MEMORANDUM

TO: Council, AP, and SSC Members

FROM: Clarence G. Pautzke
Executive Director

DATE: June 16, 1989

SUBJECT: Oil Spill and Other Habitat Issues

ACTION REQUIRED

Receive report from Habitat Committee and give direction for further work on habitat issues.

BACKGROUND

In April the Council heard reports on the Prince William Sound oil spill and appointed a Habitat Committee to meet with federal and state agencies to discuss the spill and its potential impacts on fisheries. Appointed to the Committee were Henry Mitchell (Chairman), Larry Cotter, Oscar Dyson, Tony Knowles, Ken Parker and John Winther.

Committee members John Winther (Chair pro tem), Larry Cotter and Tony Knowles met with Steve Pennoyer and other staff on May 17 in Juneau and received an overview on the locations of oil in the Sound and the Gulf of Alaska, fishing seasons that had been closed by then by the State, quality control plans that were in the process of being implemented, and study groups which had been established to assess the impacts of the spill on the habitat and various species complexes. Of particular interest to the Committee was the Trustees Council Plan for long-term research and recovery of areas impacted by the spill. Steve Pennoyer indicated that the plan would be completed in June and then there would be a public comment period. Damage assessement organization is shown in item C-3(a).

The Committee expressed support for the agencies involved in long-term assessment and mitigation work and recommended that the Council further explore such topics as how and when a disaster is declared, the criteria and mechanism for federalizing a response, measures available to respond to an oil spill or other accident in the open sea, long-term improvements in practices and procedures of tankers and the oil industry, and the adequacy of long range research on the effects of oil on fisheries. Of particular interest to Committee members was the safety of transportation of petroleum products, hazardous materials, or other materials that could seriously degrade the habitat. For example, how often are tankers inspected for structural integrity and safety problems? Who monitors transportation of hazardous materials through the EEZ, especially by foreign vessels? What is our capability to respond if something goes wrong?

The Committee went on to consider how the Council's Habitat Policy [item C-3(b)] could be implemented most effectively. The Committee felt that the policy obligates the Council to being a staunch advocate for the environment, to review projects that could impact the fisheries habitat, to ask penetrating questions of agencies that monitor those projects, and to generally be on the outlook for any deficiencies in emergency response planning. The Committee recommended that a small habitat committee, possibly reconstituted, be assigned the

task of screening major actions that could impact the fisheries habitat and that the Council explore in June how best to put the Habitat Policy to work on behalf of the fisheries.

Tanker Safety and Transportation of Hazardous Materials

In response to concerns of the Habitat Committee, I met with Coast Guard LCDR Bill Hutmacher of the Maritime Safety Office here in Anchorage to learn about tanker inspection and controls on the transportation of hazardous materials. U.S. flag tankers are inspected by the Coast Guard in dry dock every 2.5 years and there also are mid-period exams. U.S. tankers are classed by the American Bureau of Shipping and any defects known for a particular class of vessels are monitored in these inspections. The Coast Guard has the authority to order repairs before the vessel receives the required certification. These inspection requirements apply to any seagoing motor vessel over 300 GT. There are exemptions, mainly for fish tenders and vessels less than 500 GT.

All U.S. offshore mobile drilling rigs are also inspected if they float and work as a vessel, as are foreign flag rigs if they work within our EEZ and are not just towed through.

All barges, including those carrying hazardous waste materials, need inspection if they exceed 100 GT and are carrying freight for hire. Hazardous material (except for fuel) must be packaged and stowed in accordance with Title 49 CFR. Class A cargos which includes explosives, radioactive materials, and oxidizing agents, cannot be on- or off- loaded without a permit. No permit is needed for other materials such as PCBs.

Foreign traffic is least monitored. Unless a foreign vessel comes into a U.S. port and is therefore inspected, their transit across the EEZ is unmonitored. These vessels are subject to shipping and packaging regulations of the International Maritime Organization which are similar to 49 CFR but monitored for compliance by the flag country. Thus, a barge with PCBs heading from Canada to another foreign port via the U.S. EEZ would not be subject to U.S. inspection or monitoring. Foreign tankers that come into port, for example, those that service the fishing fleet with fuel out of Nikiski, all are inspected at least annually.

One additional note of interest is that many cargo vessels going from west coast ports to Japan use the great circle route which takes them through or close to the sensitive fisheries areas of Unimak Pass. The Coast Guard suspects that most oil sheens in that area are from these transiting vessels.

Permits for Activities in the Marine Environment

In State waters, the Alaska Oil and Gas Conservation Commission has jurisdiction over oil related activities and responsibility for responding to catastrophes. In the Outer Continental Shelf area, Minerals Management Service within the Department of Interior issues exploration permits, approves contingency plans, and has responsibility for conducting annual emergency response drills and inspections. MMS does submit contingency plans to the Coast Guard for review.

The Council receives notice of proposed oil and gas activities in the OCS. Item C-3(c) has two recent notices. EPA monitors hazardous waste activities and would be another source of information on potential activities that could impact fisheries habitat. And finally, the Habitat Section of the NMFS in Juneau has an elaborate system for monitoring and commenting on permit applications for proposed activities that affect coastal areas and wetlands. The Corps of Engineers is obligated to consult with NMFS on all permits that come under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Other reviewing agencies include the U.S. Fish and Wildlife Service, EPA, and the State's Departments of Environmental Conservation, Fish and Game, and Natural Resources.

Well over 95% of the permit applications reviewed by NMFS are local impacts including drege and fill in the intertidal, uplands, and impacts on streams and the associated spawning and rearing habitat. NMFS tracks these permits by the following categories: oil/gas, power, aquaculture, boating, mining, home/townsite, and timber. They examine the activity proposed and the area that will be affected, and comment accordingly.

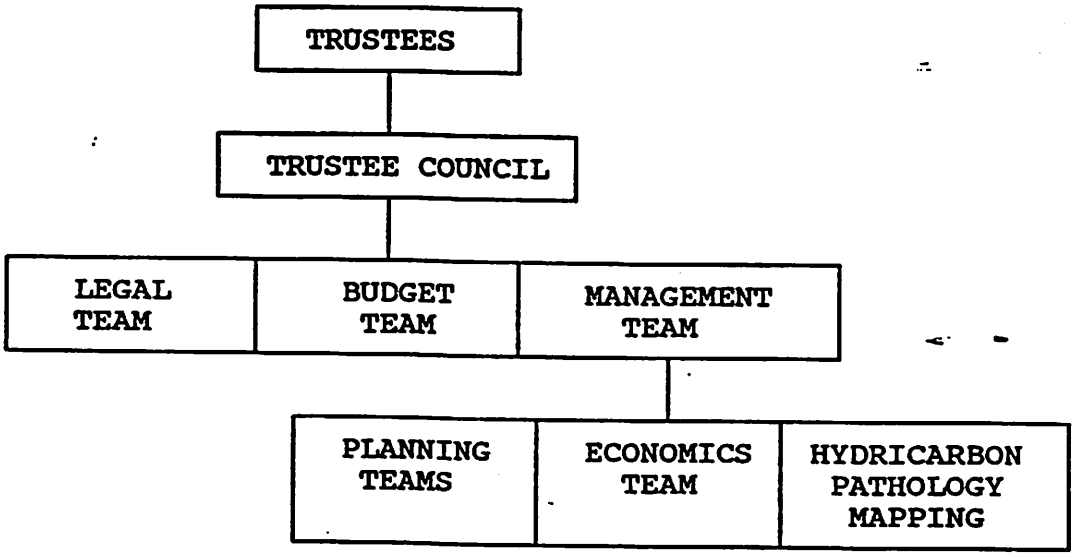
Council Direction

The Council needs to determine how involved it should be in reviewing major activities that could have environmental consequences and the composition and terms of reference for the Habitat Committee. Also, there may be opportunity to recommend research projects to the Trustees Council that could help with fish stock assessments and impacts of the spill. The Council can rely on the agencies mentioned above to provide descriptions of proposed activities and the potential impacts on the habitat. The major question for the Council is how significant does a proposed activity have to be to warrant Council attention?

The Habitat Committee will meet on Monday, June 19, to expand on some of these issues.

AGENDA C-3(a)
JUNE 1989

EXXON VALDEZ OIL SPILL
DAMAGE ASSESSMENT ORGANIZATION



TRUSTEES

DOI	Manual Lujan
DOC	Robert Mossbacker
DOA	Clayton Yeutter
ALASKA	Don Collinsworth

TRUSTEE COUNCIL

DOI	Walt Stieglitz
DOC	Steven Pennoyer
DOA	Mike Barton
ALASKA	Don Collinsworth

MANAGEMENT TEAM

DOI	Rowan Gould
DOC	Ted Meyers
DOA	Dalton Dulac
ALASKA	John Clark
EPA	Al Ewing

LEGAL TEAM

DOI	Dennis Hopewell
DOC	Craig O'Connor
DOA	Bob Maynard
DOJ	Jim Nicolls
ALASKA	Barbara Herman
ALASKA	Craig Tillery

BUDGET TEAM

DOI	Ed White
DOC	John Furuness
DOA	Bob Wilson
ALASKA	Beverly Reaume

11(n)

NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

Policy on Habitat *

Introduction

Efforts to integrate habitat considerations into the fishery management process go back to the inception of the Magnuson Fishery Conservation and Management Act (MFCMA) in 1976. The Act directs the Councils to recommend management plans for commercial and recreational species of fish occurring in the Exclusive Economic Zone throughout the range of the species. Some believed this directive gave the Councils authority to consider fishery related habitat issues within the territorial sea and further inland even though the Councils clearly did not have jurisdiction within State waters. Although some efforts were made to address significant fishery habitat issues, the Councils and the National Marine Fisheries Service (NMFS) concentrated largely on ocean harvest during the first decade of Magnuson Act.

In 1983 the NMFS adopted a National Habitat Conservation Policy, uniting its MFCMA authority with its advisory responsibilities and authority under the Fish and Wildlife Coordination Act (FWCA) and the National Environmental Policy Act (NEPA). The Habitat Conservation Policy provides guidance to the agency regarding its interactions with the Councils and other Federal and State agencies. It also focuses NMFS's habitat conservation efforts on specific habitat problems affecting fishery resources, marine mammals, and endangered marine species. Although the NMFS's policy notifies other agencies and the Councils of NMFS intent, it does not clarify the Councils' role regarding fishery related habitat issues.

In 1986 the Congress amended the Act, essentially codifying elements of the NMFS Habitat Conservation Policy, and giving the Regional Fishery Management Councils new authority and responsibility to include "readily available" habitat information in all fishery management plans. The Amendments direct the Councils, with guidance from NMFS, to evaluate the effect that changes in habitat may have on managed fisheries.

Additionally, the 1986 amendments gave the Councils the opportunity to recommend habitat management measures for ongoing and proposed Federal or State activities which could adversely affect fishery resources for which they have management responsibility. Federal agencies are required to respond specifically and substantively to a Council's recommendations within 45 days. The Amendments also encourage the Councils to monitor state activities and to comment on those that could adversely affect Council managed fishery resources. As the Councils moved to implement the new habitat options and directives in the Magnuson Act amendments, the NMFS issued operational guidelines to help Councils prepare habitat sections for inclusion in fishery management plans.

In response to these amendments, the North Pacific Fishery Management Council has adopted the following policy statement to guide its review of habitat issues. The policy statement itself is followed by descriptions of the responsibilites, guidelines, review process, and definitions that will assist the Council in executing the habitat policy.

* Approved by the Council in September 1988.

Habitat Policy Statement

The Council shall assume an aggressive role in the protection and enhancement of habitats important to marine and anadromous fishery resources. It shall actively enter Federal decision-making processes where proposed actions may otherwise compromise the productivity of fishery resources of concern to the Council.

Recognizing that all species are dependent on the quantity and quality of their essential habitats, it is the policy of the North Pacific Fishery Management Council to:

> Conserve, restore, and maintain habitats upon which commercial, recreational and subsistence marine fisheries depend, to increase their extent and to improve their productive capacity for the benefit of present and future generations. (For purposes of this policy, habitat is defined to include all those things physical, chemical, and biological that are necessary to the productivity of the species being managed.)

This policy shall be supported by three policy objectives which are to:

(1) Maintain the current quantity and productive capacity of habitats supporting important commercial, recreational and subsistence fisheries, including their food base. (This objective will be implemented using a guiding principle of NO NET HABITAT LOSS caused by human activities).

(2) Restore and rehabilitate the productive capacity of habitats which have already been degraded by human activities.

(3) Maintain productive natural habitats where increased fishery productivity will benefit society.

Council Habitat Responsibilities

The Council will ensure that:

(1) Habitat significant to the species or species group to be managed as well as its prey, where information is available, is adequately defined in the plan.

(2) The most recent and substantive information regarding habitat considerations and issues is incorporated into the fishery management plan at the earliest possible stage of the plan.

(3) Recommendations to responsible agencies be included in the plan which identify habitat improvement or changes in Federal policies, which are necessary to achieve the objectives of the plan.

The Council, through its staff, advisory bodies, and committees, will review those proposed habitat alterations or other human actions which may have a significant adverse impact on those fisheries addressed in the Council's plans and under the authority of the MFCMA. After review of such proposals and finding that significant adverse impacts could occur, the Council may file or present its position to the Federal agency(s) responsible.

Council action could include: (1) oppose the proposed action, (2) suggest modifications, or (3) seek full compensation for unavoidable fishery losses.

The Council may also recommend changes in Federal statutes and their implementing regulations to protect marine fishery resources and their habitats in water development activities and policy.

Guidelines

As a guide for determining the need for Council involvement, the Council staff and appropriate advisory bodies and committees will consider the following:

(1) The extent to which the proposed activity could directly affect the production of fishery resources or their essential food base (e.g., as a result of dredging, wetland filling, pollution loading, release of toxic or other hazardous wastes, restricting access, etc.).

(2) The existence of alternative sites lower in productivity, ecological importance, or fisheries related conflicts than that associated with the proposed activity.

(3) The extent to which man-induced perturbations could be avoided through activity modification(s) or other safeguards (e.g., piling support instead of fill, and construction timing windows).

(4) The extent to which the activity could affect the accessibility of fishery resources.

(5) The extent to which precedent could be set in relation to existing or potential cumulative impacts of similar or other developments in the proposed activity area.

(6) The extent to which the proposed activity could indirectly affect the production of fishery resources (e.g., alteration of circulation, salinity regimes, detrital or nutrient export, etc.).

(7) The extent to which the activity requires a waterfront location if dredging or filling of coastal wetlands is involved.

Review Process

(1) Information on proposed Federal activities or actions and their related habitat issues will be received by the Council staff from several sources. For example, the National Marine Fisheries Service (NMFS), Alaska Region, will forward the Council staff descriptive information such as copies of public notices of significant projects proposed for federal authorization or proposed Federal policy. NMFS will also provide special briefings, NMFS position statements, and other appropriate support as needed. Also, the Council staff may request and receive information from other State and Federal agencies, the private sector, and special interest groups.

(2) Information (including public notices) received and screened by the Council staff will, if significant, be forwarded for consideration by the Council, its advisory bodies or committees.

(3) Significant activities shall be selected for Council consideration if:

(a) A proposed Federal action or activity may have significant fishery related impacts.

(b) A proposed Federal action or activity is significant and deserves formal Council consideration.

(4) Council staff or special committees shall develop a draft Council position and forward it to the Council for their action. The following are examples of appropriate Council actions:

(a) The Council shall object to proposed Federal activities that could have significant adverse effects on fisheries for which the Council has management responsibility. The Council shall convey their objections, concerns, and recommendations directly to the appropriate Federal regulatory agency.

(b) The Council staff or members may testify at public hearings, as needed.

(c) The Council may hold public hearings, as appropriate.

(5) Council staff or special committees shall report on their actions at Council meetings as needed.

Criteria to Define Significant Activities and Policies

Significant activities and policies could include those:

(1) That may directly affect (e.g., catch, marketability, management options, etc.) fisheries or habitat for which the Council has a management or research interest.

(2) That could affect habitat important to species managed under the MFCMA, or habitat important to species upon which managed species are dependent for food.

(3) That may be precedent-setting, highly controversial, or proposed in unique or critical habitat areas.

(4) That could have a substantial indirect impact on water circulation patterns, nutrient production and export, saltwater intrusion, freshwater inflow, availability of nursery areas, migration corridors, and overwintering areas, etc.

(5) That could result in releases of toxic or otherwise hazardous wastes.

UNITED STATES
DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE

Shumagin Sale 129
Request for Interest

Purpose

Proposed Sale 129-Shumagin is being reviewed by the Secretary of the Interior to determine whether the Outer Continental Shelf (OCS) presale process should be initiated for this sale. The oil and gas industry is asked to assist in this process by providing up-to-date information on its interest in leasing and exploring in the Shumagin Basin Planning Area.

The responses will assist the Secretary of the Interior in determining if the presale process for the proposal should be started, delayed, or deferred for consideration in a future 5-year schedule. This approach is designed to add flexibility to the program by providing for the reasonable possibility that changes in geologic data and economic or other conditions could create bidding interest in areas which may now appear unattractive. For example, a substantial oil price increase (such as might result from an oil supply disruption), if anticipated to be relatively long term, could make an area presently unattractive to potential bidders into one which could be of interest. Other information of interest would include new geophysical data; new geologic data; new interpretations of existing data; and new estimates of costs of production. By requesting information and acting on it prior to the issuance of the Call for Information and Nominations, the risk of inappropriate expenditures for such sales would be reduced.

If the Request for Interest indicates sufficient interest to warrant proceeding with the sale, these prelease steps will follow: Call for Information and Nominations and Notice of Intent to Prepare an Environmental Impact Statement (EIS), Area Identification, draft EIS, Public Hearings, final EIS, proposed Notice of Sale, Governor's Comments, and final Notice of Sale. For Alaska sales, the entire process takes approximately 28 months.

Description of the Area

The Shumagin Basin Planning Area is located immediately south of the Alaska Peninsula. The planning area covers approximately 15,054 blocks or 83 million acres and is outlined on the map found at the end of this document.

Previous Sale-Related Activities

A Request for Information for Sale 86, Shumagin, was published on October 15, 1984. Information received in response to the request resulted in the continuance of the presale process. A Call for Information and Nominations was published on November 6, 1985, with comments due December 23, 1985. Comments were received from five companies, one company submitted nominations. On February 26, 1986, Sale 86 was canceled because of lack of industry interest.

Instructions on Request for Interest

Information regarding leasing and exploring in the Shumagin Basin Planning Area may be provided by mail, telephone, or, alternatively, an informal meeting with the Regional Director or designated representative. General or detailed information may be submitted. We request that you provide information on the following:

(1) Are you interested in the area at this time?

(2) Would your level of interest in this area change if oil and gas prices increase?

(3) What general or detailed information can you provide regarding whether we should proceed in this planning area with the OCS presale process; delay the presale process for 1 year or more; or defer the sale for consideration in a future 5-year schedule?

(4) Is your company spending money on any oil and gas activities in this area or are expenditures anticipated on activities such as geologic and geophysical work, etc.?

(5) What comments and suggestions can you provide on your choice of minimum bid level, alternative bidding systems, and other procedures which may lead to the enhanced understanding of the oil and gas resources of the Shumagin Basin Planning Area?

In order to be included in the review process, information must be submitted no later than 45 days following publication of this document in the Federal Register. Receipt of the information will be facilitated if the envelope is marked "Request for Interest on Proposed Lease Sale 129-Shumagin. "The telephone number and name of a person to contact in the respondent's organization for additional information should also be enclosed.

Letters should be mailed or hand delivered to the Regional Supervisor for Leasing and Environment, Minerals Management Service, Alaska OCS Region, 949 East 36th Avenue, Room 110, Anchorage, Alaska 99508-4302. Telephone responses may be made to Mr. Tom Warren at (907) 261-4691.

Barry Williamson

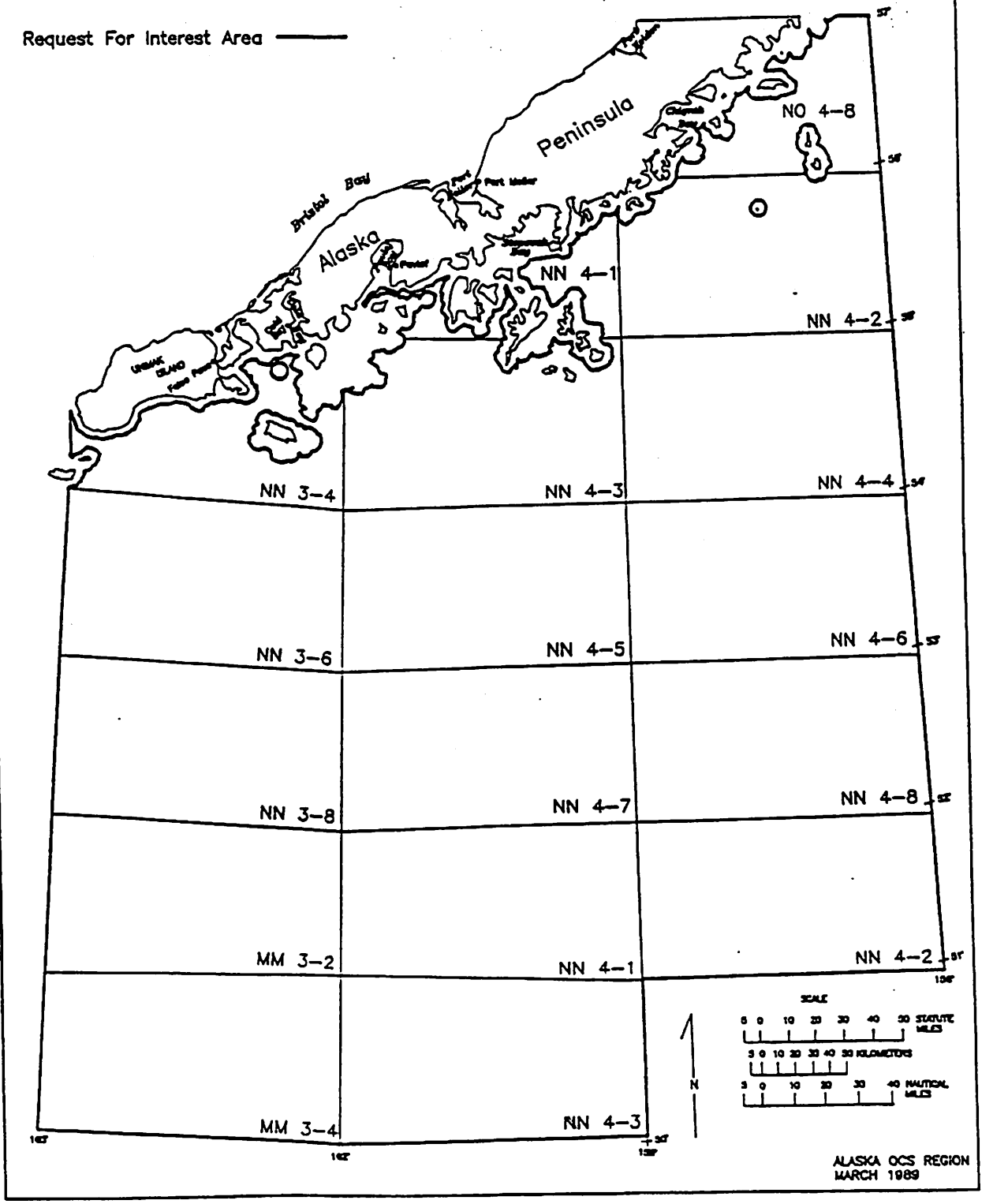
Director, Minerals Management Service

Approved:

Deputy Assistant Secretary - Land and Minerals Management

Date 5/31/89

SHUMAGIN
Sale 129
Request for Interest



ALASKA OCS REGION
MARCH 1989

MMS

U.S. Department of the Interior
Minerals Management Service
Alaska OCS Region

News Release

FOR IMMEDIATE RELEASE
June 8, 1989 #89-05

Robin Lee Cacy
(907) 261-4070

MMS ANNOUNCES AREA IDENTIFICATION FOR CHUKCHI SEA SALE 126

The Minerals Management Service (MMS) has announced the area to be studied for possible inclusion in the next federal outer continental shelf (OCS) lease sale offshore Alaska's northern coast in the Chukchi Sea, Request for Interest for Shumagin Sale 129. The Area Identification reflects a decision to eliminate six million nearshore acres from consideration in this sale. Sale 126, originally scheduled for May 1991, is now scheduled for July 1991.

MMS Director Barry Williamson noted that the decision to adopt a buffer zone at this point in the lease sale process was consistent with the Bush Administration's commitment to resolving concerns early on.

"The State expressed special concern about potential conflicts between petroleum exploration and Native hunting activities among other matters. While our studies show that potential for such conflicts is low, I believe we can best achieve our goal of increased exploration by focusing on less controversial areas at this time," Williamson said.

The area includes 4,319 blocks encompassing about 23.5 million acres. Water depths in the area range from about 65 to 325 feet. A draft Environmental Impact Statement (EIS) to be prepared by MMS which will discuss the proposals for oil and gas leasing in the Chukchi Sea. The draft EIS is scheduled for completion in May 1990.

This will be the second OCS lease sale held in the Chukchi Sea. Sale 109, held on May 25, 1988, drew 653 bids on 351

blocks, a record number of bids for any federal offering outside of the Gulf of Mexico. High bids totalled $478 million.

In addition, MMS announced the decision to issue a Request for Interest (RFI) for Shumagin Sale 129. Information received from responses will help MMS decide whether to initiate the prelease process for this sale. The RFI covers approximately 83 million acres between 3 and 160 miles offshore the Alaska Peninsula.

The RFI for Sale 129 will be published in the Federal Register on June 13, 1989. Responses should be received no later that 45 days following publication. Letters should be marked "Request for Interest on Proposed Lease Sale 129, SHumagin," and sent to the Regional Supervisor, Leasing and Environment, Alaska OCS Region, 949 East 36th Avenue, Room 110, Anchorage, Alaska 9950804302. A copy of the response should be sent to the Chief, Offshore Leasing Management Division, Minerals Management Service, Department of the Interior, Room 4230, Washington, D.C. 20240. Hand deliveries to the headquarters office may be made at 18th and C Streets, N.W., Room 2523, Washington, D.C.

Copies of the Area Identification map for Sale 126 are available from the MMS Library, Anchorage, or by writing to the Minerals Management Service at the above address.

--DOI--

MMS

U.S. Department of the Interior
Minerals Management Service
Alaska OCS Region

Fact Sheet

FOR IMMEDIATE RELEASE
June 8, 1989

Robin Lee Cacy
(907) 261-4070

AREA IDENTIFICATION
SALE 126, CHUKCHI SEA
FACT SHEET

The Department of the Interior recently selected the area for proposed outer continental shelf (OCS) oil and gas lease Sale 126, Chukchi Sea, to be analyzed in an environmental impact statement (EIS). This action constitutes the administrative prelease step referred to as Area Identification. This fact sheet contains a description of the area to be analyzed, as well as background information relevant to the proposed sale. A description of the prelease process for the proposed sale also is provided.

BACKGROUND

There has been one sale held in the Chukchi Sea--Sale 109 was held on May 25, 1988. Sale 109 garnered a record number of bids for any federal OCS sale outside the Gulf of Mexico. MMS offered approximately 4,700 blocks covering about 26 million acres in the Chukchi Sea. High bids totalled $478 million. Six hundred fifty-three bids were received on 351 blocks. The highest bid received was $16.1 million submitted by Shell Western E & P, Conoco, Inc., and Elf Aquitaine, Inc. Total bids came to $666 million.

EVENTS LEADING AREA IDENTIFICATION

*Sale 126 appeared on the 1987 Five-Year Leasing Schedule for May 1991. It has been rescheduled for July 1991.

*A Call for Information and Nominations was published in the Federal Register on January 13, 1989. It identified the area believed by MMS to be geologically favorable for hydrocarbons, and asked respondents to outline areas within the Call area that they would like included in the proposed sale. The Call requested information that would be useful in identifying potential conflicts with approved local coastal management plans, potential environmental effects and use conflicts, possible mitigating measures, and possible lease terms and conditions.

*Nine companies responded to the Call indicating specific areas of interest.

*General comments were received from: North Slope Borough, State of Alaska, U.S. Coast Guard, Chevron, ARCO Alaska, Conoco, Shell, Amoco, Unocal, National Park Service, Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration.

AREA IDENTIFIED

*Approximately 4,319 whole or partial blocks are included in the proposal to be analyzed in the EIS. The area selected was based upon nominations received from industry and the comments received regarding environmental and other issues. (A map of the proposed area is attached.)

*Six million nearshore acres have been deferred from the original Call area to provide a buffer between federal and state waters.

*Water depths in the area range from about 65 to about 325 feet.

*The proposed sale area is located between approximately 3 and 245 miles offshore Alaska's northern coast in the Chukchi Sea.

ISSUE IDENTIFICATION

The process of identifying issues to be discussed in the EIS was initiated by the publication in the Federal Register of the Call for Information and Nominations and the Notice of Intent to Prepare An EIS. The Alaska OCS Region will review information provided in response to the Call for Information for the proposed sale. An EIS scoping meeting was conducted in Barrow, Alaska, in preparation for Sale 126, and written comments were due 45 days after the Call was published in the Federal Register.

FURTHER ACTIONS REGARDING THE PROPOSED SALE

The potential effects of leasing in the area identified will undergo extensive environmental analysis in the EIS. Comments received on the Call for Information and Nominations and the Notice of Intent, and during the EIS scoping process, will be used with existing environmental data to develop alternatives to the proposed action and to design appropriate mitigating measures.

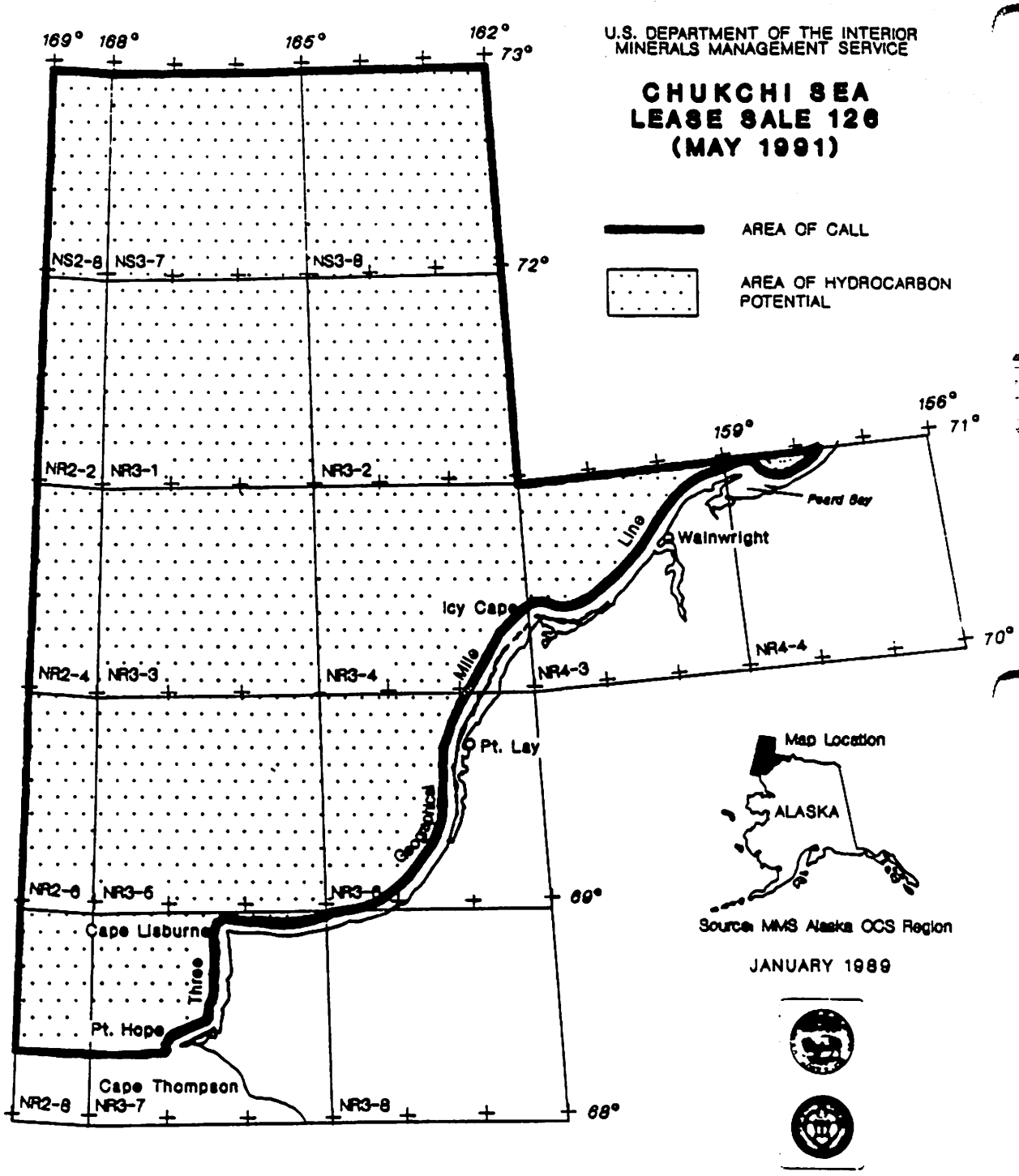
*After a draft EIS is issued in May 1990, public hearings will be held. Comments received will be used to develop the final EIS which is planned for release in December 1990.

*A decision whether to issue a proposed Notice of Sale will be made in February 1991. If issued, it will present a proposed

decision on blocks to offer; what special mitigating measures will be used to protect human, coastal, and marine resources in the area offered; and other conditions and terms that will apply to the leases. The Governor of Alaska will be asked for his recommendations on the size, timing, and location of the proposed sale. After careful consideration of the Governor's comments, the Secretary of the Interior will make a final decision.

The final Notice of Sale will be issued at least 30 days before bids are opened.

--MMS--


U.S. DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE
CHUKCHI SEA
LEASE SALE 126
(MAY 1991)
AREA OF CALL
AREA OF HYDROCARBON POTENTIAL
169°
168°
165°
162°
73°
72°
71°
70°
69°
68°
159°
156°
NS2-8
NS3-7
NS3-8
NR2-2
NR3-1
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NR4-4
NR2-6
NR3-6
NR3-7
NR2-8
NR3-8
Peard Bay
Wainwright
Icy Cape
Pt. Lay
Cape Lisburne
Pt. Hope
Cape Thompson
Line
Mile
Geographical
Thise
Map Location
ALASKA
Source MMS Alaska OCS Region
JANUARY 1989

HABITAT COMMITTEE MEETING
JUNE 19 and 21, 1989

DRAFT MINUTES

The Habitat Committee met on June 19 and 21, 1989. Present were Henry Mitchell (Chair), John Peterson, Ken Parker, Larry Cotter, Tony Knowles, Dale Evans, CAPT George White, Craig O'Connor, Deming Cowles and Clarence Pautzke.

A major concern that has surfaced since the Committee's May 17 meeting is whether NOAA Fisheries is authorized to close fisheries in the event of a major disaster such as an oil spill. The Committee reviewed a Memorandum of Understanding between ADF&G and DEC that allows for coordination between the two departments on the testing and inspection for contaminated fish and actions to close specific fisheries. ADF&G has considerable emergency order authority to react quickly, an authority that NOAA Fisheries may lack.

The Committee concluded that in the event of an oil spill or other environmental emergency, the Alaska Seafood Marketing Institute should be consulted along with agencies responsible for human health and welfare, DEC for the State and FDA for Federal waters. They could work hand-in-hand with the management agencies, ADF&G or NOAA Fisheries, in responding. An agreement similar to the State's MOU may be needed to provide the required coordination at the Federal level.

The Committee considered various alternative actions for providing NOAA Fisheries with the required authority to respond to the oil spill: emergency action at this meeting, a Secretarial amendment, and amending MFCMA to grant the authority. It was NOAA GC's opinion that the Secretary of Commerce could act under emergency authority for 90 days to protect human health and welfare. It was less clear whether the Secretary could close fisheries by emergency authority for economic reasons, for example, to keep oiled fish from ruining markets for fisheries products. The geographic scope of the Secretary's authority, such as other State waters, was also unclear. NOAA GC advised that although emergency actions would expire after 90 days, FDA still would have control over interstate movement of tainted food.

The Committee recommends that the Council determine how to give NOAA Fisheries the appropriate authority to respond this year if oil impacts fisheries in the EEZ. Two approaches were recommended:

1. Request staff to review with NOAA GC what type of legislative remedy is needed to give NOAA Fisheries long term authority to respond to a disaster. A common sense approach is needed and the

quicker legislative vehicle could be oil spill legislation now under consideration. The Council would need to determine, with the help of NOAA Fisheries, what gaps exist in their emergency authority. Then the Council should act quickly because legislation is moving rapidly through various congressional committees. Perhaps a letter to the President and/or Congress would be needed.

2. Request the Habitat Committee to develop a comprehensive policy on use of the newly legislated authority. This should involve input from industry in developing the parameters of the policy.

The Committee also recommended that the staff and interested Council members attend meetings of the newly appointed Alaska Oil Spill Commission and report back to Habitat Committee.

The Habitat Committee will meet again on July 27-28 in Juneau to review the Trustees Council Plan for damage assessment and restoration of areas and fisheries impacted by the Prince William Sound oil spill. Public review of the draft plan should commence the first week of July. Copies should be sent to committee members and the emphasis of the review will be on commercial fisheries under Council jurisdiction and marine mammals.

The Committee also recommended that its membership be expanded to include representatives from the Coast Guard, Fish & Wildlife Service, and NOAA Fisheries. Beyond oil-related activities, the work of the Committee would include developing a system for monitoring activities that could impact the environment and screening out those considered of major significance, and keeping the Council informed of ongoing activities and where Council action is needed.

1. There is a need to determine what federal policies exist on responding to pollution of the EEZ. Where is the liability? Is "zero tolerance" on oil tainting of fish also the federal policy?

2. How many different agencies are establishing plans for oil spill response, damage assessment and research?

3. Are there very sensitive areas, such as red king crab habitat in Bristol Bay, that the Council needs to especially identify in its management plans so that the onus is placed on proposers major development activities to show they will not negatively impact sensitive habitat? Plan teams should begin identifying critical habitat. Further discussion of this issue should be scheduled for the next Habitat Committee meeting in July.

4. A list of agency experts on special habitat areas and species complexes needs to be developed so that they can be quickly contacted for background information?

5. Which agencies should be routinely contacted to determine what projects are being planned that could seriously affect the environment?

6. Can the driftnet issue be addressed as an environmental problem and then outlawed on that basis?

The Committee also received a proposal for a research project prepared by Roger Decamp of the National Food Processors Association. It is entitled "Tainting of Salmon Exposed to Spilled Crude Oil" and is proposed for funding by Exxon.

AGENDA C-3
SUPPLEMENTAL

NEWS FLASH

VOL. 1 NO. 4 DATE JUNE 1989

SPECIAL EDITION

INTRODUCTION

It has been eleven weeks since the Exxon Valdez hit Bligh Reef in Prince William Sound. From the beginning, the response among the seafood industry, state, and federal agencies has been to work together to ensure that a commercial fishing season proceeds in areas that were not affected by the spill. The Alaska Departments of Fish and Game and Environmental Conservation, along with fishermen, processors, and regional governments, developed procedures needed for managing fisheries and inspecting product. The result of this work reassures consumers that only safe and wholesome Alaska seafood reaches the market.

OIL SPILL RESPONSE

Five days after the grounding of the tanker, preliminary market surveys were conducted in the U.S., France, Japan and the U.K. Consumers had not made the connection between seafood products and the spill, but the trade was concerned about pricing and availability.

Ten days after the spill, a fact sheet to 20,000 brokers, wholesalers and distributors of Alaska seafood was sent to reassure them that no fishing was going on in the Sound at the time of the spill, that products currently in the marketplace were wholesome and safe, and that the pure products they have come to expect from Alaska would continue to be available.

EXXON FUNDING

ASMI asked for and received $800,000 from Exxon to cover additional administration, travel and personnel expenses, and research projects. Exxon has agreed to meet again with ASMI to discuss additional funding should results of ongoing research indicate a need.

RESEARCH

Burson-Marsteller, an independent public relations firm, has been retained to conduct in-depth surveys in the U.S., France, Japan and the U.K. to determine how the seafood trade and consumers perceive Alaska seafood since the grounding of the tanker.

ADDITIONAL STAFFING

An Oil Spill Communications Coordinator has been added to coordinate information flow among government agencies, affected municipalities, and industry groups and media representatives. The National Fisheries Institute has loaned Peggy Parker from their Communications Department for the summer. Peggy was formerly with Seafood Business and spent ten years in Cordova involved in the fishing industry.

ASMI has also hired an office manager to handle the additional workload. A Field Communications Coordinator will be hired to work out of Cordova this summer for DEC, ADF&G, and ASMI. This will ensure a direct communications link among fishermen, processors, and the regulatory agencies as well as between the field and agency Juneau offices.

STRINGENT INSPECTION PROGRAM

In the weeks following the spill , industry and government experts were convened to review plans for the upcoming season. DEC and ADF&G developed a tough inspection program that calls for five lines of defense: pre-fishery testing, monitoring at the fishing boats, tenders and in the processing plants, and finally laboratory analysis. Our involvement with DEC, ADFG and other agencies allowed ASMI to get the word out about the program to the trade and national media. In early May ASMI issued a set of guidelines to 12,000 fishermen describing the DEC inspection program. An updated version on waterproof paper will be distributed in early June.

SEASON OPENING

The halibut and salmon season opened in Prince William Sound on May 15 after extensive pre-fishery testing and inspection. At the conclusion of the opening a thorough organoleptic assessment and laboratory analysis provided a clean bill of health for Alaska's first fisheries harvest of the year.

PROMOTIONAL STRATEGY

All of ASMI's major ad campaigns for the 1988 season have concluded. Specific new approaches to marketing Alaska seafood will be developed only after the market research has been reviewed. ASMI is being extremely careful not to call attention to a problem if none exists.

In the meantime, ASMI has been working with The Washington Post, the Los Angeles Times, CBS, NBC, ABC, and other media to get out positive stories about Alaska seafood.

FOR MORE INFORMATION CONTACT ASMI AT (907) 586-2902
ALASKA SEAFOOD MARKETING INSTITUTE, P.O. BOX DX, JUNEAU, ALASKA 99811

MEMORANDUM OF UNDERSTANDING
1989 COMMERCIAL FISHERY SEASON

Alaska Department of Fish and Game
and
Alaska Department of Environmental Conservation

I. PREAMBLE

On March 24, 1989, the oil tanker EXXON VALDEZ ran aground, spilling more than 10,500,000 gallons of crude oil into the waters of Prince William Sound. The spilled oil has spread and continues to spread from Prince William Sound through the western Gulf of Alaska. The spilled oil has polluted and contaminated and continues to pollute and contaminate state waters and shoreline. The affected waters support productive fisheries which are of immense economic and social value to the State of Alaska and its citizens.

The State of Alaska, through the Department of Fish and Game, is charged with managing fishery resources and fisheries. Management directives and goals include: 1) to protect, maintain, improve, and extend fishery resources; 2) to avoid depletion or waste of fishery resources; 3) to conduct fishing in state waters in an orderly fashion which promotes conservation, development, and utilization of fishery resources; and 4) to preserve the economic stability of the state's fishing industry.

The State of Alaska, through the Department of Environmental Conservation, is charged with protecting the environment and the health, safety, welfare, and economic and social well-being of the public. Public protection directives and goals include: 1) to conserve, improve, and protect natural resources from oil pollution; and 2) to ensure that fish marketed from state waters are pure, safe, wholesome, unadulterated, and free from any taint of oil contamination.

Oil pollution (as defined in AS 46.03.900(19)) in waters or on shorelines in or adjacent to an area where a fishery is conducted poses a risk of adulterating fisheries resources and spreading oil pollution. Oil contamination also poses a risk of disruption of fisheries, including alteration of traditional fishing patterns and Board of Fisheries' adopted fisheries management plans, by causing fouling of fishing gear, by causing loss of fishing time, by causing strains on the ability of industry to supply sufficient amounts of uncontaminated gear to vessels, by causing fishermen who are unable to acquire uncontaminated gear or vessels to forego their livelihoods, and by causing waste of fishery resources that have become adulterated by oil pollution in the water or by contact with oil contaminated gear or vessels.

If oil adulterated fish are introduced into fish processing facilities, it could cause disruption of fisheries and waste of fish product because processing activities would have to be suspended while oil contaminated processing equipment was cleaned, maintained, and inspected. Additional waste and adulteration of fish product could occur if uncontaminated fish were exposed to oil contaminated fish or equipment.

Therefore, in order to carry out the management and public protection directives and goals with which the Department of Fish and Game and the Department of Environmental Conservation are charged, the respective departments agree to conduct the following activities during the 1989 commercial fishing season.

II. ALASKA DEPARTMENT OF FISH AND GAME

The Alaska Department of Fish and Game (ADF&G) will undertake the following activities in areas which have been polluted by oil:

A. ADF&G will conduct, and document the results of, aerial surveys or beach surveys in potential fishing districts, sections, subareas, or other areas as defined by ADF&G (hereinafter "areas") before the initial fishery opening in an area in order to ascertain whether oil pollution is present and to document the character and general location of the oil. ADF&G will provide the Department of Environmental Conservation (DEC) with the results of the surveys.

B. ADF&G will monitor oil contamination in potential fishing areas using oil spill tracking maps provided by DEC and survey information developed by ADF&G.

C. ADF&G will conduct test fisheries before the initial fishery opening in potential fishing areas which have been polluted by oil, even if there is no current discernible presence of oil, and will provide samples of test fishery catches to DEC for evaluation.

1. If requested, ADF&G will assist in providing transportation for DEC inspectors to and from test fishing vessels.
2. Test fishing will be conducted according to the test fishery sampling plans developed in individual fishery management areas.
3. ADF&G may conduct additional test fishing in a previously tested or previously fished area if there is reason to believe that weather or other variables may have resulted in oil or an oil sheen entering the area.

III. ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

The Alaska Department of Environmental Conservation (DEC) will undertake the following activities:

A. DEC will evaluate commercial fishery catches to ensure that seafood safety and product wholesomeness is maintained. In order to accomplish this, DEC will undertake an intensive inspection program which will have requirements for fishing vessels, tender vessels, buying stations, and processing facilities.

B. DEC will enforce the emergency regulations, 18 AAC 34.500 et seq., which establish emergency requirements for fishing vessels, tender vessels, buying stations, and processing facilities in order to prevent adulteration of product and contamination of equipment by oil. DEC will review the records of tender vessels and processing facilities in order to assure compliance with the regulations.

C. DEC will train state personnel in the technique of organoleptic evaluation of fish for safety and wholesomeness. DEC-trained personnel will evaluate samples of catches from test fisheries provided by ADF&G to determine whether a safe and wholesome product will result from commercial openings in the areas where test fisheries were conducted. DEC will determine the appropriate methods of evaluation of particular samples. DEC will provide the results of organoleptic examination of test fish catches to ADF&G managers within 12 hours after the fish are made available to DEC. DEC will provide the results of laboratory evaluations, if any, of test fish catches to ADF&G managers within 24 hours after the fish are made available to DEC. DEC will provide inspectors for test fishing vessels when ADF&G requires an immediate evaluation of fish catch safety and wholesomeness for fisheries management purposes.

D. DEC will attempt to work with Exxon Shipping Company (Exxon) and encourage Exxon to establish boat cleaning stations and receiving stations for oil adulterated fish and oil contaminated gear. DEC will attempt to work with Exxon to develop recordkeeping procedures and oil contaminated material disposal procedures.

IV. OPENING OF FISHERY AREAS

ADF&G will decide whether to open particular areas for fishing based upon information acquired from the activities described above. The general principles by which ADF&G will make opening determinations are as follows:

A. A fishing area will remain closed if there is an indication of oil in any quantity in the area or the proximity of the area (including beaches), such that there is an appreciable likelihood that gear will be fouled, fish harvest adulterated, or such that the conduct of an orderly fishery could not take place. If weather conditions prohibit ADF&G from evaluating a potential fishing area through surveys or test fishing as set out above, the area will remain closed until the survey or test fishery can be conducted if DEC oil pollution tracking maps, or other reliable information, indicate the presence of oil pollution in the vicinity.

B. A fishing area will remain closed if test fishing has demonstrated that oil contamination of fishing gear or oil adulteration of product is likely to occur.

C. After fishing areas are opened for commercial fishing, if DEC inspection or evaluation of fishing vessels, tender vessels, buying stations, or processing facilities indicates oil adulteration of a harvest, designated representatives of DEC and ADF&G will consult to determine whether a recurring contamination problem has developed. If so, ADF&G will close fishing in the area where the oil contamination occurred.

V. AGENCY STAFF

Each agency will designate key contact people to implement this Memorandum of Understanding (MOU) and to facilitate the decision-making process during the 1989 commercial fishery season. The following are specific agency representatives for all purposes under this MOU:

ADF&G designates:

_____ (NAME)

_____ (TITLE)

_____ (PHONE)

DEC designates:

Manny Soares (NAME)

Environmental Conservation Manager (TITLE)

(907) 563-0318 (PHONE)

Because it may be necessary to make emergency closure decisions, in the event that either designated representative is unavailable, the alternative designated persons are:

ADF&G designates:

Prince William Sound Region: James Brady & Dennis Haanpaa (NAME)

_____ (TITLE)

_____ (PHONE)

Cook Inlet Region: Schroeder and Ken Florey (NAME)

_____ (TITLE)

_____ (PHONE)

Westward Region: _____ (NAME)

_____ (TITLE)

_____ (PHONE)

DEC Designates: _____ (NAME)

_____ (TITLE)

_____ (PHONE)

Agency staff will, to the maximum extent possible, coordinate and channel all respective efforts through the designated staff member.

6·8·89
Dated

Don W. Collinsworth, Commissioner
Alaska Department of Fish and Game

8 June 1989
Dated

Dennis D. Kelso, Commissioner
Department of Environmental Conservation

PACIFIC SEAFOOD PROCESSORS ASSOCIATION
4019 - 21st Ave. West, Suite 201
Seattle, WA 98199
(206) 281-1667
FAX (206) 283-2387

DATE: June 2, 1989

TO: PSPA Membership

FROM: John F. Roos

SUBJ: NFPA, PSPA, Univ. of Wash. Oil Research

We have enclosed a summary (prepared by Roger DeCamp, NFPA Northwest Lab.) of the May 26 meeting held by the above mentioned organizations concerning the needs of the seafood industry arising from the PWS oil spill. Alec Brindle, Chairman, NFPA Northwest Lab., had suggested the possibility of NFPA and PSPA contacting the University of Washington because of their previous extensive research experience and background in this field. In addition, the UW is in the process of putting a research plan (enclosed) together for this year to be funded by Exxon. A meeting was arranged and it appears that it would be both desirable and cost effective to work through FRI on this program.

It is anticipated that baseline data may be required by the industry at a later time, therefore we should develop independent research data in the event the information is needed. NFPA and PSPA will be closely involved in the program but the technical analyses will be performed by FRI and the UW.

National Food Processors Association
1600 South Jackson Street
Seattle, Wash. 98144
206/323-3540
FAX 323-3543

June 2, 1989

To: Northwest Laboratory
Board of Trustees

From: Roger DeCamp

Subject: Oil Spill Research

Enclosed is a report of the meeting which was held to review the University of Washington's proposed research project "Tainting of Salmon Exposed to Spilled Crude Oil."

The University has agreed to expand their work to provide needed baseline data. We have agreed to supply the product which will be needed for this additional work. We also have agreed to stay in close contact as the work progresses.

Please let me know if you have any comments on this.

Review of University of Washington
Research on Crude Oil Contamination
at
Pacific Seafood Processors Association
May 26, 1989

University of Washington:
Roy Nakatani
Ahmad Nevissi
Don Rogers

Industry:
John Gilbert
Barry Collier
John Roos
Roger DeCamp

Roy Nakatani described the recently completed study by the U.W. for Chevron, on the effects of contaminating adult Washington hatchery Coho and Chinook salmon with Alaska crude oil (Nevissi, et al. 1988). Copies of this report are not yet available.

The results of this and other oil contamination studies, including the development of sensory testing procedures and chemical analytical methodology, provides a background for the recently proposed research project "Tainting of Salmon Exposed to Spilled Crude Oil". This project was submitted to Exxon for funding on May 15, 1989. The object of this study is to determine the uptake of petroleum hydrocarbons by salmon swimming through salt water with a crude oil slick or dispersed oil plume. The loss, or depuration, of petroleum hydrocarbons after the salmon enter clean water will also be studied.

The tests for contamination will be both, by sensory evaluation and chemical analysis. Sensory evaluation will be done by an experienced taste panel, acquainted with oil contamination odors, using standard blind taste panel presentation and scoring procedures.
Chemical analysis will include:
- Infrared analysis for total hydrocarbons,
- Gas chromatographic analysis for C_1 to C_{10} hydrocarbons,
- Gas equilibration gas chromatographic analysis for C_1 to C_{10} soluble/volatile hydrocarbons,
- High pressure liquid chromatographic analysis for polycyclic aromatic hydrocarbons.

Discussion on the project centered on the industry feeling that there is a need for sensory evaluation and chemical analysis of normal, uncontaminated salmon to provide baseline data. This data would provide back-up to the acceptability of organoleptic examinations. It also would provide a basis for the evaluation of results of the contamination tests. In order to provide this data the University agreed to add the following to their study:
- Chemical analysis, as above, of 15 frozen Reds and 15 frozen Kings from the 1989 Copper River run (high quality fish, to be supplied by NFPA).
- Chemical analysis, as above, of two cases of 48 tall Pinks from the 1988 Prince William Sound pack (high quality fish, to be supplied by NFPA).

This work would be done as soon as possible to provide industry with information that might be needed, relating to public relations. Portions of the samples would be saved for possible further work, including sensory evaluation.

Encl.: "Tainting of Salmon Exposed to Spilled Crude Oil" May 15, 1989.

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

...ol of Fisheries
Laboratory of Radiation Ecology, WH-10
Tel. No.: (206) 543-4259
FAX No.: 206-545-7471

15 May 1989

Dr. Al Maki
Senior Biologist
EXXON Oil Co., Valdez
310 Egen St. Royal Center
Valdez, AK 99686

Subject: Salmon Tainting

Dear Dr. Maki:

Attached is a short proposal entitled "Tainting of Salmon Exposed to Spilled Crude Oil," prepared by the University of Washington team. This proposal is to study the potential of salmon tainting as a result of the recent crude oil spill in Prince William Sound.

The University of Washington team has been studying the effects of crude oil and chemically dispersed crude oil on salmon for the past ten years. This proposal was prepared as a result of discussion with Dr. Lawrence Moulton, a recent visitor at the School, Dr. Clayton D. McAuliffe, who is collaborating with our team on several projects, and Dr. Donald E. Rogers of Fisheries Research Institute in the School, who is the liaison to the fish processing industry.

Recently, we completed a project on tainting of salmon that was sponsored by the Cook Inlet Response Organization and Alaska Clean Seas. We are interested in continuing our work on the uptake and depuration of crude oil by salmon and tainting of the fish. The results of this research are of interest to many parties concerned about oil spills.

Because of international interest in the problem of fish tainting, we are currently contacting fisheries scientists at the University of Hokkaido in Japan to explore the possibility of a joint research project on this topic. We will keep you posted about the progress on this issue.

If there are questions or if additional information is needed, please do not hesitate to call us.

Sincerely yours,

A Nevissi

A.E. Nevissi
Research Associate Professor

AEN:as

Tainting of Salmon Exposed to Spilled Crude Oil

Introduction

It has been shown that crude oil spills and their chemical dispersion are highly unlikely to cause salmon mortality if the spill occurs in open waters (McAuliffe 1986a,b). Also it is known that crude oil slick thickness and concentrations of dispersed oil several times higher than in field experiments do not inhibit migration of chinook salmon in freshwater or coho salmon in sea water (Nakatani, et al., 1983, 1985). It is generally believed that salmon would not be harmed by an oilspill or chemical dispersion of the slick.

However, concern understandably remains very strong about tainting of adult salmon, and if tainting occurs, how long a salmon needs to be in clean water to lose (depurate) the hydrocarbons in the edible flesh. Even the threat of tainting can cause rejection of the entire catch and closure of the fishery.

Short-term exposure of steelhead trout to crude oil and chemically dispersed crude oil in sea water was studied by Lauby (1987). This author used sensory evaluation for determining any off-odor and off-flavor and chemical analysis (gas chromatography) for quantifying hydrocarbons in fish flesh. She reported that the taint and hydrocarbon concentrations of the fish flesh were influenced by the crude oil concentrations and the duration of exposure.

Tainting of adult chinook and coho salmon exposed to untreated and chemically dispersed crude oil and depuration of coho salmon are being studied by Nevissi, et al. (1988). However, before the completion of this study, the urgent question of tainting should be answered as soon as possible.

Objectives

This study has three general objectives:

(1) To assess, by sensory evaluation by a panel of human test subjects, and by chemical analysis, the presence or absence of a taint in salmon.
(2) To determine the uptake of petroleum hydrocarbons, by chemical and sensory evaluation, if the salmon are forced by spawning pressure to swim under a crude oil slick or through a dispersed oil plume.
(3) To determine the loss (depuration) of petroleum hydrocarbons, by chemical and sensory evaluation, when exposed under (2) and placed in clean water.

Experimental Procedure

Pre-season salmon, if possible, and salmon during the run will be obtained from the salmon industry and fishermen for objective (1). The fish will be examined visually and the pertinent information recorded.

The samples will be placed in plastic bags, frozen, and shipped to Seattle for analysis. In the laboratory, the fish will be thawed, dissected, and the flesh prepared for organoleptic and chemical analyses.

For objective (2), live fish will be captured by gillnet or purse seine. The fish will be kept in net pens, suspended at a certain depth in the water column. The net pens will be dragged through contaminated water for the uptake study, and subsequently through uncontaminated water for the depuration study. The fish will be sampled periodically from the pens and prepared in the same manner as above for analysis. Water samples will also be collected periodically to measure the concentration of hydrocarbons in sea water.

Sensory Evaluation

Background Justification

The impacts of oil spills in the path of migrating adult salmon have raised serious new concerns about their effects on the industry. Earlier, the major concern if salmon were confronted with an oil spill was potential mortality or straying from the homeward route. However, it has recently been shown that crude oil spills and their chemical dispersion are highly unlikely to cause salmon mortality if the spill occurs in open water (Brannon, et al., 1984, 1986). Moreover, Nakatani, et al (1983, 1985), has shown that crude oil slick thickness and concentrations of dispersed oil several times higher than what is associated with actual spills in the field does not inhibit migration of chinook salmon in freshwater, or coho salmon in sea water. These species, which are commercially important in Pacific Northwest waters, showed no reduction in homing ability after exposure.

The potentially more serious problem from oil spills that became apparent from preliminary work at the University of Washington, and one that has become an issue with the recent oil spill in Alaska, is the effect that oil may have on tainting the flesh of commercially important marine species harvested or caught on fishing grounds adjacent to an oil spill. Tainting, the development of a flavor or odor, not typical of the organism can arise from contaminants present in the aquatic environment (GESAMP, 182) but it can also be caused by improper handling of the seafood during and after harvest.

The marketability of fish and shellfish exposed to the oil in such a situation is seriously impacted if they become tainted with oil. Furthermore, if tainted products

reach the retail market, negative consumer response, lasting far longer than the problem of tainting, will impact the sale of Alaskan products for a long period of time.

Studies in the laboratory have shown that salmonids will take up petroleum off-flavor when exposed to oil, and the off-flavor components remain in the flesh (Lauby, 1987; Nevissi and Martinsen-Brannon, 1988; and Williams et al, 1989). How much uptake of oil components occurs under natural conditions and what result that uptake has on fish quality in terms of flavor or odor is critical. The practice of dispersing oil from spills to reduce its visibility may even compound the problem with regard to flesh quality and recovery time. Dispersed oils, as well as the dispersants themselves ,will facilitate the uptake of substances causing off-flavor and off-odor by increasing the solubility of compounds that contribute to off-flavor or off-odor problems.

To assess the impact that an oil spill has on the fishing industry, it is necessary to first determine whether commercially important fish and shell fish (flatfish, shrimp, crabs, etc.) that reside in the affected areas or migrate through the impacted areas (salmon), possess any off-flavor or off-odor due to petroleum uptakes (Connell and Miller, 1981). Marine species will be expected to show different levels of petroleum uptake, depending on the habitats they live in and the mechanism through which oil would enter their systems. However, where possible marine fish may avoid water having any significant level of polution, and even if once exposed to petroleum, depuration may render the flesh free of any off-flavor or odor. These questions need to be addressed, and if the edible flesh is free of petroleum off-flavors and odors. It is an important issue that affects present concerns about contamination of fish from exposure to oil. Additionally it should affect considerations about limiting or terminating the commercial fishery in Alaska this season, and it may affect how oil spills are to be viewed in the future. The proposed study will concentrate on two specific objectives:

1. To determine by sensory evaluation if petrochemical off-flavor and off-odor is present in fish and shellfish associated with oil impacted areas, and to determine the correlation between degree of tainting and time elapsed between the visible presence of oil and the sampling period.

2. If any petroleum off-flavor is present, to determine through sample time series by sensory evaluation and analytical chemistry the off-flavor and off-odor characteristics and depuration rates of petroleum hydrocarbon tainting. In those situations where oil still remains to some extent, samples of the oil will be taken to chemically characterize what components of the oil or dispersed oil are present.

The present team at the University of Washington is well experienced with effects of petroleum on fish, and with off-flavors associated with petroleum. However, off-flavors in fish and shellfish often occur unrelated to petroleum. It is important to point out that the team is also experienced with such off-flavors unassociated with petroleum. It is necessary that such a differentiation be made when off-flavors and odors are detected, and that the assessment be made by both sensory and analytical methods.

Present Status:

Recent studies conducted at the University of Washinton show that hydrocarbons from chemically dispersed and untreated Prudhoe Bay crude oil are taken up by steelhead trout in salt water after 1-24 hours exposure (Lauby1987). Sensory evaluation of the baked fish by a trained taste panel showed objectionable off-odor and off-flavor of the flesh. Some water-soluble components of crude oil, notably toluene, are taken up by chinook salmon in sea water almost instantaneously (Lee, 1988). The uptake occurs mainly through the gills and lateral line, and the levels of toluene in fish blood, several times higher than in the sea water, reach saturation within a few minutes.

Current studies on chinook salmon and coho salmon, show these species take up hydrocarbons from untreated, weathered, and chemically dispersed crude oil in salt water (Nevissi and Brannon-Martinsen 1988). The actual exposure for a relatively short time resulted in a concentration of oil dilutad rapidly their simulating an actual spill at sea. Measurement of hydrocarbons in the fish indicated that rapid uptake of water-soluble hydrocarbons occurred. Preliminary analysis of water-soluble hdrocarbons, and aromatic hydrocarbons showed that after two weeks, complete depuration of hydrocarbons was not achieved but sensory characteristics were improved. Sensory evaluation of cooked samples of depurated fish suggested that some off-odors and off-flavors were still retained by the tissues of fish.

Rationale:

Oil exposes migrating adult salmon and other marine foods to petroleum hydocarbons that could taint the flesh. Any level of off-flavor will affect their marketability, as well as depress the market simply by association for some time following the episode. Harvest managers need to know what level of oil contamination in fish associated the spill results in off-flavors and off-odors sufficient to impact the marine fish market.

Research Approach:

The exposure waters will be (a) analyzed for total hydrocarbons by infrared analysis (IR), (b) analyzed for C1-C10 soluble/volatile hydrocarbons by gas equilibration gas chromatographic analysis (GEGC), (c) monitored for polycyclic aromatic hydrocarbons (PAH) by high pressure liquid chromatography (HPLC), and (d) for C1-C10 hydrocarbons by GC. Frozen samples stored for evaluation will be analyzed for petroleum hydrocarbons by the above methods. Frozen samples will be thawed, tested for off-odor, cooked and tested again for off-odors and off-flavors. The detectable threshold level of hydrocarbon concentration in the fish will be determined analytically.

Experimental Procedures - Sensory evaluation

A taste panel consisting of eight trained panelists will use a modified flavor profiling technique to detect of "oil-tainting" of marine flesh. When possible, paired samples from each speciman will be analyzed by a sensory panel for the presence of off-odor and off flavor and chemically to determine presence of petroleum hydrocarbons in the edible flesh. The samples, received in the frozen state will be thawed, weighed, and wrapped in a double-thickness of foil for cooking. Times of cooking samples will be determined by preliminary tests. Samples will be assigned random numbers for later identification. All samples will be tested at room-temperature and presented to panelists in clean, white, coded ceramic sample dishes for their evaluation. Score cards used by the panel will be developed in preliminary tests using field samples and approved by the Human Subjects Review Committee at the University of Washington. Three sensory test series will be performed.

1. Tests on freshly thawed samples for off-odor. This series will constitute the initial evaluation of any contamination as off-odor in uncooked samples. If possible,

odor evaluation of whole fish will also be made by trained field workers prior to freezing and forwarding samples to Seattle. The remaining uncooked flesh will be frozen and delivered to the chemistry lab for objective analysis.

2. Tests on cooked samples for off-odor and off-flavor. Because the samples will be highly variable in size, the length of the steaming time for each will be dependent on the thickness of the flesh and will be established by their comparable thickness/weight ratios. The cooked samples were removed from their foil wrappers and weighed to determine the percent of cooking loss. The panelists will sniff a bite-sized piece (approximately 10 g) of flesh and then record any off-odor. The sample will then placed on the tongue and chewed 10 times. The chewed sample will be pressed with the tongue against the roof of the mouth before being expectorated into a paper cup. The panelist will record if any off-flavor. Water will be used to rinse the mouth between samples. Unsalted saltine crackers will also be available for consumption between tastings to clear the pallet. The remaining cooked flesh will be frozen and delivered to the chemistry lab for objective analysis. (*Ahmed, we may decide not to evalute chemically, samples with no off-odor or flavor. What do you think?)

The taste panel results will be summarized and evaluated using the Kruskal Wallis test for tests with ordinal data and Analysis of Variance for tests with nominal data.

3. If low levels of off-flavor are detected by the sensory panel, consumer panels will be used to evaluate selected marine species for off-flavor. Panelists will be asked to give general acceptability of the samples. These results can be used to demonstrate acceptability of commercially important marine fish associated with the oil spill in Alaska to consumers.

Expected Results:

Minimum impact on the odor or taste of commercially important fish and shell fish is anticipated. However, if some flesh contamination is detected, a combination of chemistry and sensory evaluation data will be used to identify the level of oil or dispersed oil contamination in the tissue that is detectable by the consumer. Correlations of time for weathering and/or depuration of hydrocarbons from the edible portions of the flesh to levels no longer detectable by consumers will be made for the species impacted.

The various strategies that limit oil uptake and enhance depuration by marine life are an important part of nature and they influence the effects of an oil spill in the environment on marine animals. Therefore, it is important to evaluate fish that have entered an area where an oil spill has occured to determine the influence of that spill on certain chemical and sensory characteristics. If these fish have no detectable off-odor or off- flavor, it should influence decisions about fishing and harvesting in these areas. If there are detectable off-odors and off-flavors, it is important to know which marine species are affected so that they can be kept out of the market in order to prevent adversely affecting the marketability and reputation of all Alaska fish products.

Chemical Analysis

Tissue analysis of the fish samples will be performed to support the findings of sensory evaluation by "fingerprint" and by quantifying the hydrocarbons present, compared with control samples. The water-soluble hydrocarbons will be analyzed by gas equilibration technique and GC analysis. The heavier hydrocarbons and lipids will be extracted from tissue, isolated, and purified, which may include steam distillation. The individual fractions will be concentrated and further purified for analysis by gas-liquid chromatography, with or without additional analytical methodology such as mass spectrometry, UV, and IR.

The lipid content and water content of tissue will be measured for all the samples. Seawater samples will be measured for water-soluble hydrocarbons by gas equilibration and GC analysis. Total hydrocarbons in water will be measured by extraction and IR analysis.

Proposed Budget

Since the magnitude of the proposed tasks is not known at this time, only a rough estimate for objective (1) at about $180,000 is made. The budget includes limited travel to Alaska but no ship time. If ship charter or other logistics are needed, a separate budget will be submitted for these items.

Investigators' Qualifications

The University of Washington team has been studying the effects of crude oil and chemically dispersed crude oil on salmon for the past ten years. If desired, resumes of the individual investigators on the team can be furnished. Briefly, however, the University of Washington team comprises the following:

Prof. Charlene Martinsen (Institute for Food Science and Technology, School of Fisheries): Sensory evaluation of odor and taste.
Prof. Emeritus Roy E. Nakatani (Fisheries Research Institute, School of Fisheries): Salmon biologist, consultant to the project.

Prof. Ahmad E. Nevissi (Department of Environmental Health, and Laboratory of Radiation Ecology in the School of Fisheries): Chemist, chemical measurements.

Prof. Donald E. Rogers (Fisheries Research Institute, School of Fisheries): Salmon fisheries expert and liaison with the industry.

Dr. Clayton D. McAuliffe: Retired chemist, consultant to the project.

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