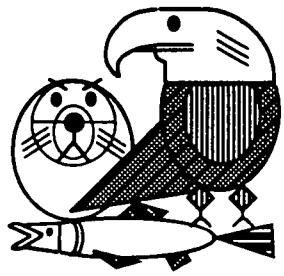
Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 G Street, Suite 401, Anchorage, Alaska 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



AGENDA
EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL MEETING **5/8/97**
MAY 9, 1997 @ 8:30 A.M. 1:20 pm
645 G STREET, ANCHORAGE

DRAFT

Trustee Council Members:

BRUCE BOTELHO/CRAIG TILLERY
Attorney General/Trustee
State of Alaska/Representative

MICHELE BROWN
Commissioner
Alaska Department of Environmental Conservation

DEBORAH WILLIAMS
Trustee Representative for Fish & Wildlife & Parks
U.S. Department of the Interior

PHIL JANIK
Regional Forester - Alaska Region
U.S. Department of Agriculture
Forest Service

STEVE PENNOYER
Director, Alaska Region
National Marine Fisheries Service

FRANK RUE
Commissioner
Alaska Department of Fish & Game

Teleconferenced in Juneau, Forest Service Conference Room 541A
Steve Pennoyer, Chair
Continuation Meeting

1. Call to Order 8:30 a.m.
   - Approval of Agenda

2. Executive Session on Habitat Negotiation and Strategy

3. Public Comment Period

4. Afognak Joint Venture*

5. FY97 Work Plan - Supplemental Funding Requests*
   - Project 97025/NVP - River Otter Aerial Survey
   - Project 97163/APEX - Jelly Fish
   - Project 97186/Coded Wire Tag Study

* indicates possible action items

Adjourn - 10:30 a.m.

raw

Exxon Valdez Oil Spill Trustee Council

645 G Street, Suite 401, Anchorage, AK 99501-3451 907/278-8012 fax: 907/276-7178

MEMORANDUM

TO: Trustee Council members

FROM: Molly McCammon, Executive Director

DATE: May 8, 1997

SUBJ: FY 97 Work Plan - Supplemental Funding Requests

The purpose of this memorandum is to provide information to the Trustee Council regarding three FY 97 Work Plan supplemental funding requests that have recently been proposed as noted below:

Project 97186/Coded Wire Tag	$ 60.2
Project 97163/Jellyfish	13.2
Project 97025/River Otter Aerial Surveys	22.0 *
	$ 95.4

* As proposed, the river otter survey work would cost a total of $30.0 ($22.0 in new funds along with $8.0 in reprogrammed FY 97 project funds).

Each of these proposed supplemental funding requests is attached, together with the Chief Scientist's review comments for each proposed request. In the case of one of the requests (Project 97025), Dr. Spies is still seeking addititional information from the PI prior to finalizing his comments.

At this point, I do not yet have a recommendation concerning these supplemental funding requests and need further guidance from the Trustee Council in light of the direction previously provided regarding the overall FY 97 work plan expenditures. While each of these individual requests has merit, there are probably a number of other project investigators who would also wish to obtain incremental funding. As you are aware, the overall FY 97 budget target was $16 million and to date the Council has authorized $16,203,800.

attachments

Supplemental Request for 97186, Coded Wire Tag Study

This study takes advantage of the simultaneous marking of pink salmon with coded wire tags and otolith thermal marks that are returning to Prince William Sound in the summer of 1997. It has technical merit, since by documenting the straying of fish marked by these different methods, the question of whether the coded wire tags themselves cause straying can be answered. This would be extremely important for the use of this technology on a statewide basis, and it also would have value in reinterpreting previous EVOS damage assessment and restoration studies using coded wire tags. However, a similar proposal (97209) was made for consideration in the FY 97 work plan, but it was then considered to be of lower priority and not funded. In addition, the objectives of this study probably have greater significance for normal agency management of pink salmon than for the future goals of the EVOS restoration program.

Supplemental Request for 97163, Jellyfish

There has been considerable discussion among the ecologists sponsored by the Trustee Council on the importance of jellyfish in possibly changing the composition and abundance of larval fish in the pelagic ecosystem in the oil-spill area. In other systems jellyfish are important predators of larval fish by virtue of their large populations and feeding habits. An initial proposal for jellyfish work by Dr. Jennifer Purcell in FY '97 was considered but not recommended for funding because of some technical questions and the overall cost of the project. Dr. Purcell was encouraged by the reviewers to resubmit a proposal in FY '98 and has done so (98163S). The current, modest request for $13.2K to obtain at least some preliminary jellyfish data in FY '97 has come from the APEX project leader, Dr. David Duffy. The rationale is that it is desirable to obtain as much data as possible concurrent with other components of the APEX and SEA projects. If some data are obtained in FY '97 and if Dr. Purcell's FY '98 proposal is funded, then there would be concurrent data in three seasons, FY 97, 98, and 99, rather than in only two. I believe that this proposal has high technical merit and that any preliminary efforts in FY 97 would also improve any subsequent efforts. However, if this FY 97 request is approved, it will not prejudice a recommendation on FY 98 funding for jellyfish research.

Supplemental Request for 97025, River Otters

The NVP project leader, Dr. Leslie Holland-Bartels, has requested authorization to reprogram $8K from FY '97 and additional funding of $22K to be advanced from the FY 98 NVP allocation for use in FY 97. This funding would be used by the river otter component of NVP to conduct aerial surveys of radio-tagged otters in Prince William Sound. The batteries on the radios will expire before the FY 98 field season, and it is important that these surveys are carried out at the same time as a new tool for estimating populations is developed. This new tool involves identifying the numbers of otters using latrine sites through analysis of mitochondrial DNA in fecal material. On the face of it, this seems like an important opportunity, but I have not been able to discuss this directly with the principal investigator, Dr. Terry Bowyer. Until I can resolve some remaining questions, I cannot make a firm recommendation.

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

OFFICE OF THE COMMISSIONER

TONY KNOWLES, GOVERNOR

P.O. BOX 25526
JUNEAU, AK 99802-5526
PHONE: (907) 465-6141
FAX: (907) 465-2332

MEMORANDUM

TO: Molly McCammon
Executive Director
Exxon Valdez Oil Spill Trustee Council

FROM: Frank Rue, Commissioner
Department of Fish and Game

DATE: May 1, 1997

SUBJECT: Request for supplemental increase for 97186, CWT.

The Alaska Department of Fish and Game is requesting a supplemental increase of $60,200 for project 97186, Coded Wire Tag Recoveries from pink salmon in Prince William Sound. This together with funding commitments by ADF&G and Prince William Sound Aquaculture Corporation will be used to conduct round surveys of several wild pink salmon spawning streams for collection of hatchery produced pink salmon marked with coded wire tags and thermally induced otolith bands. Because the 1997 PWS hatchery runs of pink salmon are doubly marked, it is possible to determine whether CWT marked pink salmon have a differential straying rate due to effect of the CWT. Differential straying rates of CWT pink salmon have been proposed to explain high rates of recovery of CWT pink salmon observed in wild pink salmon streams in PWS. Prior examinations of this hypothesis have not been definitive. Differential straying of CWT pink salmon is a concern because its occurrence would lead to biased historical estimates of hatchery contributions to PWS pink salmon catches based on CWT recoveries.

While I do not support spending money above the amount allocated for FY97 projects, I believe this request can be funded without doing so. This is because principal investigators typically spend less money than they have been allocated each fiscal year. While it is too early to project final FY97 balances, it is very likely that lapsed funds can cover this supplemental request. Furthermore, the Trustee Council will spend about $120,000 less than originally anticipated in FY98 for project 98186 since the coded wire tag recovery program will close out a full year earlier than planned.

This will be the first and only year of overlap between projects 97186 and 97188, Otolith Thermal Mass Marking. Thus, August and September 1997 will be the only time large numbers of double-marked pink salmon will be available for evaluating coded wire tag adjustment factors and the assumption that marked and unmarked salmon behave similarly. This study will nicely complement, but will not duplicate, project 97076, Effects of Oiled Incubation Substrate on Straying and Survival of Wild Pink Salmon, being conducted by NOAA in Southeast Alaska. Since coded wire tag recoveries are an integral part of managing Pacific salmon throughout their range, including international treaty fisheries, both studies have broad significance in addition to their importance to the oil spill restoration program. Trustee Council peer

reviewers and other scientists contacted by my staff have reacted favorably to the proposed study. I hope the Trustee Council will go forward with this work to avoid missing a unique and important opportunity.

cc: Robert Clasby
Doug Eggers
John Hilsinger
Claudia Slater
Lance Trasky

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Office of Oil Spill Damage
Assessment and Restoration
P.O. Box 210029
Auke Bay, Alaska 99821

May 7, 1997

Ms. Molly McCammon
Executive Director
Exxon Valdez Trustee Council

Dear Molly:

This letter is in support of the Alaska Department of Fish and Game supplemental funding request for Project 97186, Coded Wire Tag Recoveries from Pink Salmon in Prince William Sound (PWS). This money will be used to sample pink salmon spawners at streams throughout Prince William Sound for coded-wire tags and otolith thermal marks. The CWT project has been reduced by one year overall, greatly reducing the multi-year funding commitment by the Trustees, and also resulting in this being the only opportunity in PWS to evaluate the effects of coded-wire tagging by simultaneously marking with the otolith thermal mark. Given these changes in the overall project since the FY97 workplan, we feel this supplemental funding for sampling in 1997 should be approved. We believe this project is extremely valuable for increasing our understanding of the impacts of the oil spill on pink salmon, our interpretation of past tagging data for fisheries management, and the degree of hatchery/wild interaction on the spawning grounds.

The Trustee Council has invested substantial amounts of money in coded-wire tagging to maintain high management resolution in the fishery following the oil spill, and to examine impacts of intertidal oiling on subsequent survival and homing fidelity of pink salmon. Tag-induced straying has been proposed as one explanation for the very high rates of coded-wire tagged strays observed in and from wild systems following the oil spill. However, the information is insufficient to indicate the degree to which tagging affected the observed straying rates. Recent work by NMFS in Auke Bay, Alaska, indicated no measurable effect of coded-wire tags on straying rates of pink salmon from Auke Creek, and also indicated much lower straying rates than observed in PWS. The sample sizes there were small, however. Given that results to date are conflicting and inconclusive, there is a critical need for more information on how coded-wire tags affect straying. This issue has application not only for the restoration process in PWS, but also for much of the eastern Pacific rim, where coded-wire tags are used extensively in managing fisheries and in interpreting the degree of hatchery interaction with wild populations. This project would also directly complement Project 97076, the extensive study on oil impacts to survival, reproductive viability, and straying of pink salmon. In Project 97076, fin-clips are being used to examine the coded-wire tagging effect; thus we have the opportunity to look at the problem using different secondary marks and in different geographic regions.

Although this is a supplemental budget request, it actually is well within the funding the Trustee Council allocated to the multi-year coded-wire tagging project. Because of successful testing of thermal mark sampling strategies in 1996, the 186 project will be closed out a year earlier than expected at substantial savings over the life of the project. As noted above, this also results in the 1997 return being the only year of overlap for coded-wire tags and otolith marks, so it is not possible to consider the sampling for the FY-98 budget cycle. It is unlikely to have such an opportunity again to compare the two types of marks in PWS. When we consider that the cost of marking has already been incorporated in Project 186 in order to meet fishery management objectives, this is indeed a scientific bargain, providing a lot of bang for the buck.

Sincerely,

Alex Wertheimer

Jeep Rice

cc: Pennoyer, Eggers, Rue, Hauser

UNIVERSITY OF ALASKA ANCHORAGE

Alaska Natural Heritage Program

Environment and Natural Resources Institute

707 A Street
Anchorage, AK 99501
Tel (907) 257-2784 FAX (907) 257-2789

TO: Molly McCammon

FROM: D. Duffy Dave

CC: Stan Senner
Bob Spies
Bruce Wright

DATE: 5 V 97

RE: jellyfish research and APEX

The scientific reviewers have commented favorably on the project by Jennifer Purcell to study jellyfish as part of APEX, in cooperation with SEA. This project would begin in FY 98, but I would like to request funding of $ 13,200 for her to begin work in FY 97 for the following reasons:

1. We do not have explicit permission to undertake jellyfish work this year from the Council but I would suggest that this request parallels the various previous APEX efforts with historical data, modelling, statistics, GIS and harbor seals, when my subproject (97163 I) 'incubated' pilot projects that grew once they proved their worth.

I would suggest that data from a pilot effort this year might allow a more informed decision on a multiyear commitment of funds to study jellies. Perhaps we could award funds for FY 98, subject to a review of FY 97's pilot data.

2. This winter has been an exceptionally dry one, following on an equally dry year, and the Alaska Coastal Current is likely to be weak because of reduced runoff. This suggests that inshore waters will be more stratified, conditions favorable to jellies. Early indications at Kodiak from dives by Anderson's group indicate a bumper crop of jellies. A population peak of jellies occurred in 1981 during the Gulf of Alaska ecosystem transition period, so it would be very useful to sample this year, to help us determine if jellies are (in part) responsible for the shift in the food environment that is affecting recovery of apex predators in the oil spill area.

Also there are early indications that we may have an ENSO event (El Niño/Southern Oscillation) later in the year. These are known to affect fish in the Gulf of Alaska region, so it would be highly desirable to get a year's sampling, before the onset of the ENSO. All too often in the North Pacific we have 'during' and 'after' data; this is a rare chance to get ahead of the curve, thanks to increased skill in predicting ENSO events.

3. APEX responded to the Council's request to develop interproject coordination by resurrecting this project, identified as a research need in the present workplan, and working within APEX and with SEA to get it project going. We expended more than $2,000 to get this project off the ground. Given the complexity of integrating SEA and APEX sampling, we are likely to have to commit more funds before this project is fully funded in FY 98. APEX's budget is now so lean that the Council recognized last year that we would have to return for supplemental funding should the unexpected occur. We have managed to streamline our efforts even more in FY 98 as our PI's will grouse; we simply haven't the internal funds to shift within APEX to fund this.

Finally, this is a low risk ($13 K) project with a high probability of significant results. It occurs during an anomalous year, will be conducted by Jennifer Purcell, arguably the country's top jellyfish researcher, and it will catalyze sampling coordination between SEA and APEX. Jellies may well be the missing link in understanding why certain species have not recovered from the spill, this may be a particularly opportune time to look for it.

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
BIOLOGICAL RESOURCES DIVISION
Alaska Science Center
1011 East Tudor Road
Anchorage, Alaska 99503

IN REPLY REFER TO:

Molly McCammon
Executive Director
Exxon Valdez Oil Spill Trustee Council
645 G Street
Anchorage, AK 99501

Dear Molly,

I request permission to reprogram $8K of FY97 funds presently allocated to charter costs and that new funds of $22K be added to the Nearshore Vertebrate Predator Study-97025 (NVP). An equivalent $22K reduction can be taken from the proposed FY98 NVP budget if this 1997 addition is granted. This request will facilitate a time-critical assessment of the population status of river otters that could have neither been anticipated nor planned for in the original 1997 budget process last summer. The following is a brief description of the need with a more detailed explanation attached:

In the 1996 field season, 96025 Principle Investigator Dr. Terry Bowyer documented that a previously established index of population size (latrine site abandonment versus population size) was likely affected by social dynamics in the population and did not reflect population status in our study areas. This has left the NVP without a tool to fully assess demographic constrains as an hypothesis in river otter recovery. These findings were presented to Dr. Spies and reviewers at our annual program review in February. At that time, Dr. Bowyer indicated that he and his university collaborators, under outside funding, were developing a population assessment tool using mitochondrial DNA analyses of scat samples at latrine sites to identify numbers of individuals using an area. I am pleased to report that the MtDNA techniques have been developed and Dr. Bowyer is ready to apply the technique to our NVP study areas. However, we must define the bounds of the population that uses a particular latrine site to get to our question. Fortunately, we can opportunistically use data from another of Dr. Bowyer's studies to cost-effectively reach our objective.

We can use previously telemetered river otters (UAF/ADFG study) to close the population. We therefore will have no capture, surgery, or equipment costs. However the cost of the aerial survey and mapping activities increases project costs by $30K. This opportunity is time-critical and can not be accomplished in FY98 since the batteries used in the implanted transmitters are nearing the end of their life span. I strongly believe development of a new index is a priority for NVP and have included this cost within the core of my proposed 98025 DPD budget. Any additional funds granted this fiscal year can be reduced from that FY98 request. Given that the MtDNA development, original transmitters, capture, and surgery costs will not be charged to the project, I believe this will prove a scientifically sound and cost effective approach to obtaining a definitive assessment of river otter population status in the study areas.

Sincerely,

Leslie E. Holland-Bartels
Chief Scientist
Nearshore Vertebrate predator Study-97025

JUSTIFICATION FOR AERIAL TELEMETRY SURVEYS FOR RIVER OTTERS
SPRING/SUMMER 1997

The need for frequent aerial telemetry surveys this spring/summer field season stems from two primary issues: 1) estimating population levels using DNA microsatellites and establishing individual otters "at risk"; and 2) establishing home range sizes of otters in both areas relative to prey availability and for comparison with historic home range data for Herring Bay.

1. **Estimating population levels using DNA microsatellites**

Mark-resight methodology developed to date uses closed population models. Therefore, applying mark-resight methodology to estimate river otter populations using DNA microsatellites will require establishing the number of marked individuals residing in the area. Because boat surveys fail to locate all marked animals at each survey it is essential for the development of this technique to use aerial telemetry and frequent surveys. Frequent aerial telemetry flights will assist in establishing movements of otters in and out of the study areas. Otters that were captured and marked within the study area are assumed to be present and therefore "at risk" of resight. It is essential to have verification that these animals are, indeed, still residing within the study area during the time when samples are collected.

2. **Establishing home range sizes of otters in both areas relative to prey availability and for comparison with historic home range data for Herring Bay**

To answer the question 'is it food or is it oil?', home range data is valuable in the sense that a direct relationship occurs between food availability and home range size in many carnivores. Greater food availability should result in smaller home ranges. Historic data from Herring Bay showed larger home ranges for otters compared with the nonoiled area (Esther Passage). If river otters in Herring Bay are recovering we expect to see smaller home ranges than those recorded previously. In addition, comparing home range sizes between Herring Bay and Jackpot Bay in view of the different prey availabilities noted in the 1996 subtidal fish surveys, will assist in determining the level of recovery. Because boat surveys fail to locate all marked animals at each survey, establishing reliable estimates of home ranges will require frequent aerial telemetry flights.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. Tudor Rd.
Anchorage, Alaska 99503-6199

IN REPLY REFER TO:

ESO

MAY -5 1997

Mr. Stan Senner
Exxon Valdez Oil Spill Restoration Office
645 G Street, Suite 401
Anchorage, Alaska 99501

Dear Mr. Senner:

We have reviewed the draft monitoring plan for the Chenega-area Shoreline Residual Oiling Reduction, Project #96291, near the village of Chenega Bay in southwest Prince William Sound. Questions about the project and recommended changes to the monitoring plan are offered below.

General Comments:

The monitoring plan does not indicate how long the containment booms will be left on the water, nor does the plan indicate what criteria will be used when making the decision to remove boom materials. We recommend that monitoring information be used as a diagnostic tool on a site-specific basis, since beach areas may react differently to the treatment (given the amount of oil initially present, beach morphometry, degree of washing and other factors). Surface concentrations of total petroleum hydrocarbons (TPH) might be a useful indicator of residual oil within the containment area. The originally proposed boom deployment period (4 days) appears to be quite short, and we are concerned that there may still be oil seeping from the beaches for some time after the treatment period.

Many specifics such as holding times, preservation methods and analytes measured are minimally described. These issues should be addressed in more detail at a later date and documented so that the data obtained from the project can be interpreted appropriately.

Specific Comments:

Chemical analysis of oil residues on treated beaches will be conducted prior to application, seven days post-treatment, and one year after treatment (pg. 3). Alternatively, the efficacy of the airknife only treatment was to be measured only at day two post-treatment (pg. 4). We recommend that airknife efficacy be tested on the same schedule as PES-51 efficacy (pre-treatment, day 7, 1 year).

Caged mussel studies as described on page 4 may be of minimal value, depending upon the question to be answered. Having mussels located at twice the distance from shore as the booms and at a 5 meter depth greatly reduces the likelihood of them effectively taking up hydrocarbons and/or PES-51. Near-surface exposure closer to the boom locations would help with detection of impacts since the PES-51/hydrocarbon mixture is expected to float. Also, bivalves are known to close their valves when exposed to chemical stressors (sometimes for extended periods), thus they might be less effective than some other species at measuring chemical uptake. It is unclear what species the mussels are acting as surrogates for in this design.

Mussels and chitons will be sampled on the Latouche beaches "before treatment, 7 days and 90 days following treatment" (pg. 5). We recommend that they also be sampled after 1 year to ensure that longer term uptake from treated beaches is not occurring.

Fixed quadrats will be used to determine population level effects on intertidal organisms (bottom, pg. 5) by sampling before beach cleaning and immediately after cleaning. This may help answer questions about acute exposure but not chronic effects. Conducting similar analyses at one year post treatment would verify that intertidal effects (if any) were not long-lived.

Beach transects will run down slope from the grass line to the "waterline" (pg. 6). Is the same thing as the low tide line ? If not, we suggest modifying the study design so that the transects extend to the low tide zone.

Thank you for the opportunity to comment on this document. If you have any questions, please contact Philip Johnson at (907) 786-3483. We appreciate the opportunity for comment.

Sincerely,

Jon R. Nickles

Jon Nickles
Chief, Environmental Services

cc: Special Assistant to the Secretary, Alaska

APPLIED
marine
SCIENCES

May 8, 1997

Ms. Molly McCammon
Executive Director
Exxon Valdez Oil Spill Trustee Council
645 G Street, Suite 401
Anchorage, Alaska 99501

Dear Molly,

At your request I have reviewed the draft document "Chemical and Biological Monitoring Plan for Chenega Shoreline Oiling Project "(97291). I sent the draft plan out for peer review and have received three sets of comments from reviewers. I include these comments for consideration by the P.I. and offer the following summary of my views on the plan and how it should be improved before implementation. I have also received and read the unsolicited comments from two cleanup experts that attended the original workshop on this project and from the US Fish and Wildlife Service.

1. **Effectiveness of the oil removal**--Trying to measure effectiveness of oil removal from these deeply contaminated boulder and cobble beaches is a significant challenge due to the huge variability in oil distribution. The P.I. has designed a study in which multiple random samples are taken within oiled areas in order to characterize effectiveness throughout the treated area. This is the proper thing to do from a scientific and statistical standpoint, however there are several factors that must be considered. First, it is likely that the variabilitiy is so great that determining a precise answer with any degreee of certainty will require an even larger sampling effort than has been proposed here. This is especially true for discriminating between the effects of the airknife and water injection and the airknife-with-PES-51 injection. The objective of evaluating effectiveness would be much better served with some fixed plots in which the oiling is characterized in the subsurface sediments before cleanup and the same area is evaluated after cleaning. These fixed plots will have a great advantage in that many fewer will be required to understand cleanup efectiveness. In some cases for which the total area of oiling is relatively small it is difficult to imagine that a result on a fixed plot representing a significant amount of the contaminated area would not apply to the remainder of the area. A little more common sense and a little less theory will probably serve us better here. A credible cleanup operation is the most important goal, and we want to gather as much information on effectiveness as possible, but I don't particularly care if this study is publishable or not.

Second, defensible quantitative data will be a challenge in these circumstances and I would suggest that some semi-quantitative methods, such as used by ADEC after the spill by the SCAT teams would be appropriate (perhaps also photographs).

2155 Las Positas Court, Suite S Livermore, CA 94550 510.373.7142 FAX 510.373.7834

The plan should incorporate a measure of the volume of oil recovered, as this will complement the beach cleaning effectiveness data and set a lower limit for oil removed. In addition some deep sampling needs to be done in the beach to assure us that oil is not being driven deeper into sediments by the cleanup treatment.

2. Ecological risks and impact assessment.

A modest addition of surface water sampling outside the boom is needed. There are some simple approaches, for example using 1 m^2 pieces of cheese cloth followed by extraction and gravimetric determination to estimate amount of oil on the surface outside the booms. Alternatively, if a portable spectrophotometer is available and field measurements are feasible, this would provide a real-time quantitative assessment of amounts of contaminant escaping the booms. This information would supplement visual observations and assist those who are deciding on when to remove the booms. In addition it was agreed in previous meetings with Trustee Council staff that the booms would be left out for two days following the absence of active visual sheening. Although this may not be a component of the monitoring plan, this should be understood by all involved.

It is important to include some measures of areal coverage of organisms in the evaluation of quadrats. For example, for *Fucus* the area of coverage is very important. It is also important to make sure that the counts of large and widely scattered organisms, such as starfish and sea urchins, are made in such a way that allows extrapolation to a larger area.

Overall, NOAA/NMFS has done a very good job in designing this monitoring plan in a short period of time. I want the proposers to address the above points in a revision of the monitoring program, as I consider these to be of paramount importance. Consideration should be given to the other points raised by the reviewers in the attached comments, although we are working with a limited budget and not all the other suggested changes can or should be accommodated. I suggest you accept this plan with the proviso that that above changes are implenmented to the extent possible and incorporated in a revised plan.

Sincerely,

Robert B Spies
Chief Scientist

cc: S. Senner
B. Wright
B. Morris
S. Rice

Comments on the Sampling Program

Overall - The sampling program appears to be capable of producing a set of values that will provide the objective measurement, however, given heavy patchiness in the oil concentrations, the mathematical analysis proposed will not be capable of determining the true effectiveness of cleanup. Both depth sampling and water sampling is necessary to determine the fate of removed oil.

Objective 1 Measurement - Determine the proportion of oil removed from beach segments

The sample amounts etc. look ok, however I feel that the power analysis and use of logarithms as noted in page 4 of the sample protocol is inappropriate. The range of samples as found by Owens and Robson of 470 to 77,400 indicates a typical type of variance for each samples. One cannot simply average or use a logarithmic analysis on these to determine the total oil reduction. First, the variance is a real variance and not a sampling variance. Secondly, since this is a real variance, statistical manipulations even as simple as CV are inappropriate. I have a tendency not to believe any statistics on numbers of this type. The variation in numbers must be viewed as to what they are - the range in oil contamination over the beach.

I will illustrate the points by giving a table of made-up values similar to the range measured by Owens and Robson. Note that these are artificial numbers and very well behaved - much better than would be expected in real life. Three possible scenarios are given - namely that there is about a 50% removal, then none and then about 10%. All three of these scenarios are possible in the proposed experiment.

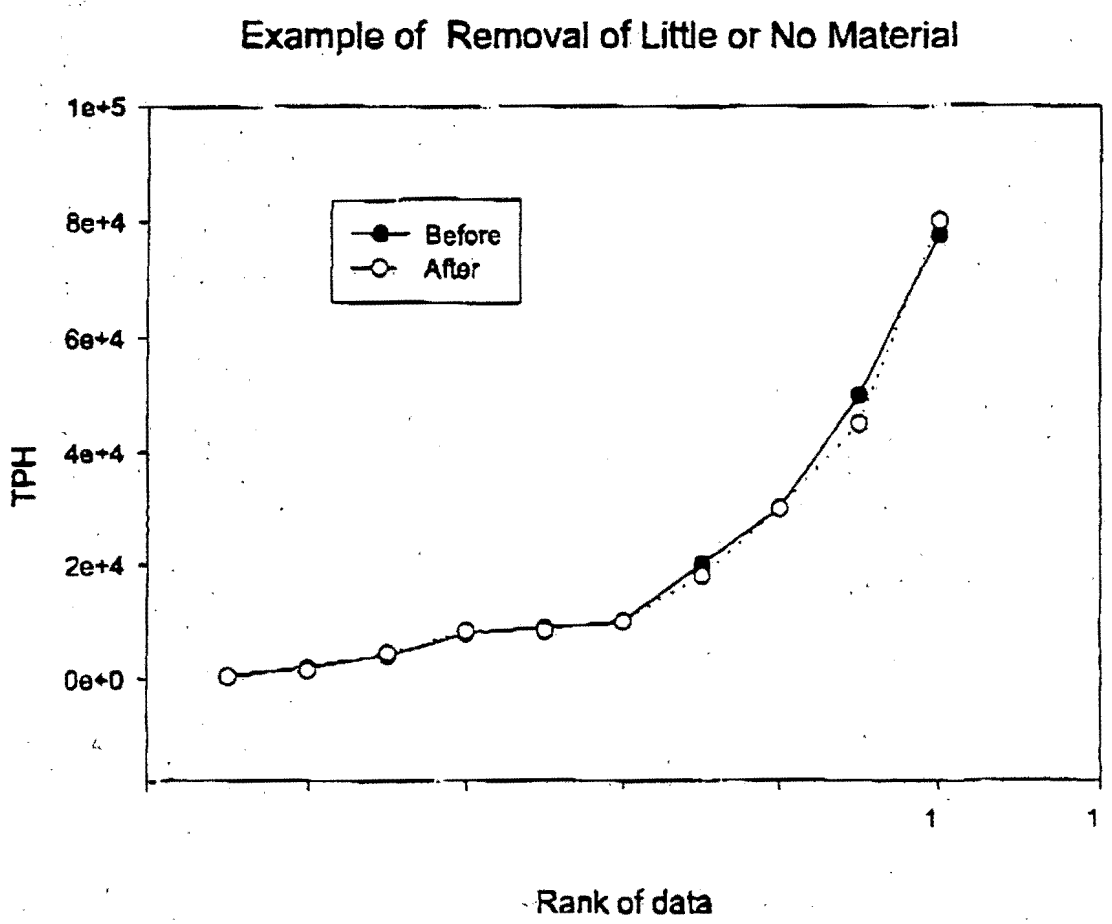
Sample Table

	Before TPH	~50%	~0%	~10%
1	500	250	500	400
2	2000	1000	1500	2000
3	4000	3000	4500	3000
4	8000	4000	8500	7000
5	9000	5000	8500	8000
6	10000	6000	10000	9000
7	20000	10000	18000	14500
8	30000	15000	30000	28000
9	50000	25000	45000	49000
10	77500	40000	80000	60000
average	21100	10925	20650	18090
% on simple average		48	2	14
% based on logarithmic analysis		15	1	4

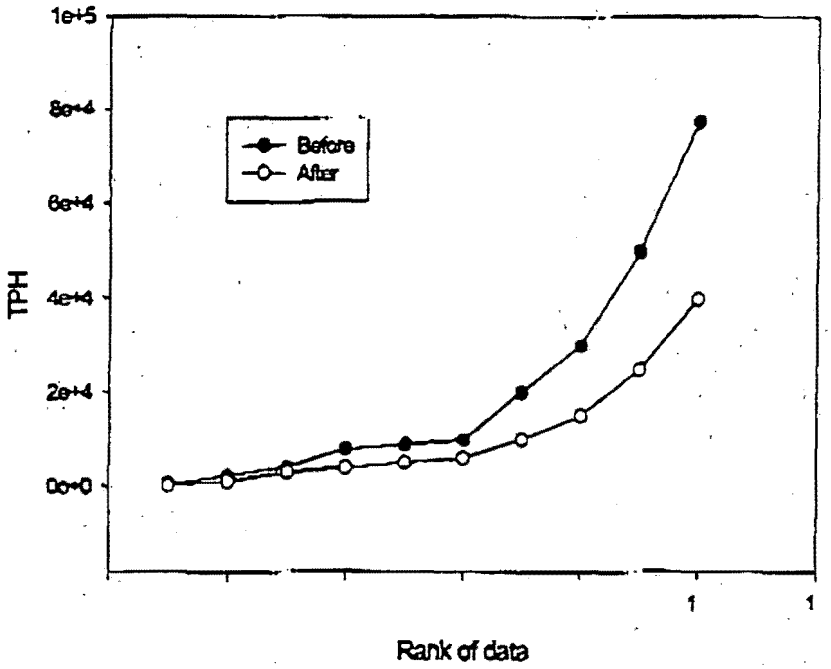
The table shows that the simple average works in this case - only because the numbers are so well behaved. The table also shows that a logarithmic analysis does not work - even on

well-behaved numbers in this case. It should be noted that the logarithmic analysis done here was a simple difference in logarithmic averages.

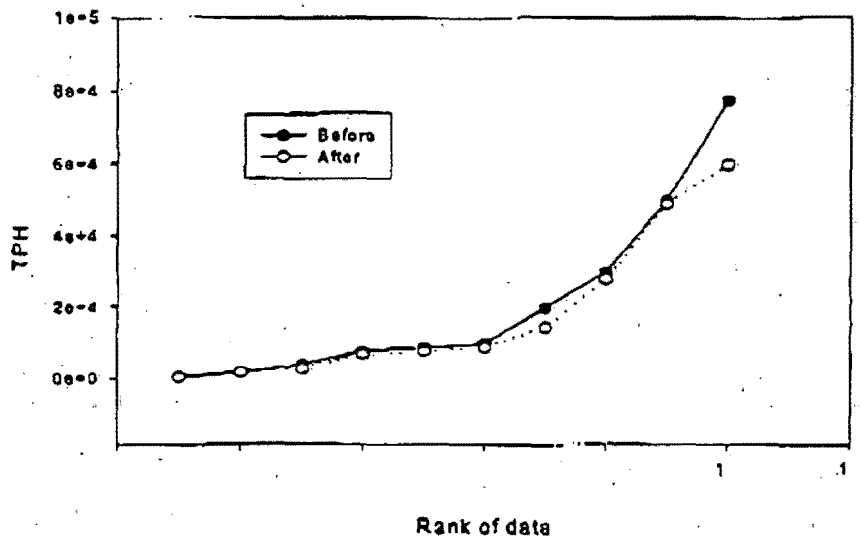
Another more useful form of analysis for such type of numbers is a simple graphical analysis. Another type of analysis would be to take the differences in pairs (ranked numbers such as shown in the table). The graphical analysis of the data is illustrated in the following three figures. These show that differences are highlighted by this simple technique as well as the fact that cleanup will probably affect the higher values more than the lower values.



Example of About 50% Removal



Example of Removal of about 10% of OI



Objective 2 - Proportion of Oil Removed from Test Plots treated only with Airknife

The data treatment is the same as that noted above and the same considerations need to be taken.

I presume that a surrogate liquid - such as water - will be used with the air knife to ensure that the treatment is analogous for the control and PES 51.

Objective 3 - Severity and Persistence of Receiving Water Contamination

Only mussel sampling is proposed. Water samples should be taken from the surface and at about 1-metre depths shortly after treatment. Analysis of these samples will provide data on whether there is a strong flux of oil/d-limonene into the water in the first place. Without water samples the connectivity to the mussels is poor. A passing motor boat could be responsible for any effects noted in the mussels.

Major Gap in Sampling

There is a strong possibility that the oil will be driven further down into the sediments by the procedures under study. There is no sampling for this possibility.

A second set of samples should be taken down to about 1 metre before and after the treatment to measure this possibility. I suggest that the increase in samples could be avoided by dividing the present samples into two depths.

This is a very serious gap in the proposed measurements. Several beach treatments have in the past simply driven the oil further down into the sediments. Because of the lack of water samples noted above and the lack of depth samples, there would be no indication of where any removed oil goes to. This must be rectified if this experiment were to have any credibility.

Biological Monitoring

The variation in population changes may be as great as that of the oil concentrations. Methodologies to deal with such variations should be in place before the experiment begins.

Comments on the Program Generally

I am a little surprised that only PES 51 is being used. The only product approved in Canada and other counties is Corexit 9580, this should have been incorporated into the program. Furthermore, I believe that cleaning the oil will cause more environmental damage than leaving it. However, these are general observations not related to the sampling program.

Review of "Chemical and biological monitoring plan for Chenega shoreline oiling project"

General comments:

As I understand the situation, the decision to conduct additional cleanup of oil on these shorelines has already been made and the decision of the choice of method to be employed has already been made. Consequently, my comments will not be directed towards those two isues but instead more narrowly focussed on whether the proposed chemical and biological monitoring plans are adequate to assess effectiveness of the removal of oil and any major biological impacts.

In general, I consider both the chemical and biological monitoring schemes to be suitable for their limited but important purposes. I consider the public interest to be adequately served by these plans and the Trustees to have properly discharged their public trust responsibility by supporting them. I do have some suggestions about details that could improve the monitoring, which I make below.

Specific comments:

(1) The test of how much oil is removed by airknife alone should conduct its assessment 7 days after application of the treatment so that this procedure can be rigorously compared with the use of airknife and surfactant together, which has its evaluation measurements after 7 days. Otherwise, there exists no rigorous comparison unconfounded by timing differences to assess the value of the surfactant component of the process.

(2) The caged mussels represent a very effective and well justified means of assessing the level of water contamination, but I question why no effort is to be made to evaluate levels of contamination of the water surface. I do not propose a biological integrator of surface contamination but just some use of adsorbent material in a sensible design placed outside the boom for the short period of the cleanup operations to assess the levels of escape of chemicals in the surface. This surface skin of the sea is far from irrelevant to the biology but more readily sampled in this way than by some more elaborate evaluation of impact on larvae, zooplankton, etc.

(3) The sampling of lower intertidal sediments for possible contamination after treatment of the higher shores needs to be certain to hold sediment character (grain size distribution

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mostly) constant at all sampling sites. Otherwise this variable if uncontrolled will overwhelm any variance due to differential chemical exposure and contamination.

(4) I suspect that the power to detect effects of treatment on the chemistry of mussels and chitons would be greatly enhanced by not compositing all individuals from a given beach but by contructing two independent composite samples for each beach segment. That would unfortunately require doubling the analytic costs for this component of the monitoring, so it may not be possible.

(5) The analysis of intertidal population change after treatment needs to be modified to include estimation of spatial coverage of all major species in the quadrats. Counting of individuals does not in itself suffice, and for seaweeds like Fucus is not even very meaningful. Areal cover is the standard complement to abundance measures of success in intertidal systems where space is the limited resource. This adition can be made to the sampling schemes at virtually no extra cost.

(6) The counts of larger mobile invertebrates like seastars need to be more rigorously quantified by relating those counts to specific measured areas of search so that density is estimated. This too involves subdividing the counting area into two or more subareas to provide replication for statistical analysis. This change requires no increase in costs but has a payoff in the value of the results to detect possible large impacts. Counts should include sea urchins, if present, as well as starfish, etc., because echinoderms represent an especially sensitive taxon.

(7) To make the photography of greatest value, care needs to be taken to create a constructed frame that always holds the camera in the identical place, height, and orientation for repeated photography of each given position on shore. Furthermore, each position for placement of that frame needs to be permanently marked with inserts driven into the beach, preferably redundantly for relocation at subsequent times of picture taking.

(8) It is unfortunate that impacts on infauna cannot be assessed but I agree that this element would be relatively costly because of the need for seiving, sorting, and identifying small animals.

RE: Review of Chemical and Biological Monitoring Plan for Chenega Shoreline Oiling Project

[redacted] reviewed the monitoring plan received late Thursday, May 1,1997. We hope the following comments will produce an informative monitoring plan,

We understand there will be several treatments: (1) Air Knife only, (2) Air Knife + PES; and (3) No treatment.

General Comments

1. What's Being Tested?
It looks like you have a null hypothesis, though not specifically stated, for effectiveness but not for effects. The Null Hypothesis for effectiveness appears to be: No significant difference in oil remaining between air knife only and PES at a level of difference of 50% oil remaining. So, if you estimated that 40% was removed from a PES plot and 30% from an airknife plot, you really couldn't say that one was better (they would have to be 50% apart, right?). Humphrey and Owens (1995) offer some information on TPH variances that might be useful. Might be good to keep all this in mind when analyzing and reporting the data. But what about power for the sediment and tissue contamination and population biology?

2. What About Qualitative Observations?
This monitoring plan does not include qualitative observations frequently used to document oil spill cleanup. Qualitative SCAT survey techniques are frequently used to monitoring effectiveness of clean-up during oil spills. These include frequent beach-walks, recording basic geomorphology, oil cover and biology features on standard forms and photo-documentation. We suggest that such activities be explicitly incorporated into the monitoring. If nothing else, they will provide a bit of rapid feed-back during the operation. Observers (trustees, villagers, contractors, guests) can be trained to participate in SCAT surveys and this may also give everyone a sense of involvement. In addition, we talked about aerial photos to document sheen movement. Also, watch for and record turbidity of effluents and nearshore waters, such as observed in trails in Puerto Rico and during 1989 shoreline cleaning in PWS. The proposed Swath Counts (p. 7) are a nice part of this approach, but counts aren't all - hopefully someone will be watching for and reporting narcotized and overturned starfish and other animals, and other qualitative conditions of the marine life, such as occurred during the original oiling.

3. No Toxicity?

The assumption that PES and oil will be diluted is true once it gets into the water, but there will be a lot of undiluted runoff crossing the inter tidal shoreline before it gets to the Sound. This water may be acutely toxic to small beach crustaceans, larvae, etc. Why not check rule out this hypothesis with some simple on-scene (or nearby) assay such as MicroTox (see MSRC publications for procedures for monitoring shoreline cleaning).

4. Chemical Monitoring Plan
The objectives are:

1. Effectiveness: Oil removed w/ PES
2. Effectiveness: Oil removed w/ air knife
3. Receiving water Contamination (PES + oil)
4. Lower Intertidal sediment contamination

Has Jaqui Michel or the State geomorphologist been contacted regarding estimating oil volumes? 100 samples seem like a lot of work for a 50% discrimination. We assume 0.6 m depth is the depth of treatment, but why this depth only?

There is a second independent measure of effectiveness: the oil actually removed. The plan should include some direct measure of oil recovered (correcting for water and emulsification, if any) and lost oil (sheen) as well as remaining.

Proposal does not demonstrate ability to measure D-limonene at useful detection limits. However, I assume the lab has a tested method.

Otherwise, the proposed activities here look OK. The monitoring includes a methods control, the lack of which was a serious criticism of the 1993 treatment monitoring ((Humphrey and Owens, 1995). It will be interesting to see if treatment causes long-term changes (and differences) in the oil fingerprints.

5. Biological Monitoring Plan
The plan includes:

1. Bioaccumulation in mussels and chitons
2. Population changes
    - 2.1 Fixed quads
    - 2.2 Swath counts

The bioaccumulation work looks OK (including both caged and inter-tidal mussels). However, plan for alternate species (such as limpets) in case target species (chitons?) aren't sufficiently abundant

I assume that it will be difficult, no matter what design, to document population differences for dominant taxa. There is no null hypothesis for the

epibiota quad work. What differences are we seeking and with what power? It would seem there should be plenty of data for determining power and resolution. Also why are perpendicular transects better than some other system or a random design at a specific elevation parallel to the shore? Are we focusing on the treated area itself, on the area downslope of the treated area (which receives effluent only, not physical disturbance) or both. In other words how will plots be correlated with treatment and treatment intensity (Which will probably vary from plot-to-plot as well as between treatment areas)? What about trading some of the quad effort for direct toxicity measurements?

What sources of intertidal impacts were considered (besides PES and oil)? What about suspended sediments, foot traffic, machine traffic, anchor chain, etc.?).

As noted above, please consider expanding the Swath count to accommodate qualitative information about the condition of macro-biota (such as overturned or narcotized sea stars, etc.).

In summary, maximize the information for estimating effectiveness (5 removed/% remaining), consider including some toxicity testing and more explicitly make use of, and report (in near real time), qualitative observations (A SCAT monitoring plan and objectives).

Citation

Humphrey, B. and E. Owens. 1995. Letters to the Editor. Spill Science and technology Bulletin 2(1):1-3.

Good Luck