amount of oil, frequency of perturbation, season of the year, wave energy, ecosystem potentially impacted (e.g., subtidal eelgrass meadow), substrate, etc. If an oil spill cannot be controlled or contained, then in spite of the increase in short-term toxicity and potential oxygen depletion, it was concluded that oil dispersants should be used before an oil slick inundates a critical habitat.

A third conclusion from the symposium was that the development of strategies to protect and restore marine resources depend upon so many factors that it is difficult to predict an appropriate methodology for restoration. Impacts are a function of the number of perturbations per unit of time, amount of oil, type of oil, persistence of oil, type and magnitude of cleanup activities, physical and biological structure of communities, season of year, and latitude. Further, recovery depended upon weathering rate, degree of removal or retention of oil, availability of organisms for recolonization of impacted sites, successional processes of specific ecosystems, sediment stability, and the restorative activities of man.

Another conclusion of the workshop was that while cleanup activities may facilitate ecosystem recovery, these activities will often cause more damage than the oil itself. Further, many restoration activities are potentially harmful to the environment. Consequently, the consensus was not to cleanup oil spills or attempt to restore an ecosystem in most instances unless these activities could be conducted with a minimum of impact to the ecosystem. A time frame for recovery was proposed for a range of ecosystems exposed to a variety of oils (Table 2). Most marine systems are highly vulnerable because their ability to resist change is low. These systems also typically have a low species diversity and/or organisms with specialized life strategies.

If restoration is a viable alternative, the last conclusion of the symposium is that strategies for the recovery or restoration of damaged ecosystems do not exist and need to be developed. The development of these strategies is wrought with problems which include a(n):

- Lack of an inventory of crucial or susceptible habitats that may be impacted by spills;
- Inability to define the "original condition" of ecosystems long exposed to societal stresses;
- Inability to define long-term adaptations or genetic changes in populations that may preclude restoration to a previously known original condition;
- Lack of understanding of the natural seasonal and temporal variability in ecosystems;
- Lack of knowledge of ecosystem recovery processes; and
- Need to consider the cost/benefit ratio of restoring an ecosystem to its original condition or the return of selected amenities at a substantial reduction in cost.

Advances since the 1981 Symposium

Unfortunately, the available scientific information remains severely limited. A recent major literature search produced very few relevant papers on restoration or colonization of marine habitats, and even fewer related to oil spills. Several possible reasons exist for this lack of information. Much of it probably centers on agency and societal lack of interest in long-term research required to understand recovery or restoration of our environment once it has been impacted. This is especially true for those environments that are difficult to study, i.e., marine ecosystems in general and those located in northern latitudes in particular. In a recent compendium on environmental studies on Port Valdez (Shaw and Hameedi 1988) the major obstacle to resolving questions about input, fate and effects was the lack of temporal continuity and the variability in quality of field data because research teams changed with the availability of funds. Apparently the law allows for restoration activities, but does not allow for long-term validation that the activities, or lack of activities, were worthwhile and protected our resources. Long-term studies are a necessary component of the restoration process.

Other reasons for this lack of information are possible. The United States is an energy intensive society; we have the highest energy use per capita in the world (Steger and Bowermaster 1990). Our excessive energy demands have become a right and, consequently, we have lost sight of the need to protect our environment and to understand the potential impacts to the environment. Further, society tends to forget environmental impacts once the aesthetic value or service is replaced or after the evidence of a perturbation is removed. To be blunt, as a society we have become lackadaisical with a minimal to nonexistent environmental ethic; some would argue that we never had an environmental ethic.

FACTORS AFFECTING RESTORATION

Uniqueness of Marine Habitats

Marine habitats are so variable that each locality is a unique habitat. An inventory of critical or susceptible habitats must be identified near any location where oil activities occur, from oil wells to shipping lanes to refineries. Although placement of offshore oil platforms requires identification of critical or susceptible habitats, the establishment of oil shipping lanes does not. Why not? This makes no sense because the majority of acc-idents are transit accidents (75 percent) whereas the number of accidents offshore is minor (1.3 percent) (NAS 1975). Even the acquisition of oil leases requires an Environmental Impact Statement where critical habitats must be identified for preservation and as epicenters for recolonization. It is proposed that some monies be used to identify critical and susceptible habitats not only in all of Alaska, but in the coastal water and freshwater ways of the United States.

Once identified, these habitats should be studied in sufficient detail to understand their uniqueness. Physical parameters that make each ecosystem unique include latitude and longitude, tidal regime, seasonality and salinity. Without this information, it may be difficult to determine if restoration methods used in one area can be used in another area. For example, a comparison of impact to a Norwegian coast (latitude N 62) would probably be more similar to one in Nova Scotia (latitude N 45) because of comparable seawater temperatures.

To assess the ecological impact of oil spills or oil spill cleanup operations, background information is desirable on the species present, their life histories and interactions. Data are also needed on the seasonal and long-term natural variability of biological systems that have been or could be impacted. Very few studies have had the advantage of comprehensive research conducted before an oil spill. Where this information existed, the oil spill usually occurred near a marine biological station. For example, in the Santa Barbara Channel at one sandy beach, the number of species ranged from four to twenty-five species over a ten year period. At another site less than a mile away, the number of species ranged from zero to fifteen species.

Evidence of fish kills in Prince William Sound were reported after the oil spill. At this symposium, we were also presented with Alaskan fish catch data for the last 90 years which illustrated a major temporal shift in numbers with a low occurring recently. Then we were told that the largest escapement of salmon in recorded Alaskan history was reported last year and it was a

banner year for fish catch. In the short-term it may be difficult to prove that the Valdez spill had a major impact on fisheries in Prince William Sound, much less Alaska. Before the damage to the fish population can be adequately assessed, a long-term record, at least long enough to encompass at least one complete breeding cycle of ecologically and economically important fish will be needed.

At best, damage can be assessed by simultaneously comparing data for oiled and unoiled (reference) sites which are in close proximity to each other. This assessment is easiest in flowing freshwater systems, but it is not easy in coastal areas or in the case of very large spills. Because each ecosystem is unique and our measurements are typically based on structural parameters, these types of comparisons may not be valid.

Toxicity Data

Data on the susceptibility of various species to oil are important to understanding the impact of a spill on populations and communities. This information also influences our ability to restore ecosystems. Differential responses to stresses are due to genetic differences within and among species. Further, many environmental and seasonal parameters affect organismal and population sensitivity to these stresses. In effect, introduction of a new species, or a species adapted to another environment, to replace an impacted population may not work if the introduced species is more susceptible to pollution than the indigenous species.

Effect of Restoration Activities

Restoration activities in an area as large as Prince William Sound could create other problems. If organisms need to be collected for recolonization, care must be given to the potential destruction of other environments by removing too many organisms and reducing these populations and communities to a size too small for survival (Gilpin 1988).

There is also a possibility that reseeding of species in an impacted area may not be successful. One reason is that genetic differences in populations may preclude their survival and reproduction in a new environment. Another is that the introduction of a species in advance of natural succession probably will not be successful.

Effects of Simultaneous Research

According to the popular press, there are 60 research projects being conducted by various agencies at a cost of $65 million dollars (Washington Post, March 18, 1990); 26 studies assessing the impact of oil spills on fish and shellfish, 14 on birds; 7 on marine mammals; 6 on land mammals; and 7 on air, water, coastal habitat and sediments. Assuming that Exxon is conducting at least as many studies, many probably in the same localities, one must ask what will be the potential impact of simultaneous research activities. Oversampling may deplete local flora and fauna and have a more detrimental impact than the spill itself. If simultaneous studies are ongoing with potentially different methods to address similar questions, will the interested parties be able to adequately address damage assessment and restoration needs? Again a cooperative effort may have been more beneficial.

Effect of Prolonged Legal Action

If restorative activities are necessary, the lack of an early settlement could delay the acquisition of funds. Then it may be too late to conduct any meaningful work! Also a delay in settlement may mean that restoration activities will occur with less monies after the settlement is corrected for inflation.

Public Perceptions

Large oil spills will happen again and again. Oil spills will continue to increase in incidence and numbers so let us not delude ourselves that a spill as large as the Valdez spill will only occur once every 240 years. It could and will happen again. In a recent report, the Wilderness Society (Washington Post) indicated that oil spills in excess of 500,000 gallons occurred in Oklahoma and Illinois within the last year. The three most serious spills since the Valdez were the release of 1.3 million gallons from a pipeline in North Dakota, 1.25 million gallons of fuel oil from a storage tank

in New Jersey, and 800,000 gallons of fuel oil from an overfilled storage tank in Connecticut. Other spills included a 211,800 gallon kerosene pipeline spill in Virginia and a 5,000 gallon underground storage tank spill in Maryland.

There is a tendency to ignore small spills. It was predicted by a consultant that an average oil spill in the vicinity of the Port Valdez facility would be between 1,000 to 2,000 gallons. We cannot ignore the cumulative effect of "multiple small spills" or diffuse inputs. In 1975 the National Academy of Sciences estimated that 45 percent of oil pollution to oceans came from river runoffs, sewage and harbor operations. One need only be reminded of the tragedy of the commons (Hardin and Baden 1977). In colonial days cattle were kept in a common area in the middle of town. Many thought that the addition of just one more animal would have no impact because the addition was minor. In reality, the number of cattle became too great and the commons was destroyed. This is common place in society today in denying the potential cumulative impacts to the environment; it even affects the registration of chemicals to be released into the environment for seemingly beneficial purposes.

Complacency and Dependency

Complacency is dangerous. There is a prevailing illusion that because of cleanup operation and the cleansing action of the winter storms that the environment is returning to normal. This perception is occurring while at this symposium we have been told that certain environments may be irreversibly damaged. When tough anti-oil sentiments are in conflict with the scarcity and cost of oil, and the high energy demands of the United States, the institution of policy reforms that are needed to protect the environment probably will not occur. This is an issue for society at large.

On a more local scale, Alaska has become highly dependent upon oil revenues such that there are no sales or income taxes and each resident received a yearly refund under a revenue sharing program. Again, the potential for policy reforms is significantly diminished unless people are willing to risk a change from being dependent upon oil monies.

Identification of Restoration Needs

The previous speakers have identified many excellent and ambitious restoration needs. While many speakers wanted to return Prince William Sound to its original state, it was rightfully pointed out that intuitively we know that this cannot be accomplished. Mr. Adler indicated that we should attempt to restore those habitats to the fullest extent possible, replace them with another type of resource or acquire equivalent resources. Most important, he indicated that these should be simultaneous activities and not a sequence of attempts.

Many references were made to the ecological resources which were impacted by the oil spill. They ranged from habitat protection to increasing habitat diversity to the introduction of species to reestablishment of communities. Ideas included an increase in fish hatchery production and the establishment of shellfish and finfish mariculture to replace lost subsistence fisheries. Other suggestions included examination of why several of the aquatic resources, such as fishing, have been diminishing for years prior to the oil spill.

Coincident with restoration of ecosystems, speakers called for changes in policy at local, regional, state and national levels. Examples included restricting the use of impacted habitats for an indefinite period of time to allow for recovery, restricting the number of fishing and hunting permits to reduce pressure on the populations, restricting fishing techniques to protect marine mammals and birds, restricting the number of boating permits to tankers, requiring an active and functional oil spill response team, etc. These policy changes will mean a reduction in income for various groups of people.

There were many direct and indirect impacts of the oil spill on subsistence cultures. Impacts included a major shift in the village economies, disruption of family life because parents were working on cleanup efforts and not caring for children in the traditional household, disruption of social and cultural activities, concerns for human physical and mental health issues, degradation and destruction of archaeological ruins, etc. Restoration needs that were identified included enhancement of local subsistence bases, relinking

village fishing industry to the commercial fishing industry, diversification of the village economy, education, identification and protection of a archaeological sites, and development of an archaeological response team similar to an oil spill response team.

Other people with needs that were identified were charter boat operators and owners of resorts located in the spill area who lost business and canners and processors of fish that were without jobs. Educational opportunities for Alaskans, tourists, and people outside the Alaskan borders were cited as a need, as well.

Many alternatives were suggested if habitats could not be restored or replaced. It was suggested that funds be used to acquire terrestrial habitats to protect biodiversity, facilitate rehabilitation efforts, develop new fisheries, restore seafood and tourism markets, establish scholarship funds for students interested in environmental issues, establish educational programs, purchase back oil leases and timber rights, and so forth.

An overwhelming message was that the restoration must be a cooperative effort involving the public, special interest groups, academe, and agency and political representatives. Further, a request was made that the scientific review process for damage assessment and restoration activities should have a citizen's group as a watchdog. This suggestion should be taken seriously because it will be necessary to either develop or redevelop trust. There is considerable distrust since the federal government attempted to settle this case out of court.

This symposium has identified so many different needs, and offered so many suggestions for restoration, replacement and acquisition of equivalent resources that is difficult to see how all these needs are interrelated. These needs encompass a broad range of issues from single habitats and species to communities of interacting species; from ecological issues to impacts on cultural legacies; from economic concerns to policy changes; and from spirituality to the restoration of a global environmental ethic through education.

Several speakers emphasized the need to view the restoration process as a whole system, rather than a series of fragmented pieces or species being reestablished. While the needs identified in this symposium appear to be disjunct, they are not. These needs represent the total impact of the Valdez oil spill to society as a whole. They can be viewed holistically or multidimensionally rather than longitudinally (from river to ocean) or temporally (over seasons). Leopold (1949) viewed the ecosystem as a clockwork mechanism with each component analogous to a cog of a gear interacting with cogs of other gears. The more gears, the more complex and precise the instrument.

If we expand Leopold's view from gears to multidimensional spheres interacting at different levels of organization, i.e., spheres within spheres, we can begin to see how these needs are indeed interrelated. Figure 1 represents a two dimensional perspective of these needs and their interrelatedness. This figure does not address all potential issues.

At the simplest level, concerns have been expressed for a particular aquatic habitat or species, or a community of interacting populations associated with the marine environment. These parameters may need to be rehabilitated to achieve a particular function or need. Because the aquatic environs of Alaska are already in the public domain, the acquisition of an equivalent resources such as terrestrial ecosystems has been proposed. On the surface, acquisition of a terrestrial habitat to replace a damaged aquatic habitat may not make sense. However, when the acquisition of terrestrial habitat is considered as a replacement for lost subsistence fisheries and the restoration of various human needs, the concept is extremely valuable. Basically, we are dealing with potentially renewable resources. Many of these resources could be further protected or enhanced by changes in policies at the local, state and national levels.

Another topic which was presented and discussed was the impact of the oil spill to nonrenewable resources. The destruction of archaeological sites, impact on subsistence family life and disruption of tribal customs are but a few of the impacts which this oil spill has caused. In addition, several speakers mentioned spirituality as a resource that needs to be protected and restored. The concept of spirituality encompasses many dimensions of our being and raises the issue of restoration to a new level for consciousness, integrating aspects of our life beyond biological systems.

Spirituality deals with those values and beliefs that are the essence of our being. Spirituality includes our personal communion with nature and the understanding of a power greater than ourselves as evidenced in nature. Policy changes at the local, regional and national levels are necessary to restore and protect this critical resource. In addition, education is needed to inform the general public about this nonrenewable resource and why it needs to be protected and restored.

Last, several speakers asked for a greater educational effort for the public at large, not only for Alaskans, but visitors to the state as well. In addition, several speakers suggested policy changes that could have national significance. Underlying these requests is the issue of an environmental ethic that transcends those people dependent upon Prince William Sound or Alaska; it encompasses the totality of man within a nation and beyond.

Is Restoration Possible

There is no question that there has been a major insult to the environment and we should attempt to prevent accidents of this type from occurring again. Until we identify the critical habitats and assess the damage, we cannot adequately discuss restoration and recovery or the other option proposed in this symposium. Data are sequestered by different parties each with its own specific agenda. When the data are made available, who will peer-review the information? More importantly, will the impact and needs be viewed as a system instead of a series of isolated component parts? Actions to protect the environment tend to be fragmentary rather than aimed at protecting the system as a whole.

But what are the principle objectives of obtaining funds for restoration, replacement or acquisition of equivalent resources? An ideal goal is the return of ecosystem structure (e.g., species or trophic levels) and/or function (e.g., services or goods). In many instances this goal may not be possible. A conclusion of the 1981 symposium was to leave nature to itself and give it time to undergo natural recolonization. If restoration activities, including cleanup activities, are needed, they should be judiciously thought out before they are undertaken to ensure that the damage due to these activities does not add to or exceed the damage from the spill itself. At a minimum it may be necessary to protect critical habitats from further degradation (e.g., protect against erosion) or facilitate the return of structure or function (e.g., providing artificial reefs for the development of fisheries).

Public support for restoration work will diminish if more is promised than can be delivered. Because of our lack of knowledge on restoration ecology and baseline conditions for the impacted habitats, we may not know if what we choose as a restoration method will work.

We cannot predict the outcome of a course of action in restoration ecology today because the field is in an early stage of development. If restoration ecology is to be successful, it will require taking risks. Solutions are not easy and success demands that risks be taken. Some risks will fail. There are at least three levels of risks that can be taken.

The first is a risk to trust, communicate and share information among groups that typically confront each other. The restoration process must be open, visible and accessible. Dr. Clark called for a multidisciplinary team to work on restoration, a team that represents a cross section of values and beliefs. These groups must work in close cooperation with each other. Until we understand each others concerns and limitations, we probably will not make any progress in the restoration of habitats damaged by this oil spill. Given the magnitude of the spill, it is even more important that there be a cooperative effort.

The second level of risk is an outgrowth of the first level of risk. Any attempt to recover or restore a habitat will require that a choice of methods will need to be made. It will require a consensus based on best available information from all parties because of the variables that are unknown about most ecosystems. This risk may require use of different, often untried, techniques. It will require a cooperative effort with no blame projected in the event of a failure.

The third level of risk is to take a stand to break an addictive cycle of environmental degradation. This may occur by demanding changes in laws and policies regarding environmental protection and utilization of resources. It may require intensive educational efforts. But it will require a coalition of groups and individuals standing up for their beliefs. As Dr. Weeden indicated, if we believe in restoration, then restoration will become a way

a way of life; more importantly, environmental destruction will remain a way of life. We need to go beyond restoration, we need to develop and/or restore an environmental ethic that diminishes our need to restore damaged ecosystems.

All systems operate as a series of interacting parts, whether the system is an ecosystem, a family, an agency or society at large. Viewing a part of the system as an isolated fragment does not allow us to understand the role of that part in the system. Further, the whole of the parts is greater than the sum of each part. A change in one part may make the system function better or worse. From a family perspective, it only takes one person to affect a change in the family. Either the family changes, the family member leaves the dysfunctional system or the system stays dysfunctional. The only way to try to change the system is to believe in oneself and risk change.

Restoration can occur, but will it be successful? We do not have an answer to that question. If our expectations border on arrogance and our goals are unrealistic, we will be disappointed and our peers will have no trust in what we do. If we state our goals as a set of fragmented pieces and not holistically, then we will fail, again. Our goals should be stated in the context of the full range of concerns: ecological, legal, societal, economic, etc. We should be optimistic in that there are many things that we can do. Past experience in similar situations blankets this optimism with pessimism. Even though there is much that we can do, what will we really do? That depends on what you believe in and your willingness to stand up for your beliefs.

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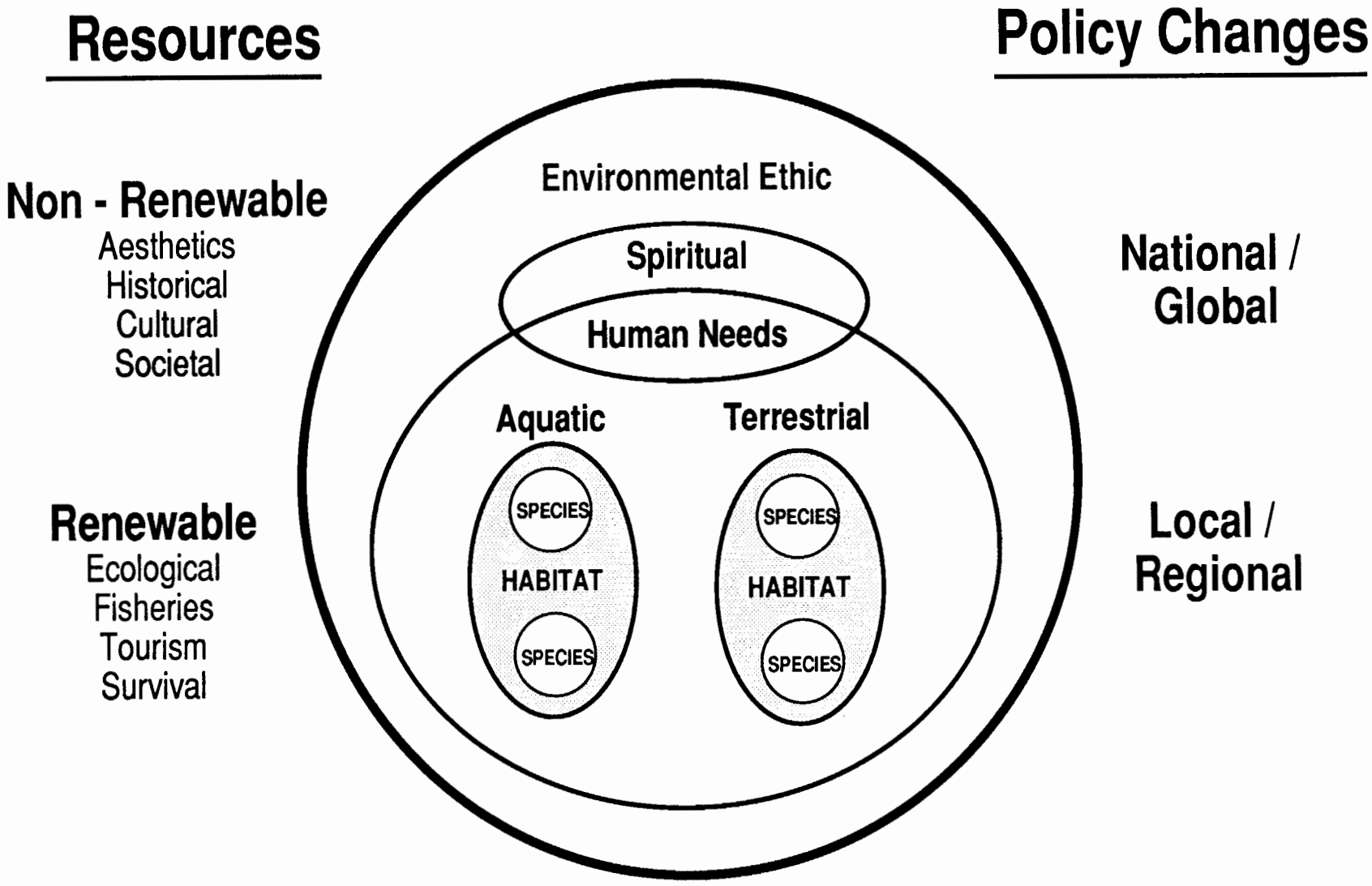

FIGURE 4
Relationship Among Restoration Needs

Table 1. Vulnerability of Habitats Potentially Impacted by Oil Spills (Gundlach and Hayes 1978). Scale: 1 = Lowest and 10 = Highest

Scale	Habitat	Cleanup Recommendation
1	Exposed or cliffed rock headlands Good wave action	No Cleanup
2	Eroding wave-cut platforms Good wave action	No Cleanup
3	Flat, fine-grained sand beached Compaction prohibits oil penetration	Mechanical Cleanup
4	Medium-coarse grained sand beach penetration of oil likely	Only on High Water Swash Zone
5	Exposed, compacted tidal flat Oil penetrates deeply	Cleanup Difficult No Cleanup
6	Mixed sand and gravel beaches Penetration of oil and rapid burial Oil may persist for years Mechanical cleanup can cause major erosion	Cleanup Difficult No Cleanup
7	Gravel beaches Oil penetrates up to 60 cm and persists as mousse for long periods	Cleanup Difficult
7-8	Coal Reefs	Not appropriate
8	Sheltered rocky coasts Oil may not be washed off for months Residual toxicity low but may alter habitat and slow recovery process	Cleanup Usually Not Recommended
9	Sheltered estuarine tidal flats Natural cleansing may take years	Cleanup Not Recommended Unless Oil is Heavy
10	Sheltered marshes and mangrove coasts Difficult to clean	Cleanup Not Recommended Unless Oil is Heavy
???	Subtidal soft bottoms, seagrass Communities and freshwater systems; once impacted may incur long-term damage	Not Appropriate

Table 2. Summary of importance, Vulnerability, and Recovery Potential Of Aquatic Ecosystems Potentially Impacted by Oil. N.A. = Not Appropriate

Habitat	Importance If Known	Vulnerability to Oil Spill Damage	Vulnerability to Oil Spill Cleanup	Ecosystem Ability to Change	Natural Recovery Period in Years
INTERTIDAL SHORE					
Sandy Beach		Moderate	Moderate	Low	0.5 to 4
Rocky Shore		High	High	Mod-Low	0.5 to 4
Tidal Flat	Bird Feeding and nesting.	High	High	Low	5 to 10
INTERTIDAL WETLANDS					
Marshes	Breeding and nursery grounds for fish and wildlife. Erosion control; nutrient trap.	Low-High	Very High	Low-High	2 to 20
Mangroves		High	Very High	Low	25 to 80
SUBTIDAL SYSTEMS					
Seagrass	Fish feeding and nursery; sediment containment and stabilization.	???	N.A.	High	0.5 to 50+
Coral Reef		???	N.A.	Low	10 to 50+
Soft Bottom		High	N.A.	Low	10+
Rocky		Moderate	N.A.	High	2+
FISHERIES					
Offshore	Commercial fisheries.	Low (except spawning)	N.A.	High	???
Nearshore		Mod-High	N.A.	Low-High	???
Coral Reef		???	???	???	???

Habitat	Importance If Known	Vulnerability to Oil Spill Damage	Vulnerability to Oil Spill Cleanup	Ecosystem Ability to Change	Natural Recovery Period in Years
FRESHWATER					
Fast Flowing	Fisheries	Moderate	???	Low	3+
Large River	Fisheries	Moderate	???	Mod-High	5 to 10
Ponds	Aquaculture	High	???	Low	10+
Lakes	Fisheries	Low	???	High	???
Tundra/Taiga		High	High	Low	30+

OPEN MICROPHONE SESSION

COMMENT (Dick Bower):

My name is Dick Bower, I am an interested Alaska state resident. I would like to say a bit beyond that. I retired in 1984, and so this is one of my first forages out on something that I am very much interested in. In order to put my perspective in a frame work to allow you to understand why I want to make some comments and questions, let me say that the last eight years of my professional experience in Alaska was in connection with nine Aleutian communities, villages and schools ranging from the Aleutian Peninsula to the end of the Chain. Prior to that my experience in Alaska has been all over the State, but not in Anchorage. I spent a lot of time in various parts of the state. Prior to my coming to Alaska on a permanent basis in 1973, I served as a consultant to the Nature Center's planning division at National Audubon and at a number of different locations in the lower 48 with educational organizations, community groups or governmental agencies. I didn't want you to think I only came here because it was free.

It seems to me that the information, data collection, and dissemination of what's going to go on now as a result of what you do, combined with the fact sheet that says there are 60 studies with a first year budget of over 35 million, that means that in terms of the environment of PWS it's going to generate a lot of information and data. In terms of publicity for this particular meeting today, I wouldn't be here except that there were about three sentences in an article I was reading that mentioned this symposium. I double checked this Monday. I'm not being critical, but I guess I would like to know what it takes to get the media to responsibly share in this matter?

I want to paraphrase Dr. Jordan, "people should be better off because of the restoration process." I would like to tie to that to say that "people" in its broadest definition means at the local, regional, national, and international level. We sat here yesterday and heard about the Gray's Harbor spill affecting Canadian land and waters, that's already international, that's fairly obvious to see. Roger Clark indicated a need for emphasis for real involvement and understanding of people, or the public. Another question is what is the role of education? Public school, post secondary, adult, or the public in general? It's a problem not just here, but in the urban, suburban, and rural areas of the nation.

There is damage to environmental and cultural elements during the spill assessment process due to unskilled and insensitive individuals at several levels of activity. I think that was indicated by some of the presentations that were made. There may be continuation of this, even in the restoration process, unless action is taken to lessen impact in a most effective manner. I served for 10 years on the Alaska State Vocational Advisory Council. I wish someone from that board could have been here to hear what's been being discussed these last two days. The reason I mention this is that Seward has the only Alaska state operated vocational/technical center. They have contracts to work with the petroleum industry in turning out technical workers, and others. This is right within the area we're talking about. It seems that public information and education is an element that is missing from the restoration process as it's now outlined. The last speaker emphasized this. My recommendation: one of the things should be something like (please don't use the title) a restoration interpretive center, not only looking at static facilities, but dynamic programs that can be utilized to influence the knowledge and understanding of people in public schools, universities, and communities, and all those who may come to Alaska.

COMMENT:

A Member of the audience inquired as to why incendiary devices were not used to control oil, given that weather conditions were favorable to this type of action.

Panel members responded that igniting the oil spill had been considered as an option, and was dropped from consideration for fear that it might be more detrimental than beneficial to the environment.

RESPONSE (Brian Ross):

With all the speakers and the limited time available, people could not present ideas in great detail. We do feel it is important to explore many of these ideas in greater detail and want everyone to know that we would appreciate any detailed comments, either written or vocal.

COMMENT:

The author Kenneth Bolding wrote about the tension between the heroic and economic man. He said that the heroic man embarrasses an ideal and pursues it without regard to cost. The economic man is a constantly calculating cost/benefit analyst. Since the spill has happened, we have become the economic man, more concerned with money than our ideals. This is particularly clear in the lack of information related to the damage assessment that has been released by the State and Exxon. Even the experts here today admitted that they didn't know anything specific about the spill. We know we are suppose to do something, but we don't know what we are suppose to fix.

Even though, as many speakers noted, the value of the Sound transcends money, the whole argument is being phrased in money. There are things that have not been done, there are things that will not be done, there are approaches that will not be taken, all because we are concerned about litigation.

I think that the State's position is surprising, because in court, the State's going to lose; I mean we can not even convict little Joe Hazelwood. How are we going to stand up against the armies of experts and lawyers that Exxon is going to have in court! I think we have to recognize this. I know it is an unpleasant reality. I think we will get a settlement, but that probably will not occur for a decade or two. When it does come, does anybody believe that the legislature is really going to appropriate any monies for the environment?

We need to get that damage assessment information released. The State must take a stand and say 'Yes, we may lose some of the money over the long run, but we need to release that information so we know how to act'. This would also put pressure on Exxon and the federal government to show they are more concerned about Prince William Sound than they are about the money issue.

I think one way to accomplish this is for people to take a stand and refuse to do research in the Sound unless the information is going to be disseminated immediately. Or perhaps some sort of petition.

We really can not expect the public to come in here and get involved without information. We look around the room now and there are very few people here. If at your next meeting you told people that this information would be available, you would have a room full of people, and a lot of media coverage. You need this to get people's attention, to get their input.

Another point is that public participation was stressed as being an important part of this process. I am very appreciative of having this opportunity. However, while we have done a good job at recruiting Ph.Ds from all over the country, we have failed in recruiting the local public. There were very few black or Native peoples here - most everyone here are middle-aged, middle-income, white males. I think we have failed to bring in the public. Also, If you want the public to participate, the comment period should be earlier in the process, not at the end of two days of technical talks. Unless you had a comment pertaining to a particular speaker, there really was not a time set aside early for comments like I am making now.

When you publish these proceedings, I think they should be written so that the general public can understand them. I realize that many of the speakers spoke off the cuff, but I think it would have been helpful for the public to have copies of their presentations before the symposium began. I think there should be another meeting in Anchorage after the proceedings are published.

Something that is kind of outside the scope of this group, but plays an important part in decreasing the public's desire to make public comment, are published comments of government agencies. The Commissioner of DNR was basically reported to say that public comments received during a public meeting relating to an

issue in Southeast Alaska were meaningless, because all the decisions had been made beforehand. Concerning another meeting related to the Denali South Visitors Center, the director of Parks for DNR was reported to say (and I do not know if it is true) that the comments made by people that had come to the meeting were not very worthwhile because most of the people just came to complain. When the public hears these types of comments, and then are not allowed to comment until the symposium is nearly over, what incentive is there for them to participate? I think the public participation process has to be refined.

RESPONSE (Stan Senner):

You make a number of good points and there is no reason here to respond to them item by item, but several things do bear response.

Most of us up here share the frustration at our inability to release data coming from the damage assessment. We are not on the legal team that made those decisions, and really not in any position to defend those judgments. I will say that from the State's standpoint, the governor has taken the position that the State is eager to share that data as soon as a deal can be made with Exxon to mutually share their data with the public.

You also mentioned concern as to weather the legislature would appropriate funds for the purposes which have been discussed here. I think it is our hope, and certainly our assumption that the legislature does not have to make a decision, per se, to release these funds. The notion is that under federal law there is the requirement that restoration funds are to be spent to restore, replace, or acquire equivalent resources, and decisions about their use are, in fact, not a legislative decision.

With regard to this particular meeting and the way it was structured, you made some good points. It would be a very good idea to come back to Anchorage and have another meeting to receive informed public comment. The structure of this meeting was as much to educate ourselves, as well as the public who wanted to hear the collective experiences of people from around the country that have been involved in restoration. To us, this seemed an appropriate way to start the process, and it is certainly a long way from the end of the process.

COMMENT:

There's one thing I would like to say about the legal aspect. I really think that we need to be aware that we have a slim chance of winning the legal battles with Exxon, and we should concentrate on getting that damage assessment information released, and not wait for litigation to begin.

COMMENT (Jed Whittiker):

You spent two days meeting. I want, to know what you learned from the public about restoration? That is the purpose - what did the public give you? I was not hear for most of the Symposium, can you summarize for me what you learned from the public over the last two days?

RESPONSE (Stan Senner):

There are probably a lot of different answers to that. I see our role as identifying the widest range of ideas and suggestions that we have received from the public, and not making judgments on their merit now. I personally have 20 pages of notes of suggestions make by both the audience and the speakers. I do not think I could really tell you what I have learned except that there are really a lot of ideas out there. A lot of people have on-the-ground and on-the-water experience, and we will want to talk to them in greater detail. But as far as identifying specifics, I do not think I am in a position to do that at this time.

RESPONSE (Frankie Pillifant):

I do not think at this point we are going to stand up here and tell you which restoration techniques we are most interested in. There is no way we can synthesize that information here and make on-the-spot decisions about what we have heard.

I will have to tell you honestly that I am a bit disappointed at the low public turnout, and it indicates to me that we have to go further in our efforts in getting the public involved in the process. I am not sure exactly how that will happen at this point. The other aspect is that in regard to people who do come, and people that do talk, we will be talking to them in more detail because we know their interested. We

will continue to solicit ideas from interested people.

COMMENT (Jed Whittiker):

What have you heard at this symposium that you have not heard before?

RESPONSE (Brian Ross):

What we have all learned is that we do not know a whole lot about what specifically to do to restore Prince William Sound. What we have learned over the last couple of days from the public, and I consider the speakers as the public because their presentations were not prepared statements from the agencies for the most part, is that there is a wide variety of approaches we can take. Some of those approaches are consistent with one philosophy of the quality of life or another, but there is quite a universe of things out there that can be done.

One thing maybe we did not make clear enough up front is that this really is the beginning of a planning process. Right now, as you are probably aware, we really do not have a settlement with Exxon. What we are trying to do is to identify all the ideas people have, and make a list of what can be done once we do have the money to do the restoration work.

What we have learned is a lot of what people consider as the important issues, and what people think are the important things to consider in terms of restoration. But we are still in the early process, just starting to hear, just starting to learn.

COMMENT (Jed Whittiker):

What were the top three or four ideas?

RESPONSE (Brian Ross):

I will not rate them as the top three or four, but I will tell you some of the many ideas presented. The ideas included all aspects of restoration, what we have referred to as the trilogy: restoration, replacement, and acquisition of equivalent resources. Some of the ideas mentioned included:

- Techniques to restore habitats such as planting eelgrass and dune grasses;
- Creating habitat to replace habitats that were effected by the spill;
- Using mariculture and hatchery programs to repopulate areas or replenish their food base; and
- Removal of introduced predators such as foxes from islands that support seabird rookeries, to allow these rookeries to expand, and repopulate impacted seabird populations.

We also heard ideas transcending strict biological approaches like purchasing timber rights or changing land management policy to protect wildlife, and establishment of tax incentives for protecting lands.

The few ideas I have mentioned are not exhaustive of the good ideas we have heard the last two days. I think what Stan said to you in the beginning is true. I have over 30 pages of notes as well.

All the presentations and public comments occurring during the last two days will be summarized as a proceedings to this symposium, and will be available for public review sometime in June. This will also include summaries of the public meetings to be held in the small communities next month.

RESPONSE (Rick Oestman):

I would like to add one more thing to what has been said. One of the things I picked up on is that we are dealing with an extremely complex system. Like any system, whenever there is an action, there is a reaction. So I think what we need to focus on (in addition to individual methodologies), is the integration of methods that are compatible. Prince William Sound is a big system, and there are lots of interacting parts, physical, biological, and cultural. So we need to think on the grand scale as well. For instance, we heard ideas of buying native timber rights from one party, and the potential cultural impacts that could result from that kind of purchase from another party. These ideas may not be compatible. We are just going to have to get all the interested parties working, and put together a plan that is well integrated, using compatible methodologies.

APPENDICES

Appendix A

APPENDIX A

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Appendix B

APPENDIX B

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TUESDAY, MARCH 27

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Appendix C

APPENDIX C

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Chugiak, AK 99567

Alaska Department of Fish & Game
Habitat Division Library
333 Raspberry Road
Anchorage, AK 99518-1599
Attn: Celia Rozen, Librarian

Appendix D

APPENDIX D

Written Comments

I would like to see fisheries enhancement work supported financially in the Cook Inlet area - Specific Prospects: Paint River Fish Pass, and Chelatna Lake Stocking Program.

The "restoration process" has a very high potential to run awry - due to lack of mandated citizen and industry advisory process. This work group is definitely a valid attempt to give input, it will be interesting to see the ultimate action taken - if it reflects this input.

Paula Keohane
P.O. Box 112565
Anchorage, AK 99511
(907) 345-7743

Restoration of the environment damaged by the Exxon Valdez oil spill will require decades. It will largely be natural processes that result in the restoration of oil-impacted areas. It is important that those involved in restoration efforts, as well as the public, are not deceived into believing that restoration can be substantially accelerated through the expenditure of large amounts of money. The idea that total restoration is possible on a short-term basis has been fostered by statements made by those in positions of responsibility such as oil industry spokespersons, Coast Guard officials involved in the cleanup, and President Bush. The major effort in oil spill cleanup has been directed toward the oiled beaches. It is obvious that this is largely a cosmetic action that serves the interest of the oil industry ("out of sight, out of mind"). Also, the technology is not available to clean up oil present in the water column or on subtidal substrates.

Given the above circumstances, it is important that restoration monies that may become available not be spent in a frivolous and wasteful manner before natural weathering and recovery processes have had time to complete the "cleanup" of the oil and reestablishment of the primary producing organisms within the affected ecosystems. The concept of a restoration endowment fund that will assure the long-term availability of monies dedicated to enhancement of the natural environment affected by the spill appears to be an extremely effective method of addressing the restoration issue. It would also place emphasis on the extended period of time required for recovery from the spill and the concurrent need for extending the availability of restoration funds.

The Restoration Planning Work Group should also be cognizant of the importance of fully informing the public of what is involved in restoration of the areas affected by the oil spill. The public is understandably irritated and frustrated over the lack of information that is being made available from the assessment of the spill impact. This effort to inform the public should stress the complexity of the ecosystem relationships affected by the spill, the slow processes of recovery, and the need to closely monitor the changes that will be

taking place over time. Such an educational process should be an integral and continuing part of the restoration plan. Other interests may tend to oversimplify and play down the values of the natural environment that have been lost or damaged by the spill, but an object of the restoration plan should be to maintain the focus of the public on the affected areas, the environmental values involved, and progress made in their recovery. To do so will assure continued public interest and pressure for protection of the natural environment from future oil spills or other human-generated threats to the environment.

David R. Klein
Alaska Coop. Wildlife Research Unit
209 Irving Building, University of Alaska
Fairbanks, AK 99775-0990

I wish you would have had this meeting when I could have come after work.

I think oil spill restoration should be immediately coordinated with local and native peoples. These people should have as much or more input and decision making power as "professionals". I think it should be your responsibility to seek out this comment (knock on doors).

Clyde Vicary
2158 Sunrise
Anchorage, AK 99508

The preliminary Draft of the Ecological Restoration of Prince William Sound and the Gulf of Alaska contains no references to restoration of archaeological sites (cultural resources). Since site restoration must be an integral part of any form of terrestrial ecological restoration, cultural resources must be considered.

Dr. Robert M. Thorne
Center for Archaeological Research
University of Mississippi
University, MS 38677

Chugach Alaska or Chugach Alaska General may well be the option to be considered for use of native personnel to clean oil from the beaches on or near the culturally significant areas CNC has identified.

TA Starr
Box 870053
Wasilla, AK 99687

Appendix E

AGENDA FOR THE OIL SPILL RESTORATION SYMPOSIUM

The Egan Center
Anchorage, Alaska
March 26-27, 1990

Monday, March 26

I.	**INTRODUCTION**	
9:00a.m.	Welcome and Opening Remarks: Judi Maxwell, Ph.D., Restoration Planning Work Group, Alaska Department of Fish and Game	
9:10	Dennis Kelso, Commissioner, Alaska Department of Environmental Conservation	
9:35	Tom Dunne, Acting Regional Administrator, U.S. Environmental Protection Agency	
10:00	Break	
II.	**PERSPECTIVES ON RESTORATION**	
10:15	Keynote #1:	Robert Adler, Attorney, The Natural Resources Defense Council.
10:45	Keynote #2:	William Jordan, Ph.D., Arboretum and Center for Restoration Ecology, Univ. of Wisconsin

III. **RESTORATION OF NATURAL RESOURCES - BIOLOGICAL RESOURCES**

This session will provide a forum to discuss both direct and indirect restoration opportunities and constraints including habitat rehabilitation, species reintroduction and breeding programs, changes in fish and game management policies, and the acquisition of resources which provide ecological and human services equivalent to those damaged by the oil spill.

Four panels will address restoration of coastal habitats, fisheries, marine and terrestrial mammals and birds. Panelists will include experts on restoration ecology and spokespersons for the various resource user groups impacted by the oil spill. Each panel will be followed by a question and answer period.

11:15 Panel I Coastal Habitats

John Teal, Ph.D., Woods Hole Oceanographic Institute
Lee Harding, Environment Canada
Stoney Wright, ADNR, Native Plant Materials Center
Jay McKendrick, Ph.D., Univ. of AK, Palmer Research Center

12:15 Lunch Break

1:30 Panel II Fisheries

Brian Allee, Ph.D., Director, FRED Division, ADF&G
Len Vining, North Pacific Rim Corporation
Brenda Schwantes, Kodiak Area Native Association
Jane Gorham, Homer Charter Association
Ken Castner, Executive Director, United Fishermen of Alaska

2:45 Break

3:00 Panel III Birds

Stanley Temple, Ph.D., Univ. of Wisconsin
David Cline, Alaska Audubon Society
Peter Michelson, Ph.D., Prince William Sound Science Center

3:45 Panel lV Mammals

Ancel Johnson, Former Director, USF&W Marine Mammal Research Program in Alaska
Jay Barlow, Ph.D., Southwest Fisheries Center, La Jolla, CA
David Klein, Ph.D., Univ. of Alaska, Wildlife Cooperative Research Unit
David Anderson, Ph.D., Regional Supervisor, Wildlife Conservation Division, ADF&G

4:45 Close of Day 1

Tuesday, March 27

8:30a.m. Welcome and opening remarks: Frankie Pillifant, Restoration Planning Work Group, Alaska Department of Natural Resources

8:45 Keynote #3: Roger Clark, Ph.D., U.S. Forest Service, Wildlands Recreation

IV. **RESTORATION OF NATURAL RESOURCES - LAND RESOURCES**

This session will provide a forum to discuss both direct and indirect restoration opportunities and constraints such as providing alternative recreation opportunities, stabilization of archaeological sites, habitat rehabilitation, changes in land management policies, and the acquisition of resources which provide ecological and human benefits equivalent to those that were damaged by the spill.

Four panels will address restoration options from the perspectives of private, Alaska Native, and public owners. Panels will also include representatives from environmental groups, cultural resource experts, and commercial users such as the tourism and timber industry. Each panel will be followed by a question and answer period.

9:15 Panel V Recreation

Bruce Cooper, Port Williams Wilderness Lodge, Shuyak Island
Stan Stephens, Charter/Tour Boat Operator, Valdez
Paul Twardock, National Outdoor Leadership School

10:00 Break

10:15 Panel VI Cultural Resources

Robert Shaw, State Historic Preservation Office
Robert Thorne, Ph.D., Univ. of Mississippi
Rick Knecht, Kodiak Area Native Association
Edgar Blatchford, Chairman, Chugach Alaska Corporation
Martin McAllister, Consultant for the National Park Service

11:30 Lunch Break

12:40 Panel VII Alternative Restoration Approaches

John Sturgeon, President, KONCOR
Rick Steiner, Univ. of AK, Marine Advisory Program
Susan Ruddy, The Nature Conservancy
Robert Adler, Natural Resources Defense Council
Allen Smith, The Wilderness Society

1:50 Panel VIII Alternative Restoration Approaches (continued)

Robert Weeden, Ph.D., Univ. of AK, Fairbanks
Edgar Blatchford, Chairman, Chugach Alaska

Corporation
Lee Gorsuch, Ph.D., Ecological Economics for Alaska and Director, Institute of Social and Economic Research (ISER)
Cliff Eames, Alaska Center for the Environment
Douglas Miller, Ph.D., National Wildlife Federation

3:00 Break

3:15 **OPEN MICROPHONE SESSION**

The purpose of this session is to provide a forum for the public to comment and/or suggest other restoration options which may not have been covered in the formal sessions. The Restoration Planning Work Group will be available to answer questions and record your comments.

4:30 Keynote #4: Arthur L. Buikema, Jr., Ph.D., Professor of Zoology, Virginia Polytechnic Institute

5:00 Close of Symposium

This symposium is sponsored by:

Alaska Department of Environmental Conservation
Alaska Department of Fish and Game
Alaska Department of Natural Resources
U.S. Department of Agriculture
U.S. Department of Commerce
U.S. Department of Interior
U.S. Environmental Protection Agency

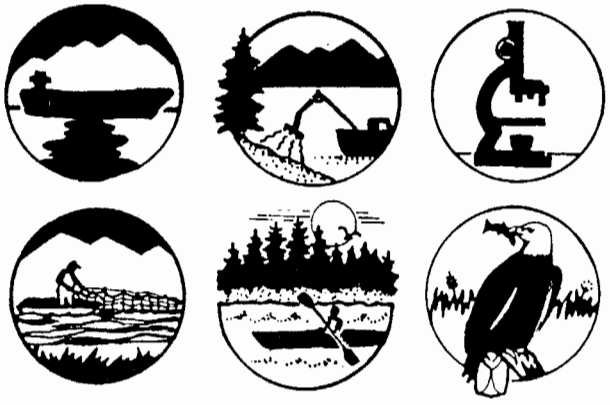
What should be done to help Alaska's resources recover from the impacts of the *Exxon Valdez* oil spill?

❖

COME HEAR SPEAKERS FROM THE FOLLOWING ORGANIZATIONS:

Alaska Center for the Environment
Archaeolgical Research Investigations
Center for Archaeological Research
Ecological Economics of Alaska
Environment Canada
Greenpeace
Kodiak Area Native Association
KONCOR
National Audubon Society
National Outdoor Leadership School
National Wildlife Federation
Natural Resources Defense Council
Prince William Sound Tourism Coalition
Resource Development Council
State Historic Preservation Office
Society for Ecological Restoration
The Nature Conservancy
The Wilderness Society
United Fishermen of Alaska
University of Alaska
Virginia Polytechnic Institute
Woods Hole Oceanographic Institute

Alaska Dept. of Natural Resources
Oil Spill Project Coordination Office
P.O. Box 107005
Anchorage, AK. 99510



OIL SPILL RESTORATION SYMPOSIUM

March 26 - 27, 1990
Egan Convention Center
Anchorage, Alaska

This symposium will be the first in a series of opportunities for members of the public and scientific community to discuss and exchange ideas on the restoration of resources damaged by the Exxon Valdez oil spill.

Free to the Public

OIL SPILL RESTORATION SYMPOSIUM

- Presented by State and Federal agencies, this symposium will give members of the public an opportunity to exchange ideas on the subject of resource restoration and related topics with numerous technical experts.

- The symposium will include panel dicussions on restoration of:
  - coastal habitat
  - birds
  - fisheries
  - mammals

- It will also include panels addressing:
  - recreation
  - cultural resources
  - land acquisition
  - alternative restoration options

- Some of the options which will be discussed include:
  - habitat rehabilitation
  - species reintroduction
  - breeding programs
  - changes in land & resource management policies
  - the aquisition of equivalent resources

- Each panel will be followed by a question and answer period and there will be an open mike session.

Restoration of damaged resources is required by laws which mandate that damages received from polluters will be used to restore and protect Alaska's environmental resources.

This symposium is the first step in a process aimed at identifying ways to restore oil-damaged resources in Prince William Sound and the Gulf of Alaska.

Other opportunities for public involvement will be provided in the near future through public scoping meetings held in the communities directly affected by the spill, and through the distribution of series of reports.

This symposium is being presented by the Alaska Departments of Environmental Conservation, Fish and Game, and Natural Resources; the U.S. Departments of Agriculture, Commerce, and Interior; and the U.S. Environmental Protection Agency, as a part of the Natural Resource Damage Assessment proccess.

There will be no charge for attendance.

For additional information you may contact:
Alaska Department of Natural Resources at 762-2295
or any of the presenting agencies located in your area

AGENDA

March 26, 1990

I. INTRODUCTION - Welcome & Opening Remarks

9:00 am	Explanation of Restoration Planning Process
9:10 am	Representative of the State of Alaska
9:35 am	Representative of the Federal Agencies
10:00 am	Break

II. PERSPECTIVES ON RESTORATION

10:15 am	Keynote Speaker #1 - Bill Jordan
10:45 am	Keynote Speaker #2 - Erik Olsen

III. RESTORATION OF NATURAL RESOURCES - BIOLOGICAL RESOURCES

11:15 am	Panel I - Coastal Habitats
12:30 pm	Lunch Break
1:30 pm	Panel II - Fisheries
2:45 pm	Break
3:00 pm	Panel III - Birds
3:45 pm	Panel IV - Mammals
5:00 pm	Close of Day 1

March 27, 1990

8:30 am	Welcome and Opening Remarks
8:45 am	Keynote Speaker #3 - Roger Clark

IV. RESTORATION OF NATURAL RESOURCES - LAND RESOURCES

9:15 am	Panel V - Recreational Users
10:00 am	Break
10:15 am	Panel VI - Cultural Resources
11:30 pm	Lunch
12:30 pm	Panel VII - Alternative Restoration Approaches #1
1:40 pm	Panel VIII - Alternative Restoration Approaches #2
3:00 pm	Break

IV. OPEN MICROPHONE SESSION - 3:15pm

V. ENDNOTE

4:30 pm	Keynote Speaker #4 - Arthur Buikema
5:00 pm	Close of Symposium

Introduction: Restoration of the Environment Following the Exxon-Valdez Oil Spill

A broad variety of environmental restoration projects and activities may be appropriate following the Exxon-Valdez oil spill. Under Federal law, funds available for environmental restoration are to be used **to restore, replace, or acquire the equivalent of injured natural resources.** The Alaska departments of Fish and Game, Natural Resources, and Environmental Conservation, the Federal departments of Agriculture, Commerce, and Interior, and the U.S. Environmental Protection Agency are carrying out a restoration planning project to identify and report on restoration alternatives.

"Restoration" includes direct attempts to return an injured resource to its baseline condition or function. An example would be to rehabilitate an oiled marsh ecosystem by augmenting natural plant and animal populations (after removal of the oil).

"Replacement" includes substitution of a new resource for an injured resource. An example is to use hatchery/aquaculture techniques to establish an entirely new fishery stock in lieu of one that had been severely damaged.

"Acquisition of equivalent resources" means to purchase or otherwise protect other resources that are similar or related to the injured resource in terms of ecological value, functions, or services provided. For example, one could purchase undamaged and unprotected wildlife habitats as alternatives to direct restoration of injured habitats. Equivalent resources need not be confined to the direct spill area.

The interagency Restoration Planning Work Group has initiated a series of public activities including this Restoration Symposium, several public Scoping Meetings in communities directly affected by the oil spill, and a world-wide review of scientific literature. These activities are the first steps in restoration planning. The process is largely without precedent and it is expected to be long, complicated, and probably controversial. Righting the wrong done to the environment by the Exxon-Valdez oil spill is the ultimate goal.

An interim report on the restoration planning project is expected to be available for public distribution in July, 1990.

Fact Sheet:
Exxon-Valdez Oil Spill Damage Assessment

State and federal agencies are conducting a comprehensive assessment of the effects of the spill on natural resources in Prince William Sound and the Gulf of Alaska. Approximately 60 studies are being conducted with a first–year budget of $35 million.

> 26 studies focus on the effects of the spill on fish and shellfish (e.g., salmon, herring, shrimp, rockfish, clams, and crab).

> 14 studies focus on the effects of the spill on birds (e.g., bald eagles, peregrine falcons, sea ducks, kittiwakes, and shorebirds).

> 6 studies focus on the effects of the spill on terrestrial mammals (e.g., bear, deer, river otter, and mink).

> 7 studies focus on the effects of the spill on marine mammals (e.g., sea otters, whales, seals, and sea lions).

> 6 studies address the effects of the spill on air, water, sediments, and coastal habitats.

These studies are being funded by the state and federal governments and Exxon. They are being conducted under the authority of two federal laws: the Comprehensive Environmental Response, Compensation, and Liability Act and the Clean Water Act. Study results will be used to:

1. assess the extent and magnitude of damage caused by the spill;
2. guide the development of an action plan to promote the long–term recovery of injured natural resources; and
3. determine the level of monetary compensation to be paid by Exxon.

Any compensation received from Exxon as a result of this process must be used to "restore, replace, or acquire the equivalent" of the injured natural resources.

Three federal officials (the Secretaries of the Departments of Interior, Agriculture, and Commerce) and one state official (the Commissioner of the Department of Fish and Game) have been appointed as natural resource "trustees" to oversee the studies and restoration work. In addition, the Alaska departments of Environmental Conservation, Natural Resources, and Law, the U.S. Justice Department, and the U.S. Environmental Protection Agency are playing important roles in the overall process.

OIL SPILL RESTORATION

Use this form for any comments you would like to have considered during the Restoration Planning process, or for any ideas you have about how aspects of the environment that may have been affected by the Exxon-Valdez oil spill might be restored. Return the form with your comments to the Restoration Planning Work Group, 437 E Street, Suite 301, Anchorage, Alaska 99501. Attach additional sheets if necessary.

Please fill in your name and mailing address if you would like to receive copies of future reports about Restoration Planning for the Exxon-Valdez oil spill.