RPWG
Ex I

"CONFIDENTIAL LITIGATION SENSITIVE ATTORNEY WORK PRODUCT"

RPWG MEETING
OILED MUSSELS
November 6, 1991

Attendees:

Susan MacMullin	EPA	(202) 260-6412
Mark Fraker	ADF&G	(907) 267-2136
Michael Fry	Univ. of Cal.-Davis	(916) 752-1201
David Doudna	IMS/UAF	(907) 474-7840
Jeep Rice	NMFS/ABL	(907) 789-6020
John Strand	NMFS/RPWG	(907) 789-6601
Sam Patten	ADF&G	(907) 267-2376
Rick Gustin	ADF&G/DWC	(907) 267-2376
Tom Crowe	ADF&G	(907) 267-2376
Ken Rice	USFS/RPWG	(907) 278-8012
Charles Simenstad	Univ. of Washington	(206) 543-7185
Karen Klinge	USFS/RPWG	(907) 278-8012
Bob Spies	AMS	(415) 373-7142
Mark Kuwada	ADF&G	(907) 267-2277
Mark Brodersen	ADEC/RPWG	(907) 465-2610
Jim Slocomb	ADNR/RPWG	(907) 278-8012
Art Weiner	ADNR/RPWG	(907) 278-8012
Sandy Rabinowitch	DOI/RPWG	(907) 257-2653
Barbara Iseah	CACI/RPWG	(907) 278-8012

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with the injured species; NOAA led the charge and reviewed a great number of reports and went out and selected a number of sediments and mussels; analytical results are now available so that we can determine whether or not we have a problem; there are a number of sites that we know have oil; have analytical data that there are residues in the tissue and sediment

Bob - will now discuss the affects on different species

Sam - (Harlequin Ducks) - started from a scratch point and ran across blue mussels as a potential agent for transmission of pollutants; went out and started collecting birds and examined them for the presence of chemicals; using clean techniques, we took food samples from the ducks and noted where the ducks were feeding; Theoretic approach led to where the sea ducks feed; affects progressively went up the shoreline to the Harlequin Duck; in the upper intertidal was where the maximum affects existed; we were told to stop collecting and had to use a different research technique; later we began to see no Harlequin broods and went to an unexposed area; results are quite graphic with evidence of complete reproduction failure; located breeding hands-on nests in East PWS; we were delighted Dr. Fry had done a paper; there was a conference about the middle of June discussing that we were looking at a reproductive shutdown in Harlequin Ducks; the common food item is blue mussels for Harlequin Ducks; the birds that came up with most evidence of exposure were the Harlequin Ducks; the common denominator is blue mussels; we looked at the mussels beds; there is raw unweathered oil in them; we are trying to make rapid progress in this relationship of mussels

Art - do birds eat the entire animal?

Sam - there is a difference in the feeding behavior; Oystercatchers open up mussel and feed; Harlequins remove the mussel and swallow the whole thing which passes through the intestinal track; they are exposed to not only what is in the mussel shell but what is on the mussel shell

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Comment - what is the geographic scope?

Jim - have coverage for western PWS and most of the Kenai Peninsula; could use the same for Kodiak but have not been asked to; this is the data we have from DNR and DEC

BOb - does anyone have information regarding degree outside the PWS?

Sandy - what happened to the information I provided?

Mark - tried to get out there but trip was weathered out three times

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sighting, and coastal habitat provided some

Mark - the initial list was made up of many, many sources; managed to check 30 sites with 17 hits that showed fairly extensive oiling

Reviewed maps provided of Prince William Sound, Alaska sites sampled in June, August, and September 1991, during oiled mussel bed surveys

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Jeep - there are some sites remaining that have not been examined

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Bob - nothing in the data contradicts that we don't have a problem; what about subsistence?

Kuwada - don't make too much of subsistence data; people in Chenega harvest very few mussels

Comment - is there a problem with oiling and subsistence?

Kuwada - very low problem with people eating oiled mussels

Ken - Chenega study showed a low incidence of people eating oiled mussels

Art - the mussel bed contains so much that birds rooting around can get on oil on their feathers and during preening can get oil in their system

Bob - are you doing scat analysis? Mike, what do we know about doses? is this within the range

Mike Fry - wild bird studies show there is a very complex stress; altering the palatability of food affects reproduction

Bob - can't shoot ducks, so we have to work more indirectly and fall back on the literature on what is known about birds and ingestion of oil

Mike - there are less than 10 or 15 papers that document this

Bob - as a PI, can you put together this literature for us

Mike - yes

Comment - what percentage of mussels is so heavily fouled?

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Bob - could you coordinate this data sharing with Jim or Art?

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Bob - how do we proceed; can look into areas of cause and effect and characterization; principal investigators have been requested to discuss hydrocarbon samples

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Art - there are quite a few more potential oiled beds than 30, but potential sites may, in fact, not have oil; there are 70 additional sites

Comment - there is a big difference in what is in DEC files and Coast Guard files

Art - offer to identify other problem areas and go out and visit the sites; need to know what is out there

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Meeting adjourned at 5:00.

RPWG
BI

State of Alaska
Department of Natural Resources
Division of Land

Mussel Bed Study
Draft GIS Product

Prepared By:
Oil Spill Project Office

Arthur H. Weiner PhD, Natural Resource Manager
Jim Slocomb, Natural Resource Manager

October 9, 1991

P.O. Box 107005
Anchorage, AK 99510-7005
(907) 762-2295

MEMORANDUM

State of Alaska

DEPARTMENT OF NATURAL RESOURCES **DIVISION OF LAND**

OIL SPILL PROJECT OFFICE

DATE: October 9, 1991

TO: Distribution

FROM: Art Weiner AW

SUBJECT: **Mussel Bed Study: Draft GIS Product**

The attached map set and table represent a first attempt to determine the relationship between oiled mussel beds and species potentially at risk from the persistent oil within these beds.

The first column in the table includes all those segments that were identified by ADEC and ADNR staff as possibly containing moderate to heavy levels of EVOS oil within or immediately adjacent to a mussel bed. The second column reflects the findings of the summer field surveys conducted by the NOAA team. Analytical results for the third and fourth columns are not now available. Habitat information listed for the harlequin duck and black oystercatcher comes from reports, maps and discussions with NRDA study investigators and peer reviewers. Subsistence use data was extracted from ADF&G maps.

I discussed the probability of sea otter impacts with the USFWS experts and was told that it was unlikely that either adults or pups would come into direct contact with this oil. I have not explored the possibilty of river otters nor any other species being at risk.

The maps were prepared by Jim Slocomb [ADNR/OSPO] by combining existing digital data sets and data from the attached table. The colored portion of the shoreline represents the entire segment that either contains or potentially contains an oiled mussel bed. As more precise location information becomes available, it will be incorporated into the maps. It is also possible to add other data layers, such as segment numbers, as needed.

Since both the Management Team and NRDA science group has shown considerable interest and support for this project, I suggest that we convene a meeting this fall to discuss the existing information and plans for the future. Please let me know if there is a convenient date when you might be in Anchorage so that we can dovetail a meeting onto your schedule.

Distribution:

Malin Babcock
Mark Broderson
Dave Gibbons
John Karinen
Sam Patten
Pete Peterson
Stan Senner
Bob Spies
John Strand

Privileged and Confidential
Attorney Work Product
Attorney-Client Communication

MUSSEL BED STUDY SEGMENT LIST

Segment Number[1]	Ground Survey Date[2]	OILED	Sediment Sample (ppm)	Tissue Sample (ppm)	HDQ Stream Site[3]	BLOY Feeding Site[4]	Subsistence Site
AE001A							
AE005A							
AG001A							
AG005A							
AG009A	8/12/91	NO					
BA006C	6/29/91	YES					
BL063A							
BL064B							
CH010B	9/4/91	YES					
CH012A	9/4/91	YES					
CR004A							
CR004C							
DE001							
DI063A							
DI064B							
DI067A	6/30/91	YES					
EB011A							
EL011A							
EL013A	6/28/91	YES					
EL013B							
EL015A					YES		
EL052B					YES		
EL054A							
EL057							
EL107B							
EL108							
ER020B	6/29/91	YES					
EV017A	6/29/91	NO					
EV036A							
EV070H					YES(G)		YES
EV900A	Sept.	NO					
FL004A	6/29/91	YES					
GR007A						NO ?	
GR008A						NO ?	
GR101							

1 Containing a potentially oiled mussel bed.
2 Mussel bed survey.
3 Harlequin Duck
4 Black Oystercatcher

MUSSEL BED STUDY SEGMENT LIST

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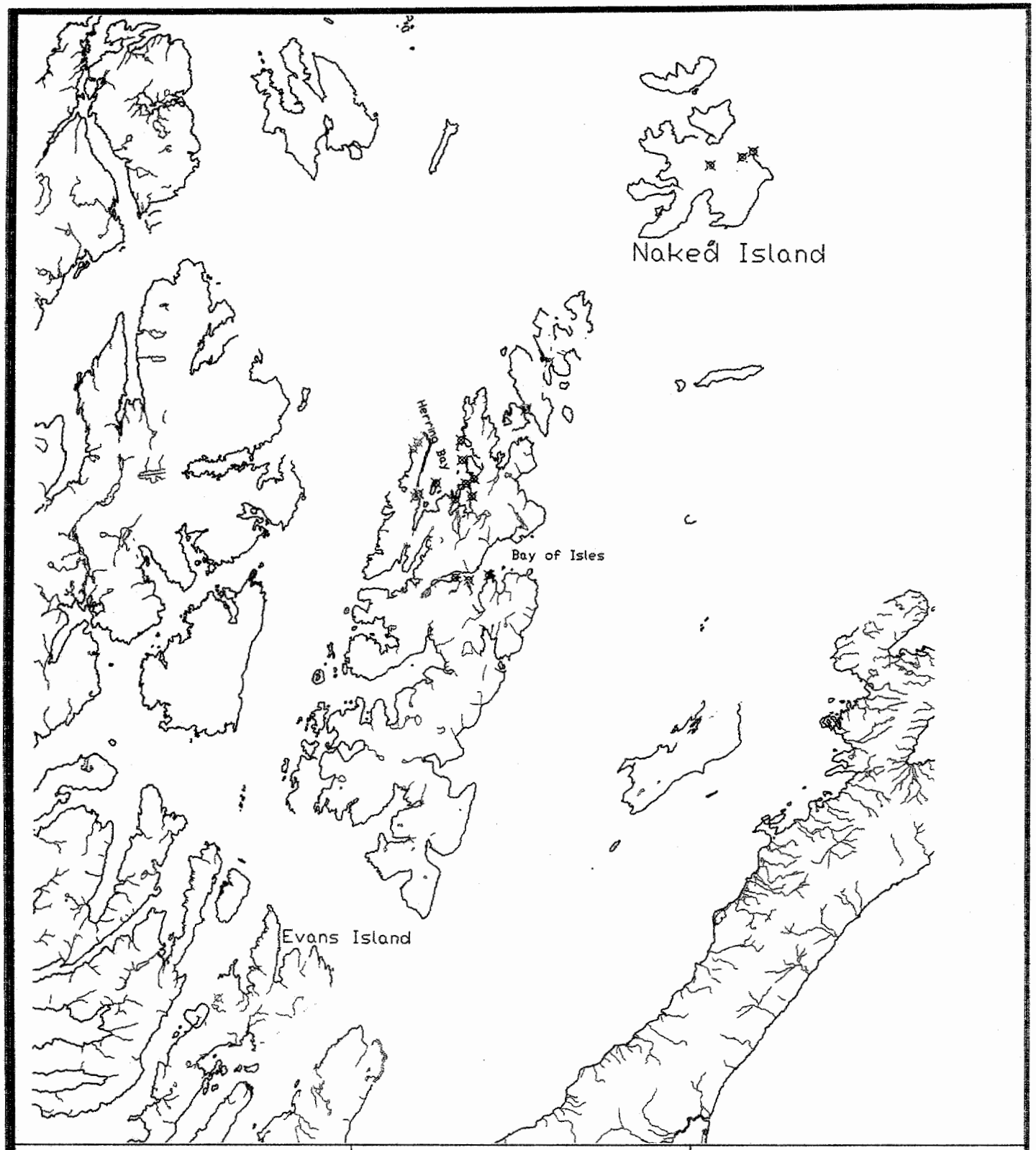
GR103					YES		
IN021A							
IN022A							
IN031A							
IN031B					YES		
KN004E						YES	
KN005B						YES	
KN007A							
KN011A							
KN012						NO	
KN013B						NO	
KN113B	9/6/91	YES				NO ?	
KN117A						NO	
KN119A						NO	
KN132C					YES(B)	NO	
KN132D					YES(B)	NO	
KN136A	6/28/91	YES				YES ?	
KN141A						YES ?	
KN141B						YES ?	
KN300A	9/6/91	YES				NO	
KN500A					YES	NO	
KN500B					YES	NO	
KN505A						NO	
KN701B						NO	
LA015E	6/30/91	YES					
LA018							
LA035							
MA002A	8/7/91	YES			NO		
MA009							
MN002A	8/2/91	NO					
NA006						YES	
NA009							
NY001A							YES
PL007A							
SE041A							
SI001C	8/12/91	NO					
SQ001D							
TB004A							



Alaska Department of
Natural Resources
Oil Spill Project Office
3601 C st. #222
Anchorage, Alaska
99510-7005
(907) 762-2515
(907) 762-2290 FAX

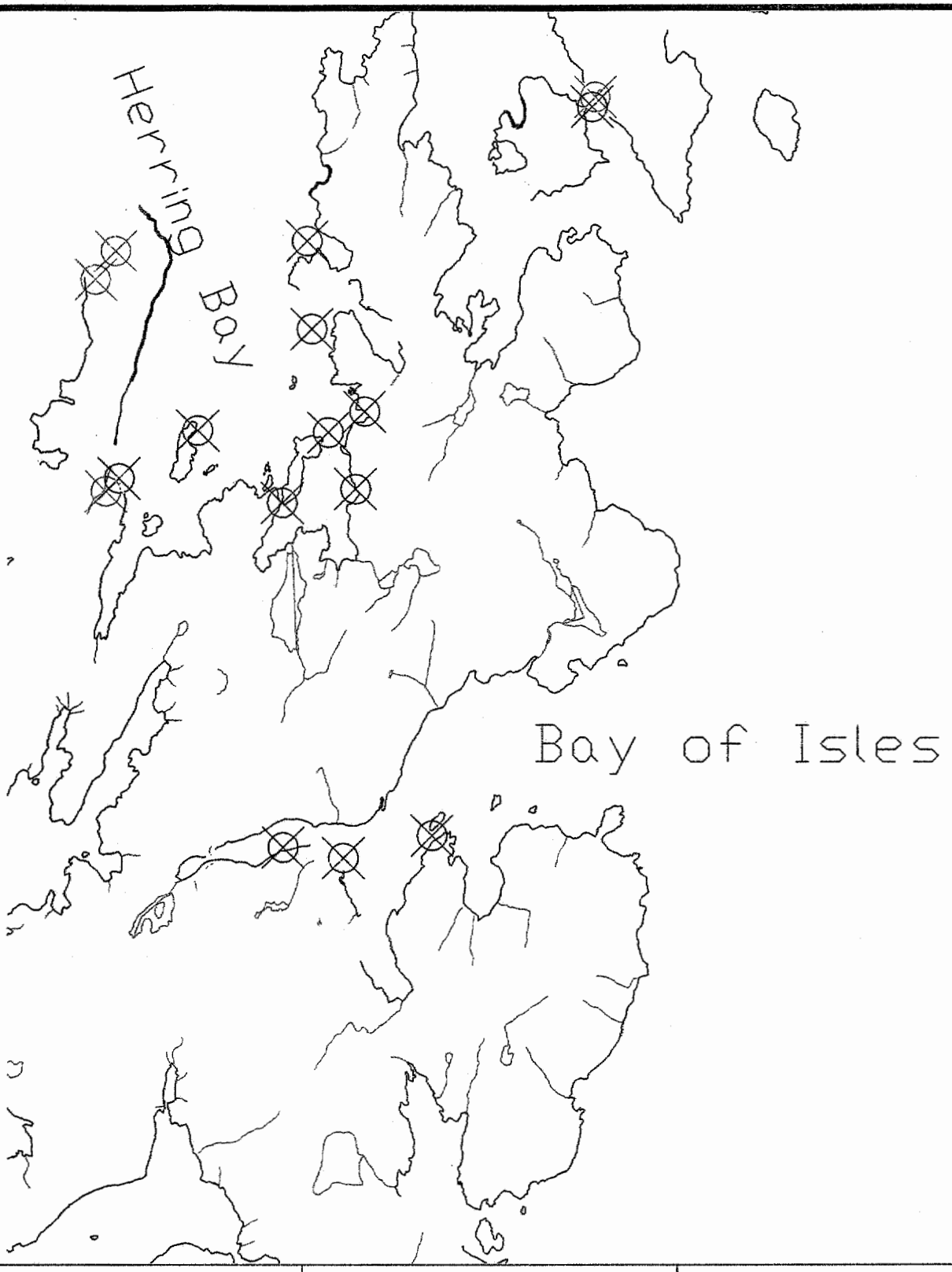
PWS Mussel Project

Scale: 1=400000

/mussel/pws.dwg/xref

Drawn By: JWS
10/8/91

Potentially Oiled
Surveyed Oiled
Subsist. Area
Harlequin Duck
Feeding Habitat
Black Oyster Catcher
Feeding Habitat



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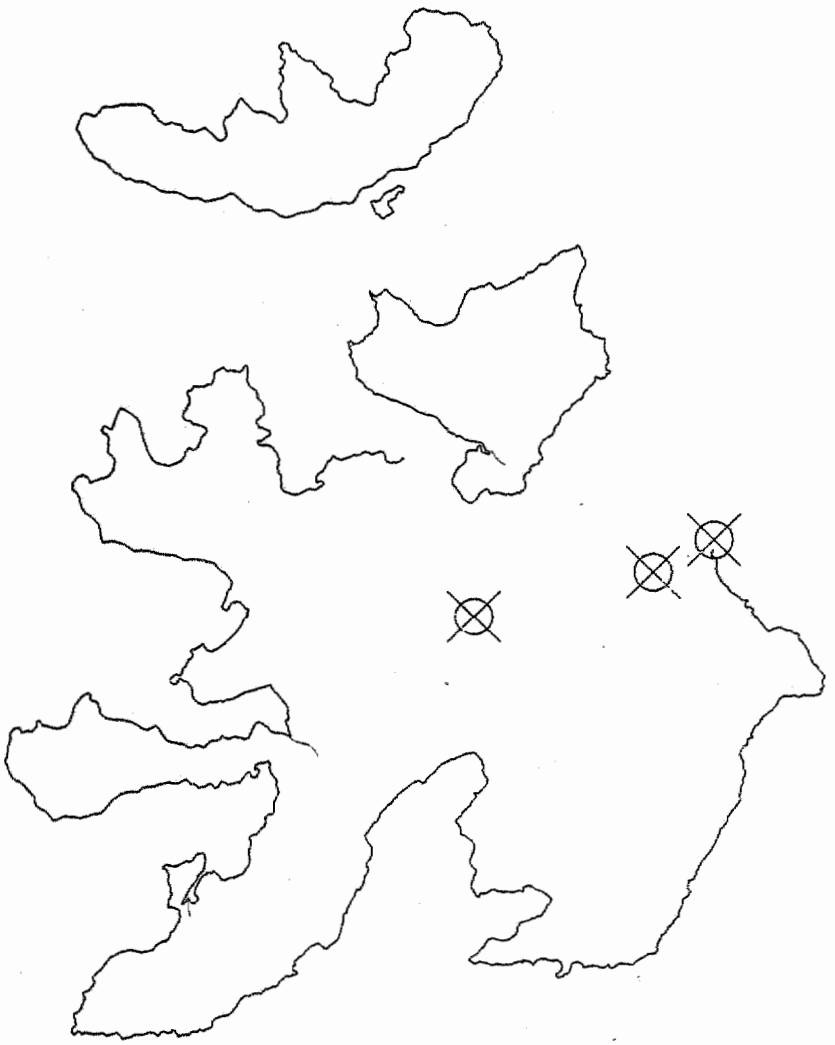
Surveyed Oiled
Subsist. Area
Harlequin Duck
Feeding Habitat
Black Oyster Catcher
Feeding Habitat



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Alaska Department of
Natural Resources
Oil Spill Project Office
3601 C st. #222
Anchorage, Alaska
99510-7005
(907) 762-2515
(907) 762-2290 FAX

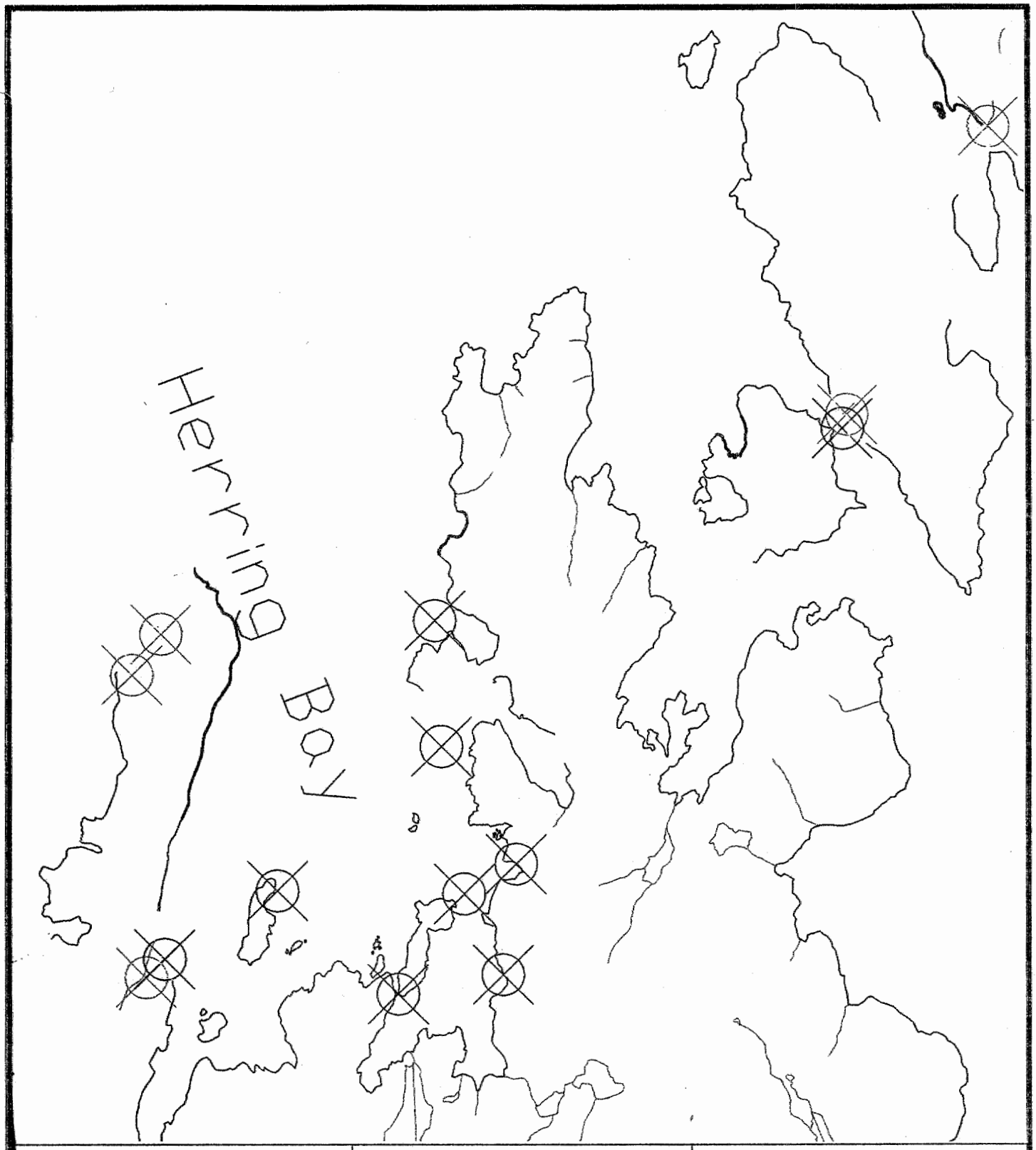
PWS Mussel Project

Scale: 1=100000

/mussel/pws.dwg/xref

Drawn By: JWS
10/8/91

Potentially Oiled
Surveyed Oiled
Subsist. Area
Harlequin Duck
Feeding Habitat
Black Oyster Catcher
Feeding Habitat



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PWS Mussel Project

Scale: 1=63360

/mussel/pws.dwg/xref

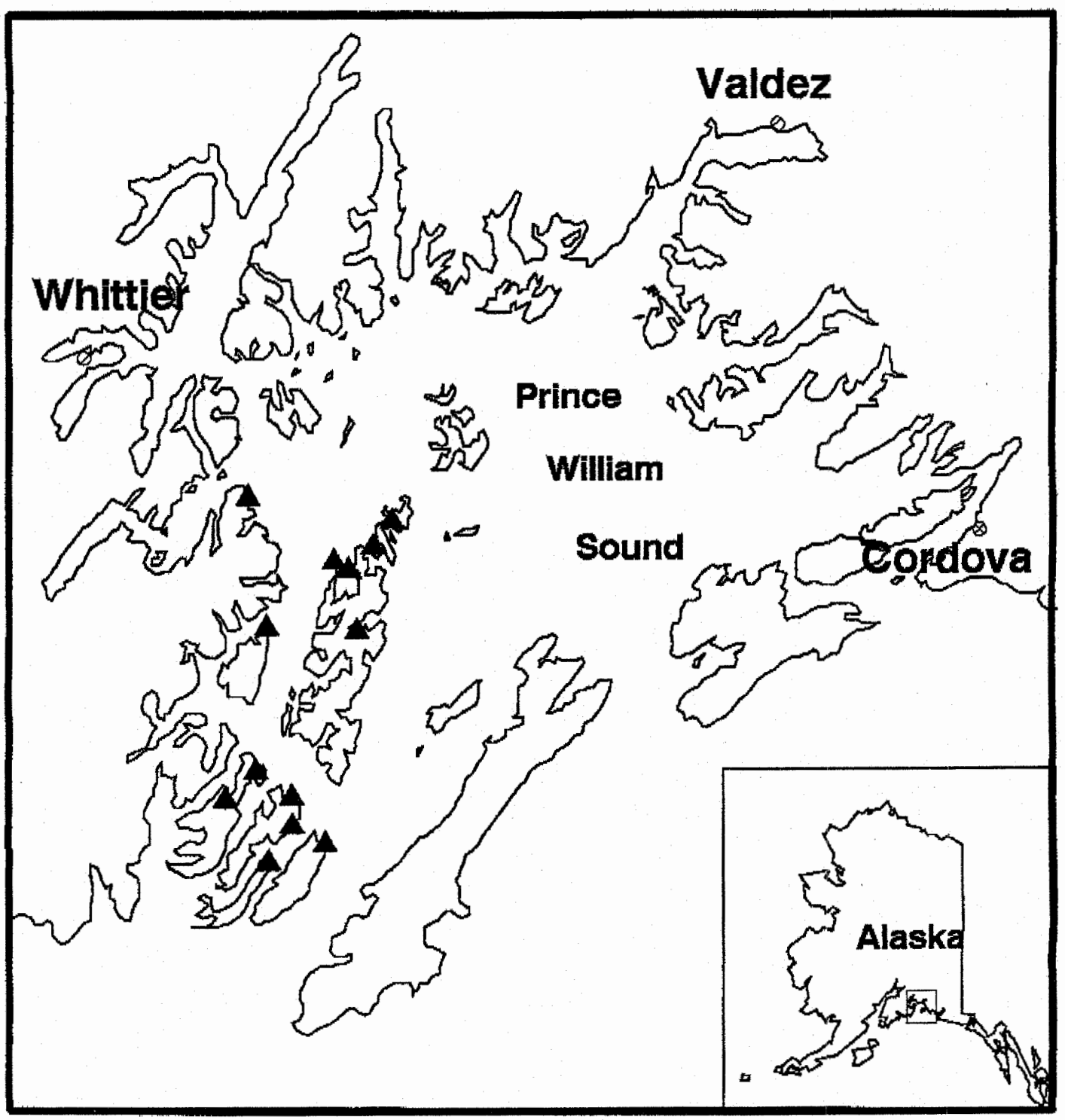
Drawn By: JWS
10/8/91

Potentially Oiled
Surveyed Oiled
Subsist. Area
Harlequin Duck
Feeding Habitat
Black Oyster Catcher
Feeding Habitat

RPWG
BI

Figure 1. Prince William Sound, Alaska sites sampled, June, August and September, 1991, during oiled mussel bed surveys.

▲ = samples taken



'CONFIDENTIAL LITIGATION SENSITIVE ATTORNEY WORK PRODUCT'

Figure 2. Total aromatics hydrocarbons and selected hydrocarbon groups in mussels sampled in Prince William Sound, June, 1991. Sums of aromatic hydrocarbon groups in Prudhoe Bay crude oil. * = avg. 2 samples; T = total; S = sum.

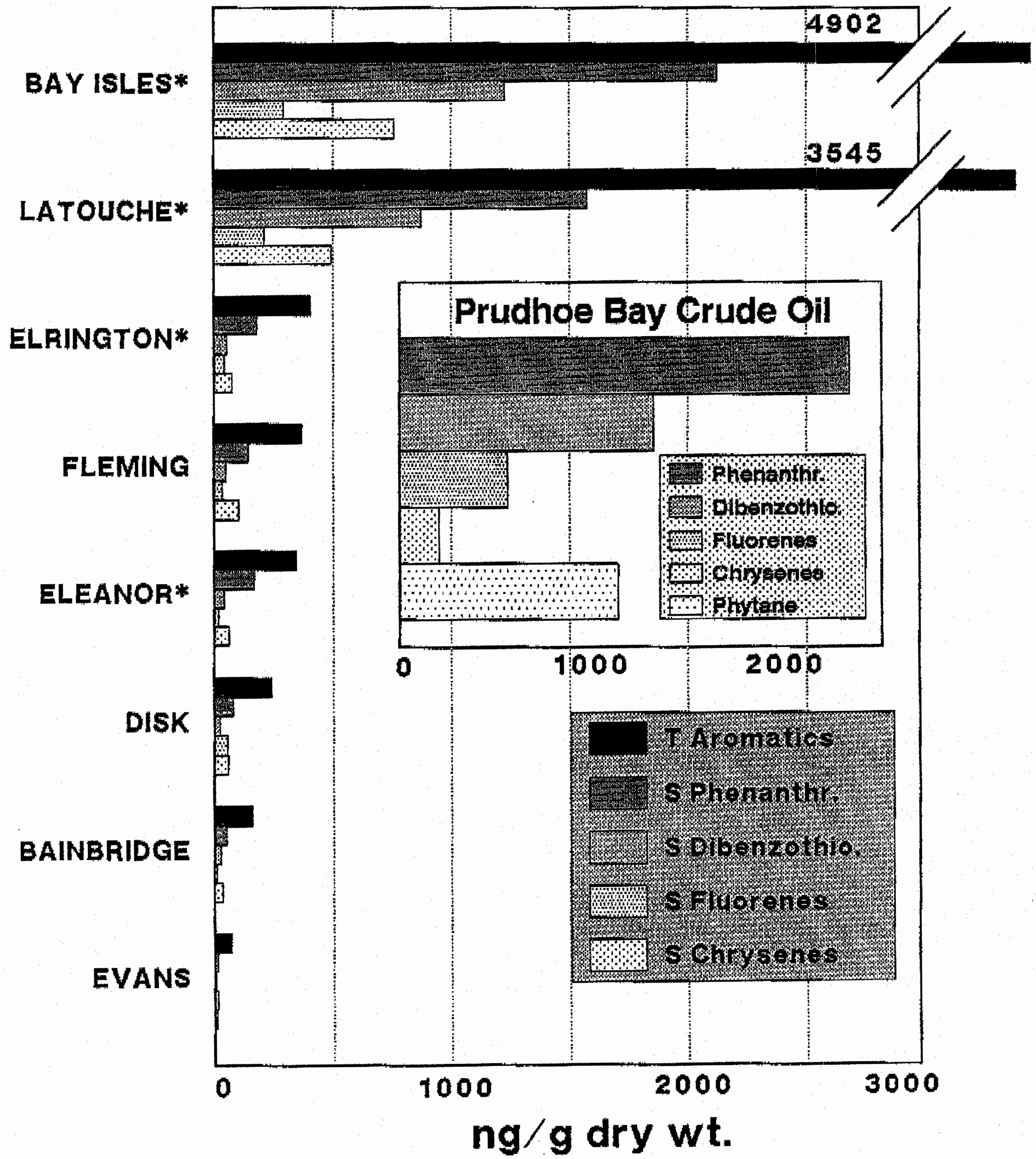


Figure 3. Total aromatics hydrocarbons and selected hydrocarbon groups in substrates sampled in Prince William Sound, June, 1991.

*** = avg. 2 samples; T = total; S = sum.**

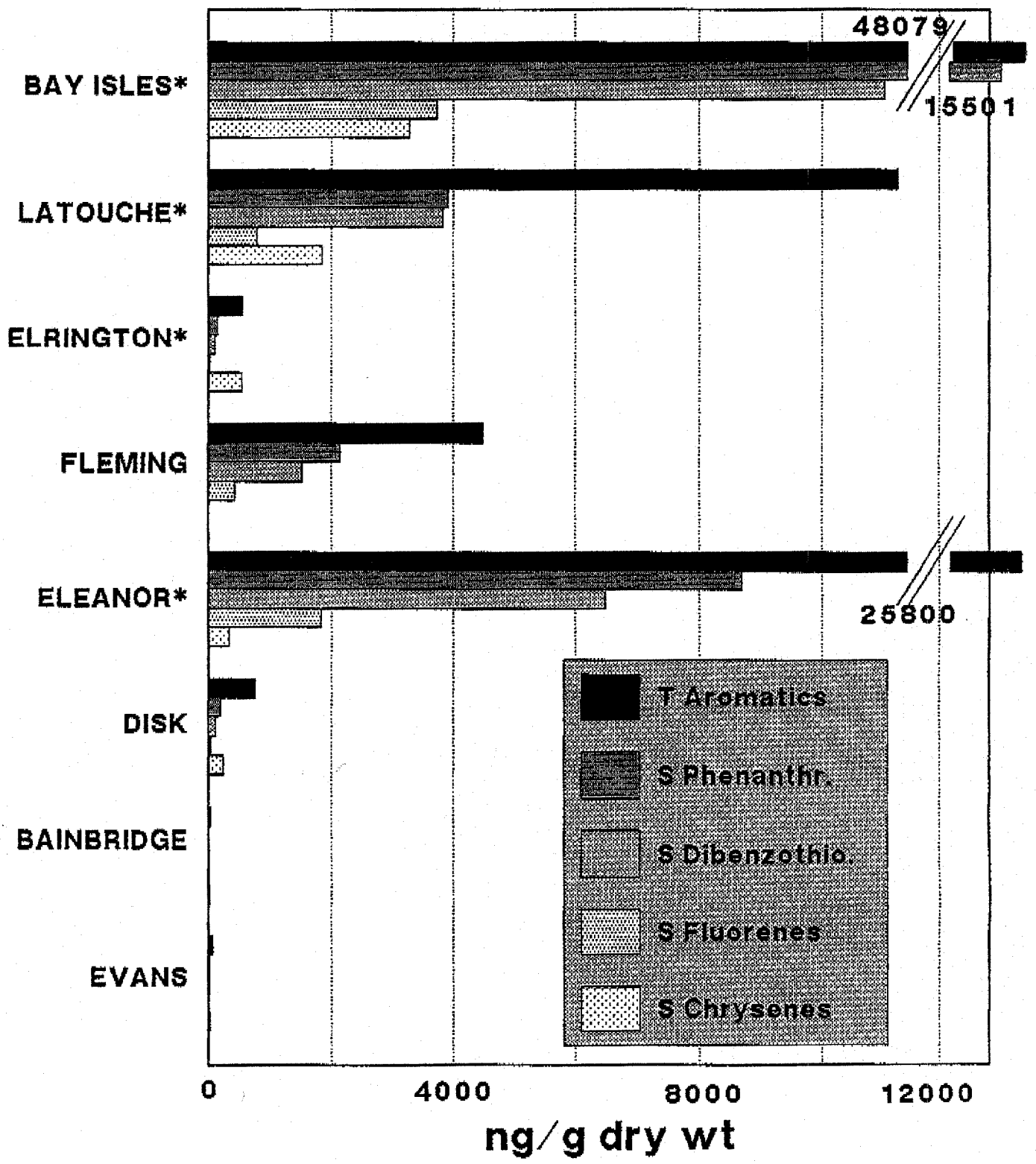
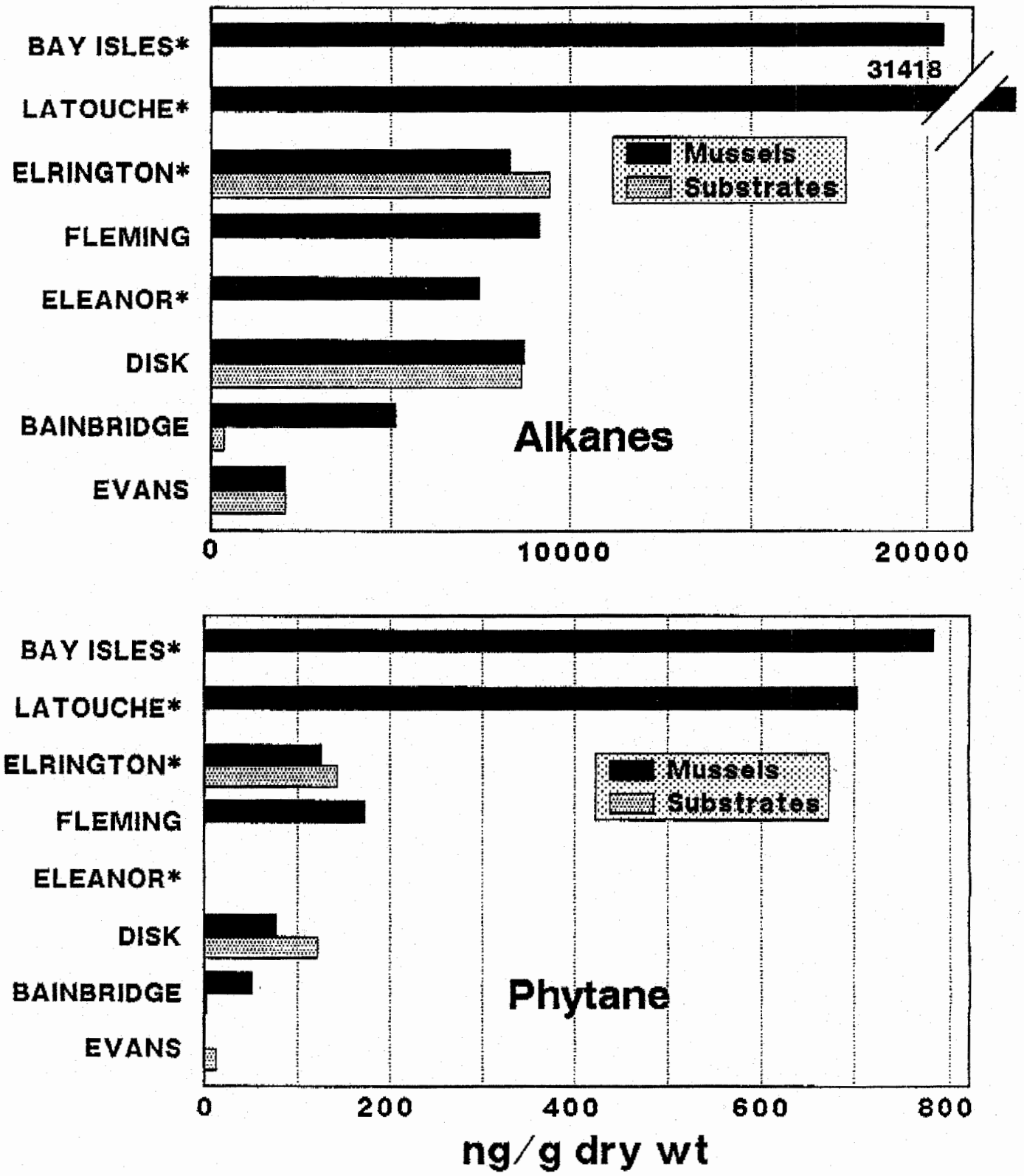


Figure 4. Total alkanes and phytane in mussels and substrates from Prince William Sound, June, 1991. Alkane fraction from several sites (substrates only) lost during processing. * avg. 2 samples.



11-6-91

Mussel Meeting Attendees: RPWG 3 I

Susan MacMullin	EPA	202/260-6412
Mark Fraker	ADFG	267-2136
Michael Fry	U.C. Davis	916.752.1201
David Doudna	IMS/UAF	907-474-7840
Jeep Rice	NMFS/ABL	907-789-6020
John Strand	NMFS-RPWG	907-789-6601
Sam PATTEN	ADF&G DWC	907-267-2376 - 455-6101
Rick Gustin	ADF&G DWC	Ditto
Tom Crowl	ADF/G	"
Ken Rice	USFS/RPWG	278-8012
Charles Simenstad	Univ. Washington	(206) 543-7835
Karen Klinge	USFS/RPWG	278-8012
Bob Spies	AMS	(415) 393-7147
Mark Kuwada	ADF&G	267-2277
Jim Slocomb	ADNR	278-8012
ART WEINER	ADNR	278-8012
Sandy Rabinowitch	DOI	257-2653
Barbara Mseak	RPWG/CACI	278-8012

RPWG
B I

1st version

RESTORATION PLANNING WORK GROUP
PROGRAM REVIEW
November 6, 1991

Meeting began at 10:00.

The following materials were distributed:

CERCLA definitions
Excerpts from John Boland's report
Copies of the sign up sheet

Stan opened discussion with: What guidance is in current NRDA regulations and the law? What is natural recovery? How do we determine the adequacy of natural recovery? Important to note that in the discussion of biological resources, the damage assessment was to measure the difference from baseline. The recovery period means either the longest length of time required to return to baseline or the lesser period of time. Alex Swiderski will give any other context that he puts on the above. Must evaluate the no action alternative. Before we can justify spending significant restoration dollars, we will need to argue that it will be of some benefit or at least prevent further harm. Need an understanding of natural recovery.

Alex - The Trustees have never given a mandate on whether to remain within NRDA guidelines. Settlement agreement specifically states Trustees are not bound by the guidelines. It is appropriate to deviate from the guidelines. If we take baseline as a definition and consider the meaning of enhancement, that may be one avenue of determining how to proceed.

Definition of restoration from MOA: any action, in addition to response and cleanup activities required or authorized by state or federal law, which endeavors to restore to their pre-spill condition any natural resource injured, lost or destroyed as a result of the Oil Spill and the services provided by that resource or which replaces or substitutes for the injured, lost or destroyed resource and affected services. Restoration includes all phases of injury assessment, restoration, replacement, and enhancement of natural resources, and acquisition of equivalent resources and services.

We are not bound by NRDA guidelines but it is appropriate to use them where applicable.

The following definitions are from current CERCLA-NRDA regulations:

Recovery period means either the longest length of time required to return the services of the injured resource to their baseline condition, or a lesser period of time... [43 CFR Subtitle A 11.14

(gg)]

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... [43 CFR Subtitle A 11.14 (11)]

Baseline means the condition or conditions that would have existed at the assessment area had the discharge of oil or release of the hazardous substance under investigation not occurred." [43 CFR Subtitle A 11.14 (e)]

Biological resources - (1) The extent to which the injured biological resource differs from baseline should be determined by analysis of the population or the habitat or ecosystem levels. [43 CFR Subtitle A 11.71 (1)]

In all cases, the amount of time needed for recovery if no restoration efforts are undertaken beyond response actions performed or anticipated shall be estimated. This time period shall be used as the "No Action - Natural Recovery" period... [43 CFR Subtitle A 11.73 (a)(1)].

Stan - need to talk about what these terms and definitions mean and if they provide functional guidance. How do we determine if recovery has been achieved?

Comments:

You can never get resource back to where it was.

There is a good argument to do more than recovery.

The infrastructure of cooperation has been established between federal and state agencies, and they will all look at restoration and recovery. The shared interest is how PWS ecosystem functions. The oil spill has been a big experiment. There is an opportunity to put together a good interdisciplinary program and enable much wiser management of resources in the future. Need to expand knowledge base. Unique opportunity to combine talents and make management in Alaska improved for generations to come.

Stan - there is considerable sympathy for that view point that will be hammered out on this issue. Need to focus on recovery question.

Nadav Nur - Recovery may not be able to get back to what was and you don't know what would have been. In bird species, things don't go back to where they were.

Art - as a restoration group, we need to know if a population is

on the way to recovery.

Comments:

Need to consider the risk involved in active restoration; a lot of it is disturbance; comes down to assessing risk in intervention.

Alex - You have described a biological need. There is also a legal need to determine when and if natural recovery will occur. Trustees are required to engage in cost benefit analysis to determine what is appropriate. Would be incumbent to compare restoration. Regulations give Trustees a great deal of discretion;

Stan - Need to look at John Boland's excerpt.

Comments:

Need to examine all definitions of restoration

Some uncertainty of what system would have looked like

Stan - Exxon argued that recovery has occurred

Comments:

John Boland gave the following definitions of recovery:

American Heritage Dictionary - return to a normal condition; the getting back of something lost.

Ganning et al. - the restoration to original functional and structural conditions with original species present in original numbers.

Ganning et al. - returning the ecosystem to within the limits of natural variability.

Lewis - complete recovery (has occurred when) there are no discernable aftereffects.

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Conan - a new stable age distribution and equilibrium species assemblages attained.

National Research Council - complete recovery means that (1) the faunal and floral constituents that were present before the oil spill are again present and (2) they have their full complement

of constituent age classes.

Committee on Restoration of Aquatic Ecosystems, National Research Council - the return of an ecosystem to a close approximation of its condition prior to disturbance.

Boland's definition of complete recovery - complete recovery after an oil spill occurs when (1) all the species that were present before the oil spill are again present, (2) each of these species has reached their original abundances and biomasses, (3) each of these species has reached their original age distributions, and (4) all individuals are as healthy (as measured by growth rates) and productive (as measured by reproductive condition) as the individuals that were present at the time of the oil spill.

Stan - which definition comes closest to capturing what recovery is?

Comments:

#2 comes closest: Ganning et al. (1984) "the restoration to original functional and structural conditions with original species present in original numbers."

John has brought out an important element in #4 in health and productivity which should be incorporated into the definition.

Stan - Will list some attributes that might be included in definition:

Healthy and productive - organismic - ecosystem
Abundance
Species composition
Age structure
Distribution -
    colony numbers
Natural variability

Contamination -
    services degraded
    biological effects
    surrogate

Comments:

May want to put more weight on things that were visually apparent.

Stan - with subsistence users, the level of contaminants was acceptable as far as health but their level of perception was

VEC - valued ecosystem component

different and they went elsewhere for their subsistence needs.

Comments:

Weighing is quite different from one resource to another.

Could we still be missing the ecosystem level?

Stan - Will be forced to look at individual species and the larger picture.

Art - Have to look at structure and function. May work hard to recreate structure but if we don't work hard to recreate the function, we have nothing.

Comments:

Navissi - Need to add the level of contaminants.

Mark Fraker - Need to come to some point of operational definition. Has used the VEC - valued ecosystem component. You can't measure everything; so you have to settle on some things. (A)

David - May need to delist some species.

Stan - Talked about pre-spill and baseline. How do we bring around functionally the question of is natural recovery adequate? How does that translate into making a recommendation to the Trustees? One thing that might help is a section in the regs stating:

These estimates are to be based on the best available information: published studies, other data sources, experience of managers or resource specialist with experience with the injured resource, managers who have dealt with similar situations such as:

ecological succession patterns
biocumulation
dispersion dilution
biological degradation
local climatic conditions

The regs basically say do your best and rely on all available sources of information. How do we make use of the information?

Comments:

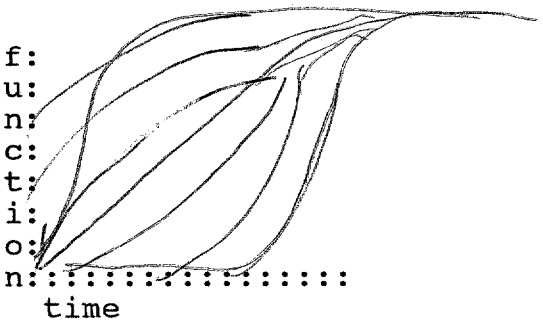
Who will make the decision of time period for recovery?

No one has said but a decision will be made some time in the future.

Stan - One functional definition is if you have a technique that will speed up natural recovery, then by definition natural recovery is inadequate.

Comments:

Charles Simenstad - Need to use our literature search to form indicators for recovery.



Is there information out there that would enable us to generate these models as indicators? Need to watch out for situations that can take a downturn and may not see something taking off until another indicator is taking off. It is a way to structure indicators of when and how accurate you can be about when a system is approaching recovery.

John Strand - Hopefully this will come out in the Coastal Habitat plans.

Comments:

Would be desirable to extrapolate from models and combine with the data you have so far. Need to come up with good estimates of recovery.

Dan - How intrusive are we getting about restoration? Are you going to do whatever it takes?

Stan - May be worth the money to experiment. May trim some time.

Comments:

Should make an effort to understand the system so that something isn't done that wouldn't have been done if you had more information.

John Strand - Need to get a multi-agency task force together to study prey base.

Comments:

This study could evolve into a major indicator.

Stan - How did VEC's approach work?

Mark Fraker - VEC approach looks at normal operations and minimizes interference with normal function; was a part of a multidisciplinary group. Should have been interdisciplinary. Didn't have the information needed; had relatively little understanding from the bottom up.

Comments:

That is a science management issue that is achievable.

Most valuable thing is to have it driven or guided from the top down.

Stan - We don't know what all the rules are and there is a high level of concern about money.

Comments:

Need to get some major policies established and some ground rules.

Alex - There is a danger of passing the buck. Decisions at the top are based on proposals from here. Needs justification that comes from the scientists so that policy makers can make decisions. Need to be confronted with what are the options and what will work.

Mark Brodersen - Will take about a year to come up with a package. Must come from this level up.

Comments:

Need a larger scale study but need to lay the ground work for logic behind it.

Mark Brodersen - Will be a question of breaking some people loose to write package.

Stan - There are a lot of things that drive this project.

Susan - Thinks these little pieces will fit in.

Stan - Need to develop an understanding of the research that needs to be done and look at the best tactic for achieving the goals. Information is now available for peer reviewers. RPWG and peer reviewers need to meet at 1:00.

RPWG
I

"CONFIDENTIAL LITIGATION SENSITIVE ATTORNEY WORK PRODUCT"

Named: workshp6.61

RESTORATION PLANNING WORK GROUP
PROGRAM REVIEW
November 6, 1991

Attendees:

Susan MacMullin	EPA	(202) 260-6412
John Armstrong	EPA	(206) 553-1368
Sandy Rabinowitch	DOI/RPWG	(907) 257-2653
Barbara Iseah	CACI/RPWG	(907) 278-8012
David Ainley	Pt. Reyes Bird Observatory	(415) 868-1221
Nadav Nur	Pt. Reyes Bird Observatory	(415) 868-1221
Stan Senner	ADF&G/RPWG	(907) 278-8012
Joe Sullivan	ADF&G	(907) 267-2213
Art Weiner	ADNR	(907) 278-8012
John Strand	NMFS/RPWG	(907) 789-6601
Charles Peterson	Univ. N. Carolina (PR)	(919) 726-6841
Charles Simenstad	Univ. of Washington	(206) 543-7185
D. Michael Fry	Univ. California-Davis	(916) 752-1201
Karen Klinge	USFS/RPWG	(907) 278-8012
Ahmad Nevissi	Univ. of Washington	(206) 543-4259
Gail Irvine	National Park Service	(907) 257-2529
Daniel D. Roby	Coop. Wildl. Res. Lab.	(618) 536-7766
Mark Fraker	ADF&G	(907) 267-2136
Alex Swiderski	AG's Office	(907) 269-5274
Jeep Rice	NMFS/Auke Bay Lab.	(907) 789-6020
Mark Brodersen	ADEC	(907) 465-2610
Ken Rice	USFS/RPWG	(907) 278-8012
Valerie Payne	National Park Service	(907) 257-2532
John Boland	San Diego State University	(619) 594-7422

Meeting began at 10:00.

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remain within NRDA guidelines; settlement agreement specifically states Trustees are not bound by the guidelines; it is appropriate to deviate from the guidelines; if we take baseline as a definition and consider the meaning of enhancement, that may be one avenue of determining how to proceed

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Stan - there is considerable sympathy for that view point that will be hammered out on this issue; need to focus on recovery question;
Nadav Nur - recovery may not be able to get back to what was and you don't know what would have been; in bird species, things don't go back to where they were

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Comments:

need to consider the risk involved in active restoration; a lot of it is disturbance; comes down to assessing risk in intervention

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Comments:

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Stan - which definition comes closest to capturing what recovery is?

Comments:

#2 comes closest: Ganning et al. (1984) "the restoration to original functional and structural conditions with original species present in original numbers."

John has brought out an important element in #4 in health and productivity which should be incorporated into the definition.

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Healthy and productive - organismic - ecosystem
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Species composition
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    colony numbers
Natural variability

Contamination -
    services degraded
    biological effects
    surrogate

Comments:

may want to put more weight on things that were visually apparent

Stan - with subsistence users, the level of contaminants was acceptable as far as health but their level of perception was different and they went elsewhere for their subsistence needs

Comments:

weighing is quite different from one resource to another

could we still be missing the ecosystem level?

Stan - we will be forced to look at individual species and the larger picture

Art - have to look at structure and function; may work hard to recreate structure but if we don't work hard to recreate the function, we have nothing

Navissi - need to add the level of contaminants

Mark Fraker - need to come to some point of operational definition; has used the VEC - valued ecosystem component; you can't measure everything; so you have to settle on some things; VEC's are those things that someone puts a value on; they may be species that taste good, are critical ecologically, or are cute and furry and are liked by many people in the public

David - may need to delist some species

Stan - talked about pre-spill and baseline; how do we bring around functionally the question of is natural recovery adequate? how does that translate into making a recommendation to the Trustees? one thing that might help is a section in the regs

stating:

these estimates are to be based on the best available information: published studies, other data sources, experience of managers or resource specialist with experience with the injured resource, and managers who have dealt with similar situations such as:

ecological succession patterns
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local climatic conditions

the regs basically say do your best and rely on all available sources of information; how do we make use of the information?

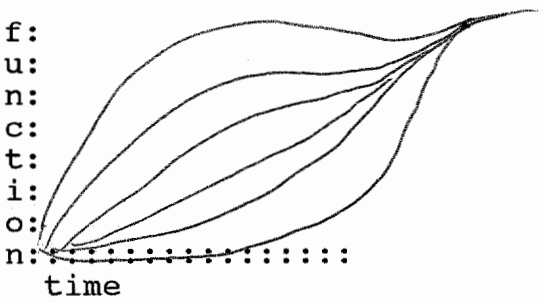
Comments:

who will make the decision of time period for recovery?

no one has said but a decision will be made some time in the future

Stan - one functional definition is if you have a technique that will speed up natural recovery, then by definition natural recovery is inadequate

Charles Simenstad - need to use our literature search to form indicators for recovery; Simenstad diagramed the following:



Comments:

is there information out there that would enable us to generate these models as indicators? need to watch out for situations that can take a downturn and may not see something taking off until another indicator is taking off; it is a way to structure indicators of when and how accurate you can be about when a system is approaching recovery

John Strand - hopefully this will come out in the Coastal Habitat

plans

Comments:

would be desirable to extrapolate from models and combine with the data you have so far; need to come up with good estimates of recovery

Dan - how intrusive are we getting about restoration? are you going to do whatever it takes?

Stan - may be worth the money to experiment; may trim some time

Comments:

should make an effort to understand the system so that something isn't done that wouldn't have been done if you had more information

John Strand - need to get a multi-agency task force together to study prey base

Comments:

this study could evolve into a major indicator

Stan - how did VEC's approach work?

Mark Fraker - VEC's are those things that are deemed to be important for some reason; they provide a focus for research and management; without them, effort is likely to be dissipated in unproductive ways; the Beaufort Sea Project in Canada was multi-disciplinary - everybody went out and did their own thing; however, there was no integration, and the stuff that the zooplankton biologists learned didn't help those of us who were studying bowhead whales; later, we got an inter-disciplinary group together and studied the oceanographic features and zooplankton ecology that helped us to understand how bowhead whales did what they did; it worked a lot better to start from the top and work down rather than the other way; it was also important that conceptual models were developed to help guide us in understanding what was most important to study

Comments:

that is a science management issue that is achievable

most valuable thing is to have it driven or guided from the top down

Stan - we don't know what all the rules are and there is a high level of concern about money

Comments:

need to get some major policies established and some ground rules

Alex - there is a danger of passing the buck; decisions at the top are based on proposals from here; needs justification that comes from the scientists so that policy makers can make decisions; need to be confronted with what are the options and what will work

Mark Brodersen - will take about a year to come up with a package must come from this level up

Comments:

need a larger scale study but need to lay the ground work for logic behind it

Mark Brodersen - will be a question of breaking some people loose to write package

Stan - there are a lot of things that drive this project

Susan - thinks these little pieces will fit in

Stan - need to develop an understanding of the research that needs to be done and look at the best tactic for achieving the goals information is now available for peer reviewers; RPWG and peer reviewers need to meet at 1:00

Meeting continued at 1:00.

Attendees were:

Stan Senner
John Strand
Art Weiner
Ken Rice
Karen Klinge
Susan MacMullin
Mark Brodersen
Sandy Rabinowitch
Tim Steele
Barbara Iseah
Bob Spies

The following Peer Reviewers attended:

Dan Roby
Michael Fry
Charles Simenstad
Charles Petersen

Note: missed first 30 minutes of the meeting preparing the minutes for the first half of the day for incorporation in discussions this afternoon

Note: add to Agenda for next RPWG meeting suggestion of literature search on recovery of sediments

Stan - what contaminants are in sediment?

John - if he did another RFP, maybe Si and Pete could think of any concepts to put in RFP

Ken - what is the restoration endpoint?

Mark - oiled fisheries; suspects there are others

Bob - may want to link it to studies being done on pink salmon

Stan - need to discuss further, scope out and make some decisions; this is one to persuade Trustee Council on; Tom Campbell has said if there is no biological effect, don't spend one penny on it; This is the kind of thinking we have to deal with; is November 18th and 19th still on schedule for next RPWG meeting?

Mark - There is a Management Team meeting on the 21st on the TNC contract by Rod

Ken - need to get comments back by that Friday

Stan - meeting will be the 18th and 19th; another topic to discuss is the idea of natural recovery and what we need to do next; need to put together a monitoring and research program for longer term implementation of the settlement

Definition of Natural Resource

Develop a Monitoring Plan
:
:
Adequacy of Natural Recovery
:
:
Restoration Actions
:
:
Estimates of Natural Resources

have judgments to be made about adequacy and restoration plans; it is matter of looking at what is in NRDA regulations and settlement document and also the contamination and services; need to take a stab at what we think natural recovery is all about
Susan - thought we made progress on the different perimeters, but did not say how we should measure it for each species

Stan - that is important but it is on a longer term track; don't have the luxury of talking about measurement for some of our nearer term decisions

Susan - we have experts that can do these things

Stan - the difficulty is don't see the Trustees sitting around waiting for us to make a rigorous determination on recovery before they make decisions on restoration

Susan - there are more than the Trustees to talk to; there is also the public to consider

Stan - the public's test will be even more common sense than the Trustees

Tim - public will expect some action

Susan - should discuss how we present this

Stan - sees the definition as a statement of ideal, recognizing that application comes from common sense and not science

Ken - we will have to defend our actions

Stan - goal can't be so high and lofty that it can't be attainable

Mark - no matter what we do, someone will think we should have done something else

Stan - on the common sense question, we need to come up with a definition and apply our best decision; common sense takes precedence over science; however, common sense and science don't have to be inconsistent

Peer Reviewer - we would probably have a more realistic goal, if through literature we came up with some type of indicators

Stan - ultimately the manager goes with the best information; what do we need to do; Art, do we know enough to articulate a definition of natural recovery?

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Susan - needs some intrinsic value of how the ecosystem works as a whole system

Stan - the goal is the natural recovery of the affected ecosystem and the restoration of the services provided

Peer reviewer - if we come to definition of recovery, then there are two processes

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Peer reviewer - we do need a definition of recovery

Stan - before we talk about recovery, we still need a definition of natural recovery; we are explicitly required to; we need to get what constitutes recovery; Pete, could you take a stab at a definition; would invite anyone to do the same; need to put on agenda for next meeting and at that point should be open for comments and then put them together in final form

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Stan - services are what is provided by the natural resources; your frame of reference is to the human users such as subsistence, recreation, aesthetic, archeology, and commercial enterprises; as long as we can say we are enhancing the natural resource that provides the service, that is our goal

Art - functional integrity is the key phrase

Stan - Bob, can you take a stab at defining what constitutes injury and what is the application?

Peer Reviewer - definition of recovery - complete recovery to a functional ecosystem means that (1) the faunal and floral constituents that were present before the oil spill are again present and healthy and (2) they have their full complement of constituent members, age classes, and productivity; a fully recovered ecosystem will provide the same functions and services as the undamaged systems

Meeting adjourned at 2:45.

RESTORATION PLANNING WORK GROUP
PROGRAM REVIEW
November 6, 1991

Attendees:

Susan MacMullin	EPA	(202) 260-6412
John Armstrong	EPA	(206) 553-1368
Sandy Rabinowitch	DOI/RPWG	(907) 257-2653
Barbara Iseah	CACI/RPWG	(907) 278-8012
David Ainley	Pt. Reyes Bird Observatory	(415) 868-1221
Nadav Nur	Pt. Reyes Bird Observatory	(415) 868-1221
Stan Senner	ADF&G/RPWG	(907) 278-8012
Joe Sullivan	ADF&G	(907) 267-2213
Art Weiner	ADNR	(907) 278-8012
John Strand	NMFS/RPWG	(907) 789-6601
Charles Peterson	Univ. N. Carolina (PR)	(919) 726-6841
Charles Simenstad	Univ. of Washington	(206) 543-7185
D. Michael Fry	Univ. California-Davis	(916) 752-1201
Karen Klinge	USFS/RPWG	(907) 278-8012
Ahmad Nevissi	Univ. of Washington	(206) 543-4259
Gail Irvine	National Park Service	(907) 257-2529
Daniel D. Roby	Coop. Wildl. Res. Lab.	(618) 536-7766
Mark Fraker	ADF&G	(907) 267-2136
Alex Swiderski	AG's Office	(907) 269-5274
Jeep Rice	NMFS/Auke Bay Lab.	(907) 789-6020
Mark Brodersen	ADEC	(907) 465-2610
Ken Rice	USFS/RPWG	(907) 278-8012
Valerie Payne	National Park Service	(907) 257-2532
John Boland	San Diego State University	(619) 594-7422

Meeting began at 10:00.

The following materials were distributed:

CERCLA definitions
Excerpts from John Boland's report
Copies of the sign up sheet

Stan opened discussion with: what guidance is in current NRDA regulations and the law? what is natural recovery? how do we determine the adequacy of natural recovery? important to note that in the discussion of biological resources, the damage assessment was to measure the difference from baseline; the recovery period means either the longest length of time required to return to baseline or the lesser period of time; Alex Swiderski will give any other context that he puts on the above; must evaluate the no action alternative; before we can justify spending significant restoration dollars, we will need to argue that it will be of some benefit or at least prevent further harm; need an understanding of natural recovery

Alex - the Trustees have never given a mandate on whether to

remain within NRDA guidelines; settlement agreement specifically states Trustees are not bound by the guidelines; it is appropriate to deviate from the guidelines; if we take baseline as a definition and consider the meaning of enhancement, that may be one avenue of determining how to proceed

Definition of restoration from MOA: any action, in addition to response and cleanup activities required or authorized by state or federal law, which endeavors to restore to their pre-spill condition any natural resource injured, lost or destroyed as a result of the Oil Spill and the services provided by that resource or which replaces or substitutes for the injured, lost or destroyed resource and affected services. Restoration includes all phases of injury assessment, restoration, replacement, and enhancement of natural resources, and acquisition of equivalent resources and services.

we are not bound by NRDA guidelines but it is appropriate to use them where applicable

The following definitions are from current CERCLA-NRDA regulations:

Recovery period means either the longest length of time required to return the services of the injured resource to their baseline condition, or a lesser period of time... [43 CFR Subtitle A 11.14 (gg)]

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... [43 CFR Subtitle A 11.14 (11)]

Baseline means the condition or conditions that would have existed at the assessment area had the discharge of oil or release of the hazardous substance under investigation not occurred." [43 CFR Subtitle A 11.14 (e)]

Biological resources - (1) The extent to which the injured biological resource differs from baseline should be determined by analysis of the population or the habitat or ecosystem levels. [43 CFR Subtitle A 11.71 (1)]

In all cases, the amount of time needed for recovery if no restoration efforts are undertaken beyond response actions performed or anticipated shall be estimated. This time period shall be used as the "No Action - Natural Recovery" period... [43 CFR Subtitle A 11.73 (a)(1)].

Stan - need to talk about what these terms and definitions mean and if they provide functional guidance; how do we determine if

recovery has been achieved?

Comments:

you can never get resource back to where it was;

there is a good argument to do more than recovery

the infrastructure of cooperation has been established between federal and state agencies, and they will all look at restoration and recovery; the shared interest is how PWS ecosystem functions; the oil spill has been a big experiment; there is an opportunity to put together a good inter-disciplinary program and enable much wiser management of resources in the future; need to expand knowledge base; unique opportunity to combine talents and make management in Alaska improved for generations to come

Stan - there is considerable sympathy for that view point that will be hammered out on this issue; need to focus on recovery question;
Nadav Nur - recovery may not be able to get back to what was and you don't know what would have been; in bird species, things don't go back to where they were

Art - as a restoration group, we need to know if a population is on the way to recovery

Comments:

need to consider the risk involved in active restoration; a lot of it is disturbance; comes down to assessing risk in intervention

Alex - you have described a biological need; there is also a legal need to determine when and if natural recovery will occur; Trustees are required to engage in cost benefit analysis to determine what is appropriate; would be incumbent to compare restoration; regulations give Trustees a great deal of discretion

Stan - need to look at John Boland's excerpt

Comments:

need to examine all definitions of restoration

some uncertainty of what system would have looked like

Stan - Exxon argued that recovery has occurred

Comments:

John Boland gave the following definitions of recovery:

American Heritage Dictionary - return to a normal condition; the getting back of something lost.

Ganning et al. - the restoration to original functional and structural conditions with original species present in original numbers.

Ganning et al. - returning the ecosystem to within the limits of natural variability.

Lewis - complete recovery (has occurred when) there are no discernable aftereffects.

Boesch et al - complete recovery is the time required for a disturbed community to exhibit variation that is within the bounds of variation seen in undisturbed, control areas.

Conan - a new stable age distribution and equilibrium species assemblages attained.

National Research Council - complete recovery means that (1) the faunal and floral constituents that were present before the oil spill are again present and (2) they have their full complement of constituent age classes.

Committee on Restoration of Aquatic Ecosystems, National Research Council - the return of an ecosystem to a close approximation of its condition prior to disturbance.

Boland's definition of complete recovery - complete recovery after an oil spill occurs when (1) all the species that were present before the oil spill are again present, (2) each of these species has reached their original abundances and biomasses, (3) each of these species has reached their original age distributions, and (4) all individuals are as healthy (as measured by growth rates) and productive (as measured by reproductive condition) as the individuals that were present at the time of the oil spill.

Stan - which definition comes closest to capturing what recovery is?

Comments:

#2 comes closest: Ganning et al. (1984) "the restoration to original functional and structural conditions with original species present in original numbers."

John has brought out an important element in #4 in health and productivity which should be incorporated into the definition

Stan - we will list some attributes that might be included in

definition:

Healthy and productive - organismic - ecosystem
Abundance
Species composition
Age structure
Distribution -
colony numbers
Natural variability

Contamination -
services degraded
biological effects
surrogate

Comments:

may want to put more weight on things that were visually apparent

Stan - with subsistence users, the level of contaminants was acceptable as far as health but their level of perception was different and they went elsewhere for their subsistence needs

Comments:

weighing is quite different from one resource to another

could we still be missing the ecosystem level?

Stan - we will be forced to look at individual species and the larger picture

Art - have to look at structure and function; may work hard to recreate structure but if we don't work hard to recreate the function, we have nothing

Navissi - need to add the level of contaminants

Mark Fraker - need to come to some point of operational definition; has used the VEC - valued ecosystem component; you can't measure everything; so you have to settle on some things; VEC's are those things that someone puts a value on; they may be species that taste good, are critical ecologically, or are cute and furry and are liked by many people in the public

David - may need to delist some species

Stan - talked about pre-spill and baseline; how do we bring around functionally the question of is natural recovery adequate? how does that translate into making a recommendation to the Trustees? one thing that might help is a section in the regs

stating:

these estimates are to be based on the best available information: published studies, other data sources, experience of managers or resource specialist with experience with the injured resource, and managers who have dealt with similar situations such as:

ecological succession patterns
biocumulation
dispersion dilution
biological degradation
local climatic conditions

the regs basically say do your best and rely on all available sources of information; how do we make use of the information?

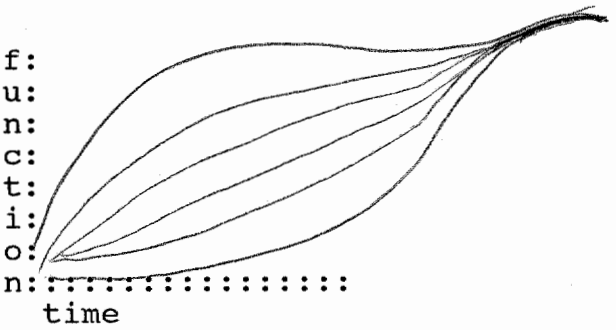
Comments:

who will make the decision of time period for recovery?

no one has said but a decision will be made some time in the future

Stan - one functional definition is if you have a technique that will speed up natural recovery, then by definition natural recovery is inadequate

Charles Simenstad - need to use our literature search to form indicators for recovery; Simenstad diagramed the following:



Comments:

is there information out there that would enable us to generate these models as indicators? need to watch out for situations that can take a downturn and may not see something taking off until another indicator is taking off; it is a way to structure indicators of when and how accurate you can be about when a system is approaching recovery

John Strand - hopefully this will come out in the Coastal Habitat

plans

Comments:

would be desirable to extrapolate from models and combine with the data you have so far; need to come up with good estimates of recovery

Dan - how intrusive are we getting about restoration? are you going to do whatever it takes?

Stan - may be worth the money to experiment; may trim some time

Comments:

should make an effort to understand the system so that something isn't done that wouldn't have been done if you had more information

John Strand - need to get a multi-agency task force together to study prey base

Comments:

this study could evolve into a major indicator

Stan - how did VEC's approach work?

Mark Fraker - VEC's are those things that are deemed to be important for some reason; they provide a focus for research and management; without them, effort is likely to be dissipated in unproductive ways; the Beaufort Sea Project in Canada was multi-disciplinary - everybody went out and did their own thing; however, there was no integration, and the stuff that the zooplankton biologists learned didn't help those of us who were studying bowhead whales; later, we got an inter-disciplinary group together and studied the oceanographic features and zooplankton ecology that helped us to understand how bowhead whales did what they did; it worked a lot better to start from the top and work down rather than the other way; it was also important that conceptual models were developed to help guide us in understanding what was most important to study

Comments:

that is a science management issue that is achievable

most valuable thing is to have it driven or guided from the top down

Stan - we don't know what all the rules are and there is a high level of concern about money

Comments:

need to get some major policies established and some ground rules

Alex - there is a danger of passing the buck; decisions at the top are based on proposals from here; needs justification that comes from the scientists so that policy makers can make decisions; need to be confronted with what are the options and what will work

Mark Brodersen - will take about a year to come up with a package must come from this level up

Comments:

need a larger scale study but need to lay the ground work for logic behind it

Mark Brodersen - will be a question of breaking some people loose to write package

Stan - there are a lot of things that drive this project

Susan - thinks these little pieces will fit in

Stan - need to develop an understanding of the research that needs to be done and look at the best tactic for achieving the goals information is now available for peer reviewers; RPWG and peer reviewers need to meet at 1:00

Meeting continued at 1:00.

Attendees were:

Stan Senner
John Strand
Art Weiner
Ken Rice
Karen Klinge
Susan MacMullin
Mark Brodersen
Sandy Rabinowitch
Tim Steele
Barbara Iseah
Bob Spies

The following Peer Reviewers attended:

Dan Roby
Michael Fry
Charles Simenstad
Charles Petersen

Note: missed first 30 minutes of the meeting preparing the minutes for the first half of the day for incorporation in discussions this afternoon

Note: add to Agenda for next RPWG meeting suggestion of literature search on recovery of sediments

Stan - what contaminants are in sediment?

John - if he did another RFP, maybe Si and Pete could think of any concepts to put in RFP

Ken - what is the restoration endpoint?

Mark - oiled fisheries; suspects there are others

Bob - may want to link it to studies being done on pink salmon

Stan - need to discuss further, scope out and make some decisions; this is one to persuade Trustee Council on; Tom Campbell has said if there is no biological effect, don't spend one penny on it; This is the kind of thinking we have to deal with; is November 18th and 19th still on schedule for next RPWG meeting?

Mark - There is a Management Team meeting on the 21st

Ken - need to get comments back on the TNC contract by that Friday

Stan - meeting will be the 18th and 19th; another topic to discuss is the idea of natural recovery and what we need to do next; need to put together a monitoring and research program for longer term implementation of the settlement

Definition of Natural Resource

Develop a Monitoring Plan
:
:
Adequacy of Natural Recovery
:
:
Restoration Actions
:
:
Estimates of Natural Resources

have judgments to be made about adequacy and restoration plans; it is matter of looking at what is in NRDA regulations and settlement document and also the contamination and services; need to take a stab at what we think natural recovery is all about Susan - thought we made progress on the different perimeters, but

did not say how we should measure it for each species

Stan - that is important but it is on a longer term track; don't have the luxury of talking about measurement for some of our nearer term decisions

Susan - we have experts that can do these things

Stan - the difficulty is don't see the Trustees sitting around waiting for us to make a rigorous determination on recovery before they make decisions on restoration

Susan - there are more than the Trustees to talk to; there is also the public to consider

Stan - the public's test will be even more common sense than the Trustees

Tim - public will expect some action

Susan - should discuss how we present this

Stan - sees the definition as a statement of ideal, recognizing that application comes from common sense and not science

Ken - we will have to defend our actions

Stan - goal can't be so high and lofty that it can't be attainable

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Meeting adjourned at 2:45.

Restoration Planning Work Group

Program Review:

COMPREHENSIVE REVIEW AND CRITICAL SYNTHESIS OF THE LITERATURE ON RECOVERY OF ECOSYSTEMS FOLLOWING MAN-INDUCED AND NATURAL PHENOMENA-RELATED DISTURBANCES

Agenda, 5-6 November 1991

Tuesday, 5 November

Meeting Overview

0830-0900	Introductions, Meeting Objectives, and Status of Restoration Planning - Senner
0900-0930	Use of Information Derived from Literature - John Strand
0930-1000	Break

Review of Studies

1000-1200	Marine Birds - Nadav Nur, Point Reyes Bird Observatory
1200-1300	Lunch
1300-1500	Intertidal Invertebrates - John Boland, San Diego State University
1500-1515	Break
1515-1715	Fish and Shellfish - Ahmad Nevissi, University of Washington

Agenda, 5-6 November, continued

Wednesday, 6 November

Review of Studies, continued

0830-0930	Wrap-up review of studies, final reports, etc. - John Strand and Stan Senner
0930-0945	Break

Natural Recovery Workshop

0945-1030	Legal and Scientific Definitions of "Natural Recovery" - RPWG/Legal Team
1030-1200	Determining the Adequacy of Natural Recovery - RPWG/Legal Team
1200-1300	Lunch

Executive Session

1300-1500	Discussion of Progress - RPWG and Peer Reviewers only

experimental phase so that the success rates of different methods can be evaluated. This will help rule out techniques that don't work and will help identify promising approaches that can be developed further (see PERL 1990). This research will provide valuable information on restoration techniques (a subject about which little is known) as well as further our knowledge of the Alaskan ecosystems. All major projects should be continually evaluated with a long-term monitoring program that will allow managers to take advantage of unforeseen benefits and to address unexpected problems quickly.

4.0 EXTRAPOLATION TO THE INJURED ALASKAN ECOSYSTEM

4.1 Identification of Most Practical and Cost Effective Indicators of Recovery to Measure

Indicator species have been used extensively in pollution studies. Indicator species are those species which, by their presence and abundance, provide some indication of the prevailing environmental conditions. The best indicator species are those that have narrow and specific environmental tolerances, because they will show a marked response to quite small changes in environmental quality (Abel 1989).

However, indicator species provide only a general overview of the approximate position of the community in the successional process, i.e., whether the community is generally in the early or the late successional stage. What is needed to determine whether recovery has occurred is an extensive study that includes all of the macroinvertebrate species. Only then can one be sure of one's conclusions. See below for details.

4.2 Recommended Approach to Determine When Recovery has Occurred

4.2.1 Definition of recovery

It is important that in a study of recovery that one state one's objectives clearly and define what one will or will not accept as a fully recovered ecosystem. The objectives will guide the entire project, including the sampling design, statistical tests and conclusions. Without clear objectives, the work will end up with a poorly directed sampling design and weak conclusions.

If one's objective is to determine whether an area has fully recovered from an oil spill then one must define what one will accept as recovered. Most of the researchers in Table 1 did not explicitly define recovery but their implicit definition was:

- "the return of all population densities to pre-disturbance levels or undisturbed levels."

However, there are many other possible definitions of recovery.

- American Heritage Dictionary (1973): "return to a normal condition; the getting back of something lost."

- Ganning et al. (1984): "the restoration to original functional and structural conditions with original species present in original numbers."

- Ganning et al. (1984): "returning the ecosystem to within the limits of natural variability."

- Lewis (1982): "complete recovery (has occurred when) there are no discernable after-effects."

- Boesch et al. (1987): "complete recovery is the time required for a disturbed community to exhibit variation that is within the bounds of variation seen in undisturbed, control areas."

- Conan (1982): "a new stable age distribution and equilibrium species assemblages attained".

- National Research Council (1975; page 91): "Complete recovery means that (1) the faunal and floral constituents that were present before the oil spill are again present and (2) they have their full complement of constituent age classes."

- Committee on Restoration of Aquatic Ecosystems, National Research Council (in press) " the return of an ecosytem to a close approximation of its condition prior to disturbance."

None of these definitions is completely satisfactory. They give a general description of the term but few specifics. I suggest the following definition of recovery -- it is a combination of the definitions:

- Boland (this report): "Complete recovery after an oil spill occurs when (1) all the species that were present before the oil spill are again present; (2) each of these species has reached their original abundances and biomasses, (3) each of these species has reached their original age distributions, and (4) all individuals are as healthy (as measured by growth rates) and productive (as measured by reproductive condition) as the individuals that were present at the time of the oil spill." In the absence of pre-spill data, original conditions should be estimated from several unoiled communities in similar physical/chemical environments.

Prespill data on species abundances, biomasses, age distributions, growth rates and reproductive conditions are necessary for determining when recovery has occurred, however these data are usually unavailable. In these cases, studies of many unoiled sites must be conducted instead. These unoiled sites should be chosen carefully and should include all the habitats that were oiled. All the appropriate data should be collected in the unoiled sites soon after the oil spill and used as the baseline data representing the prespill conditions in the oiled sites.

Therefore, when one is testing for recovery one is testing the hypotheses that there are no significant differences in (1) the species that are present in oiled and unoiled areas; (2) the abundances and biomasses of the species in oiled and unoiled areas; (3) the age distributions of the species in oiled and unoiled areas; and (4) the growth rates and reproductive condition of individuals in oiled and unoiled areas.

Notice that our definition, like those above, focuses on the structure of the community rather than its functioning. Too little is known about the functioning of marine communities to include it in the definition. One hopes that when the structure returns the functioning will return too. However, also notice that the recovered community does not have to be identical to the undisturbed community, only not statistically different from the undisturbed community.

Our definition of recovery is based upon that used by many researchers and the dictionary definition. However, the biologists working for The Exxon Corporation have recently proposed a different definition of recovery and this is:

- Baker et al. (1990): "the re-establishment of a healthy biological community in which the plants and animals characteristic of that community are present and functioning normally. It may not have the same composition or age structure as that which was present before the damage, and will continue to show further change and development." This definition is very different to all the others outlined above in that it will consider a community recovered when it is only on the road to recovery. This is unacceptable. For instance, using this definition one may consider a mussel bed to have recovered if the rocks are completely covered with healthy opportunistic species such as green algae.

The difference between the definitions of Baker et al. (1990) and the others can be illustrated in an analogy. Say a train jumped the tracks and destroyed my house. The railroad company apologized and agreed to rebuild the house. After six months, the rubble has been removed, the new foundations have been laid and the workmen are starting to erect the wooden frame. Someone using Baker et al.'s definition would be impressed with the progress and probably state that "recovery has occurred!" But a house on the road to being built cannot be lived in; it is neither structurally nor functionally the same as a completed house. The other definitions of recovery require that further work be done on the house and only when it is completed will it be considered to have "recovered." In the same way, a community is recovered not when it is on the road to recovery but when it is fully recovered, i.e., structurally and functionally the same as it was before the disturbance.

The defintion of recovery of Baker et al. (1990) leads them to estimate recovery times that are relatively fast. "Rocky shores usually recover in 2 to 3 years. Other shorelines show substantial recovery in 1 to 5 years with the exception of sheltered, highly productive shores (e.g., salt marshes), which may take 10 years or more to recover." In subtidal sand and mud systems "recovery times are 1 to 5 years, but they can be 10 years or longer in exceptional cases" (Baker et al. 1990). Our literature survey suggests that recovery times are longer than these, and in general, these numbers should be doubled to obtain true estimates of recovery times (Section 3.1.1).

In conclusion, the definition of recovery is an extremely important part of the study.

4.2.2. Methods

We are testing the hypotheses that there is no significant difference in (1) the species that are present in oiled and unoiled areas; (2) the abundances and biomasses of the species in oiled and unoiled areas; (3) the age distributions of the species in oiled and unoiled areas; and (4) the growth rates and reproductive condition of individuals in oiled and unoiled areas.

from current CERCLA-NRDA regulations

"Recovery period" means either the longest length of time required to return the services of the injured resource to their baseline condition, or a lesser period of time... [43 CFR Subtitle A 11.14 (gg)]

"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... [43 CFR Subtitle A 11.14 (ll)]

"Baseline" means the condition or conditions that would have existed at the assessment area had the discharge of oil or release of the hazardous substance under investigation not occurred." [43 CFR Substitle A 11.14 (e)]

Biological resources. (1) The extent to which the injured biological resource differs from baseline should be determined by analysis of the population or the habitat or ecosystem levels. [43 CFR Subtitle A 11.71 (l)]

In all cases, the amount of time needed for recovery if no restoration efforts are undertaken beyond response actions performed or anticipated shall be estimated. This time period shall be used as the "No Action-Natural Recovery" period... [43 CFR Subtitle A 11.73 (a)(1)].

Nov. 6, 1991 — Restoration Planning -- Natural Recovery Literature Synthesis - 2nd day

Susan Mac Mullin	EPA	202/260-6412
John Armstrong	EPA Region 10, Seattle	(206) 553-1368
Sandy Rabinowitch	DOT - RPWG	257-2653
Barbara Cleaver	RPWG	278-8012
DAVID AINLEY	Pt. Reyes Bird Observatory	415 868 1221
NADAV NUR	Pt. Reyes Bird Observatory	415 868 1221
Stan Senner	ADF+G - RPWG	(907) 278-8012
~~Alex Swiderski~~	~~Same~~	
Joe Sullivan	ADF+G	907-267-2213
ART WEINER	ADNR	278-8012
JOHN STRAND	NMFS - RPWG	(907) 789-6601
Charles "Pete" Peterson	Univ. North Carolina - Peer Reviewer	(919) - 726-6841
CHARLES 'Si' SIMENSTAD	UNIV. WASHINGTON	(206) 543-7185
D Michael Fry	Univ Calif Davis	(916) 752-1201
KAREN KLINGE	USFS - RPWG	278-8012
Ahmad Nevissi	University of Washington	(206) 543-4259
Gail Irvine	National Park Service	(907) 257-2529
Daniel D. Roby	Coop. Wildl. Res. Lab., SIU	(618) 536-7766
MARK FRAKER	ADFG	267-2136
Alex Swiderski	Alt's Office	269-5274
Jeep Rice	NMFS/Auke Bay Lab	907-789-6020
Mark Brodersen	ADF	465-2610
Ken Rice	USFS/RPWG	278-8012
Valerie Payne	National Park service	(907) 257-2532
JOHN BOLAND	SAN DIEGO STATE UNIV.	(619) 594-7422

(A)

VEC's are those things that someone puts a value on. They may be species that taste good, are critical ecologically, or are cute and fuzzy and are liked by many people in the public.

done

(B)

done

VEC's are those things that are deemed to be important for some reason. They provide a focus for research and management. Without them, effort is likely to be dissipated in unproductive ways. The Beaufort Sea Project in Canada was multi-disciplinary — everybody went out and did their own thing. However, there was no integration, and the stuff that the zooplankton biologists learned didn't help those of us who were studying bowhead whales. Later, we got an inter-disciplinary group together and studied the

over

oceanographic features and zooplankton ~~[illegible]~~ ecology that helped us to understand why bowhead whales did what they did. It worked a lot better to start from the top and work down rather than the other way. It was also important that conceptual models were developed to help guide us in understanding what was most important to study.

Nov. 6, 1991

Restoration Planning -- Natural Recovery Literature Synthesis - 2nd day

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from current CERCLA-NRDA regulations

"Recovery period" means either the longest length of time required to return the services of the injured resource to their baseline condition, or a lesser period of time... [43 CFR Subtitle A 11.14 (gg)]

"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... [43 CFR Subtitle A 11.14 (ll)]

"Baseline" means the condition or conditions that would have existed at the assessment area had the discharge of oil or release of the hazardous substance under investigation not occurred." [43 CFR Substitle A 11.14 (e)]

Biological resources. (1) The extent to which the injured biological resource differs from baseline should be determined by analysis of the population or the habitat or ecosystem levels. [43 CFR Subtitle A 11.71 (l)]

In all cases, the amount of time needed for recovery if no restoration efforts are undertaken beyond response actions performed or anticipated shall be estimated. This time period shall be used as the "No Action-Natural Recovery" period... [43 CFR Subtitle A 11.73 (a)(1)].

RPwG
BI

BARRY M. HARTMAN
Acting Assistant Attorney General
Environment & Natural Resources
Division

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

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

Attorneys for the United States of America

CHARLES E. COLE
Attorney General
State of Alaska
Pouch K, State Capitol
Juneau, Alaska 99811
(907) 465-3600

Attorney for the State of Alaska

UNITED STATES DISTRICT COURT
DISTRICT OF ALASKA

UNITED STATES OF AMERICA, Plaintiff, v. STATE OF ALASKA, Defendant and Counterclaimant.	Civil Action No. A91-081 CV

MEMORANDUM OF AGREEMENT AND CONSENT DECREE

This Memorandum of Agreement and Consent Decree (MOA) is made and entered into by the United States of America (United States)

and the State of Alaska (State) (collectively referred to as the Governments).

INTRODUCTION

WHEREAS, Section 311 of the Clean Water Act, 33 U.S.C. § 1321, establishes liability to the United States and to States for injury, loss, or destruction of natural resources resulting from the discharge of oil or the release of hazardous substances or both and provides for the appointment of State and Federal Trustees;

WHEREAS, the United States and the State are trustees and/or co-trustees for natural resources injured, lost or destroyed as a result of the EXXON VALDEZ Oil Spill (Oil Spill);

WHEREAS, Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9607, the National Contingency Plan, 40 C.F.R. § 300.615(a), and the Natural Resource Damage Assessment Regulations, 43 C.F.R. § 11.32(a)(1)(ii), provide a framework for and encourage the state and federal trustees to cooperate with each other in carrying out their responsibilities for natural resources;

WHEREAS, the Secretaries of the United States Departments of the Interior and Agriculture and the Administrator of the National Oceanic and Atmospheric Administration (NOAA), a bureau of the United States Department of Commerce, have been designated trustees (the Federal Trustees) for purposes of the Clean Water Act, 33 U.S.C. § 1321, and CERCLA, 42 U.S.C. § 9607, and otherwise have statutory responsibilities related to the natural

resources injured, lost or destroyed as a result of the Oil Spill, and the United States Environmental Protection Agency (EPA) has been designated by the President of the United States to coordinate restoration activities on behalf of the United States;

WHEREAS, the Commissioners of the State Departments of Environmental Conservation and Fish and Game and the Attorney General of the State of Alaska have been designated trustees for purposes of the Clean Water Act, 33 U.S.C. § 1321, and CERCLA, 42 U.S.C. § 9607, and otherwise have statutory responsibilities relating to the natural resources injured, lost or destroyed as a result of the Oil Spill;

WHEREAS, the United States Coast Guard, an agency of the United States Department of Transportation, is the predesignated Federal On-Scene Coordinator (FOSC) to direct response efforts and to coordinate all other efforts at the scene of the Oil Spill, pursuant to the Clean Water Act, 33 U.S.C § 1321, and the National Contingency Plan, 40 C.F.R. § 300, and is coordinating its efforts with the Federal Trustees in accordance with the National Contingency Plan;

WHEREAS, the State Department of Environmental Conservation is the State On-Scene Coordinator (SOSC) to direct containment and cleanup of discharged oil pursuant to AS 46.04.020;

WHEREAS, the United States Department of Justice (Justice) and the Department of Law for the State of Alaska (Law) have constitutional and statutory responsibility for litigation

management and specifically for prosecuting claims for damages for injury, loss or destruction to the natural resources affected by the Oil Spill;

WHEREAS, all of the above state and federal entities have determined that it is in furtherance of their statutory and trust responsibilities to ensure that all injuries, loss or destruction to state and federal natural resources are fully compensated and to ensure that such compensation is used in accordance with law;

WHEREAS, the United States has brought this action against the State, and the State has asserted counterclaims in this action against the United States, with respect to their respective shares in any recoveries for compensation for natural resource damages resulting from the Oil Spill;

WHEREAS, recognizing their mutual desire to maximize the funds available for restoration of natural resources, the United States and the State have determined that entering into this MOA is the most appropriate way to resolve their claims against one another in this action, and that the terms of this MOA are in the public interest and will best enable them to fulfill their duties as trustees to assess injuries and to restore, replace, rehabilitate, enhance, or acquire the equivalent of the natural resources injured, lost, or destroyed as a result of the Oil Spill;

NOW THEREFORE, in consideration of their mutual promises, the United States, acting through the United States Departments of

EPA, and the State of Alaska, acting through the State Departments of Fish and Game, Environmental Conservation, and Law (together "the Governments") have agreed to the following terms and conditions, which shall be binding on both Governments, it is hereby ORDERED, ADJUDGED, AND DECREED as follows:

I.

JURISDICTION

The Court has jurisdiction over the subject matter of the claims set forth in the United States' Complaint and in the State's Counterclaim and over the parties to this MOA pursuant to, among other authorities, 28 U.S.C. §§ 1331, 1333, and 1345, and section 311(f) of the Clean Water Act, 33 U.S.C. § 1321(f).

II.

DEFINITIONS

For purposes of this MOA, the following terms shall have the meanings specified in this paragraph:

A. "Base Allowed Expenses" means (1) reasonable, unreimbursed costs obligated or incurred by either the United States or the State on or before March 12, 1991, for the planning, conduct, evaluation, and coordination, and oversight of natural resource damage assessment and restoration pursued by the Governments with respect to the Oil Spill, and (2) reasonable, unreimbursed costs obligated or incurred by the State on or before March 12, 1991, for experts and counsel in connection with the preparation of the Oil Spill Litigation.

B. "CERCLA" means the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. § 9601 et seq. as amended.

C. "Clean Water Act" means the Federal Water Pollution Control Act, 33 U.S.C. §§ 1251-1376, as amended.

D. "Joint use" means use of natural resource damage recoveries by the Governments in such a manner as is agreed upon by the Governments in accordance with Article IV of this MOA.

E. "National Contingency Plan" means the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300.

F. "Natural resources" means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the fishery conservation zone established by the Magnuson Fishery Conservation and Management Act of 1976) and/or the State.

G. "Natural resource damage recovery" means any award, judgment, settlement or other payment to either Government which is received as a result of a claim or demand for Base Allowed Expenses or for damages for injury, destruction, or loss of natural resources arising from the Oil Spill and for costs incurred by the State for experts and counsel in connection with the Oil Spill Litigation. The term includes, without limitation,

state and federal common law, state statutes, admiralty law, state and federal right-of-way lease covenants and any recoveries for natural resource damages obtained from or in connection with a civil proceeding or criminal restitution, unless the parties otherwise agree that criminal restitution recoveries can be separately managed by either government consistent with this MOA. The term also includes all interest accrued on any such recoveries. Natural resource damage recovery excludes any reimbursement or other recovery by either Government for response and cleanup costs, lost royalty, tax, license, or fee revenues, punitive damages, federal or state civil or criminal penalties, federal litigation costs and attorney fees.

H. "Oil Spill" means the grounding of the T/V EXXON VALDEZ on Bligh Reef in Prince William Sound, Alaska on the night of March 23-24, 1989, and the resulting oil spill.

I. "Oil Spill Litigation" means any past, present, or future civil judicial or administrative proceeding relating to or arising out of the Oil Spill.

J. "Response and cleanup costs" means actual, unreimbursed response and/or cleanup costs incurred by either Government in connection with the Oil Spill, as certified for payment by the Federal On-Scene Coordinator or the State On-Scene Coordinator.

K. "Restore" or "Restoration" means any action, in addition to response and cleanup activities required or authorized by state or federal law, which endeavors to restore to their pre-

as a result of the Oil Spill and the services provided by that resource or which replaces or substitutes for the injured, lost or destroyed resource and affected services. Restoration includes all phases of injury assessment, restoration, replacement, and enhancement of natural resources, and acquisition of equivalent resources and services.

L. "Trustees" means the officials now or hereafter designated by the President of the United States and the Governor of the State of Alaska to act as trustees, for purposes of CERCLA and the Clean Water Act, of natural resources injured, lost or destroyed as a result of the Oil Spill.

III.

EFFECT OF ENTRY OF MOA

Upon approval and entry of this MOA by the Court, this MOA shall constitute a final judgment between the United States and Alaska in accordance with its terms. The MOA is entered for the sole and exclusive benefit of the Governments and does not create any rights or privileges in any other parties.

IV.

CO-TRUSTEESHIP

A. The Governments shall act as co-trustees in the collection and joint use of all natural resource damage recoveries for the benefit of natural resources injured, lost or destroyed as a result of the Oil Spill.

B. Nothing in this MOA shall be deemed an admission of law or fact by either Government concerning ownership, right, title

or interest in or management or control authority over natural resources or the right to recover for injury to such resources. Except in matters concerning or relating to enforcement of this MOA, the Oil Spill Litigation, or the settlement of claims relating to the Oil Spill, the Governments agree that this MOA may not be used by one Government against the other for any reason.

C. Nothing in this MOA shall be construed to affect or impair in any manner the rights and obligations, if any, of any entities or persons not parties to this MOA, including without limitation:

1. The rights and obligations, if any, of Alaska Native villages to act as trustees for the purposes of asserting and compromising claims for injury to, destruction of, or loss of natural resources affected by the Oil Spill and expending any proceeds derived therefrom;

2. The rights and obligations, if any, of legal entities or persons other than the United States and the State who are holders of any present right, title, or interest in land or other property interest affected by the Oil Spill;

3. The rights and obligations, if any, of the United States relating to such Alaska Native villages and the entities or persons referred to in subparagraph 2 above.

V.

ORGANIZATION

A. General Provisions

1. All decisions relating to injury assessment, restoration activities, or other use of the natural resource damage recoveries obtained by the Governments, including all decisions regarding the planning, evaluation, and allocation of available funds, the planning, evaluation, and conduct of injury assessments, the planning, evaluation and conduct of restoration activities, and the coordination thereof, shall be made by the unanimous agreement of the Trustees. Such decisions, on the part of the Federal Trustees, shall be made in consultation with EPA.

2. The Governments shall cooperate in good faith to establish a joint trust fund for purposes of receiving, depositing, holding, disbursing and managing all natural resource damage recoveries obtained or received by the Governments. The joint trust fund shall be established in the Registry of the United States District Court for the District of Alaska or as otherwise determined by stipulation of the Governments and order of the court.

3. If the Trustees cannot reach unanimous agreement on a decision pursuant to paragraph A.1. of this Article, and either Government so certifies, either Government may resort to litigation in the United States District Court for the District of Alaska with respect to any such matter or dispute. At any time, the Governments may, by mutual agreement, submit any such

matter or dispute to non-binding mediation or other means of conflict resolution.

4. Within 90 days after their receipt of any natural resource damage recovery, the Trustees shall agree to an organizational structure for decision making under this MOA and shall establish procedures providing for meaningful public participation in the injury assessment and restoration process, which shall include establishment of a public advisory group to advise the Trustees with respect to the matters described in paragraph V.A.1.

B. Injury Assessment and Restoration Process

1. Nothing in this MOA limits or affects the right of each Government unilaterally to perform any natural resource injury assessment or restoration activity, in addition to the cooperative injury assessment and restoration process contemplated in this MOA, from funds other than natural resource damage recoveries as defined in paragraph G of Article II.

2. Nothing in this MOA constitutes an election on the part of either Government to adhere to or be bound by the Natural Resource Damage Assessment Regulations codified at 43 C.F.R. Part 11.

3. Nothing in this MOA shall prevent the President of the United States or the Governor of the State of Alaska from transferring, pursuant to applicable law, trustee status from on official to another official of their respective Governments; provided that, in no event shall either Government designate mor

than three Trustees for the purposes of carrying out the provisions of this MOA. The designation of such substitute or successor Trustees by either Government shall not affect the enforceability of this MOA.

C. Role of the Environmental Protection Agency

The Governments acknowledge that the President has assigned to EPA the role of advising the Federal Trustees and coordinating, on behalf of the Federal Government, the long-term restoration of natural resources injured, lost or destroyed as a result of the Oil Spill.

VI.

DISTRIBUTION OF MONIES

A. Joint Use of Natural Resource Damage Recoveries

The Governments shall jointly use all natural resource damage recoveries for purposes of restoring, replacing, enhancing, rehabilitating or acquiring the equivalent of natural resources injured as a result of the Oil Spill and the reduced or lost services provided by such resources, except as provided in paragraph B of this Article. The Governments shall establish standards and procedures governing the joint use and administration of all such natural resource damage recoveries. Except as provided in paragraph B of this Article, all natural resource damage recoveries shall be placed in the joint trust fund for use in accordance with the terms and conditions of this MOA. Nothing in this MOA creates a right in or entitlement of

any person not a party to the MOA to share in any of the natural resource damage recoveries.

B. Reimbursement of Certain Expenses

1. The Governments agree that the following costs shall be advanced or reimbursed to each Government, at its election, out of any natural resource damage recoveries related to the Oil Spill and shall not be placed in the joint trust fund referred to in paragraph A: (1) Base Allowed Expenses; (2) reasonable unreimbursed costs jointly agreed upon by the Governments and incurred by either or both of them after March 12, 1991 for the planning, conduct, coordination, or oversight of natural resource damage assessment and restoration planning with respect to the Oil Spill or for restoration activities conducted under this MOA; and (3) other reasonable unreimbursed costs incurred by the State after March 12, 1991 for experts and counsel in connection with the Oil Spill Litigation provided that the total amount, in aggregate, deducted for such purposes shall not exceed $1,000,000 per month and a total of $40,000,000, and provided further that no such costs shall be deducted from any natural resource damages recovered as restitution in a criminal proceeding.

2. Solely for the purposes of the allocation of monies received by either or both of the Governments pursuant to any settlement(s) of the Governments' claims arising out of the Oil Spill, $67 million shall be reimbursed to the United States for Base Allowed Expenses and for response and cleanup costs incurred by it before January 1, 1991, and $75 million shall be reimbursed

to the State for Base Allowed Expenses and for response and cleanup costs incurred by it before January 1, 1991; provided that this subparagraph shall not affect or impair in any way the rights of either Government to recover any costs, damages, fees, or expenses through litigation.

3. The Governments further agree that any monies received by either or both of them pursuant to a settlement of claims arising from the Oil Spill that remain after the costs referred to in subparagraphs 1 & 2 have been reimbursed shall be allocated as follows: (1) first, to reimburse the Governments for their respective response and cleanup costs incurred after December 31, 1990, and for their respective costs of natural resource damages assessment (including restoration planning) obligated or incurred after March 12, 1991 and; (2) second, to the joint trust fund for natural resource damage recoveries referred to in paragraph A of this Article.

C. Except as otherwise provided in this MOA, the Governments agree that all natural resource damage recoveries will be expended on restoration of natural resources in Alaska unless the Trustees determine, in accordance with Article V, paragraph A.1. hereof, that spending funds outside of the State of Alaska is necessary for the effective restoration, replacement or acquisition of equivalent natural resources injured in Alaska and services provided by such resources.

D. Nothing in this MOA shall be construed as obligating the

Governments to expend any monies except to the extent funds are appropriated or are otherwise lawfully available.

VII.

LITIGATION AND SETTLEMENT OF CLAIMS RELATING TO THE OIL SPILL

A. Agreement to Consult and Cooperate. The Governments, through the Departments of Law and Justice, agree to act in good faith to consult and cooperate with each other to develop a common approach to the Oil Spill Litigation, to the settlement of civil claims and restitution claims in connection with criminal proceedings: provided, however, that this MOA shall not in any way limit or otherwise affect the prosecutorial discretion of the State of Alaska or the United States.

B. Legal Work Product and Privileged Information. The Governments, through the Departments of Law and Justice, agree that, except as may otherwise be provided by separate agreement of the parties, they may in their discretion share with each other or with private and/or other public plaintiff litigants scientific data and analyses relating to the injury to natural resources resulting from the Oil Spill, the products of economi studies, legal work product, and other confidential or privile information, subject to the following terms and conditions:

1. Each Government will take all reasonable steps necessary to maintain work product and other applicable privileges and exemptions available under the Freedom of Information Act, 5 U.S.C. § 552 et seq., the Rules of Civil

2. No Government may voluntarily share with another party information jointly prepared or prepared by the other Government without the prior express written consent of the other Government's legal counsel.

VIII.

SCIENCE STUDIES

The Governments shall continue to work cooperatively to conduct all appropriate scientific studies relating to the Oil Spill.

IX.

COVENANTS NOT TO SUE

A. Each Government covenants not to sue or to take other legal action against the other Government with respect to the following matters:

1. The authority of either Government to enter into and comply with the terms of this MOA.

2. The respective rights of either Government to engage in cleanup, damage assessment or restoration activities with respect to the Oil Spill in accordance with this MOA.

3. Any and all civil claims (including, but not limited to, cross-claims, counter-claims, and third party-claims) it may have against the other Government arising from any activities, actions, or omissions by that other Government relating to or in response to the Oil Spill

which occurred prior to the execution of this MOA, other than claims to enforce this MOA.

B. Solely for purposes of the Oil Spill Litigation and any other proceedings relating to the ascertainment, recovery, or use of natural resource damages resulting from the Oil Spill, each Government shall be entitled to assert in any such proceeding, without contradiction by the other Government, that it is a co-Trustee with the other Government over any or all of the natural resources injured, lost or destroyed as a result of the Oil Spill; and each Government covenants not to sue the other with respect to, or to take any other legal action to determine, the scope or proportionate share of either Government's ownership, rights, title or interest in or management, control, or trusteeship authority over any of the natural resources injured, lost or destroyed as a result of the Oil Spill.

C. Notwithstanding anything in this Article, each Governmen reserves the right to intervene or otherwise to participate in any legal proceeding concerning the claims of a third party with respect to the scope of either Government's Trusteeship and waives any objection to such intervention or participation by th other Government; provided that, in any such proceeding, neithe Government may dispute that it is a co-Trustee with the other over the natural resources injured, lost, or destroyed as a result of the Oil Spill.

D. If the Governments become adverse to each other in the

course of the Oil Spill Litigation, this MOA shall nevertheless remain in effect.

E. Notwithstanding the covenants contained in this Article, if both Governments are sued by a Third Party on a claim relating to or arising out of the Oil Spill, the Governments agree to cooperate fully in the defense of such action, and to not assert cross-claims against each other or take positions adverse to each other. Each shall pay its percentage of liability, if any, as determined in a final judgment.

F. Notwithstanding the covenants contained in this Article, if one of the Governments is sued by a Third Party on a claim relating to or arising out of the Oil Spill, the Governments agree that the non-sued Government shall cooperate fully in the defense of the sued Government, including intervening as a party defendant or consenting to its being impleaded, if necessary. I the non-sued Government thereby becomes a party to the action, the Governments agree not to assert cross-claims against each other, to cooperate fully in the defense of such action, and no to take positions adverse to each other. Each shall pay its percentage of liability, if any, as determined in a final judgment.

G. Notwithstanding Paragraphs E and F above, the Governme may assert any claim or defense against each other necessary a matter of law to obtain an allocation of liability between the Governments. Any such actions shall be solely for the purpose allocation of liability, if any, and neither Government shall

enforce any judgment obtained against the other Government pursuant to this paragraph.

X.

RETENTION OF JURISDICTION

This MOA shall be enforceable by the United States District Court for the District of Alaska, which Court shall retain jurisdiction of this matter for the purpose of entering such further orders, directions, or relief as may be appropriate for the construction, implementation, or enforcement of this MOA.

XI.

MULTIPLE COPIES AND EFFECTIVE DATE

This MOA may be executed in several counterparts, each of which shall be an original, but all of which shall constitute or and the same instrument. This MOA shall be effective as of the date it is signed by all the parties hereto.

XII.

INTEGRATION AND MERGER

A. This MOA constitutes the entire agreement between the United States and the State as to the matters addressed herein and there exists no other agreement of any kind which is inconsistent with this MOA with respect to the subjects addres in this MOA; provided, that the agreement reached among the Trustees as to disbursements of the original $15 million paid Exxon in April, 1989 shall remain in full force and effect.

XIII.

TERMINATION

This MOA shall terminate when the Governments certify to the Court, or when the Court determines on application by either Government, that all activities contemplated under the MOA have been completed.

XIV.

JUDICIAL REVIEW

This MOA creates no rights on the part of any persons not signatory to this MOA and shall not, except as provided in Article X, be subject to judicial review.

XV.

MISCELLANEOUS

A. This MOA can be modified only with the express written consent of the Parties to the MOA and the approval of the Court, except that the Parties may correct any clerical or typographic errors in writing without court approval.

B. Each undersigned representative of a Party to this MOA certifies that he or she is fully authorized to enter into this MOA and to execute and legally bind such Party to this MOA.

THE FOREGOING Memorandum of Agreement and Consent Decree among the United States of America and the State of Alaska is hereby APPROVED AND ENTERED THIS 28 DAY OF August, 1991.

Honorable H. Russel Holland
United States District Judge
District of Alaska

cc: J. Bottini (AUSA)
B. Herman (AAG-K)

FOR THE UNITED STATES OF AMERICA

Date: Aug. 27, 1991

Barry M. Hartman
Acting Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice

Stuart M. Gerson
Stuart M. Gerson
Assistant Attorney General
Civil Division
U.S. Department of Justice

FOR THE STATE OF ALASKA

Date: Aug 27, 1991

Charles E. Cole
Attorney General
State of Alaska
Pouch K
Juneau, Alaska 99811