11.17.05

Exxon Valdez Oil Spill
Trustee Council Meeting

May 23, 2006

Agenda

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, AK 99501-2340 • 907 278 8012 • fax 907 276 7178

AGENDA
EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
May 23, 2006 8:30 a.m.
Anchorage, Alaska

DRAFT 5/11/06 **DRAFT**

Trustee Council Members:

DAVID W. MÁRQUEZ
Attorney General
Alaska Department of Law

JAMES BALSIGER
Administrator, Alaska Region
National Marine Fisheries Service

KURT FREDRIKSSON
Commissioner
Alaska Department of
Environmental Conservation

DRUE PEARCE
Senior Advisor to the Secretary
for Alaskan Affairs
U.S. Department of the Interior

McKIE CAMPBELL
Commissioner
Alaska Department of Fish
and Game

JOE MEADE
Forest Supervisor
U.S. Department of Agriculture
Forest Service

Meeting in Anchorage, Trustee Council Office, 441 West 5th Avenue, Suite 500
Teleconference number: 800.315.6338 (contact EVOS for code)
_____ State Chair

1. Call to Order – 8:30 a.m.

2. Consent Agenda
   - Approval of Agenda*
   - Approval of Trustee Council meeting notes*

March 29, 2006
May 9, 2006

3.	Public Advisory Committee comments	
4.	Public comment (no reopener comments accepted) – 8:40 a.m.	
5.	Executive Director's Report	Michael Baffrey, Executive Director
6.	Herring Workshop	Kimberly Trust, Interim Science Director
7.	Monitoring projects*	James Bodkin & Kimberly Trust

James Bodkin, USGS
- Bodkin-050750—Nearshore Restoration and Ecosystem Monitoring

Kimberly Trust
- Batten-040624—Acquisition and Application of CPR data in the Gulf of Alaska
- Cokelet-040699—Biophysical Observation Aboard Alaska Marine Highway Systems Ferries
- Okkonen-040614—A Monitoring Program for Near-Surface Temp, Salinity, and Fluorescence Fields in the northeast Pacific Ocean: Transition to an Operational Program
- Weingartner-040340—Toward Long-Term Oceanographic Monitoring of the Gulf of Alaska Ecosystem

8.	FY 07 Invitation*	Kimberly Trust
9.	PAC Charter	Doug Mutter, DOI, Designated Federal Officer
10.	Small Parcel Program*	Carol Fries, ADNR
11.	Trustee travel funds *	Michael Baffrey

Executive Session if necessary

12. Adjourn

* Indicates action items

March 29, 2006
Meeting Notes

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, Alaska 99501-2340 • 907/278-8012 • fax 907/276-7178

TRUSTEE COUNCIL MEETING NOTES
Anchorage, Alaska
March 29, 2006

DRAFT - *5/9/06* DRAFT

Chaired by: David Márquez
Trustee Council Member

Trustee Council Members Present:

Joe Meade, USFS
Drue Pearce, DOI
Craig O'Connor, NMFS *
Heather Brandon, ADF&G **
Kurt Fredriksson, ADEC
•David Márquez, ADOL

• Chair
* Craig O'Connor alternate for James Balsiger
** Heather Brandon alternate for McKie Campbell

The teleconferenced meeting convened at 10: 05 a.m., March 29, 2006 in Anchorage at the EVOS Conference Room.

1. Approval of the Agenda

APPROVED MOTION: Approval of the March 29, 2006 agenda

Motion by O'Connor, second by Fredriksson

2. Approval of February 8, 2006 meeting notes

APPROVED MOTION: Approval of February 8, 2006 meeting notes

Motion by O'Connor, second by Pearce

Public Advisory Committee (PAC) comments: Lisa Ka'aihue reported on the March 6, 2006 PAC teleconference meeting.

Public comment period began at 10:12 a.m.

No public comments were received.

3. Amendments for FY 07 Projects

FAILED MOTION: Motion to approve extended funding for FY 07 for: Batton-040624, Cokelet-040699, Okkonen-040614, and Weingartner-040340.

Motion by O'Connor, second by Pearce

APPROVED MOTION: Motion to defer until the next Trustee Council meeting the proposed one-year extension funding four FY 07 projects: Batton-040624, Cokelet-040699, Okkonen-040614, and Weingartner-040340.

Motion by O'Connor, second by Fredriksson

4. Herring Work Shop

APPROVED MOTION: Motion to sponsor a Herring Work Shop in Anchorage April 24-25, 2006

Motion by O'Connor, second by Pearce

5. Executive Session

APPROVED MOTION: Motion to move to Executive Session to discuss personnel issues

Motion by Pearce, second by O'Connor

Off the record: 11:40 a.m.

Adjourned

NOTE: The Trustees adjourned from executive session at 11:50 a.m. without going back on the record. No action was taken.

Motion by Fredriksson, second by Meade

May 9, 2006
Meeting Notes

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, Alaska 99501-2340 • 907/278-8012 • fax 907/276-7178

TRUSTEE COUNCIL MEETING NOTES
Anchorage, Alaska
May 9, 2006

DRAFT - *5/9/06* DRAFT

Chaired by: Craig O'Connor
Trustee Council Member

Trustee Council Members Present:

Joe Meade, USFS
Drue Pearce, DOI
•Craig O'Connor, NMFS *
McKie Campbell, ADF&G
Kurt Fredriksson, ADEC
David Márquez, ADOL

• Chair
* Craig O'Connor alternate for James Balsiger

The teleconferenced meeting convened at 10: 05 a.m., May 9, 2006 in Anchorage at the EVOS Conference Room.

1. Approval of the Agenda

APPROVED MOTION: Approval of the May 9, 2006 agenda with the following revisions: go into executive session immediately following public comment, and defer March 29, 2006 meeting notes, Public Advisory Committee comments, and Executive Director's report until May 23, 2006 meeting

Motion by Pearce, second by Campbell

Public comment period began at 10:05 a.m.

One public comment was received.

Public comment closed at 10:10 a.m.

2. Executive Session

APPROVED MOTION: Motion to move to Executive Session to discuss personnel issues

Motion by Pearce, second by Meade

Off the record: 10:15 a.m.
On the record: 10:50 a.m.

APPROVED MOTION: Motion to move from Executive Session to public meeting

Motion by _____, second by _____

3. Project Amendment

APPROVED MOTION: Motion to defer Project 050778, Jacqui Michel, Identify and Evaluate Oil Remediation Technologies to May 23, 2006 meeting

Motion by Pearce, second by Fredrikkson

Adjourned Motion by Pearce

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, AK 99501-2340 • 907 278 8012 • fax 907 276 7178

Date: May 8, 2006
To: Trustee Council
From: Kimberly Trust, Interim Science Director
Subject: Herring Workshop Briefing

Included with this memorandum are four documents resulting from the Herring Workshop of April 24-25, 2006. The following are submitted for the Trustee Council's review prior to the May 23, 2006 meeting:

1) Herring Workshop Summary
2) Herring Workshop Minutes
3) Herring Workshop Project List and Brief Summaries
4) Herring Workshop Recovery Plan Memorandum to Participants

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, AK 99501-2340 • 907 278 8012 • fax 907 276 7178

Date: April 28, 2006
To: Michael Baffrey, Executive Director
From: Kimberly Trust, Interim Science Director
Subject: Summary of the Herring Workshop: April 24, 25, 2006

On April 24-25, 2006, the Exxon Valdez Oil Spill Trustee Council (EVOS TC) hosted a workshop directed at restoring Pacific Herring in Prince William Sound (PWS). The meeting comprised scientists and community stakeholders (i.e., fishermen from Cordova, AK), who were brought together to identify immediate needs for herring restoration and create a process for herring recovery.

The meeting loosely followed a three objective agenda:

- A brief synopsis of existing information was presented by invited participants
- Identification of data gaps and limitations of current information was discussed
- A process for how to proceed with restoration/recovery of herring was developed

It was important that the panel came to consensus regarding plans for herring restoration/recovery. Given the diversity of interests and opinions among the participants, the following, group-derived recommendations are testament to their commitment to restoring herring in PWS:

- Strong financial support and a continuing commitment to the herring recovery process must come from the Trustees.

- A long-term restoration plan should be developed and implemented for Pacific Herring in PWS. The planning process should include stakeholders, community members and scientists. The restoration plan would define critical decision pathways needed to make progress in herring recovery. A planning model worth consideration would be the Recovery Planning process used for threatened and endangered species. The process should begin in the summer of 2006.

- In FY07, short-term projects should be funded that will contribute to the restoration plan being concurrently developed. By May 1, 2006, a list of projects for the FY07 Invitation will be provided to Kim Trust. This list will be prioritized by the workshop participants and presented to the Trustees. It is important to recognize that these projects should be considered in the larger framework of the restoration planning effort.

Attachments: Minutes from the Workshop, as transcribed by Carolyn Rosner.
(Supplemental notes from Katie Walter and Steve Moffit are incorporated)

HERRING WORKSHOP

April 24/25, 2006,
Trustee Council Office, Anchorage
Minutes

Original Objectives:

- Provide brief synopses of existing, relevant data that identify stressors or ecological factors contributing to the decline of Prince William Sound herring.
- Identify data gaps that may lead to determining more precisely those factors constraining recovery of herring in Prince William Sound.
- Develop restoration/research projects directed at herring recovery.
- Utilize outputs of this workshop in the 2007 Invitation for Proposals.

Focus: Herring Restoration and Research

Goals:

Short term: FY'07 Invitation. Should set groundwork for long term goal;
Long term: Identify needs and create process for herring restoration.

Hosts:

- **Kimberly Trust:** Interim Science Director
- **Michael Baffrey:** Interim Executive Director

Introduction of Invited Panelists:

- **Ross Mullins:** Retired commercial fisherman from Cordova, fished 40 years, Along with Ken Adams and Vince Patrick developing community based herring program, resurrecting some of SEA aspects done in 1990's.
- **Bill Webber:** Cordova fisherman
- **RJ Kopchak:** Fisherman, EVOS PAC member
- **Dick Kocan:** Univ, Wash School of Fisheries, USGS, diseases in herring, shrimp, salmon in Yukon River.
- **Wendell Jones:** Commercial fisherman, herring, hired by state of AK to report interaction of oil and herring during first two weeks of spill, then hired by Aquaculture; herring spotter for years
- **Terry Quinn:** UA Juneau, statistics, population modeling, Gary Marty invited him to work on this model 10 years ago.
- **Brenda Norcross:** fisheries oceanography, UAF, doing herring since spill, works on recruitment of herring
- **Gary Marty:** BC Canada, fish culturing, used to be at UC Davis; disease research, damage assessment from spill from 1989-2002
- **Steve Smith:** Fisherman, herring was 50% of income that disappeared
- **Liz Senear**: Commercial fisher, herring also important to income
- **Steve Moffitt:** ADFG, area research biologist for commercial fisheries, herring stock assessments since 1988
- **Dick Thorne:** PWSSC, hydroacoustic studies

- **Jeep Rice:** Auke Bay Lab, toxicity, lingering oil issues
- **Jeff Short:** Environmental chemist, Auke Bay Lab; where oil is, how long it's been there.
- **Dave Irons:** Fish and Wildlife, bird biologist, trends in marine birds since birds eat herring.

Attendees 4/24:

Wendell Jones, DCFU
Vince Patrick, PWSFRAP
Bill Webber, CDFU
Anne Hoover-Miller, ASLC
Mary Bishop, PWSSC
Kathy Kuletz, USFWS
Katey Walter, PWS OSRI
Sara Miller, UAF
Dede Bohn, USGS
Terry Quinn, UAF
Jenifer Kohout, USFWS
Steve Zemke, Chugach NF
Lisa Rosan
Stacey Marz
Evelyn Brown, UAF
RJ Kopchak, CDFU
Less Williams, Integral
Erling Carlson, fisherman
Jeff Short, Auke Bay Lab
Jeep Rice, Auke Bay Lab
Dick Throne, PWSSC
Liz Senear, fisher
Steve Smith, CDFU, seine division
Gary Marty, fish pathology sevices
Brenda Norcross, UAF
Steve Moffitt, ADFG
Dick Kocan, USGS, Univ. WA
Ross Mullins, PWSFRAP
Nate Bickford, UAF
David Irons, USFWS
Ryan Babcock
Barat LaPorte, Patton Boggs
Gina Belt, US Dept of Justice
Ken Adams, PWSFRAP
James Brady, N. Cape Fish Consulting
Peter Hulson, UAF
Pete Hagen, NOAA

- **On conference call: Rita Lovett,** AK Department of Law; **Heather Brandon**, ADFG

Attendees 4/25:

Barat LaPorte
Ryan Babcock
RJ Kopchak
Liz Senear
Bill Webber
Dick Kocan
Anne Hoover-Miller
Steve Zemke
Jenifer Kohout
Dede Bohn
Wendell Jones
Peter Hulson
Sara Miller
Steve Smith
Vince Patrick
Steve Moffitt
Less Williams
Ross Mullins
Gary Marty
Jeff Short

OBJECTIVE 1: BRIEF SYNOPSES OF EXISTING INFORMATION

- **Presentations (incorporates Katey Walter's notes)**
- **A CD, containing the presentations summarized below is available from the EVOS TC Office**

1) Herring History: Current and Historical Catch in PWS (Steve Moffitt / Brenda Norcross)

- 1978-2006: $6MM average exvessel value of herring fisheries; PWS used to extend to Seward; fisheries included spawn on kelp, sac roe, bait, food
- Current assessment: spring acoustic surveys, aerial surveys since 1973, age/sex/size collections, disease indices
- 2006 status: fisheries closed fall '05, spring '06. 17K tons projected. Spawn happening March instead of normal mid-April. Currently entering historical spawn data into a GIS; ArcPad, Bluetooth GPS for real time mapping
- Western Pacific: fewer, large populations, and fish are bigger too
- E. PWS more, smaller pops that are easier to wipe out
- GOA/PWS is at the end of the habitat range, so is more vulnerable. Huge Hokkaido-Sakhalin fishery collapsed in 1930s-1950s; not overfishing, cause unknown. Hypothesis: collapse of a large fishery could be due to climate change?
- **Katey Walter (OSRI, Cordova):** Seems like there would be more resiliency in small stocks due to more diversity. Individual smaller stocks are easier to wipe out
- **Evelyn Brown**: Predation is very important re: herring
- Why herring important: ecological value. Humpback whales, stellar sea lions, gulls, eagles fisherman
- 1917, most fish pickled for food and bait; gap 1927-37; 1930's harvest reduction era
- reduce demand for herring oil in '58, anchovy oil used instead
- 1969 sac roe harvest started Japan market, bait, and spawn on kelp
- PWS sac roe harvest died in 1993 after EVOS, but Sitka kept on going.
- Spawn locations by year; aerial surveys done in late march, area mile days. 17 miles in 2001, highest was 200+ in 1988
- List of current stock assessment projects
  - Spring acoustics survey with PWSSC, started in 1995; 2 charter vessels
  - Spring aerial surveys since 1973 to document miles of milt, biomass
  - Age, sex and size collections from commercial fisheries harvest, and autumn
  - Disease index, virus since 2003; before that Dr. Gary Marty did intensive disease sampling from 1992-03. VHSV (20% have virus)
  - All data used in catch-age model.
  - 17,000 tons need 22,000 tons for open fishery, so closed 2005, 06.
  - First spawning event this year was March 25. Most of this years mile days occurred in March. Very early. Mean is April 14-18. It was 35degC, usually spawn occurs in 40degC, so unusual to see spawn in such cold conditions.
  - Large schools of 2 and 3 year old fish, and 10 humpback whales in Sawmill Bay. 9 Whales there since November. Steve counted 19 in December. Each whale eats 1 metric ton herring per day.

2) Oil Impacts (Jeep Rice/Jeff Short)

- Lingering oil does not appear to be the cause for continuing decline of herring. Disease, habitat, environment… but not oil. Herring spawned in '89 in oil areas. Lingering oil in Knight Island area and SW; majority of herring are spawning in NE and Montague, but no lingering oil there. So they don't believe that oil is accounting for continuing affects today. Oil could have contributed to initial crash; hard to measure now. There maybe residual effects from 89 oil, but if so, today it is manifesting through disease, habitat and other issues.
- Question about sampling the ocean bottom—Answer from Jeep - Sampled down to subtidal, but could not find any oil. Studied winter trenches and spring spawning beaches Oil present in transects from beach, intertidal at -3 to -100m. Can see oil in pits in intertidal. They couldn't get signal in deep water, too low concentrations. But if there is oil, it would be covered by other things in deep marine. Doesn't think there is oil on deep bottom; would have been resurfaced.
- Historically large herring fishery in Japan/Sakhalin Islands. Dramatic collapse of fishery that hasn't recovered. Oil did not cause collapse of Sakhalin fishery because oil development didn't start until later; herring don't overwinter there. Some terrestrial spills but nothing on scale that would affect reproductive herring habitat.
- **Evelyn**: Oil should still be studied as a contributing factor to decline
- **Jeep**: More important to study disease, habitat, environ. factors
- Question to Jeep Rice. If oil spill didn't happen would herring be in such bad shape today? This is restoration question because we need to understand how to manage.-To understand dynamics of stock restoration.

3) Climate Change/Regime Shift (Brenda Norcross)

- Climate change and carrying capacity conference in Hawaii. Doug Hays work, herring across whole North Pacific. Herring mature later and later as go north to Bering Sea; fish live ~7 years in east pacific. In west pacific they live longer.
- Herring recovery. Much more herring in 30's than 80's. Need minimum amount of spawning fish to see if there will be a fishery.
- *Prior to 1996, fishery profit was 1-10M dollars, 1996-2006 $0M.*
- Northern herring stocks fluctuate a lot more in population size than southern stocks.
- West pacific has few, large pops; East pacific has large number of small pops. Easier to wipe out small pops. East pop puts energy into reproduction. West pop puts energy into getting bigger. East pop = Gulf of Alaska. All the same species but react differently.
- Stock Diversity: East have lots of small stocks. Mid latitude stocks are stable. Stocks at edge of range (Gulf of AK, PWS) are more vulnerable to change. So must think about this when we look at herring in 1930's-1980. In East Pacific, more stocks as you go south. There are really 60-70 stocks in BC, but managed as 5. Shelf size is important. West side has HUGE area of continental shelf including Bering Sea- large range of similar habitat so can evolve over large range. On East side, small shelf with great variability in habitat.
- Sakhalin stock crashed in 1950's and 60's for unknown reason. Not overfishing because they didn't recover after fishing stopped. Maybe 1960's cold (climate change), Just a hypothesis.
- Asians are harvesting huge predators that are not harvested in West Pacific.

- Climate variability and change through 'time'.
  - Nothing is known about herring and climate change.
  - Regime shift. El Niño, ENSO… science concepts have become popular word.
  - Regime shift = relatively rapid change
  - PDO (cool in 60's, warm in 80's and 90's, and cool again now. East and West Pacific don't act same way.
  - Proportion of total catch has changed: Shrimp lots until 1970's then switch to cod, now flatfish since 1980s. Was it PDO? It doesn't explain everything and it doesn't fit right now. Cold in Western Pacific and warm in Eastern. But there are more indices of climate change.
  - A regime shift is in the eye of the beholder. You can draw abrupt changes where you want them to have more simple and complex shifts.
  - There should be some quantitative way of determining regime shift. Or define it. Set parameters before you look at data so that you are not biasing it.
  - Scientist believe there are regime shifts; climate is changing and it affects herring
- **Nate Bickford, UAF**: Stock biomasses changing. Determining contributing factors is difficult

4) Epidemiology and Mechanisms of Fish Disease (Dick Kocan)

- Put everybody into same page on disease and epidemiology. 3 organisms as examples.
  1) VHSV- disease of herring that occurs in PWS. Virus transmitted by H2O, multiple hosts, high mortality, upon recovery, there is long lasting immunity to prevent reinfection.
  2) Ichthyophonus, protozoans, fish don't recover, no immunity developed, transmitted orally
  3) ENV, virus, affect red blood cells, multiple hosts, cause severe anemia, immunity unknown (don't know if recovered individuals are resistant). Immature red blood cells pour out and replaced; white flesh of fish shows fish is anemic, but not necessarily affected with ENV.
- Infection and disease are not synonymous. Infection is invasion of one organism by another. Disease is physical, chem damage caused by infection. Also non-infectious disease caused by toxins, radiation, genetic damage, malnutrition, trauma (scurvy, sickle cell anemia…)
- Emerging infections diseases. Prior to 1985 no Ichthyophonus, now it is everywhere and in severe conditions.
- Ecological transformation susceptible to disease.
- Arise from changes in evolution of existing organisms. Example: bird flu. Genetic modification could happen so that it moves from one human to another. Microorganisms change all the time.
- Virulence- variable in pathogen. Are they capable of getting a disease?
- Host characteristics: age, sex, strain, genetics, other pathogens, immune status, behavior
- Environmental factors: temp, crowding, water quality, salinity, pollution, habitat change
- Epidemiology- disease in humans, Epizootiology, disease in animals
- Endemic (within the population) disease vs. epidemic disease: Endemic, in an island community, if a new disease comes in gets mass mortality with little survival. The disease rises and falls as population fluctuates. Then for some unknown reason, when the right set of

conditions comes together, an epidemic get a sudden spike in number of cases of disease. Infected either die or become immune, then number of infected individuals falls abruptly again. Important, what happened... did they die or become immune?

- Clinical disease: characterized by signs (you can see them); (not symptoms)
- Other individuals have infection without disease at clinical level. What are non-clinical conditions of other individuals?
- Temperature: Ichthyophonus grown in culture at 4 temps. 5,10,15,20. Increase temp, increase Ichthyophonus growth. If herring temp increase, Ichthyophonus increases.
- Experiment of trout infected, survival depended on temp at which they were kept 10-20 deg.
- Chinook Salmon in Yukon River. At start of run, 9 deg water temps, at end of June up to 16 or 17 deg C mean. 30-40% of fish infected with Icthy. Fish that enter river late in run have more disease signs then fish in early run.
- Crowding: In open water, pathogens get diluted b/c water exchange as they move through the water. In artificial crowding, a pen, no renewal of water.
- Bait fishery, spawn-on-kelp fishery (PWS and PS herring); predators can cause crowding too. (Stress- globular eggs = stress)
- Other pathogens: Herring pathogens include protozoa, viruses, bacterial, helminthes, and arthropods. So when you go out to take a random sample from fish, what are you really looking at? Fulfilling Koch's postulates. Microorganisms have to be present in every single case of the disease, so must look at population during peak of disease. Microorganisms must be isolated and grown in pure culture so that you have one variable to test with each culture. Must reproduce that disease in non-immune specific pathogen-free animals. Microorganisms must be recoverable again in the experimentally infected host. This is the trick to identify specific organism that causes a specific disease. Sometimes combinations of organisms cause disease.
- Chinook salmon spawning: Emmonak 24mi; Lower Tanana 695 mi; Upper Tanana 900 mi (Fairbanks); Chena River 970 mi; Salcha River 1015 mi
- Lots of infected fish at lower spawning streams, got infected in ocean. Fish died or didn't reach upper spawning streams. Infected fish got fatigued and couldn't swim longer than 4 min; uninfected fish couldn't swim after 12 min. So Ichthyophonus can cause some fish to have less stamina, they might have gotten fatigued before reaching upper spawning streams.
- You cannot immunize them, quarantine them, restock from hatcheries,...but you can manage around the problem if you understand the problem.
- Once you have all the information, you can manage around the problem.
- Ichthyophonus doesn't cause mortality, but when combined with VHS or something else, they die.

5) Role of Disease in Abundance of the Pacific Herring Population in Prince William Sound (Gary Marty)

- Focal skin reddening: cyclical, 3-year cycle
- Sometimes pathogen is present, but not the disease.
- Highest prevalence in 3-year old fish
- Conclusions: prevalence varies year to year, best modeled with an index VHSV & ulcers
- *Ichthyophonus* virus not a cause of population decline

- SEA program only lasted a few years, with big changes either side, so 3+ year projects are probably needed to capture the fluctuations
- Pigmented macrophagic aggregates in liver; 1988 year classes are similar between Sitka and PWS
- Understanding this disease is critical to understanding pop dynamics in PWS
- Ulcers, virus prevalence, *Ichthyophonus*: can explain the last 15 years of population variability
- Pacific Herring increased in PWS from mid 70s to early 90's. Based on egg deposition surveys. Population peak 1992. Since 1993 population dominated by disease. We are in disease regime. Gary can explain all population fluctuations by disease with some parameterization.
- **Ken Adams** pointed out that other data show decline since '89. Different measure.
- Pounding causes slight outbreak. Affect of pounding during healthy regime vs. unhealthy regime. Length of time holding fish in the pound increases their immunity.
- Disease study design: 1994-2002. Population level.
- 300 fish sampled in spring (20 fish per set, 15 different sets. For first 8 years, pop mostly in Montague area, in later half, took northern fish too. Disease was split evenly). 100 fish in fall. Determined age from scales, Steve Moffitt's group method. Blood analysis.
- Total sample size ~4000 fish
- 3 significant pathogens:
    - filamentous bacteria invade and cause ulcers
    - Ichthyofonus hofri (primitive fungus like organism)
    - VHSV
- Key features of all three: they all infect different species of fish; all are common in fish in the environment
- For epidemic to occur need: susceptible population, pathogen, environmental conditions (acute exposure to oil causes disease outbreak, maybe not 4 years later).
- Focal skin reddening outbreaks in 1994, 1998. VHSV Virus prevalence in 1997, 1998. 1997 no ulcers, but high virus. Here you have pathogen, but no disease. Mortality occurred in 1998. Pattern disappeared by 2000.
- To model population needed to make index of FSK and virus. 1998 big year.
- How does VHS change with age? In 1997 prevalence in 3-year olds is higher than 4,5, and 9 year olds. In 1998 same thing. In 2002, new outbreak, 3 year olds and 5 year olds high, at 14% prevalence in field, older fish not much.
- VHS prevalence is highly variable from year to year. Young fish more likely to express VHS. Best model for disease is combination of FSK and VHS.
- What else plays a role? Ichthyophonus not much variability from 1994-2000, and variability is best explained by age and population. As average fish age increases, Ichthyophonus increases. R2=0.74. Prevalence is ~17% in 1997 and 1998, but opposite pattern as VHS. Older fish (5 year olds) have lots Ichth., but 3 year olds low.
- So, Icthy. Prevalence is high in PWS, Sitka, and Auke Bay. Prevalence. of lesions increases as fish age.
- Which pathogen most important at population level? VHS*ulcers, NOT Ichthyophonus.

- Other useful information? Autumn samples. Never isolated VHSV in fall sample. 2 year olds and older. In spring it was as high as 14%, though some springs had 0%. Ichthyophonus same in fall and spring. In Sitka, virus present, but at lower prevalence.
- 2001 and 2002: Population biomass was as low as ever been with no evidence of recovery. Some disease in 2002, but less than 1998. SEA program? SEA mostly done during 1995-97, low disease years. So RFPs should consider longer term studies of disease. Ichthyophonus suddenly unexpectedly VERY high in 2001 with high mortality of older fish. In 2002 Icthoph goes back down to trend line.
- Do we have evidence that disease is limiting recruitment? Examine recruitment after high disease years. If high disease in 1998, do you get poor recruitment in 1999?
- 2003-2006, sample 300 fish per year, sample for ulcers, skin reddening, age, gross Ich. (1997-2002 Gross Ichtho. Correlated to cell Ichthyophonus.). Each year age class increased in prevalence of Ichthyophonus. In 2005 gross Ichthyophonus was higher than ever before.
- Summary:
    - 1993 severe VHS and ulcers
    - 1994 moderate, VHS-ulcers
    - 1998- moderate VHS ulcer
    - 2001 severe Ichthyophonus
    - 2005 severe Icthy
    - 2009 disease or recovery?
    - Looks like 4 year pattern. Good to have long term data for prediction.
- Do we have evidence of oil spill affects?
- 1988 vs. 1994 year classes: Kidneys livers and spleens have pigmented macrophage aggregates, not a normal feature. PMA increase with age, increase in starved fish, with disease, with exposure to toxins. PMA is a stress pigment.
- Gary has samples from 1990-2002, put proposal in to NPRB.
- Different age classes with different EVOS and disease events and some ages with no events.
- No difference in PMS population in 1989 after spill;
- What about after disease outbreaks? 2x as high PMA following outbreak. 3 years after disease, pattern of increasing PMS increases, with seasonal affects.
- Sitka populations: 1993 disease outbreak was a significant stressor for 1988 year class. Effects of 1989 EVOS were not detectable.
- Understanding disease is critical for understanding herring population dynamics in PWS. Disease can explain all population variability during last 15 years.
- 3rd year recruitment important, first two years after disease have some immunity.

6) Herring Recruitment (Brenda Norcross)

- Spawning—eggs—larval—fall juv—winter juv—age 4 spawners
- Span usually mid-late April around PWS, not the same place every year
- Eggs: 24-45% survival rates of eggs (literature) 44.5% (model)
- Larvae: 1-7% survival (lit) .25% (model) **larval stage critical; more studies needed to examine what's going on in larval stage.
- Fall juv: 2-21% survival (lit) 32.9% survival (model)
- Winter juv: 5-99% survival (lit) 62% survival (model)

- Overall survival to 1 year: 1-6500 (lit) survival from 1MM eggs; 1-680 (model)
- More sampling needed! Big differences between data from literature and the models
- Herring life stages: Spawning, eggs, larvae, fall juveniles, winter juveniles, age-4 spawners
- 1 to 6,500 egg survival per 1M eggs.
- Eggs deposited in intertidal killed by birds, waves, storms, dehydration. Survival range estimate 24-45%. Survival means to hatch. (model estimate 44%)
- Larvae develop through summer, moving from hatch spot to nursery by water flow. Survival 1-7%. (Model estimate 0.25%) So original model says larvae are vulnerable.
- <all based on literature, need more samples)
- Fall juveniles; they are in the bays, feeding in fall to get energy to make it through the winter. They are big enough to be food for birds and mammals. Survival range 2-21% (model = 33%).
- Winter juveniles (Vince Patrick's work, SEA); Different bays over different times, 5-99% survival (new model 66% survival during winter).
- Using range total, starting with 1M herring and taking edges of ranges. For every 1M eggs, 1-6,500 larvae survive to age 1.
- Survival model says 0-680 will survive to age 1. Potential survival is an order of magnitude less than Brenda predicted 5 years ago. This model is more accurate, and more depressing. Larval stage most important.
- In 1988, 4 trillion eggs deposited; 1997 2 trillion eggs deposited.
- Each female herring lays 20,000 to 50,000 eggs per year.
- 40-100 adults needed to make…
- Survival model says larval stage is most vulnerable. We know fall juvenile is linked to larval stage. Need transport of larvae to ensure success. How do we reduce loss of larvae during transport? They need to make it to a good Fall nursery grounds. Transport of larvae first depends on location of spawning. Spawning affects recruitment..

7) Integrating Information with an Age-Structured Stock Assessment Model: Updated Results for PWS Herring with Data Through 2004. (Terry Quinn)

- Disease model is best for explaining decline in herring.
- 1989-1992: General rise in herring until 1989, then drop. 75% of spawners were missing. Suspicion of disease epidemic. Now we know disease is important factor. Hydroacoustic surveys let us understand biomass better. ASA was predicted at 120, the highest ever.
- Natural mortality hard to observe because we don't see them die, so we have to infer from other types of information: forage to predators, disease. Goal of population modeling is to incorporate all info, particularly disease info, to explain what has happened since 1992 and to see effects on recruitment. Have simple accounting system. Start with year class and a number in that class. Then subtract catch from fisheries, adjust by annual survival rate, subtract food fishery in fall, subtract natural mortality. Look at all relevant data to estimate information.
- Get lots of estimated parameters (e.g.,recruitment)
- Assumption that natural mortality is 0.25. It would be better to have this as a function of predator abundance, but don't have time series.

- In model extension for disease, assume natural mortality is linear function of disease prevalence.
- After 2000, elevated Ichthy.
- Is the disease model better? The disease model is best model. None of the other models come close to explaining the data like the disease model. (The M-increase model is second best, then 92-93model, then Base model.)
- Strong year classes in 1983, 87, 91. Big recruitment in '87 led to big population increases through 1991; big crash in 1992. Since then there has not been a good recruitment. We have a pit of low spawning biomass and low recruitment (1996-2006).
- VHSV had affected earlier in time series, and Ichthyophonus. Later.
- Did fisheries have an affect on the population? No.
- There has been a big change in maturity of fish at ages 3-4 yrs. Before 1997, maturity of age 3 was 30% after 1997 it jumped to 60%. Reaction to being a depressed population. The population can mature at an earlier age to get spawning earlier.
- Data conflict in 1992. Egg surveys show increasing trend with highest values 1990-92. Milt data show decrease in reproduction starting in 1988. They try to balance their weighting of these data; but difficult to resolve. Evelyn Brown says high error in egg surveys in 1991-92. The 1989-90 had lower error. Drop in milt sighting also misleading because miles thinly deposited and later thickly. Egg density/egg thickness measurements might be an easy way to correct this problem. (Milt is males releasing milt; water drift affects thickness and thinness, also false spawning)

8) Trends of Marine Birds in PWS (David Irons)

- Seabirds live to be 20-30 years old
- 150MM seabirds in AK; 38 spp, 75% on refuges, colonial
- Most eat fish—eulachon, capelin, sand lance, herring and roe
- 600,000 (1972) to 150,000 (2005): total number of birds counted in PWS 1972-2005
- Bird decline coincident with herring crash
- Malaria in birds?

9) PWSSC Research on Herring and EVOS (Dick Thorne)

- **PWSSC:** Acoustic herring surveys since 1993
- IR/aerial surveys of whales and Stellers since 200
- No detectable EVOS impact on Stellers, so their behavior is good to study in relation to herring collapse.
- Critical years. Age structure model, egg deposition.
- Day-moles of spawn best historical measurement correlated with acoustic surveys. So decline began 1988-89. Collapse began in 1989.
- Ecological indicator of herring collapse that itself was not directly affected by EVOS. Birds? Not a good indicator. Many declined. Strong correlation between herring and birds, but decline confounded by direct impact.
- Stellar Sea lions? 2000-2006. strong short term response in SSL foraging behavior to abundance of herring. Compare synoptic counts with historical agency census. 1973 mile days of spawn began and SSL. 0.61 r-squared correlation between SSL #'s in PWS and

herring abundance. Foraging, not population, response. All SSL come into PWS in winter to feed on herring; their rookeries are not in PWS.

- Mile days spawn and age structure model correlated excellent until 1989, then huge deviation. ASA= age structure model. Catch-age model first published 1992, but began in 1985. (Steve Moffit)
- Conclusion: herring decline began in 1989.
- Dick says we are seeing response to increased predation on herring.

10) Local Knowledge/Community- Based Herring Restoration Plan (Ross Mullins, Steve Smith, Bill Webber, R.J. Kopchak, Liz Senear, Wendell Jones)

- **Intervention Process:** Combine ecosystem dynamics and monitoring, marking/tracking via otolith chemistry with engineering/operations ability of herring fleet and community
- Try to increase survival rate of "a small fraction of egg biomass" to get 80% or more improvement in survival. Use otolith chemistry to mark and track
- Study the chemistry of proposed bays to see which would be the best for depositing eggs.
- Want $45MM over 10 years, $4.5MM/year
- Herring fishery used to be $6MM/yr, 13 years not fishing = $48MM
- Did not get $50K for workshops from TC in Feb.
- **Steve Smith:** "If we hadn't had an oil spill, we'd still be fishing like Sitka"
- **Bill Webber:** Used to see millions of fish over the flats but since deballasting tankers in PWS was allowed, the herring have vanished; recalled big summer spawn and fishing in Valdez Arm. There are a lot of herring that no one is mentioning, like summer herring.
- **Wendell Jones:** Herring are social creatures. They are not mindless; they have patterns for escape. "Scouting schools' are sent out to find the best places to spawn—EVOS created all these problems. Flying in PWS since 1976. Looking spotting for fisheries. When they get attacked by predators, they split onto schools and run in different directions.
- **R.J.**: Was there a historical recruitment from the Gulf that has not come back? What does toxicity of oil do to herring genetics or age structure?
- **Liz Senear:** There hasn't been a comprehensive study of herring. Why is PWS different? Why is disease here and nowhere else?
- **Katey Walter:** What's behind a 10-year plan? With regards to intervention: How can people find a better place for spawn than the fish can?
- **Nate Bickford:** Otolith chemistry. Permanent record of temporal and spatial history of a fish. Uses strontium chloride or barium chloride. Used to mark otoliths. Immersion in 3000 ppm strontium bath; speedy mass marking w/o much handling. 20-30K fish/hr. to mark and test juvenile fish is quick. Not exact relationship between water chemistry and otolith chemistry but otolith chemistry is very stable over time.
- **General Discussion:** 5 fishermen present that represent 100+ years of fishing in PWS. Since 1970's they've been arguing for a good understanding of what might be affect of an oil spill.
  - Not a lot of science.
  - Pink salmon failed 1992-93, coincides with herring crash.
  - Here we have good focus on disease;
  - Missing data: zooplankton, micronutrients

- Not until 1994 when funding was forced on situation when fisherman blockaded, did we get funding, SEA 1994-99. We are here today as fishermen who have lost a vital resource, lost >50% of income. We feel aggrieved that fish are not there in normal abundance. Want to remedy this situation.
- We can show that herring are in trouble, and we may never see natural recovery, especially given disease and strong predation. "predator pit." This winter we discussed intervention.
- Herring are a keystone species supporting Orca, Harbor seals, birds. It's been 15 years since a normal fishery.
- Intervention: use some techniques that the fishermen are in tuned to. We have resources: fleet, community, restoration reserve, and results of SEA 1994-2000 that provide spin-offs, Science Center in the Sound.

- Intervention Approach:
  - Maximize survival from egg stage through larval stage, up through overwintering. Intervene at egg or hatch stage could increase survivorship 80%.
  - 1996 Larval Drift from PWS circulation model. Larvae end up in NE area. Stormy spring. Depending on currents, they may exit the sound getting carried out to Gulf. Larval advection.
  - How will we measure results to see success? SEA used coded wire tags from hatcheries, expensive.
  - With herring, could utilize otolith technique. **Nate Bickford**. Mass marking egg or larval stage otoliths, laser ablation-ICPMS. Can show natal area where egg was deposited.
  - Move herring roe on kelp from Montague Island to NE bays with water circulation. Each barge could handle X lbs of roe.
  - *Question:* Why did Sitka recover and PWS not recover?
  - Best bays for survival: Simpson, Whale, and Zaikof
  - Need to develop chemistry of bays, areas not productive to areas that are productive.
  - Need $45M. Vessels, fleet, science personnel. For 10 years, $4.5M per year.
  - Cost of activity is not out of proportion of benefit. (Loss was $75M).
  - What are the alternative ways of spending the $100M?

OBJECTIVE 2: IDENTIFY DATA GAPS AND LIMITS OF CURRENT INFORMATION

- **Discussion (Includes Steve Moffitt's Notes)**

Factors limiting herring population

1. Predators *(top down)*
   a. *Humpback whales*
   b. *Salmon sharks*
   c. *Orcas*
   d. *Gulls*
   e. *Eagles*

2. Disease
3. Low recruitment
4. Climate change
5. Lack of immigration
6. Genetics (bottleneck from fishing or earthquake?) Does not appear to be any lack of genetic diversity, but we don't know about the genes that code for disease immunity?
7. Lingering toxicity
8. Habitat
    a. Energetics
    b. Vegetation
    c. Circulation modeling
9. Interspecific competition for food resources
    a. Adult herring
    b. Juvenile salmon
    c. Juvenile Pollack
    d. Jellyfish
10. Spatial complexity of spawn – *don't put all of your eggs in one basket,*
11. Interactions of factors
12. Advection
13. Food resources

Ross	More sophistication in circulation model needed so you know where larvae end up, fish behavior, etc.; zooplankton/micronutrients available? Where?
Jeep	Factors get at same issue of survival
Jeff	Concerned about $ on intervention—might spread disease—must think carefully about potential problems to pick most intelligent way to proceed
Nate	Why do some survive and some don't?
Ken	Thinks some experimental intervention is valid
Kocan	Could check for disease before releasing fish
Jeff	Don't know which life stage is most limiting'
Evelyn	Critical stages of life 1. Adult-summer/fall (-1) prior to spawn 2. Late summer (metamorphosis (0) 3. Fall- prior to 1st overwintering (0) 4. Spring 1st feeding after 1st winter (+1) 5. Late summer feeding prior to 2nd over winter (+1) 6. Late summer/fall 'joining' adult school (+2)
Jeff	Cordova harbor had more CYP1A than Knight Island. No basis. 'sunscreen' in herring eggs; Low susceptibility to toxicity
Ken	Bioaccumulation of PAH in mussels? Any merit in continuing?
Jeff	Doesn't accumulate in mussels any more
Jeep	Sea otters and ducks might be exposed by digging, but no overlap with herring habitat
Jeff	Generally, PWS is a very clean body of water

Evelyn, Jeep, and Jeff "Keep vessels out of spawning areas to prevent fuel/oil spills because of toxicity to eggs."

Evelyn These herring area t the edge of their range; the pound fleet produces an oil slick that washes over the spawn areas with each tide

Jeff Two years ago we deployed many more passive samplers in PWS --nothing!

Ross Wants a 10 year plan to study and fix problem

Brenda Can't see a regime shift yet but can detect that something is changing

Ken The 4 monitoring projects that the TC didn't continue funding could help ID a 'régime shift'. PWS and Sitka sound used to be 'hand in glove' but aren't any more. GOA monitoring might help see how climate will affect things. At least 10 years needed-restoration reserve very important. Maintaining projects such as the Ocean station P line and other GEM type projects are important for understanding long term shifts."

Nate Marking otoliths is part of monitoring effort.

Ross Need "chemical map" of PWS to view movements of discrete pops. Every pop has disease, why is PWS more susceptible?

Wink Baseline studies had been planned before pipeline was built, but never happened

RJ No such thing as a 10 year program. TC efforts must be for restoration. But you can't restore unless you are always monitoring--can't skip/ignore segments of science in stead of '3 deliverables and you're done," commit to monitoring components so can restore with better direction. TC not willing to look at decadal commitments to programs. SEA lasted only 3 years so its usefulness is limited

Brenda The original SEA plan was sandwiched between two ENSOs and there was not a strong recruitment year or a herring disease event in the SEA plan work. Regime shifts are not a 0-1 switch that goes back and forth. Regime shifts are generally not detected until they are long past

Jeff Developing a restoration plan will be very difficult and a long process.

RJ Get money for a further planning effort. EVOS only providing one year of funding. Need monitoring for any restoration project to understand.

Brenda Better techniques now than when SEA ran. We know more—need better drift models. Must keep monitoring going, have better tools

Terry Every limiting factor involves "why…?" hypotheses? If that's where restoration $ is going, need more process oriented studies, not more data collection and monitoring.

Vince Still a gap on mechanisms of disease.

Ken We propose an intervention that could be used as an experiment"

Terry/ Brenda We like it for that reason. Use for an experiment to test what bays would work

Epidemiological Goals (Kocan)

- ID pathogens in PWS herring and determine pathogenicity of each
- ID host-range (=susceptible spp.)
- Monitor sublicinical infections
- Monitor immune status of population
- Determine environmental factors' impact on disease

- Use data to develop predictive models

What are the Data Gaps surrounding each limiting factor?

1) Disease

- Why did ichthyofonus rise in PWS to levels that killed herring?
- Why are herring more susceptible now?
- How does disease relate to spawning areas?
- How doe disease in juveniles compare to disease in adults?
- What is disease prevalence in all age classes and how does it compare with energetics? Changes in ages? Trends over time?

Vince	Ecosystem dynamics: herring ecosystem and disease ecosystem
Liz	Why are PWS herring more susceptible to disease?
Vince	How does disease relate to rearing habitat and spawning stocks?
Gary	Look at all year classes of 0, 1, 2 juveniles, we know about adults
Evelyn	Age2 herring, spring: find in bays. Find from air? 1's are easier
Jeep	Can learn energetic status, otoliths, fat content… all at once
Thorne	Look at predator-stressed vs. nonstressed pops

2) Predators and Competition

- A balance between eating and being eaten
- Niche competition
- Can we formulate simulation models that let us understand predation/pits?
- How do whales influence herring?
- Who are the predators and do they make up an appreciable portion of mortality? Include time series
- Do "loophole" events occur in predator relationships?

Nate	Competition from Pollock? Pink salmon?
Terry	Hard to study competition
Evelyn	Diet work useful but need $$ to look at gut contents—expensive. Can we formulate simulation models that snow predation regime?
Vince	Did some for salmon and herring thru SEA, so, yes
RJ	Changes in whale diet and caloric needs – the number of whales has changed in PWS. Do predators make up an appreciable portion of mortality over time?
Thorne	10-15% removal of herring by Stellers and whales
Evelyn	Knowing predator movements could help in restoration because you could add it to the model and move the eggs to safe places
Wink	Herring know more than we do. We've got to do something; the herring need our intervention
Vince	Come up with an explanation for spiky recruitment every 4 years—predation alone won't account for this.
Ross	Fences to protect herring from whales?

3) Food resources

- Is food limiting? Brenda thinks we should start with the assumption that food is NOT limiting – food is concentrated by the same factors that concentrate zooplankton. Herring still feeding in the winter. Evelyn – Correlation in size at age and PWSAC plankton watch data. Size at age influences size of eggs and the amount of yolk for larvae. Size at age and recruitment correlation?
- Have the right 'little' critters been monitored?
- Compare age/size with food resource availability
- Model circulation/prey (plankton)
- Do we have any monitoring of the Cushing match-mismatch of herring and zooplankton?
- Is the Hatchery Watch monitoring of zooplankton sufficient? *No one thought it was enough.*

A.J. Paul's measure of condition factor: Collect measures of condition factor of larvae in Oct

Brenda and Evelyn. Sample as many bays as possible.

Jeff	What life stage?
Evelyn	Three years of age 1 abundance from aerial surveys? Summer surveys. Bowpicker with an aquarium net to collect age 0 and age 1?
Nate	They were collecting about 100 age 0 fish a minute in Sitka Sound.
Pete	Use scales to back calculate timing or size at age? *We could use this information to get a historical perspective on the size at age of age 1 and 2 fish and examine this for correlations to recruitment events.*
Vince	Use advection model to estimate bays to sample?
Vince	Showed some graphs of predator swamping and suggested that herring were always limited by predators and every 4 years or so they swamped the predators.

Use circulation model (ROMs) – should be able to integrate the spawn data real-time to estimate where the larvae will be located.

Brenda	Survival in bays related to abundance? If you are going to move fish, don't move them to a bay that is already crowded.
Jeff	Have drifters been used to check the circulation model?
Vince	Full test of circulation model to be tested in 2007 by JPL, UAF

Circulation model – what data is required? Need surface winds, freshwater input, inflow and outflow at Hinchinbrook Entrance. Brenda said she had problems getting the model run even with the money.

Tuesday, April 25

Objective 3: Develop Restoration/Recovery Projects

- **Discussion: How to Proceed**

Kim	Suggestion: Individuals write lists of projects/processes, ranked, to form a matrix?
Evelyn	It is pointless to prioritize potential projects when we are ready to create dynamic ecosystem models
Kim	Four hours will not work to get to actual projects, but we can design an approach.
Evelyn	Suggested that the RFP (AKA The 07 Invitation) should be designed to put together a team and workshop to design projects or approach.
Evelyn	We have disease studies, population studies, recruitment analyses; need a way to integrate this information. Database access, synthesis – need modeling exercises to pull disease info in with SEA work and with fishermen observations. Multiple models OK, interdisciplinary effort needed
Kim	FY07 is transition year. How do we put things together so we can create something that will fit into long-term goals?
Evelyn	Stochastic, dynamic modelers here along with fishermen. The tools are in place—just need a team and money to put it together
Terry	Call FY07 a year of integration that leads to a larger workshop to assess integration, and maybe initial results of experimental integration could be added in too.
Brenda	Include larval fish, work with circulation modelers to get circulation physics info—maybe get 4 different models from physicists and then Brenda can compare models, not physicists
Evelyn	All modelers need is a person to be the interface and run the thing
RJ	The challenge is the process, not so much the modeling How to make the data/ info available as knowledge? How, over the next 12 months, can we shape the next 10 years and beyond? Need a 'legacy process' – only have some published info and unpublished data. Two things re: modeling: 1) modelers from SUCG, OSRI, AOOS, etc., together with people whose research could use modeling; 2) develop a "GIS-type, animated" components for generalists and the public. Educational component, e.g., no seasonal atlas for PWS—not digital—it's been around for 10 years on paper
Kim	There is support now to get restoration off the ground. TC supports it. If we put out an RFP for projects that don't get at the 'so what' question, directly relates to herring restoration, these projects won't be funded. Must show the link.
Evelyn	Maybe RFP process isn't the best idea—maybe get together in a workshop, 'lock ourselves in' and come out with ideas. These people have already done the work. Have an EVOS person lead it, maybe
Brenda	Schumacher and McNutt proposed such a workshop 2 years in a row and didn't get funding'; they probably won't try again

Jeep	Politics aren't' right to dump all our resources into modeling and a 10 year planning effort—the reality now is one year.
Wink	Then why aren't we here for longer than 1.5 days?
Jeff	No comprehensive research plan to date integrates all the work that has been done.
Ross	Don't know what future politics will be but maybe a 1-year restoration plan can generate momentum that will carry us forward.
Jeff	Create a research plan (aka restoration plan) that includes process studies, validation studies of otolith marking, larval work, etc., intervention pilot studies
Brenda	Agree. No larval work has been done for a long time; needs validation. But, there is a huge political element here—can't ignore. 1-year projects with a 'restoration' product—but most of these projects involve long-term time scale. If a 10 year plan won't fly with the TC. So… what can we produce in a year?
Pete	Leave aside the politics. The Japanese have been doing herring enhancement since the 1980s; 1-2cm size larvae have better chance of survival than eggs (has the literature)
Irons	EVOS needs a 'herring restoration coordinator' to create a research (aka restoration) plan, to have workshops, develop long term strategy, etc.--needs a director.
Vince	Look at history on programs that worked—why did it work? Took SEA 3 months to create plan. It worked for 3 reasons: it was extended dialogue between stakeholders and scientists, with internal vetting; there was real motivation to produce a plan by a deadline; and the incentive was there for all participants to contribute due to a funding commitment at the start. This was vetted along the way by the sponsor and the community
Jeep	SEA was 4-5 years and $20MM. We have $2MM seed money.
Ross	Reopener issue is clouding our efforts. Expectations are too high because of the potential of $100MM
Wink	Don't worry about the $100MM! Worry about the money you do have! The sooner we get something going to restore herring…
Evelyn	There is matching potential through Pew Trust, EPA, OSRI, PWSSC…
Jeep	Need a herring vision for the next 10 years. One year vision not good enough. TC is the stumbling block for the long term. We need to provide them a vision. Can we get a vision here?
Kim	We need to develop a restoration plan and include money for short-term pilot projects. What can we do on the ground in the short-term that would help us?
Jeff	Solicit 3 months worth of development time?
Ken	Talk to the TC and tell them we need $X for a planning effort
Pete	Community plan has been developed (marking/transport/intervention). Let's use it as a kernel to tie into. Need a beginning, a focus. First, do no harm.
Evelyn	Need to develop an experimental bay
Jeff	Specific ideas are valuable but still need development of a comprehensive restoration plan: voluntary; RFP for development, admin thru TC itself and they invite people to participate directly. Pick one of these three, soon, like today

Strategy for Developing Restoration Plan

1. Volunteers
2. Select group paid for by the Trustee Council
3. Self assembling group
4. *Select group paid with input from additional self assembling.*
5. *Paid coordinator with self assembling group*

Vince Volunteer effort will limit resources; RFP was like SEA in '93, from the bottom up. TC appointed means a top down process

Ken Stakeholders only had initial involvement in SEA but it petered out so some SEA goals weren't met in regard to application of results and use of information in improving the forecasting of, say, pink salmon. Need more incentive to produce something of value for stakeholders

Evelyn SEA didn't prioritize the issues that needed work. Fishermen were dismissed last time, don't let it happen again

Irons Pick a group and leaders.

RJ Likes the TC-driven component to 'bring horse to market,' but needs strong community involvement – go around the traditional RFP process

Jeep Also likes TC-driven, more functional, manageable, doesn't have to be restricted to a number of people. Can have leadership, need diversity. Allows opportunity to set a real deadline

Vince There is a gross underestimate of the leadership and coordination resources in the community. Put fishermen in charge or scheduling and timing of this effort. Fishermen are very involved in various boards. There won't be political bias; they won't be looking at anything but the outcome

Kim Whichever strategy is chosen, the leader needs to be accountable to the TC.

Evelyn Maybe an independent person (George Rose?) will need a chief scientist to lead or liaison between TC and others

RJ The leader should be a Trustee Council employee or have direct ties to the Council to prevent having a disconnect with the politics involved, but the community should be involved. Need a coordinator who is accountable to TC.

Baffrey Fishermen and scientists are only two of the stake holders—we will get a coordinator, so let's not spend more time on this aspect. Get a group together and run by TC at next meeting? Develop a restoration plan in 3-6 months

Jeff The TC needs to fund an effort to start, summer '06, with internal EVOS funds; get money to develop this plan starting in June. Create long-term road map

Jeep Finish the planning effort by Jan' 07 so can use it in FY08 RFP. Summer start might be hard…how 'bout Oct 1?

RJ Call this the 'EVOS plan for restoration of herring and herring dependent species"

Jeep Must include predation but don't other species the focus.

- **Projects**

Kim	One year projects that would be concurrent with development of herring restoration plan
Gary	Not worthwhile doing any projects of one year unless it's a synthesis of some sort, from a scientific stand point
Steve	Integration worthwhile, i.e., go through aerial survey information and put into a GIS—ADFG is already doing this but needs more $
RJ	Herring data can go into a GIS database; use Thorne's work as base
Evelyn	Has 3-year aerial database; we need a comprehensive geospatial database
Jeep	What's needed to support monitoring projects that are ongoing? Pick disease back up; we dropped this in '02—need to reestablish measurements for all age classes. Also need predator monitoring/modeling, as well as synthesis
Terry	Look at spatial distributions and variability of herring over time—otolith work could support this. Need better understanding over time
Ross	PWSFRAP has larval advection model and other projects. Pull together interested parties that need larval advection models, both users and modelers, and establish some basic simulations to demonstrate its usefulness.
Jeep	What is limiting recovery? Basic question. Advection model projects would focus on this
Jeff	Validation studies of circulation model (drones installed that collect oceanographic data; JPL already doing this), and otolith marking (put numbers on error rates, get herring for 10 bays, say, and mark blind, to see if analysts can put them back in their right groups)
Thorne	I have funded collection periods set up for fall 06, spring 07, fall 07, and spring 08
Kocan	One year projects: 1) Thorne gets immune status of 0 and 1 fish; catch and hold for a week? Possible? 2) Look at other pathogens: do these affect survival? All age classes are already in Kocan's lab; can be looked at using Koch's postulates.
Brenda	The reality of the funding cycle must be kept in mind. Look at fall juvenile herring energetics?
Vince	Immediacy/urgency of these is not apparent unless looked at in context of herring restoration plan. Can be restated in larger context of a restoration plan. Need a diagram of these projects and relationship to the restoration plan to show their broader validity
Kim	How can all of these projects be integrated-diagram the conceptual model
Evelyn	Co funded effort to get the model done – it's halfway done. Call it a Herring Life History Ecosystem Based Model. Al and Evelyn have a core model that just needs parameters; it exists in a flowchart form
Ross	Allow a week to submit proposals for Kim to decide between them—just conceptual ideas, with justification, budget, by close of business Sunday 4/30?
Kim	How 'bout Monday morning? Conceptual Idea Proposals **Title:** **Objective**: – with link to restoration **Project description:**

Link to restoration:
Approximate cost:
Management application: PI and decision makers – Will this help decision makers - Ask the 'who cares' question and answer it.

- **Restoration Plan Structure**

Kim	Promote the concept of a restoration plan to the TC and work on the actual details when approved
Baffrey	TC-driven, they appoint a science coordinator/facilitator/herring planning coordinator. Needs for conceptualization? Need a clear idea of what the plan is. What would we tell the TC about this broader umbrella?
Jeff	To do intervention on a large scale we need a defined critical decision pathway—must evaluate all assumptions that it would work, in various scales—this is what the plan would do. We need to know that the circulation model works; we need to know the error rate on otolith marking; we need to know the best scale for designing marking/recapture studies. Could still do egg transfer concurrently
Ross	Starting 10/1 gives time to develop and sell plan to TC—pressure is off for 6/2 Reopener deadline. Developing a restoration plan at this meeting is not realistic. PWSFRAP very willing to help put this plan together. They'd apply for it. Have had 5 herring workshops; ready to get to work this is how SEA got developed. Or, TC could hire a coordinator. A number of approaches can be taken.
Jeep	Given guidance for meeting (one year projects), we have a list of projects; we also have a need to modify old herring plan. Need a new plan with different vision. We should add the ADF&G management plan criteria e.g., below 10,000 tons direct intervention happens
Kim	Similar to an endangered species recovery plan
Jeep	Yes, very similar
All	Need to support funding for people working on the plan. Burn-out is quick if there is not a commitment of financial resources to the process.
Kim	We need to build momentum for the restoration plan idea
Jeep	Building momentum is critical.

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, AK 99501-2340 • 907 278 8012 • fax 907 276 7178

Date: May 1, 2006
To: Herring Workshop Participants
From: Kimberly Trust, Interim Science Director
Subject: Recovery Plan: Pacific Herring in Prince William Sound

At the workshop last week, we discussed the concept of a restoration/recovery plan for herring in Prince William Sound. Below is a summary of the Recovery Planning process which has been developed under the Endangered Species Act. I believe we could use elements of this method for herring and would appreciate your comments on this approach. If you would like to evaluate some actual Recovery Plans, please go to:

http://ecos.fws.gov/tess_public/SpeciesRecovery.do?sort=1

Here you will find a list of plans, by species, which have been adopted. The Atlantic Salmon plan may have elements applicable to PWS herring, but this particular plan is enormous. Other plans are smaller, and I would recommend that we develop a document that is streamlined and usable. Please give me your feedback on the concept of developing a Recovery Plan using the guidance outlined below.

Recovery Plan Model

- Within the Endangered Species Program there is a concept of a '**candidate conservation action**' (A 'candidate' is a species for which there is enough information to propose listing but the agency is precluded due to funding, staff or other constraints). A conservation action is a proactive step taken to stop and/or reverse declines of an imperiled species in an attempt to prevent it from being listed.

- Similarly, we can take a 'conservation action' to protect Pacific Herring in PWS. It has been 13 years since the herring crash and since then, there has been no trend towards full recovery. Moreover, other injured species may not fully recover without increasing herring numbers.

- In the **2006 Herring Workshop**, we agreed (via consensus) that a long-term restoration/recovery plan should be developed and implemented for Pacific Herring in PWS. The planning process should include stakeholders, community members and scientists, and the process should begin in the summer of 2006. The restoration plan would define critical decision pathways needed to make progress in herring recovery. A brief outline of a conceptual plan follows below.

- A planning model worth consideration would be the **Recovery Planning** process used for federal threatened and endangered species.

- **Recovery Team**: To write the plan and direct herring restoration/recovery actions, a recovery team would be formed. This team would comprise:

1. A Coordinator: A liaison between the TC Executive Director and the Team;
2. A Team Leader: Chosen from within the ranks of the Recovery team;
3. Members: Team members are chosen for what they know about the species, not for the agency or constituency group that they may represent.

- **Recovery Plan:** The goal of the herring "recovery" team would be to write, implement, and periodically reassess a plan directed at restoring herring in PWS. The plan would contain the following sections:

    1. Background- This section describes the problem and may contain enough natural history information to allow the uninformed reader to understand the problem.
    2. Threats – These threats are based on five factors
        a. Habitat
        b. Exploitation of the species
        c. Inadequate regulatory mechanisms to protect the species
        d. Disease/predation
        e. Other factors
    3. Description of the Recovery Tasks (i.e., projects). This is, in essence, a sentence outline of all recovery tasks that the team deems worthy of pursuit.
    4. Implementation Table: This table provides details on
        a. how each task will be completed;
        b. each tasks relative importance or priority;
        c. who is responsible for implementing the task;
        d. estimated cost per year per project;
        e. estimated start and completion date for each project;
        f. threat factors that the task addresses
        g. others

TRUSTEE COUNCIL MTG

May 23, 2006,

Trustee Council Office, Anchorage

FY07 Herring Project List

SUMMARY

The list of project below was generated using two different project lists:

1) Individual participants of the EVOS TC herring workshop were asked to submit proposals for projects that could be accomplished with one year of funding. These projects were developed with a general understanding that they would be part of a larger restoration planning effort.

2) ADF&G biologists generated projects directed at the Reopener. These projects were grander in scale than those produced from the Workshop.

All projects were provided to the EVOS TC Science Director and collated for this meeting. Similar projects were assimilated together and presented under on topic heading. For example, two projects suggested the synthesis of herring data using geospatial analysis: These were reduced to the one project outlined below. A brief description of each project follows the list of titles.

TITLE	EST. COST (IN THOUSANDS)
Planning:	
1) Develop a Long-term Herring Restoration Plan	$75
a. Hire PWS Herring Research Coordinator to be located in Cordova	$150/yr
b. The Prince William Sound (PWS) Herring Ecosystem: Reconciling Divergent Interpretations for Effective Restoration and Management Applications	$50
2) Develop a 'White Paper' on National and International Efforts Currently Directed at Herring Restoration	$35
Mapping and Geospatial Analysis:	
3) Synthesis and Use of Available Herring Data Through Geospatial Analysis	$250
4) Shorezone Mapping/Herring Habitat	$250
Modeling:	
5) Biological Model of Herring Life Stages: Integration and Evaluation	$300
6) Circulation and Larval Drift Models: Update and Validation	$200
Predation:	
7) Predation on Juvenile Herring in Prince William Sound	$150
8) Modeling Marine Mammal and Seabird Predation on Herring	$70

Disease:

9) Disease Impact on Early Life-stage Survival and Population Growth of Pacific Herring	$250
10) Role of Disease in Limiting Recruitment of Pacific Herring in Prince William Sound	$200

Oceanographic Characteristics: (e.g., Zooplankton, Temperature)

11) Oceanographic Monitoring as Factors Affecting Recruitment	$300
12) Zooplankton Abundance and Herring Prey Study	$50

Mass Marking Studies:

13) Use of Otolith Analysis as a Marker for Population Studies	$125

Intervention:

14) Protect PWS Herring Eggs from Predation	$150
15) A Half Scale Pilot Project for Testing Restoration and Re-Colonization Concepts and Techniques for PWS Herring (Year 1)	$500
16) Development of Technology to Support Restoration and Protocols of Herring in Prince William Sound: Use of *in vitro* Studies to Optimize and Validate Active Restoration Activities	$280
17) Experimental Nursery Bay	$600

Donation:

18) A Platform for Juvenile Herring Sample Collection from the Prince William Sound Science Center	Project specific costs

PROJECT DESCRIPTIONS

PLANNING:

1) Long-term Restoration Plan **Time Scale: 1 yr**

In the 2006 Herring Workshop, we agreed (via consensus) that a long-term restoration/recovery plan should be developed and implemented for Pacific Herring in PWS. The planning process should include stakeholders, community members and scientists, and the process should begin in the summer of 2006. The restoration plan would define critical decision pathways needed to make progress in herring recovery.

a) The Prince William Sound (PWS) Herring Ecosystem: Reconciling Divergent Interpretations for Effective Restoration and Management Applications **Time Scale:** *Length of Plan Implementation*

This project provides a critical forum for creating a timely and continually updating picture of the herring ecosystem in PWS assembled from the information streams developed by individual components of an extended herring research program. This will not be a summarizing task, but rather will seek *to understand*, through debate of any number of plausible scenarios, the most likely path that the population dynamics of the present stock has taken since the late 1970s. The forum will be composed of the PIs of new and previous studies encompassing the relevant oceanography of the region, juvenile ecology of herring, stock size, spawning history (numbers and sites) and recruitment, disease and oil impacts, and other factors that may be operating to suppress the stock at this time. Additional expertise may be invited to participate as needed.

b) PWS Herring Research Coordinator **Time Scale**: *Length of Plan Implementation*

A coordinator, hired through the Alaska Department of Fish & Game or other agency, will develop and coordinate a PWS herring recovery plan with clear and focused objectives, public input and involvement, and a discrete timeline. The Herring Research Coordinator, based at ADF&G in Cordova, will have a regular and open dialogue with the EVOS staff and Trustees. The Coordinator will direct, coordinate and perform original research on all aspects of PWS herring with the end goals of 1) increasing the understanding of the herring population(s) in the PWS ecosystem, and 2) increasing herring abundance in PWS to provide for further human harvests, either directly through established herring fisheries, or indirectly through established fisheries on other species dependent on herring. Increased herring abundance will also provide for the Prince William Sound ecosystem food web and predator species.

2) Develop a 'White Paper' on National and International Efforts Currently Directed at Herring Restoration **Time Scale: 1 yr**

Identify and evaluate national and international efforts related to herring (and similar species) enhancement, restoration and recovery.

MAPPING AND GEOSPATIAL ANALYSIS:

3) Synthesis and Use of Available Herring Data Through Geospatial Analysis
Time Scale: Phased 1-2 yr

Synthesize herring aerial survey data and other information in an interactive visual format (e.g., using GIS). A clear understanding of the spatial and temporal relationships of past herring spawn and other herring data is necessary to understand how restoration activities might affect current and future populations. This project would a) create geospatial database of 1973-2006 herring aerial survey spawn locations, b) create protocols to absorb future aerial survey data and other herring, habitat, or relevant oceanographic data c) publish data on the web to allow users to access and visualize data with resources such as map views, simple animation capabilities, and data download and d) create Standard Operating Procedure (SOP) and computer application for real time collection of herring aerial survey data.

4) Shorezone Mapping **Time Scale: 1-2 yr**

Of the 5500 Km of coastline in PWS, 1600 have been shorezone mapped. Current mapping efforts have concentrated on the west side of PWS and these areas and the most important in relation to herring or to oil remediation issues. Approximately 3900 Km still need to be mapped: These remaining areas would include places important for herring spawn, possible herring release locations, and future oil remediation and tracking.

MODELING:

5) Biological Model of Herring Life Stages: Integration and Evaluation
Time Scale: Phased 1-3 yr

The continued decline of herring is most likely linked to more than one life stage and to multiple causes. Linking information attained from past herring studies in PWS will help resolve conflicts in hypotheses of decline. The model will help relate all these factors and help interpret the cause of the decline. A biologically-focused, statistical model that includes multiple life stages will be created. Information such as food resources, disease information, predation, climate change, and habitat will be gleaned from existing studies and publications and by contacting relevant researchers. These variables will be related through functions such as mortality, growth, recruitment, and energetics.

The three objectives for the project are to complete the existing herring ecosystem model that will allow 1) simulation and evaluation of herring population enhancement efforts, 2) monitor and simulate predator/prey interactions that restrict recruitment, 3) simulate and evaluate the past, current and future effects of pollution and disease on the population. This will be the first tool available that will allow managers to see the impact of past, current and future effects of fishing, conservation efforts, and population restoration efforts on the herring population.

6) Circulation and Larval Drift Models: Update and Validation **Time Scale: Phased 1-3 yr**

Include recent information into the current circulation/larval drift model of Prince William Sound. The general circulation model that would be used to predict larval drift should be validated by comparison of model predictions and actual Lagrangian trajectories. Ideally, this would involve tracking a collection of drifting buoys placed initially at locations scattered throughout PWS and simultaneous documentation of meteorological and oceanographic data necessary for model performance. The model would then predict

the trajectories of the buoys, uninformed by the actual trajectories (i.e. a blind model run), and the predictions would then be compared with reality.

PREDATION:

7) Predation on Juvenile Herring in Prince William Sound Time Scale: 1 yr

Predation on herring has been cited as one of the possible causes for the lack of recovery in PWS. At the same time, juvenile herring is an important food resource for EVOS injured bird species, including marbled murrelet, pigeon guillemot, cormorants and loons. This project will provide information on the amount of juvenile herring being consumed by their chief predators and provide input for a herring survival model that is being developed.

8) Modeling Marine Mammal and Seabird Predation on Herring Time Scale: 1 yr

A broad consensus exists that predation is contributing to the suppression of herring populations in PWS, and that marine mammals and seabirds are major factors. Any restoration effort must understand whether or not increased herring production will merely result in more predators rather than more herring. Fisheries management models currently use broad and highly uncertain estimates of natural mortality. Predation is the major source of mortality, even if underlying causes are disease or starvation. Understanding the predation process is critical in improving management models such as the age-structured assessment model.

DISEASE:

9) Disease Impact on Early Life-stage Survival and Population Growth of Pacific Herring
Time Scale: Implement Upon Recommendation of Restoration Plan

Numerous potentially lethal pathogens are present in PWS herring but their impact on survival and reproductive success in unknown. Through experimental studies with herring of known disease history, the mortality associated with each pathogen can be determined. Management decisions require information relating to the production and survival of each year class of herring, so if disease(s) is responsible for significant mortality at any life-stage it will impact subsequent year-class size and limit population growth.

10) Role of Disease in Limiting Recruitment of Pacific Herring in Prince William Sound
Time Scale: Initiate in first year and reevaluate through life of Restoration Plan

Disease among adult Pacific herring has played a significant role in the decline of herring in PWS and failure of population recovery. It is necessary to study early life stages (ages 1-2) and combine this information to ongoing disease information collected as part of the adult epidemiology studies conducted as regular management by ADFG. Moreover, a 'reference' area, (where herring populations are stable) should also be established (e.g., Sitka) where similar information is collected for comparison with PWS stocks.

OCEANOGRAPHIC CHARACTERISTICS:

11) Oceanographic Monitoring **Time Scale: On-going**

Any effort to restore or enhance herring production will require understanding of the factors affecting recruitment success. The four basic oceanographic monitoring studies should be continued so that future herring recruitment and population dynamics can be interpreted with regard to environmental and habitat change.

Using the information from these studies, zooplankton production and the role of water exchange with the Gulf of Alaska can be evaluated as factors in early life history survival. Some comparisons, like those among different bays will give insight into the relationship between survival and circulation, a necessary understanding for enhancement through egg transportation. Understanding the recruitment process is critical to improving management models such as the age-structured assessment.

12) Zooplankton Abundance and Herring Prey Study **Time Scale: 1 yr**

The project would determine if food a limiting factor for juvenile herring. It would a) describe, in detail, the local/seasonal forage base for herring and its relationship to fish survival/abundance or potential limiting factor for juvenile herring b) document the relative food/prey/predator changes that have or have not occurred in the past 15-20 years c) relate those changes to herring abundances and recent shifts in zooplankton species and abundance noted in the area d) identify herring rearing areas that are not food limited.

MASS MARKING STUDIES

13) Use of Otolith Analysis as a Marker for Population Studies **Time Scale: Phased 1 – 3 yr**

Current research is being done on the unique chemical components of herring otoliths that can reveal the location of herring at the time of egg, larval and juvenile life stages. Artificial mass marking of herring otoliths may also be possible with the use of certain benign chemicals or the manipulation of water temperatures. Analysis of herring otoliths for trace elements has great potential for identifying natal and rearing habitat of larval and juvenile herring, and may prove to be a crucial tool for identifying environmental factors modulating recruitment. While promising, the reliability of this method needs to be quantitatively assessed so that future studies based on it may be interpreted with confidence.

After a validation study confirms the reliability of this technique, a pilot project on the success rate of mass marking PWS herring via the otolith will provide an important tool for tracking success of herring enhancement and allow for the development of performance measures for enhancement experimentation. Mass marking should allow further refined tracking of all PWS herring life stages necessary to determine any limiting factors for this species.

INTERVENTION

14) Protect PWS Herring Eggs from Predation. **Time Scale: 1-2 yr**

Individual Adult herring spawn thousands of eggs nearshore on the natural bottom substrate, such as dock pilings, rocks, kelp, and sea grass beds. Protection from predation may be a simple and effective way to increase herring roe survival to the larval stage, and so greatly increase the relative abundance of juvenile

and/or adult herring. The Herring Research Coordinator will test methods to protect herring spawn from predation and conduct research on the effectiveness of predator exclusion devices.

15) A Half Scale Pilot Project for Testing Restoration and Re-Colonization Concepts and Techniques for PWS Herring

Time Scale: This project incorporates several of the individual projects listed above and is a multi-year effort.

This project will design, construct and operate a small specialized vessel (approximately 45x20) designed to provide the necessary environment for the hatching of herring eggs and rearing the resulting larvae to a size of approximately 30mm. Additionally, with approval by the State, tests of moving eggs from an original spawning site to a site where a more suitable habitat that has been determined to provide enhanced juvenile rearing and survival will be tested. Chemical marking of herring otoliths (ear bones) both in egg and larval stages will allow the project to monitor juveniles in the selected nursery areas as they advance from age 0 to age1, the first overwinter phase. Data collection and insight into the age 0 fall physical condition of the herring and comparison with the following spring condition of the same herring cohort will provide beginning data for development of a condition index that will be extremely valuable for use by resource managers. During the project, disease issues will be monitored by providing samples to an investigator that has 9 years experience on adult herring disease in PWS but is in need of juvenile samples to complete the linkage to the full herring life cycle.

16) Development of Technology to Support Restoration and Protocols of Herring in Prince William Sound: Use of *in vitro* Studies to Optimize and Validate Active Restoration Activities

Time Scale: Varied. (The SeaLife Center is available to support herring restoration efforts. Below are some areas in which they've offered expertise).

This project will directly support restoration by (1) reviewing artificial propagation technologies successfully used for herring stock enhancement in Japan, (2) providing laboratory capability and expertise for conduct *in vitro* studies needed for refining and validating proposed restoration activities (e.g., Community-based Restoration, R. Mullins pers. comm.), and (3) conducting preliminary investigations on the role of calcium receptors on immune system function under varying environmental conditions to investigate effects of salinity and temperature on immune activity.

17) Experimental Nursery Bay **Time Scale: Implement Upon Recommendation of Plan**

The main objective of this project is to establish an experimental bay that will allow evaluation and validation of 1) herring ecosystem models, 2) the interplay and dynamics of fish condition and stress to predator/prey relations and disease, 3) intervention/enhancement efforts, and to 4) fill in research gaps in early life history critical to understanding the recruitment process.

DONATION:

18) A Platform for Juvenile Herring Sample Collection from the Prince William Sound Science Center

The Prince William Sound Science Center is funded to study juvenile herring as a food source for Steller sea lions. This study will include juvenile herring sampling in fall 2006, spring 2007, and fall 2007. Each effort involves a cost of about $40,000, including ship time. The sample collection involves a

search effort using a variety of methods, as well as the direct capture process itself. This existing project framework allows an opportunity for other projects and investigators to obtain samples at a much lower cost than normal cost for such sampling.

Cherri Womac

From: Kim Trust
Sent: Wednesday, May 10, 2006 2:33 PM
To: Cherri Womac
Subject: FW: Herring Projects

Cherri

Can you please include this email in the TC package with the herring information.

Tx
Kim

-----Original Message-----
From: Ross Mullins [mailto:rmullins@gci.net]
Sent: Tuesday, May 09, 2006 6:36 PM
To: Evelyn Brown
Cc: Kim Trust; vince@isr.umd.edu; kadams@gci.net; windsong@montana.com
Subject: Re: Herring Projects

Evelyn,

I heartily endorse this approach. It seems to me that it is the only way that we will have an opportunity to succeed.
That was (is) the opportunity of the re-opener funds. It would be sufficient to create an program that would likely solve the herring problem and move our understanding of the ecosystem forward.

We here in Cordova appreciate your thoughts

Ross
LPWSFRAP

The array of project lists points to what was emphasized at the workshop: **"We need a herring restoration plan/research plan workshop to develop a coordinated, multi- disciplinary & agency, approach. The coordinated approach will be MUCH cheaper and more efficient than funded this suite or a selected group of this suite.** Attendees at the workshop develop the approach, methods and can bid for a place at the table. There should be an initial disbursement (I vote for sending it to the PWS Cordova group who have worked so hard to make this happen) of funds to host and pay for workshop
participants. Out of that should come a detailed work plan.
Proposal/contracts go to individual bidders who will accomplish very specific tasks that the workshop proceedings (THE PLAN) dictates.
Otherwise, you will, as in the past, get a bunch of funded, but not necessarily linked, data that may or may not help. So, the first project funded, should be the planning workshop!

Dr. Evelyn D. Brown
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>>
>>

Motion
May 23, 2006 TC Council Mtg

$75,000 will be spent by the Trustee Council Restoration Office to develop a Pacific Herring Restoration Plan (Plan) for Prince William Sound. Funds will be used to support travel and logistics work sessions needed by a 6 – 8 person Restoration team to initiate planning efforts. Funds will also be used to pay for services of non-agency personnel to write, edit and review drafts of the Plan as it is developed. Finally, if remaining funds are available, they will be used to print, bind and distribute the Plan when completed. Initial efforts including selection of a Restoration team will begin in summer of 2006.

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, AK 99501-2340 • 907 278 8012 • fax 907 276 7178

Date: May 8, 2006
To: Trustee Council
From: Kimberly Trust, Interim Science Director
Subject: Monitoring Presentations

Included with this memorandum are two documents related to long-term monitoring and its use as a restoration tool. The following are submitted for the Trustee Council's review prior to the May 23, 2006 meeting:

1) Nearshore Restoration and Ecosystem Monitoring Brief
   - by Tom Dean and Jim Bodkins
   - Jim will be speaking to TC at the meeting about this project

2) Herring Lifecycle Diagram
   - this diagram speaks to the need for long-term monitoring of oceanographic parameters as they relate to the herring lifecycle
   - it will be explained at the meeting in the context of the four extension projects and the herring workshop

Nearshore Restoration and Ecosystem Monitoring (N-REM) – Project Overview

The EVOS had its greatest impact on the nearshore. Of the 30 resources identified as injured as a result of EVOS, over half live or spend a critical part of their life history in the nearshore. This list includes a wide variety of fishes (e.g. pink salmon and herring), birds (e.g. harlequin ducks), marine mammals (e.g. sea otters), and invertebrates (e.g. mussels and littleneck clams). While nearshore resources (including human services) are recovering from oil spill impacts, several have been identified as "not fully recovered" and the status of several others is in question because of a lack of direct evidence regarding recovery. Of the 21 resources considered to have not "recovered" by 2002, 18 are linked to nearshore habitats including those known to harbor Exxon Valdez oil.

Options for direct restoration of injured resources are limited. High costs, questions concerning efficacy, and risk of collateral environmental injury (either recognized or as a potential unintended consequence) make direct restoration efforts, including removal of lingering oil, problematic.

Monitoring provides a viable restoration alternative. Long-term monitoring can promote restoration from oil spill impacts by reducing the impact of other human-induced stressors thereby allowing for normal restorative processes to proceed unencumbered. The N-REM monitoring program will identify changes that occur in the nearshore over time, identify causes for that change, and provide resource managers with information that can be used to reduce human-induced impacts thereby promoting natural recovery from oil-spill impacts.

Future human-induced impacts are likely. Human induced impacts are almost certain to occur in the Gulf of Alaska over the next decades. These are likely to result, for example, from increased extraction of natural resources (including oil, minerals, lumber, and fish), an increase in coastal access which will lead to coastal development and recreational use, and a growing cruise ship and tourism industry.

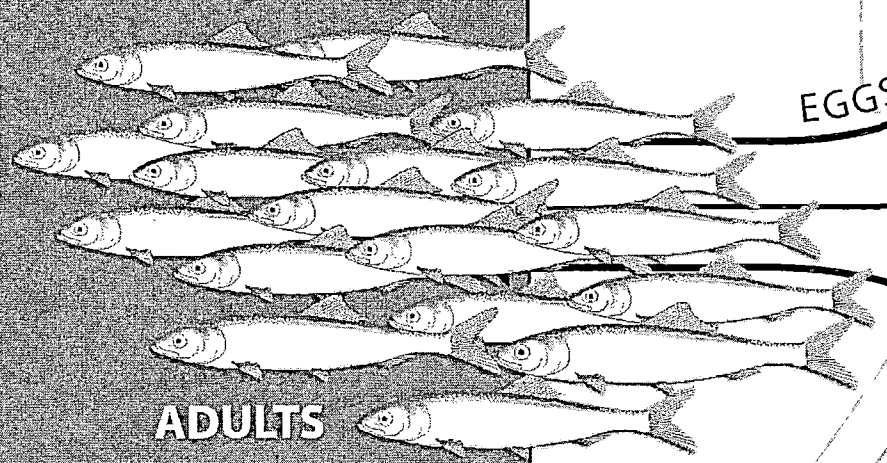
Monitoring can ameliorate human-induced impacts. The list of human-induced impacts on nearshore ecosystems is long and growing. Several examples of these impacts and how monitoring was used, or could have been used, to ameliorate adverse impacts are given in our report. Several of these are summarized as follows. 1) The introduction of DDT into the marine environment in California in the late 1950s led to dramatic decline in several seabirds including brown pelicans and to numerous other adverse environmental impacts. This led to the listing of pelicans as endangered, a several decade-long legal action, a near $100,000,000 settlement, and a restoration effort that is ongoing. A monitoring program similar to N-REM would have likely detected the reduction in pelicans and its cause early on and ameliorated both environmental and socioeconomic costs. 2) The "killer algae", *Caulerpa* was introduced into the Mediterranean in the early 1980's and over the past 2 decades has spread widely and led to extensive destruction of vital fish habitat with severe economic costs. Eradication and control is no longer possible in the Mediterranean. Monitoring in the US led to early detection and eradication of this alga before it was able to spread. 3) Monitoring detected a decline in sea otter populations in Central California in the 1980s. Subsequent follow up studies identified that nets being used in a newly

developed trammel-net fishery were killing sea otters and causing the decline. Regulators placed restrictions on the fishery before the declines had reached critical levels and the sea otter populations have since recovered.

Monitoring has other direct socioeconomic benefits. In addition in restoration from oil spill impacts, monitoring will provide direct socioeconomic benefit by providing an early warning system that can prevent loss of resource use and reduce remediation costs by nipping environmental problems in the bud. Additionally, early detection of change (both increases and decreases) in resources caused by natural process will facilitate adaptive management and provide confidence in resource management actions. The cost of monitoring pales in comparison to the cost, for example, of closing or restricting fisheries, restoring endangered species, or cleaning up hazardous wastes over large areas.

The proposed monitoring plan will detect changes (especially those that are human induced) and assign cause. The emphasis will be on species that are of particular importance in the nearshore food web and in structuring nearshore communities. These are largely the same species that were injured as a result of the EVOS and were the focus of recovery and restoration monitoring. In addition, these are the same resources identified as important "vital signs" of ecosystem heath identified in a separate planning effort for long-term monitoring conducted by the National Park Service's Southwest Alaska Network of coastal parks. The resources to be examined include sea otters, nearshore marine birds (e.g. goldeneye and harlequin ducks), black oystercatchers, nearshore fishes, intertidal invertebrates and algae (e.g. mussels, littleneck clams, and rockweed). The N-REM plan places primary emphasis on detecting and examining trends in population abundance, but additionally anticipates that change will be detected and incorporates design elements that will lead to understanding what factors are responsible for causing that change. N-REM design components that will aid in understanding cause include; measuring levels of contaminants in animal tissue, occurrence of spawning by herring, the occurrence of unusual die offs of birds and marine mammals, sightings of introduced or novel species, and growth rates of selected invertebrates, and diets of selected vertebrate species. These metrics were selected to provide sensitive indicators of change and linkages between various system components. Monitoring will take place within four regions: Prince William Sound, Kenai Peninsula, Kodiak, and the Alaska Peninsula. Funding for the Alaska Peninsula region is being provided by the National Park Service. Monitoring is to be conducted on time scales generally ranging from annually to once every four years. More frequent (generally annual or biannual) sampling is to be conducted at a small number of sites within each region and will focus on detecting changes occurring over larger spatial scales (e.g. over all of Prince William Sound). Less frequent sampling (generally every two to four years) will be conducted at a larger number of sites in order to detect more localized impacts, especially those that are human-induced. Volunteer or community based sampling efforts are encouraged where appropriate. An overview and rationale for the sampling design are given in the Sampling Protocol and specific procedures for sampling are given in Standard Operating Procedures.

Early Life History of Pacific Herring, *Clupea pallasi*



ADULTS

Factors Influencing Survival to Recruitment

Brown, E. 2006. Personal communication.

1 INTERTIDAL

SURVIVAL
- Sea surface temperature
- Depth of deposition
- Adult lipid reserves

MORTALITY
- Waves
- Dessication
- Pollution
- Predation
- Disease

EGGS

YOLK SAC LARVAE

2 PELAGIC (drift)

SURVIVAL
- Sea surface temperature
- Drift path ends in favorable habitat
- Lipid reserves

MORTALITY
- Advection to poor habitat
- Predation
- Disease?

LARVAE

METAMORPH

JUVENILES 0-1

3 NURSERY BAYS

SURVIVAL
- Sea surface temperature
- Zooplankton
- Winds/mixing

MORTALITY
- Condition
- Predation
- Disease

JUVENILES 2+

4 BAYS - PASSES

SURVIVAL
- Zooplankton
- Storm activity
- Chance of encountering adult schools

MORTALITY
- Condition
- Predation
- Disease

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, AK 99501-2340 • 907 278 8012 • fax 907 276 7178

Date: May 8, 2006
To: Trustee Council
From: Kimberly Trust, Interim Science Director
Subject: Draft Invitation

Included with this memorandum are the draft 07 Invitation as originally drafted in April, 2006 and a one page outline of the complete Invitation. The draft Invitation does not include the 'boilerplate' information from the Invitation, such as Instructions on How to Submit a Proposal, Budget Tables, etc. These documents are submitted for the Trustee Council's review prior to the May 23, 2006 meeting:

1) Outline of Draft 07 Invitation
2) Draft 07 Invitation Version 2 (without format information)
3) Draft Timeline if Invitation is released on June 1, 2006

FY07 Invitation for Proposals
***Draft* Outline**
April 10, 2006

I. Schedule

II. Background/Purpose

- *a. Introduction*
- *b. Funding and Duration*
- *c. Continuing Project Guidance*

III. Introduction to the Invitation

IV. Project Invitation by Category

- *a. Lingering Oil*
  - i. Distribution
  - ii. Processes
  - iii. Remediation
- *b. Injured Resources: Evaluation and Restoration*
  - i. Intertidal Communities
  - ii. Harlequin Ducks
  - iii. Sea Otters
  - iv. Sea Birds
  - v. Pacific Herring
  - vi. Harbor Seals
  - vii. Killer Whales
  - viii. Monitoring/Population Modeling
- *c. Integration*
  - i. Multiple Resources
  - ii. Data Management/Synthesis
- *d. Community Participation*

V. Instructions for Non-Trustee Council Proposals

VI. General Conditions

VII. How to Prepare a Proposal

VIII. Example of a Proposal with Detailed Explanations

IX. Budget Instructions with Sample Budget Forms

X. How Proposals are Reviewed

XI. Community Involvement Information

INVITATION FOR PROPOSALS

Draft Vers 2

Federal Fiscal Year 2007

Issued XXX, 2006

Exxon Valdez Oil Spill Trustee Council

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Exxon Valdez Oil Spill Trustee Council

Implementation of the *Exxon Valdez* Oil Spill Restoration Plan

FY 2007
Invitation for Proposals

Exxon Valdez Oil Spill Trustee Council
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XXXX, 2006

The FY07 Invitation was issued in an electronic format on the Trustee Council's website at (URL)
This paper copy of the Invitation has been prepared to provide documentation for the permanent files.

Statement of Non-Discrimination

The Trustee Council conducts all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood or disability. The Council administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975 and Title IX of the Education Amendments of 1972. If you believe you have been discriminated against in any program, activity or facility, or if you desire further information, please write to: EVOS Trustee Council, 441 West 5th Avenue, Suite 500, Anchorage, Alaska 99501-2340; or O.E.O. U.S Department of the Interior, Washington, D.C. 20240.

For information on alternative formats for this and other publications, contact the department ADA coordinator at (voice) 907-465-4120 or (telecommunication device for the deaf) 1-800-478-3648

Eligibility Criteria

Individuals, private industry, government agencies and other interested parties, regardless of nationality or institutional affiliation, are entitled to submit a proposal in response to this Invitation. All proposals will be evaluated based on the same criteria regardless of the source of the proposal.

TABLE OF CONTENTS

SECTIONS BELOW ARE NOT INCLUDED IN THIS VERSION:

I. Schedule

The schedule for the receipt, review and approval of FY07 proposals is shown below.

Schedule and Milestones for the FY07 Invitation

June XX, 2006 .....Invitation for Proposals issued
July XX.....FY07 proposals due
July XX .....Peer review and STAC notification
TBD .....STAC meets to review proposals
TBD .....STAC recommendations due to Executive Director
TBD .....Draft Work Plan published
TBD .....PAC meeting/public comment
Nov 2006.....Trustee Council meets
TBD.....Contacts for successful projects notified

II. Background and Purpose

In 1989, the *T/V Exxon Valdez* spilled 11 million gallons of crude oil into Prince William Sound. In 1991, the U.S. District Court approved a civil settlement that required Exxon to pay the United States and the State of Alaska $900 million to restore the resources injured by the spill and the reduced or lost services, or human uses, the resources provide. A **Trustee Council** (Council) of three federal and three state members administers the restoration fund to restore the resources and services injured by the spill.

A *Restoration Plan* was adopted by the Council in 1994 (with a subsequent *Update on Injured Resources and Services* in August 2002) that provides long-term guidance for restoring the resources and services injured by the oil spill. It contains policies for making restoration decisions and describes how restoration activities will be implemented.

The Council sets restoration priorities and annually determines what projects will be funded. Restoration projects are solicited through this Invitation for Proposals. The Invitation is open to individuals, private industry, government agencies and other interested parties interested in submitting proposals for restoration work identified in the Invitation.

The FY07 Invitation is consistent with **interim Council guidance**. As such, it will provide funding opportunities to "single year projects which will: 1) extend current monitoring efforts and historical data sets, and/or show a significant cost benefit to continuing use of new technology; 2) provide supplemental synthesis information; and 3) perform direct restoration as identified by the current review of lingering oil."

Proposal formats are comparable with previous years to provide consistency, and the Council encourages individuals and entities possessing expertise in specific species and EVOS research to solicit funding.

A. Funding and Duration

Funding The Council established an Investment Fund and adopted an endowment approach for management of the fund. This approach establishes annual spending limits thus ensuring the fund's value over time. Yearly spending includes the annual work plan, continuing multi-year projects and administrative costs, including the science and data management, public information and project management. ***After accounting for fixed costs and currently funded multi-year projects, in FY07, the Trustee Council will release $2.0 million dollars for new research and restoration proposals.***

Duration Award periods for proposals commencing in 2007 may range up to one year. Applicants must achieve an outcome and product within the requested award period, including data analysis and submission of quarterly reports, a draft final report and a peer-reviewed, final report of research results.

B. Projects Continuing from Prior Fiscal Years

A few projects currently receive funding from previous multi-year awards. ***Principal investigators (PIs) already receiving funding from the Council who have already been authorized to continue their projects in the fiscal year of this Invitation need not submit a proposal package.*** In order to be considered for an amendment or an extension, an annual report must be current and available at the EVOS TC office. Amendments or extensions to existing proposals must be submitted to the Science Director, and include a reference to their previously funded project. All amendments will receive full review by the STAC, the Science Director and the Executive Director. Recommendations for additional funding will by made to the Council for a final decision.

III. Introduction to the FY07 Invitation for Proposals

In 2006, the Trustee Council recognized that a tremendous amount of work had been accomplished over 15 years of research, monitoring and specific activities directed at addressing the restoration and rehabilitation goals of the 1994 Restoration Plan. However, the Council determined that results of previous efforts needed synthesis in order to better understand the effects of lingering oil and to evaluate the status of injured resources and services. They decided to realign priorities and restorative activities, placing focus on critical work required to reach closure in areas of restoration related to lingering oil and injured resources.

Research opportunities for 2006 were therefore directed towards synthesis projects relevant to the status of unrecovered injured resources and services, as well as towards understanding why some resources had not recovered, were still recovering or whose recovery status was unknown. The outcome of these prioritized synthesis studies and a finalized 2006 update of the Injured Resources and Services list will provide the Council with comprehensive information that they can use to fully meet the goals outlined in the 1994 Restoration Plan.

Many of the synthesis projects from 2006 are ongoing; however, pending results do not preclude the release of the FY07 Invitation for Proposals. The FY07 Invitation will seek projects that can be completed within one year.

Proposals are being sought in the following categories:

1) Lingering Oil: Processes, Distribution and Remediation
2) Injured Resources Restoration and Evaluation
3) Integration
4) Community Participation

Proposals should build on previous Trustee Council-sponsored research, as well as on Integral Consulting's **Assessment of Lingering Oil and Resource Injuries from the Exxon Valdez Oil Spill** and recommendations of the Lingering Oil Committee. Information on the status of Council funded studies is available on the EVOSTC website as it becomes available, or you can contact the Council office directly for more information at (907)278-8012. The Council does not wish to duplicate efforts and encourages the use of existing materials and collaboration with other ongoing efforts.

IV. Project Invitation by Category

A. Lingering Oil: Distribution, Processes and Remediation

Distribution

The Lingering Oil Committee (LOC) summarized the current knowledge of lingering oil distribution in their Research Priorities FY07 Recommendations to the Executive Director. Since 2001, our understanding of the amount of oil remaining in PWS and its location has grown increasingly sophisticated. For instance, we now know that much of the remaining oil is found at a lower level in the intertidal zone than thought for the first 12 to 13 years after the spill.

It is estimated that 11 – 35 acres of intertidal beaches have remnant lingering oil. However, one of the assumptions underlying the estimates is that nearly all of the remaining oil is located in beaches that were heavily or moderately oiled in 1989. Yet, because some nearshore organisms inhabiting less oiled areas of Western Prince William Sound are still being exposed to oil, it is possible that organisms are being exposed to sources of oil that have not been identified.

Because of the persistence of oil in subsurface deposits, beaches that were classified as lightly oiled in 1989 could still be harboring oil in 2006. While in 1989 this oil burden may have been relatively minor in comparison to the heavily and moderately oiled beaches, the long-term persistence of oil in many areas suggests that Prince William Sound beaches that were considered at the time to be lightly oiled should be reevaluated in order to ascertain the amounts and distribution of lingering oil.

Lingering oil studies have been conducted since 2001, but these have focused primarily on beaches that received large quantities of oil in 1989. However, in 1989, a beach covered with a three-meter-wide band of oil would have been classified as lightly oiled.

Therefore, what was thought to be a small amount of oil—and a relatively small problem—in 1989 might still be contributing to total remaining oil in 2006.

The Council seeks proposals that address distribution and patterns of lingering oil remaining in Prince William Sound. For example, a project which produced a quantitative estimate of remaining oil in the sound, including amounts remaining in beaches that were originally classified at lightly oiled, would be considered. Proposals could seek to relate oil distribution to migratory patterns of injured resources, or develop models which relate distribution to accessibility and potential bioavailability.

Processes

Questions remain about the geomorphology and geochemistry of the beaches on which lingering oil deposits are found. The physical and chemical processes in beaches with remaining oil need to be defined, as these processes will determine the potential success of any further attempts at remediation. Moreover, the dispersion of oil in these beaches relative to local fauna will also determine how accessible the oil is to organisms. Therefore, it is important to gain better understanding of the fine-scale processes occurring in the beaches that still harbor significant quantities of oil.

The Council seeks proposals to investigate the physical and chemical processes that influence the lingering oil remaining in Prince William Sound. Examples of these processes include but are not limited to flux and loss rates of hydrocarbons from oil-containing beaches, nutrient and oxygen flow through beach substrate and presence of hydrocarbon-degrading bacteria associated with the surface of the oil.

Remediation

The Council is interested in proposals to assess current technologies that may be used for in-place treatment of lingering oil and associated habitat restoration. In 2005, the Council funded an **Evaluation of Oil Remediation Technologies for Lingering Oil from the Exxon Valdez Oil Spill in Prince William Sound, Alaska.** In their final report, Michel et al. (2006) determined that two remediation strategies—natural attenuation and bioremediation—were feasible alternatives for removing lingering oil. Bioremediation was by far the more expensive option in terms of dollars spent. However, the researchers made many assumptions and acknowledged that their findings were mainly the results of a scoping effort to determine if any viable methods were possible.

The Council seeks proposals that build on the findings of Michel et al. (2006). According to these researchers, much additional work is needed to determine the factors that are limiting natural recovery of lingering oil and locate all areas of subsurface oil that need treatment. Thus, the Council suggests that any proposal developed to assess and test bioremediation technology will produce more meaningful results if it is developed in conjunction with efforts to determine the distribution of remaining *Exxon Valdez* oil and the natural processes affecting lingering oil. Moreover, field efforts pertaining to bioremediation will be limited to pilot tests in small geographic areas. Field tests should be designed to provide objective and statistically meaningful results. If the field tests

show that bioremediation is effective, and then a risk assessment or cost/benefit analysis should be conducted to illustrate benefits to natural resources, including those on the injured resource list. This project will assist the Council in deciding the ultimate technique that should be employed to expedite the process of oil removal in PWS.

B. Injured Resources: Evaluation and Restoration

As of 2002, 18 resources and human services were classified as not recovering or recovering. In 2005, the Council funded Integral Consulting to provide a comprehensive, independent evaluation of the status of injured resources and service. The results from this project are pending, but using the final report as guidance, the Council will provide an updated list of injured resources and services in late 2006.

Table 1: Injured Resources and Services[1]

Resource	Recovered	Recovering	Not Recovered	Recovery Unknown
Archaeological Resources	X			
Bald Eagles	X			
Black Oystercatchers	X			
Common Murres	X			
Pink salmon	X			
River Otters	X			
Sockeye Salmon	X			
Clams		X		
Commercial Fishing		X		
Designated Wilderness		X		
Intertidal Communities		X		
Killer Whales		X		
Marbled Murrelets		X		
Mussels		X		
Passive Use		X		
Recreation and Tourism		X		
Sea otters		X		
Sediments		X		
Subsistence		X		
Harbor Seals			X	
Harlequin Ducks			X	
Pigeon Guillemot			X	
Pacific Herring			X	
Common Loon			X	
Cormorants (3 species)			X	
Dolly Varden				X
Kittlitz's Murrelet				X
Rockfish				X
Subtidal Communities				X
Cutthroat Trout				X

[1] From 1994 Restoration Plan and 2002 Update on Injured Resources and Services

The Council seeks proposals that further our understanding of the processes by which recovering or not recovered resources are exposed to and affected by lingering oil. Proposals should explicitly state how the project could lead to the *restoration* of injured resources.

Intertidal Communities

The intertidal zone was the recipient of 40 to 45% of the 11 million gallons of *Exxon Valdez* oil released during the spill. Habitats within this area included a variety of substrates harboring multiple types of infaunal species. Although some of these areas were not consistently monitored over the 17 years since the spill, evidence suggests that some parts of the intertidal benthic community may still be experiencing effects of residual oil exposure. The Council funded a 2004 study, **Ecological Effects to Benthic Infauna from Lingering Oil 15 Years after the *Exxon Valdez* Oil Spill**, to examine the effects of lingering oil on benthic communities in nearshore environments. The LOC reviewed the draft final report and determined that questions about this system still remain. Specific toxicity tests suggest that some species of invertebrates in and around remaining oil deposits could still be exposed to toxic concentrations of oil. However, ecological implications were difficult to derive from the study due to confounding natural factors.

The Council seeks proposals that will study the effects of lingering oil on invertebrate infaunal community using definitive measurements of community composition and sediment toxicity. Studies should involve chronic exposure tests with species appropriate to those in Prince William Sound. Additionally, these studies should evaluate the exposure and effects of oil on deep-burrowing invertebrates.

Harlequin Ducks

The **Interim Guidance Document** provides a venue for supplemental synthesis information to be collected for injured resources, if warranted. Integral and the LOC both suggest that harlequin ducks may still be exposed to and affected by oil in certain areas of Prince William Sound. However, several factors make it difficult to assess the true impact of continuing oil exposure to harlequins. For example, population densities in oiled and unoiled areas of the Sound were similar in 2004, but the proportion of females to males remains lower in oiled areas. Moreover, population trends in the western portion of the sound are not increasing, and elevated biochemical responses (CYP IA induction) indicative of oil exposure continued in birds wintering in oiled areas as late as March 2005.

In order to rectify these discrepancies and formulate an appropriate restoration strategy for harlequin ducks, it is necessary to have a thorough understanding of both the sources and distribution of lingering oil and the foraging behavior of harlequin ducks that facilitates their continuous exposure to oil. Evidence suggests that over time, exposure of harlequin ducks to *Exxon Valdez* oil has led to individual losses and suppression of population recovery. However, despite the vast amount of data collected through

Council-funded studies, a synthesis of these data has not culminated in a model that can both quantitatively evaluate acute and chronic population-level effects of lingering oil on harlequin duck populations and identify factors (including oil) that could be constraining population recovery of harlequin ducks today.

The Council seeks projects that can synthesize existing data and develop a population model that can make quantitative/predictive conclusions about long-term population demographics and the influence of *Exxon Valdez* oil on harlequin ducks. Modeling should include, if possible, a component to predict the likelihood of oil encounter, estimate ingestion rates and predict the likelihood of CYP IA induction. With the recommendation of Integral and/or the LOC, the Council also seeks proposals for harlequin duck research that incorporates other stressors (e.g., climatic shift, predator-prey relationships), foraging behavior, and/or other parameters needed to complete the population model.

Sea Otters

In 2004, the total number of sea otter found throughout Prince William Sound was approximately 10,000; populations appear relatively stable. In oiled areas of western Prince William Sound there has been significant increases in sea otter abundance, indicating progress toward recovery, although patterns of mortality remain different compared to pre-spill. Further, subpopulations in and around Knight Island remain at numbers less than half of their 1989 abundance and continue to decline. Full recovery of this subpopulation may be constrained due to demographic lag, or it may continue to suffer from residual oil effects, continuous oil exposure or other factors such as hunting or predation.

The Council seeks proposals that further the understanding of factors affecting western Prince William Sound and particularly the northern Knight Island population of sea otters. Both Integral and the LOC recommend continued monitoring of sea otters around Knight Island. Moreover, long-term carcass collections should continue in order to determine the age of the dying population and the effect that the removal of these animals has on population structure. Finally, proposals would be considered that studied the sensitivity of the Knight Island population to stressors in addition to oil (e.g., hunting and predation).

Seabirds

This Section in Progress

Pacific Herring

Insert results of Herring Workshop here.

Harbor Seals

No direct recommendations for restoration, research or monitoring have been submitted by Integral or the LOC. Integral suggests refining recovery objectives.

Killer Whales

No direct recommendations for restoration, research or monitoring have submitted by Integral or the LOC. Integral suggests population modeling, especially the AT pod.

Monitoring/Population Modeling

In some instances, new studies of specific resources may not aid in resolving questions regarding continuing injury. Nonetheless, long-term evaluation of injured species should occur to determine when populations in oiled and unoiled areas can be declared recovered. For example, both Integral and the LOC noted that clam communities were damaged in the aftermath of the spill, either through direct oiling or from high-intensity cleaning practices. While neither group recommended new studies for clams, each suggested that monitoring of clam populations should continue until clams in oiled and unoiled areas are equivalent. Moreover, Integral determined that is was difficult to assess the recovery status of resources such as intertidal communities because monitoring in both oiled and unoiled areas has not been conducted consistently in these areas since the spill. Thus, monitoring of some resources should continue at an intensity necessary to track changes. Given that most of the restoration goals for injured resources require a measurable comparison, monitoring is consistent with the 1994 Restoration Plan.

Therefore, the Council seeks proposals for monitoring of species as suggested by Integral and the LOC; these include sea otters in western Prince William Sound and Knight Island, harlequin ducks, Barrow's goldeneye, pigeon guillemots, marbled murrelets or other injured resources. Furthermore, the LOC recommends continued measuring of oceanographic parameters related to conditions in Prince William Sound that could directly affect recovery of Pacific herring (see Herring section above for more information).

Integral also recommended that population models be constructed for several species that may be experiencing continuing effects of oil or whose recovery may be constrained by stressors other than or in addition to lingering oil. Models of injured species would be considered if they could provide quantitative analysis of population demographics in relation to the *Exxon Valdez* oil spill and restoration and recovery of individuals, populations, communities or species. **Therefore the Council is seeking proposals that develop population models for harlequin ducks, sea otters (including Knight Island), seabirds, harbor seals and killer whales.**

C. Integration

Multiple Resources

The Council seeks proposals that asses the status or propose restoration for groups of interrelated injured resources or services. Proposals that group resources and services should include the rationale and benefits of grouping injured resources or services into a single integrated project. Integrated projects are encouraged to involve aspects of multiple categories. For example, multi-species data sets from common areas (e.g., Knight Island) could be integrated with studies conducted on physical processes of

lingering oil. Combining studies could provide economies of scale for logistics, chemical analyses and data analyses.

Data Management and Synthesis

The Council will consider proposals that facilitate recovery, utilization and/or enhancement of long-term data series within the oil spill affected areas that can assist the Trustee Council in defining restoration projects and incorporating long-term monitoring programs directly towards restoration.

D. Community Participation

The Council encourages proposals in any invited category that involve communities within the oil spill affected area into the design and conduct of research or monitoring projects. Studies that directly involve community residents in remediation or restoration will be highly regarded.

Authors of proposals are advised elsewhere in this Invitation on approaching and engaging communities in the design of proposals and the conduct of projects, and of how to prepare budget proposals to meet requirements for community involvement activities.

FY 07 Invitation—Draft Timeline

Apr 11: Outline and 1st Draft of 07 Invitation (INV) to the Liaisons
April 20: Comments due and mtg with Liaisons
May 12: Incorporation of Herring Workshop results into draft INV
May 23: TC meeting to consider release of 07 INV
May 26: Incorporation of TC comments,
June 1: Invitation released to the public: STAC/PAC notified separately of INV release
Jun 12: Potential Peer Reviewers contacted for availability by EVOS staff
Aug 4: Proposals due (9 week prep time during field/fishing season)
Aug 16: Proposals out for Peer review (Date tentative; could be earlier): Notification to STAC that proposals are available
September 15: Peer Reviews due (4 weeks turnaround)
September 26/27: STAC mtg
October 2: STAC recommendations due to ED
October 13: Draft Work Plan due: Fed Register Notice for PAC meeting
October 30 : PAC mtg
November 7/8 (?): Trustee Council Meeting

April-May

Science Director compiles supporting documentation:
- Information from Lingering Oil Committee meeting,
- Preliminary results of project 060783 and
- Other reports as appropriate.
- Results of the herring workshop

Science Director develop a draft outline and Invitation organized by various research clusters or resources identified as recovering, not recovering.
- Long term monitoring needs
- Lingering oil remediation
- Restoration actions

Liaisons and TC review draft outline and Invitation.
TC meets to authorize release of FY 07 invitation – **late May**
Science Director incorporates comments from TC into Draft Invitation

June 1, 2006 – release FY 07 Invitation
Aug 4, 2006 – FY07 proposals due to Restoration Office
REVIEW PROCESS
Late July – Early August

EVOS Staff and Science Director identify peer reviewers and distribute proposals to reviewers by **August 16th** with a requested review completion date of **September 15.**

August– September

EVOS staff compile all peer reviews and distribute proposals and associated reviews in an organized manner to the **STAC as they come in or** by **September 20th.**
EVOS Staff develop web based and hard copy public comment form to manage public input received in response to publication of draft work plan.
STAC meets to review proposals **September 26 - 27.**

STAC written review comments and recommendations on each project proposal delivered to Exec. Director **October 2**.

Executive Director working with the Science Director develops written review comments and recommendations on each project proposal by **October 13th**

EVOS Staff prepare **final Draft Work Plan** in a distributable document capable of stand-alone publication in hard copy as well as on the web. This must be a formal static document on which the Trustee Council can take administrative action. This is not dynamic.

EVOS Staff publishes DRAFT WORK PLAN October 13.

Trustee Council meets to adopt FY 07 Work Plan – November 7/8

EXXON VALDEZ OIL SPILL PUBLIC ADVISORY COMMITTEE CHARTER

1. OFFICIAL DESIGNATION: *Exxon Valdez* Oil Spill Public Advisory Committee (hereinafter referred to as the Committee).

2. SCOPE AND OBJECTIVES: In accordance with and pursuant to Paragraph V.A.4 of the Memorandum of Agreement and Consent Decree entered into by the United States of America, through the Department of Justice, and the State of Alaska, through the Attorney General, on August 27, 1991 and approved by the United States District Court for the District of Alaska in settlement of United States of America v. State of Alaska, Civil Action No. A91-081 CV (hereinafter referred to as the MOA), the Committee shall advise the Trustees (State of Alaska Department of Law, State of Alaska Department of Fish and Game, State of Alaska Department of Environmental Conservation, U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce, and the U.S. Department of the Interior) through the Trustee Council with respect to the following matters:

   All decisions relating to injury assessment, restoration activities, or other use of natural resource damage recoveries obtained by the Governments, including all decisions regarding:

   a. Planning, evaluation, and allocation of available funds;
   b. Planning, evaluation, and conduct of injury assessments and restoration activities;
   c. Planning, evaluation, and conduct of long-term monitoring and research activities;
   d. Coordination of a, b, and c.

3. DESCRIPTION OF DUTIES: The Committee functions are advisory only, and its officers shall have no administrative authority by virtue of their membership.

4. DURATION: By order of the District Court for the District of Alaska, the Committee is to advise the Trustees appointed to administer the fund established in settlement of United States v. Exxon Corporation, Civil Action No. A91-082, and State of Alaska v. Exxon Corporation, Civil Action No. A91-083, both in the United States District Court for the District of Alaska, in all matters described in Paragraph V.A.1 of the MOA referenced above. The requirement for the Committee will continue throughout the life of the settlement.

5. AGENCY OR OFFICIAL TO WHO THE COMMITTEE REPORTS: The Committee shall report to the *Exxon Valdez* Settlement Trustee Council through the Federal members of the Trustee Council.

6. BUREAU RESPONSIBLE FOR PROVIDING NECESSARY SUPPORT: Support for the Committee shall be provided by the Trustee Council's Executive Director, who shall procure all needed space, supplies, equipment, and support for the Committee. The Executive Director shall prepare an annual budget for the Committee. The budget shall provide for the Committee such funds as the Trustee Council deems appropriate for administrative support for the Committee, from the *Exxon Valdez* Oil Spill Investment

Fund established as a result of the settlement of United States v. Exxon Corporation and State of Alaska v. Exxon Corporation.

7. ESTIMATED ANNUAL OPERATING COSTS: The estimated annual operating cost for the Committee is $70,000.00, including all direct and indirect expenses. It is estimated that .6 staff years will be required to support the Committee.

8. ALLOWANCES FOR COMMITTEE MEMBERS: Members of the Committee serve without compensation. However, while away from their homes or regular places of business, members engaged in Committee business approved by the Trustee Council Executive Director or the Designated Federal Officer will be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as persons employed intermittently in Government service.

9. ESTIMATED NUMBER AND FREQUENCY OF MEETINGS: The Committee is expected to meet approximately, and no less than, two times per year.

10. TERMINATION DATE: The Committee is subject to the provisions of the Federal Advisory Committee Act (FACA), 5 U.S.C. Appendix 2, and shall take no action unless the charter filing requirements of section 9 of FACA have been complied with. The Committee is subject to biennial review and will terminate two years from the date the charter is filed, unless, prior to that time, the charter is renewed in accordance with section 14 of FACA.

11. COMMITTEE MEMBERSHIP: The Committee shall consist of 15 members, including a Chair and Vice-Chair elected by the Committee members. Each member will serve a two-year term and members are eligible for re-nomination and reappointment. One member, and two for public-at-large, will be appointed representing each of the interests identified below.

    a. aquaculturist/mariculturist (e.g., fish hatcheries and oyster/shellfish farming)
    b. commercial fisher (e.g., commercial fishing for salmon, halibut, herring, shellfish and bottom fish; including boat captains and crews, cannery owners/operators, and fish buyers)
    c. commercial tourism business person (e.g., promoting or providing commercial travel or recreational opportunities, including charter boating, guiding services, visitor associations, boat/kayak rental)
    d. recreation user (e.g., recreation activities that occur within the area, including kayaking, power boating, sailing, sightseeing)
    e. conservationist/environmentalist (e.g., organizations interested in the wise use and protection of natural resources)
    f. local government (e.g., incorporated cities and boroughs in the affected area)
    g. Native landowner (e.g., regional or village corporations in the affected area established by the Alaska Native Claims Settlement Act)
    h. tribal government (e.g., federally-recognized tribes in the affected area)

i. scientist/technologist (e.g., organizations, institutions, and individuals involved in, or with expertise in, scientific and research aspects of the affected area/resources and/or the effects of the oil spill and/or the technical application of scientific information)
j. sport hunter/fisher (e.g., hunting and/or fishing for pleasure)
k. subsistence user (e.g., customary and traditional use of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools or transportation; for the making and selling of handicraft articles; and for customary trade)
l. regional monitoring program operator (e.g., monitoring and reporting on environmental conditions in the affected area, including monitoring for pollution and the status of biological resources)
m. marine transportation operator (e.g., transport of goods and services in marine waters, including piloting, tug operations, barge operations, oil tankers and pipelines, shipping companies)
n. public-at-large (e.g., representing the affected area of the oil spill and its people, resources, and/or economics)

12. ETHICS RESPONSIBILITY: No member shall participate in any matter specifically concerning a lease, license, permit, contract, claim, agreement, or related litigation in which the member has a direct financial interest.

13. DESIGNATED FEDERAL OFFICER: The Designated Federal Officer is the U.S. Department of the Interior, Alaska Office of Environmental Policy and Compliance's Regional Environmental Assistant, or his/her designee.

14. SUBGROUPS: The Committee may, upon approval of the Trustee Council, establish such workgroups or subcommittees as it deems necessary for the purpose of compiling information or conducting research. However, such work groups or subcommittees may not conduct business and must report to the full Committee.

15. AUTHORITY: The Committee is established as mandated by Paragraph V.A.4 of the MOA and shall be located in Alaska. Additional authority for its creation is found in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. subsection 9601 et seq.

_____ _____

Secretary of the Interior Date

_____

Date Filed

Introductory Text

The next item on the agenda is the Small Parcel Program. As you know, the Trustee Council requested that the Small Parcel Working Group revise and update the Small Parcel Process. The Working Group revised the process and the Trustee Council approved the revised policies and procedures in the fall of 2005. In December, the Trustee Council authorized funding for agency work on the small parcel program for both state and federal agencies. Based upon this direction, the agencies to began work on small parcel nominations that had been submitted. Before you today are four small parcel nominations received by the State. At this point in the process, the State needs authorization to continue with due diligence requirements for these parcels, in order for the process to move forward. I have reviewed the information presented and it is my recommendation that the Council move forward and direct staff to conduct appraisals, hazmat and other due diligence efforts, particularly those that must be done during the summer field season. An additional $44,000 will be needed for these efforts.

Motion:

The four parcels before us today have met our previously defined threshold criteria as outlined in the Restoration Benefits reports before us. I move that we authorize $44,000 to allow staff to proceed with appraisals, hazmat surveys, and other due diligence efforts for the four parcels before us today:

Corr, KEN 3001,
Russell/Long KEN 3002,
Chokwak II KAP 3001,
Capjohn KAP 3002.

When due diligence efforts have been completed and a purchase price is arrived at based on the appraised value, the parcels will be brought back before the council for final approval.

Exxon Valdez Oil Spill Restoration
Small Parcel Process
Status Update, May 15, 2006

The Trustee Council approved a revised and updated small parcel process as well as policies and procedures in the fall of 2005. The public has been made aware of the revised process through Trustee Council meetings and the Trustee Council web site.

The Department of Natural Resources has received four small parcel nominations from landowners interested in participating in the small parcel program.

Parcel	Acreage	Location
Kenai Peninsula		
KEN 3001, Corr	138 acres	Soldotna, Kenai River frontage
KEN 3002, Russell/Long	4.25 acres	Soldotna, Kenai River frontage
Kodiak		
KAP 3001, Chokwak II	160 acres	Kiliuda Bay, Kodiak Island
KAP 3002, Capjohn	160 acres	Kiliuda Bay, Kodiak Island

The four parcels above have met the Threshold Criteria described in the Small Parcel Process:

1. All parcels are located within the oil spill area.
2. All parcels have willing sellers.
3. All landowners have indicated a willingness to sell at fair market value.
4. All parcels have been linked to one or more injured resources or associated services.

Parcel	Injured Resources/Services
KEN 3001, Corr	Dolly Varden, Recreation, Commercial Fishing, Passive Uses, Subsistence
KEN 3002, Russell/Long	Dolly Varden, Recreation, Commercial Fishing, Passive Uses, Subsistence
KAP 3001, Chokwak II	Harlequin Duck, Cormorants, Pigeon Guillemots, Dolly Varden, Pacific herring, Intertidal communities, Recreation, Passive Uses, Subsistence.
KAP 3002, Capjohn	Harlequin Duck, Cormorants, Pigeon Guillemots, Dolly Varden, Pacific herring, Intertidal communities, Recreation, Passive Uses, Subsistence.

5. All parcels could reasonably be incorporated into existing land management systems.

KEN 3001 and 3002 could reasonably be incorporated into the existing management framework provided by the Kenai River Special Management Area and the acquisitions are supported by the Kenai River Special Management Area Advisory Board and other interested parties on the Kenai Peninsula.

KAP 3001 and 3002 are surrounded by State lands on the north shore of Kiliuda Bay that the state received as part of the Old Harbor Land Exchange, a component of the larger USFWS Old Harbor acquisition package. Additional information on this exchange is included in the benefits reports for these parcels.

These parcels have received a preliminary review of title and there appear to be no indications of problems that would preclude acquisition however, further work would need to be done and issues relative to subsurface access may need additional attention. Before additional time is invested in these parcels, it would be helpful for the Council to determine their interest in pursuing these parcels. Should the Council be interested in pursuing these parcels further, the following steps would need to be taken for each parcel:

- Secure an appraisal consistent with Trustee Council appraisal requirements.
- Secure a review of the appraisal.
- Conduct a site inspection and hazardous materials assessment (Hazmat).
- Conduct an in house review of all title documents, the appraisal and hazmat report.
- Negotiate final purchase price with the seller.
- Return package to Trustee Council for approval and authorization to proceed to make a formal offer on subject parcel.
- Prepare and review closing documents (DOL, DNR, ADF&G, BLM, seller)
- Request BLM site inspection and approval.
- Establish escrow account, disburse funds and close.

It should be noted that the above steps would take time and due diligence requires that appraisal and hazmat services be secured and completed before snowfall. The timeline for completing acquisitions is dependent upon the complexity of title, results of the appraisal, results of the hazmat assessment, and the workload of agency personnel and contractors. Legislative approval would need to be addressed in the SY 08 budget development process.

Currently it is estimated that sufficient funds exist within the 06 Small Parcel Process budget for staff to begin work on these four packages. An additional $44,000 would be needed to secure contractual services outlined above and described on the attached "Estimated Costs for Due Diligence Requirements." It can be expected that similar funding requirements would be needed for 07 in order for staff to complete these transactions.

Fees for title insurance and escrow could be addressed when each package is brought back to the Council for authorization to proceed with an offer once due diligence requirements are completed.

A motion by the Council directing staff to move forward, defer, or eliminate a parcel from further consideration would provide adequate direction for staff. A resolution to approve an additional $44,000 to satisfy due diligence requirements would allow appraisals, hazmat surveys and site inspections to move forward during the field season.

Exxon Valdez Oil Spill Small Parcel Program

Estimated Costs for State Due Diligence Requirements

KEN 3001, Corr

Title Insurance (based on sale price)	$4,907.00
Alta (based on sale price)	$1,547.25
Escrow (based on sale price)	$1,650.00
Appraisal Update (based on acreage)	$5,000.00
Review Appraisal (based on acreage)	$4000.00
Hazmat (based on acreage)	$3,000.00
BLM site inspection	$1,000.00
Staff review	(can use existing funds thru 9/30/06.)
Total	$21,104.30

KEN 3002, Russell/Long

Title Insurance	$2,907.00
Alta	$947.25
Escrow	$1,150.00
Appraisal	$5,000.00
Review Appraisal	$4,000.00
Hazmat	$3,000.00
BLM site inspection	$1,000.00
Staff review	(can use existing funds thru 9/30/06.)
Total	$18,004.30

KAP 3001, Chokwak II

Title Insurance	$762.00
Alta	$303.75
Escrow	$310.00
Appraisal	$5,000.00
Review Appraisal	$4,000.00
Hazmat	$3,000.00
BLM site inspection	$2,000.00
Staff review	(can use existing funds thru 9/30/06.)
Total	$15,375.80

KAP 3002, Capjohn

Title Insurance	$762.00
Alta	$303.75
Escrow	$310.00
Appraisal	$5,000.00
Review Appraisal	$4,000.00
Hazmat	$3,000.00
BLM site inspection	$2,000.00
Staff review	(can use existing funds thru 9/30/06.)
Total	$15,375.80

Land Values used for estimating expenses:	**$3,320,000**
Estimated Cost of Due Diligence:	**$69,860**

KEN 3001, Corr Parcel

Owner:	Ms. Tommye Jo Corr
Location:	Kenai River, Left Bank River Mile 18
Legal Description:	Government Lots 1, 2, & N ½ SE ¼ of Section 25 Township 5 North Range 11 West & Government Lot 9, Section 30, Township 5 North Range 10 West
Acreage:	138 acres
Agency Sponsor:	ADF&G and ADNR
Appraised Value:	$2,200,000
Negotiated Purchase Price:	$2,100,000
Matching Funds:	$1,100,000
Requested EVOS Funds:	$1,000,000

Parcel Description. The Corr Homestead, located on the west bank of the Kenai River at River Mile 18, fronts on some of the finest and most popular fishing holes on the Kenai. This 138 acre parcel is one of the largest remaining private riverfront tracts on the lower Kenai River, representing approximately 1 mile of river frontage.

The property is located on the west bank of the river three miles downstream from the Soldotna Bridge, adjacent to the Grubba property acquired by the Alaska Department of Fish and Game in 1998 for habitat protection. The property is just downstream from the Slikok Creek State Recreation Area and across the river from the Girves property acquired by the EVOS Trustee Council. The riverfront includes sections of high bank and low bank, the latter used by sportfishermen with permission from the landowner.

The property is a mix of riparian wetlands and well-drained uplands. A slough that begins on the Grubba property extends upstream onto the Corr property, and provides excellent rearing and overwintering habitat for Dolly Varden, chinook and coho salmon. The uplands are forested in a mix of birch, aspen and white spruce. In summary, the property provides riparian habitats such as low, overhanging grassy banks for fish rearing; extensive wetlands for maintaining water quality, flood control and recharge; and forested uplands for large and small terrestrial mammals.

Approximately half of the riverbank is low and readily accessible by bank fishermen. The remainder of the riverbank is high bluff that exhibits some erosion. A dirt road provides access across the Corr property to an unimproved boat-launch site.

Linkage to Restoration:
Restoration Benefits. Public ownership of this parcel will allow for conservation and managed access to the Kenai River and thereby protect habitat for pink salmon and Dolly Varden and enhance the recovery of services such as sport fishing, commercial fishing, and tourism.

Key habitat and other attributes of the parcel include the following:

- *Pink salmon, sockeye salmon, and Dolly Varden.* Pink salmon and Dolly Varden spawn and rear in this stretch of the Kenai River. Sockeye salmon and chinook salmon rear here also. The streamside vegetation afforded by this and other parcels along the Kenai River stabilize riverbanks, protect water quality, moderate temperatures and provide cover for fish.

- *Recreation/tourism.* This parcel already supports some recreational fishing and has the potential to promote additional use if access ammenities such as protective boardwalks can be provided.

  Commercial fishing. Protecting rearing habitat for sockeye and coho salmon will promote sustained quantities of these harvested fish populations.

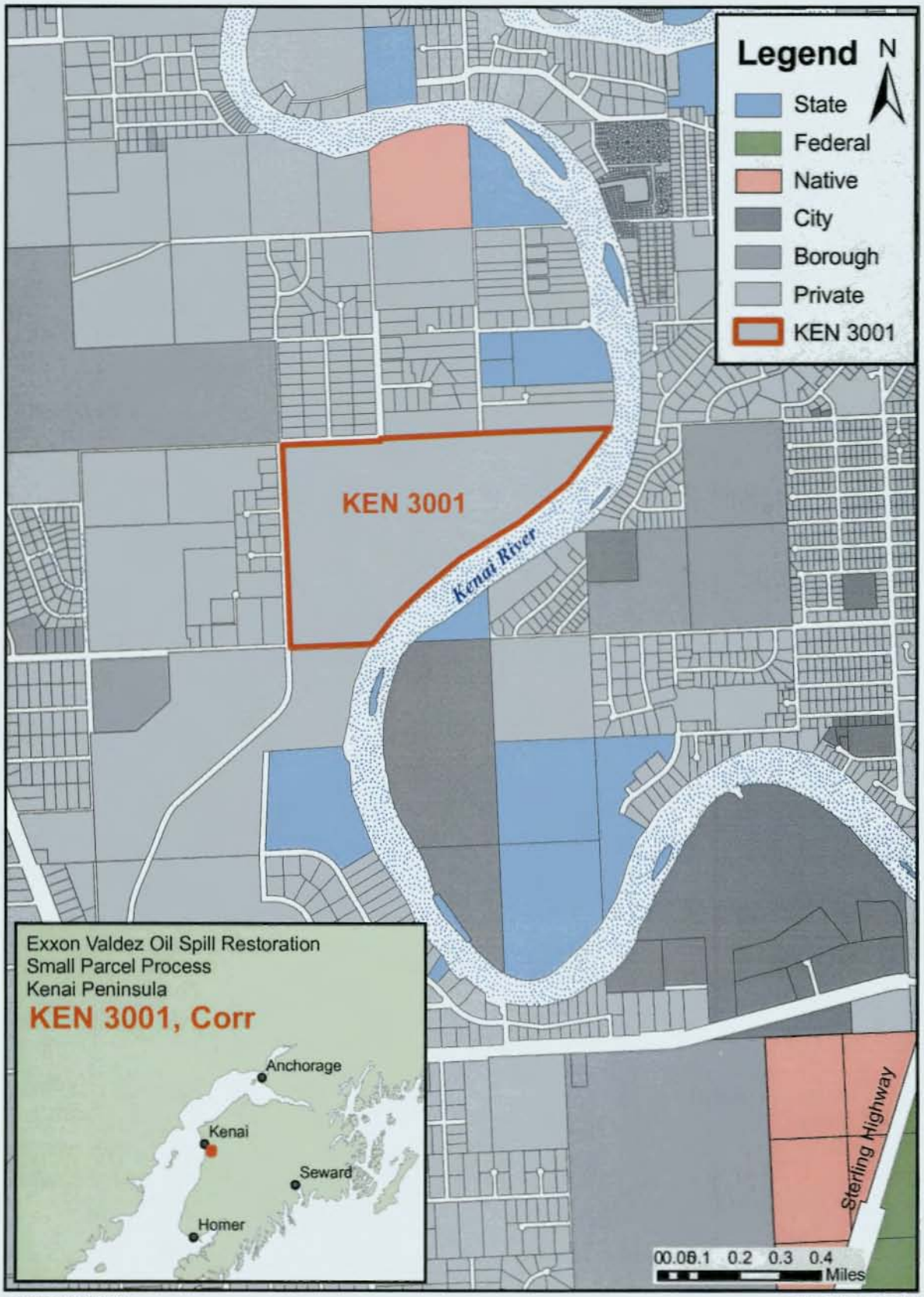
This parcel connects to the larger Kenai River ecosystem and contributes to previous Council and State efforts focused on the health of the Kenai River, its riparian habitat and the various species of fish, such as pink, sockeye, coho and king salmon and Dolly Varden, which form the basis for commercial and sport fishing activities. Acquisition of this parcel will provide restoration benefits to Dolly Varden, pink salmon, commercial fishing, passive use, recreation and tourism.

Potential Threats. Because it is prime real estate the Corr property is extremely valuable. Riverfront lots on the Kenai commonly sell in excess of $100,000/acre. Possible developments include clearing for homesites and/or recreational vehicle/campground ammenities. Despite strong pressure from real estate developers and speculators, the Corrs have worked quietly with The Conservation Fund for the past two years to explore conservation alternatives for their property.

Proposed Management. Acquisition of this parcel would protect 4,300 linear feet of river bank and provide an urban development buffer that will increase in restoration value as more wild lands are subdivided or otherwise cleared. The purpose of acquisition is to preserve and protect in perpetuity the ecological, natural, physical and scenic values of the subject property for the benefit of fish and wildlife resources and services that were injured in the *Exxon Valdez* oil spill. If this parcel is acquired, ADNR in cooperation with ADF&G will manage it to protect environmentally sensitive river frontage and provide recreational opportunities for the public as appropriate on the remainder of the parcel. If purchased, it is likely this parcel will be added to the Kenai River Special Management Area, providing additional focused management.

Attachments:

Parcel Map, KEN 3001, Corr
Corr Plat Map
Letters of Support:
Jack Williams, Mayor, Kenai Peninsula Borough
Kenai River Sportfishing Association
Kenai River Special Management Area Adivsory Board
Resolution of the Kenai Peninsula Borough



Print Date 5/8/06

ADNR, EVOS Proj. Office
Kenai Peninsula Borough Parcel Data
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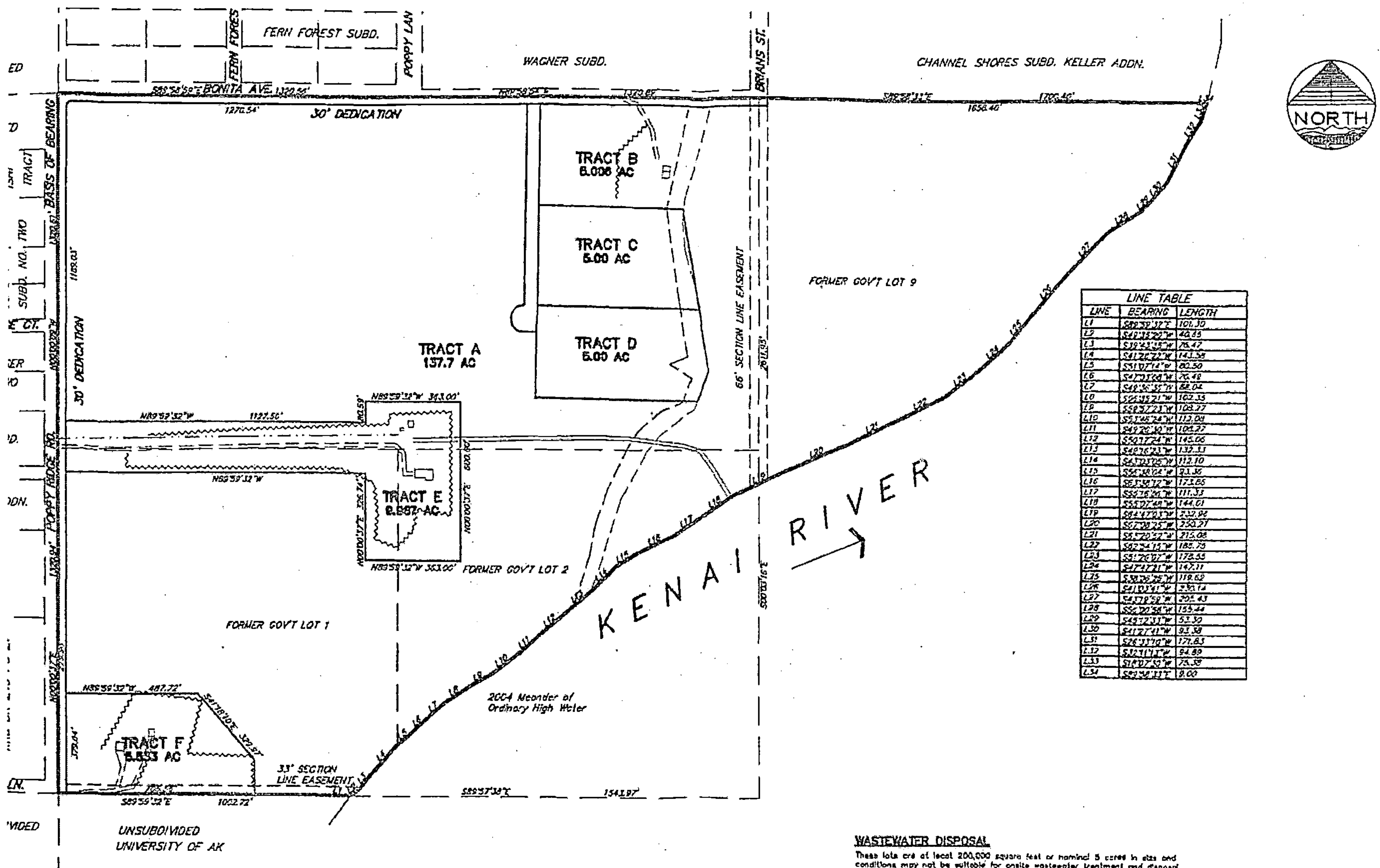


LINE TABLE		
LINE	BEARING	LENGTH
L1	S89°59'32"E	101.30
L2	S49°35'20"W	40.65
L3	S39°43'45"W	76.47
L4	S41°26'22"W	143.58
L5	S51°07'14"W	80.50
L6	S47°35'44"W	76.48
L7	S49°36'35"W	88.04
L8	S55°35'21"W	102.35
L9	S58°57'23"W	103.77
L10	S53°45'24"W	113.08
L11	S49°26'30"W	103.27
L12	S50°17'24"W	145.06
L13	S49°26'23"W	132.33
L14	S63°03'25"W	112.10
L15	S55°38'04"W	93.36
L16	S63°58'12"W	173.85
L17	S55°26'26"W	111.33
L18	S55°07'48"W	144.01
L19	S64°47'03"W	232.96
L20	S57°08'25"W	253.27
L21	S55°20'52"W	215.08
L22	S62°54'15"W	185.75
L23	S51°26'07"W	178.55
L24	S47°47'21"W	147.11
L25	S38°26'25"W	119.62
L26	S41°03'41"W	330.14
L27	S43°19'59"W	202.43
L28	S56°20'58"W	155.44
L29	S45°12'31"W	53.30
L30	S41°27'41"W	93.58
L31	S26°33'10"W	171.83
L32	S32°11'13"W	94.89
L33	S18°07'53"W	75.38
L34	S89°58'33"E	9.00

WASTEWATER DISPOSAL

These lots are at least 200,000 square feet or nominal 5 acres in size and conditions may not be suitable for onsite wastewater treatment and disposal. Any wastewater treatment or disposal system must meet the regulatory requirements of the Alaska Department of Environment Conservation.

KENAI PENINSULA BOROUGH

144 N. BINKLEY · SOLDOTNA, ALASKA · 99669-7520
BUSINESS (907) 262-4441 FAX (907) 262-1892

JOHN J. WILLIAMS
MAYOR

April 11, 2006

Brad Meiklejohn
Alaska Representative
The Conservation Fund
2727 Hiland Road
Eagle River, AK 99577

RE: Acquisition of the Corr Property

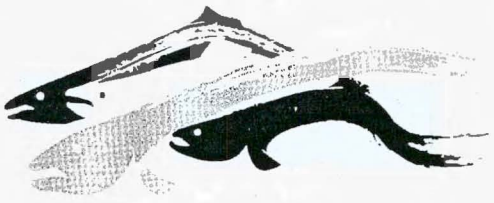
Dear Mr. Meiklejohn:

I commend your efforts to purchase property owned by the Corr family, along the Kenai River, for habitat protection and potential public access. The Corr property encompasses over eight-tenths of a mile of frontage on the Kenai River and is one of the largest undeveloped tracts on the lower river.

I appreciate your efforts to secure the funds for this important project, and by this letter lend my support and encouragement. I understand that, once acquired, the Corr property will be conveyed to the State of Alaska for addition to the Kenai River Special Management Area. Protection of habitat along the Kenai River will benefit residents, the fishing and tourism industries, and our Alaska way of life.

Sincerely,

John J. Williams
Kenai Peninsula Borough Mayor



KENAI RIVER SPORTFISHING
ASSOCIATION

May 5, 2006

Brad Meiklejohn
Alaska Representative
The Conservation Fund
2727 Hiland Road
Eagle River, Alaska 99577

RE: Acquisition of the Corr Property

Dear Mr. Meiklejohn:

Kenai River Sportfishing Association (KRSA) supports your efforts to purchase property owned by the Corr family along the Kenai River for habitat protection and potential public access. The Corr property encompasses over eight-tenths of a mile of frontage on the Kenai River and is one of the largest undeveloped tracts on the lower Kenai River.

We appreciate your efforts to secure the funds for this important project and understand that, once acquired, the Corr property will be conveyed to the State of Alaska for addition to the Kenai River Special Management Area.

By this letter we lend our support and encouragement to the acquisition of the Corr property, with the following understanding and conditions of such support:

1. provisions are made for public sportfishing access; and
2. adequate infrastructure for such access is provided and maintained to ensure responsible stewardship.

Thus, in the event of purchase and conveyance to the State of Alaska, KRSA would expect that provisions for public sportfishing access are made. Future trends indicate continued growth and demand for public sportfishing access on the Kenai River, and we feel it is vital that traditional areas of use by anglers are maintained and not closed.

KRSA would have a specific interest in assisting future projects that enhance responsible public access on the Corr property.

Sincerely,

Ricky Gease
Executive Director

Dedicated to preserving the greatest sportfishing river in the world, the Kenai.

PO Box 1228 • 224 Kenai Ave., Suite 102 • Soldotna, Alaska 99669
Phone: (907) 262-8588 • Fax: (907) 262-8582 • www.kenairiversportfishing.com • E-mail: info@kenairiversportfishing.com

KENAI RIVER
Special Management Area
"Working together...for the river"

ADVISORY BOARD

September 28, 2004

Brad Meiklejohn
The Conservation Fund
2727 Hiland Road
Eagle River, AK 99577

Dear Brad:

During the September 23rd meeting of the KRSMA Advisory Board, we discussed your efforts to explore purchase possibilities for a Kenai River parcel owned by the Corr family. The Board fully supports these efforts as this parcel would provide habitat protection and potential public access for a critical piece of property. Based upon recommendations within the *Kenai River Comprehensive Management Plan*, revised in 1997, the Corr property meets almost all of the criteria for prioritized acquisitions, including the following attributes:

- Possesses significant habitat or recreation values
- Encompasses large, vacant tracts
- Includes at least 600 feet of continuous river frontage
- Retains significant habitat and recreational values (i.e., not be significantly degraded)
- Complements land management of state owned tracts (particularly parcels adjacent to existing state properties)
- Acquisition values should be established by appraisal which establishes fair market value using standard appraisal
- Be in the overall State's best interest

(Recommendation 4.5.4.3 Government Land Acquisition)

We understand that funding sources from the EVOS small parcel program or state funding are off the table, so we know that securing funding for this acquisition may be a challenge. We were impressed that you have already been able to secure half of the $2,000,000 purchase price so far, however! What other possible funding sources might there be, and are there options for which our Board can provide support?

Various Board members spoke of the possibility to secure additional letters of support from the Borough Assembly and local city councils, as well as other groups interested in the Kenai River watershed. We are interested in learning more about how we can help you in your process.

CAROL F.

Kenai Area Office, Box 1247, Soldotna, AK 99669, Soldotna 262-5581
Kenai Peninsula Borough, Box 850, Soldotna, AK 99669, Soldotna 262-4441

Alaska Division of Parks and Outdoor Recreation, Department of Natural Resources, in cooperation with the Kenai Peninsula Borough.

Thank you very much for all of your efforts on behalf of the Kenai River's habitat and recreation resources. We look forward to the day when the Corr property is successfully added to the Kenai River Special Management Area!

Sincerely,

Ken Lancaster

Ken Lancaster
President, KRSMA Advisory Board

Introduced by:	Sprague
Date:	04/19/05
Action:	Adopted
Vote:	7 Yes, 2 No

KENAI PENINSULA BOROUGH

RESOLUTION 2005-033

A RESOLUTION SUPPORTING EFFORTS TO PURCHASE THE CORR PROPERTY NEAR SOLDOTNA, ALASKA, LOCATED ALONG THE KENAI RIVER, FOR INCLUSION INTO THE KENAI RIVER SPECIAL MANAGEMENT AREA

WHEREAS, the 170-acre Corr Homestead is the largest intact block of mostly undeveloped land remaining along the lower Kenai River; and

WHEREAS, the Corrs have worked for the past two years to explore conservation alternatives for their property; and

WHEREAS, the principal benefits in the acquisition of this property would be to safeguard public recreation and tourism, protect archaeological resources on the property, and to protect habitat; and

WHEREAS, the Kenai River Special Management Area (KRSMA) Advisory Board supports the inclusion of the Corr property in the KRSMA in part because it possesses significant habitat and recreation values, encompasses large, vacant tracts, and includes sizeable river frontage; and

WHEREAS, the Kenai Peninsula Borough believes that protection of habitat along the Kenai River will benefit residents, the fishing and tourism industries, and our Alaskan way of life; and

WHEREAS, no state funding is requested to purchase this property;

NOW, THEREFORE, BE IT RESOLVED BY THE ASSEMBLY OF THE KENAI PENINSULA BOROUGH:

SECTION 1. The Kenai Peninsula Borough Assembly supports efforts to purchase the Corr property for inclusion into the Kenai River Special Management Area.

SECTION 2. That copies of this resolution be sent to Senator Thomas Wagoner, Senator Gary Stevens, Senator Al Kookesh, Representative Kurt Olson, Representative Mike Chenault, Representative Paul Seaton, Representative Woodie Salmon, and Tom Irwin, Commissioner of the State of Alaska Department of Natural Resources

SECTION 3. That this resolution takes effect immediately upon its adoption.

ADOPTED BY THE ASSEMBLY OF THE KENAI PENINSULA BOROUGH THIS 19TH DAY OF APRIL 2005

KEN 3002, Russell/Long Parcel

Owner:	Alex B. Russell, Jr. and William E. Long
Physical Location:	The parcel is located on the Kenai River adjacent to the previously purchased Roberts parcel near the Kenai Peninsula Visitors Center in Soldotna.
Acreage:	4.25 +/-
Legal Description:	T5N, R10W, Sec 32, KM, that portion of Government Lot 8 as per WD 102@274 lying north of Kalifornsky Beach Road.
Agency Sponsor:	ADNR and ADF&G
Appraised Value:	Not available. Currently offered for sale at $1,000,000.
Acquisition Expenses	Hazmat survey, appraisal, appraisal review, site inspection, title insurance, due diligence. Estimated cost $18,000.

Parcel Description. This parcel is located on the Kenai River between the Roberts parcel previously purchased by EVOS, and the City of Soldotna's Centennial Park. The Roberts parcel is adjacent to the Kenai Peninsula Visitors Center. The parcel slopes from Kalifornsky Beach Road to the Kenai River, is vegetated with spruce and birch trees, and has approximately 270 feet of Kenai River frontage.

Linkage to Restoration:
Restoration Benefits. Public ownership of this parcel will allow for managed access to the Kenai River and thereby protect habitat for pink salmon and Dolly Varden and enhance the recovery of recreational services such as sport fishing, commercial fishing, and tourism.

Key habitat and other attributes of the parcel include the following:

- *Pink salmon, sockeye salmon, and Dolly Varden.* Pink salmon spawn and Dolly Varden spawn and rear in this stretch of the Kenai River. The streamside vegetation afforded by this and other parcels along the Kenai River stabilize riverbanks, protect water quality, moderate temperatures and provide cover for fish. Unfortunately, increasing bank fishing along the Kenai River is destroying riverside brush and grasses.
- *Recreation/tourism.* This parcel has the potential for increasing levels of use for recreational fishing because of its location next to the Kenai Peninsula Visitors Center, its gentle slope toward the Kenai River, and the recent construction of a public use "fishwalk" on a 10-foot easement along the river on the EVOS purchased Roberts/Shilling parcel.

This parcel connects to the larger Kenai River ecosystem and contributes to previous Council and State efforts focused on the health of the Kenai River, its riparian habitat and the various species of fish, such as pink, sockeye, and king salmon and Dolly Varden, that the commercial and sport fishing industries depend upon. Acquisition of this parcel will provide restoration benefits to Dolly Varden, subsistence, commercial fishing, passive use, and recreation and tourism.

Potential Threats. This parcel has the potential to be converted to profitable commercial use. In addition a significant threat to restoration results from uncontrolled access to the Kenai River, which damages habitat by trampling streambanks and denuding them of vegetation. Similar habitat on adjacent parcels has been protected through acquisition and on the ground restoration efforts including bank stabilization and the construction of elevated light penetrating gratewalk and access stairs designed to provide fishing access while minimizing bank trampling and destruction of riparian habitat. Acquisition of this parcel provides ADF&G/ADNR with the ability to protect contiguous riparian habitat, and through bank stabilization and managed recreational access contribute to the restoration of pink salmon and Dolly Varden

Proposed Management. The purpose of acquisition is to preserve and protect in perpetuity the ecological, natural, physical and scenic values of the subject property for the benefit of fish and wildlife resources and services that were injured in the *Exxon Valdez* oil spill. If this parcel is acquired, ADNR in cooperation with ADF&G will manage it to protect environmentally sensitive river frontage and provide recreational opportunities for the public as appropriate on the remainder of the parcel. The parcel will probably be classified Habitat/Public Recreation Land." The seller has specified "This parcel is to be managed by Alaska State Parks in the interest of maintaining riverine habitat in a natural state on the Kenai River." It is possible that this parcel will be considered for inclusion in the Kenai River Special Management Area providing additional focused management.

Appraised Value. An appraisal will be secured should the council choose to move forward with this parcel. Based upon the value conclusions of the appraisal of the adjacent Roberts parcel it could be expected that the highest and best use of this parcel would be similar to those of the Robert's parcel; commercial development.

Public Comment. The Restoration Office has received letters of support for acquisition of this parcel from the Kenai River Sportfishing Association, the City of Soldotna and Kenai Peninsula Borough.

Print Date 5/9/06

ADNR, EVOS Proj. Office
Kenai Peninsula Borough Parcel Data
(carolf\c\mxdfiles\ken3002.mxd)

United Cook Inlet Drift Association

43961 K-Beach Road, Suite E • Soldotna, Alaska 99669 • (907) 260-9436 • fax (907) 260-9438 • ucida@acsalaska.net

May 11, 2006

Exxon Valdez Oil Spill Trustee Council (EVOSTC)
441 West Fifth Avenue, Suite 500
Anchorage, AK 99501

Dear Trustee:

The United Cook Inlet Drift Association (UCIDA) is opposed to the spending of EVOS funds for the Russell property described as TO5N R10W S32 KN that portion of government lot 8 as per WD 102 @274 lying north of Kalifornsky Beach Road, Tax Account Number 06001107-9 (located in Soldotna, Alaska). We feel that the use of EVOS funds to purchase this property is inappropriate.

There are other remediation, cleanup, and habitat restoration projects that still require funding. There are coastal areas that remain oiled or have visible "Exxon tar balls" present. These coastal areas need cleaning and rehabilitation. We feel that the EVOS funds would serve their original purposes by funding oil cleanup or tar ball removal projects.

Sincerely,

Roland R. Maw, PhD
UCIDA Executive Director

cjh
cc: Soldotna Chamber of Commerce
Soldotna City Council
Mayor of Soldotna, David Carey
Representative Kurt Olson
KPFA
Cook Inletkeeper

Soldotna Chamber of Commerce & Visitor Information Center

Exxon Valdez Oil Spill Trustee Council
550 W. 5th Ave., Suite 500
Anchorage, Ak 99501

RE: Acquisition of the Russell/Long Property

Dear Council,

The Soldotna Chamber of Commerce supports your efforts to purchase the property described as TO5N R10W S32 KN. Tax Number 06001107-9. We feel acquiring the middle piece of land (the Russell/Long Property), surrounded by properties held for recreation, education and historic purpose would work together cohesively. Acquisition of the Russell/Long property would hold for recreation, all property from the Sterling Hwy/Kalifornsky Beach corner down the Kenai River attaching the Visitor Center to the historical museum, the Soldotna Sports Center and Centennial Park, owned and operated by the City of Soldotna.

We appreciate your efforts to secure the funds for this important project, and by this letter lend our support and encouragement.

We understand that, once acquired, the Russell/Long property will be conveyed to the Division of Natural Resources/Alaska State Parks. In that event, it is our hope that provisions for public use are made. The Soldotna Chamber of Commerce and Visitor Center would be very interested in enhancing the property in keeping with the Councils mission.

www.SoldotnaChamber.com
44790 Sterling Highway • Soldotna, Alaska 99669 • (907) 262-9814 • Fax 262-3566 • Email: info@soldotnachamber.com

2006 Soldotna Chamber Board of Directors

Evy Gebhardt, President
Peninsula Clarion

Sammie Cole, Past President
Southcentral Title Agency

Lisa Roberts, President Elect
Key Bank

Ryan Kapp, Vice President
Edward Jones Investment

Tim Pope
Natron Air

Norm Blakely
Blakeley's Auction

Alice Paulson
Soldotna Inn/ MYKELS

Ken Lancaster
Lancaster Enterprises

Dan Mortenson
Four D Carpet One

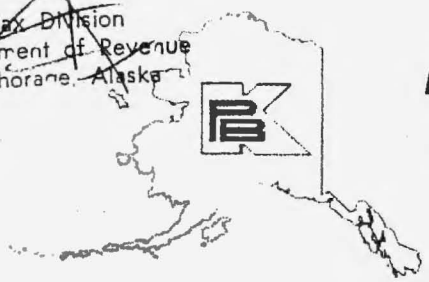
Marnie Nelson
Alaska Legends

Bill Gifford
Commodore's Guide Service

Si Zimmerman
Kenai Peninsula Harley Davidson

Jim Stogsdill
Soldotna City Council

Michelle Glaves
Executive Director



KENAI PENINSULA BOROUGH
144 North Binkley Street • Soldotna, Alaska 99669-7599
Toll-free within the Borough: 1-800-478-4441, Ext. 2150
PHONE: (907) 714-2150 • **FAX**: (907) 262-1892
www.borough.kenai.ak.us

JOHN J. WILLIAMS
BOROUGH MAYOR

May 1, 2006

Exxon Valdez Oil Spill Trustee Council
550 W.5th Ave. ,Suite 500
Anchorage ,Alaska ,99501

Re: Acquisition of the Russell/Long Property

Dear Members of the Council,

I am writing you today to offer the Kenai Peninsula Borough Administration's support for your efforts to purchase the Russell/Long property, described as TO5NR10WS32KN. I believe that the acquisition of this parcel is in the public interest and I support the efforts of the Exxon Valdez Oil Spill Trustee Council to purchase this property.

My administration believes that, with your purchase and ultimate transfer of responsibility to State Parks, the fish walk at the Soldotna Visitors Center could be completed to Centennial Park, creating improved public access and enhanced habitat protection for the Kenai River. The additional potential to add handicapped accessibility at this site, as well as additional public parking, are an additional public benefit if this property is acquired and used for the described purpose.

I appreciate your efforts to secure this integral parcel of land and providing to the public the enhanced access to the Kenai River this property purchase will provide.

Sincerely,

John J. Williams
Kenai Peninsula Borough Mayor

KENAI RIVER
Special Management Area

"Working together...for the river"

ADVISORY BOARD

May 12, 2006

Interim Executive Director Michael Baffrey
Exxon Valdez Oil Spill Trustee Council
441 W 5th Ave., Suite 500
Anchorage, AK 99501

Dear Director Baffrey:

The Citizen's Advisory Board for the Kenai River Special Management Area (KRSMA) is charged with advising the Department of Natural Resources on critical issues effecting the health and well being of the recreational and natural resources of the Kenai River watershed.

One critical issue that we wish to unanimously support and encourage your involvement is in the purchasing of the Russell Property, a key habitat parcel near the heart of Soldotna. This property will not only protect precious rearing habitat along the banks of the Kenai River but will also provide an invaluable, contiguous link between two parcels of municipal and state park property. The highest and best use of this property is unequivocally for habitat protection and public use. The Russell property has a willing seller and the EVOSTC appears prepared to enter into these types of truly necessary purchases on behalf of the public.

We earnestly hope that through the actions of the EVOSTC that we can protect and provide a lasting habitat for important wildlife species affected by the Exxon Valdez Oil Spill.

Thanks you for your attention to this very important matter.

Sincerely,

/ss/
Ken Lancaster
President, KRSMA Advisory Board

Attached: Russell property description
Cc: Carol Fries

Kenai
Watershed
Forum

44539 Sterling Hwy
Suite #202
Soldotna, AK 99669

Working together for healthy watersheds on the Kenai Peninsula

5/12/06

Ms. Fries,

I am writing on behalf of the Kenai Watershed Forum in regard to the potential purchase of the Russell/ Long parcel, located in Soldotna, adjacent to the Centennial Park. This 4-acre parcel would create a contiguous river frontage from the Sterling Hwy. through the park owned by the City of Soldotna. Assuming a fair price can be reached, we believe this would be worthwhile purchase in our opinion.

Please feel free to contact us if there are any questions or concerns regarding this letter of support.

Thank you,

Robert Ruffner
Executive Director
260-5449

Transmitted via Email

Cc:

Ken Lancaster

City of Soldotna
177 North Birch • Soldotna, Alaska 99669 • Phone: (907) 262-9107
Office of the Mayor

Soldotna

Michele Glaves,
Executive Director,
Soldotna Chamber of Commerce
Soldotna, Alaska 99669

May 11, 2006

Dear Michelle:

I was most pleased with the unanimous action by the Soldotna City Council last night to direct me to write a letter to you from the City of Soldotna in support of your nomination of the Russell/Long property to the Exxon Valdez Oil Spill Trustee Council under the recreational use category.

A positive decision by the EVOST Council will allow for future development of city parks adjacent to this property along with enhanced walkways next to the Visitor's Center facility. The continued cooperative development of recreational areas will allow for increased appreciation of our state by visitors from all over the world.

The City of Soldotna greatly appreciates the work you are doing and the work of the EVOST Council.

David R. Carey

David R. Carey, Mayor

Exxon Valdez Oil Spill Trustee Council
550 W. 5th Ave., Suite 500
Anchorage, AK 99501

May 11, 2006

RE: Acquisition of the Russell/Long Property

Dear Council:

Kenai River Sportfishing Association supports the efforts of the Exxon Valdez Oil Spill Trustee Council to purchase the Russell/Long property described as TO5N R10W S32 KN. Tax Number 06001107-9.

Through its acquisition, KRSA believes that this parcel and the surrounding properties held for recreation, education and historic purpose would work together cohesively. Acquisition of the Russell/Long property would hold for recreational purposes all property from the Sterling Hwy/Kalifornsky Beach corner down the Kenai River, which would connect the Soldotna Visitor Center and Classic Fishwalk to the Soldotna Historical Museum, the Soldotna Sports Center and Centennial Park.

We appreciate your efforts to secure the funds for this important project and understand that, once acquired, the Russell/Long property will be conveyed to the State of Alaska / Division of Natural Resources / Alaska State Parks.

By this letter we lend our support and encouragement to the acquisition of the Russell/Long property, with the following understanding and conditions of such support:

1. Provisions are made for public use of the property, including the option of recreational sportfishing access; and
2. Adequate infrastructure and maintenance for such use is a prerequisite to ensure responsible stewardship of the resource.

KRSA would have a specific interest in assisting future projects that enhance responsible public access on the Russell/Long property, and would work in cooperation with Alaska State Parks, the City of Soldotna, the Soldotna Chamber of Commerce and Visitors Center and other entities to make sure adherence to the Council's mission.

Respectfully,

Ricky Gease, Executive Director

KAP 3001, Chokwak II Parcel

Owner:	Heirs of Phillip Chokwak
Location:	Kiliuda Bay, Shearwater Peninsula, Kodiak Island
Legal Description:	U.S. Survey 8981, T33S R23W, Sections 5 and 8, Seward Meridian.
Acreage:	159.97 acres
Agency Sponsor:	DNR
Appraised Fair Market Value:	$160,000 (estimated)
Total Cost to EVOS:	$185,000 (estimated)
Cost Breakdown:	$160,000 fee simple; $15,000 estimated for title, hazmat, and appraisal review and other tasks as necessary to meet State due diligence requirements.

Background: This 160-acre Native allotment is located on the north shore of Kiliuda Bay on the east side of Kodiak Island. The Chokwak II tract is surrounded by lands the State recently received through a land exchange between the State and the Old Harbor Native Corporation, a component of the larger Old Harbor acquisition package acquired by USFWS. Before undertaking the exchange, the state identified the inholdings on the north shore of Kiliuda Bay as priorities under the small parcel program. The Old Harbor Exchange has been completed. The objectives of the Old Harbor exchange and subsequent acquisition of inholdings were to improve public access to state acquired lands and protect and restore species and associated services injured by the oil spill.

The Chokwak II tract is east of the Chokwak I parcel acquired in 2002 through the EVOS Small Parcel Grant. The owners of the Chokwak II property have listed the parcel for sale after completing BIA requirements. Mr. Chokwak has approached the State on behalf of the heirs many times in the past in hopes of having the State purchase the property.

The following comment received, and response provided, are part of the public record created during the public comment period relative to the Old Harbor Land Exchange:

> *Comment:*
> The Alaska Department of Fish and Game (ADF&G) commented that the most used access points in the lands to be acquired by the State were native allotments that would remain in private hands. ADF&G requested that efforts be undertaken to acquire these in holdings.
>
> *Response to the comment*:
> Owners of two of the allotments have already approached the state to sell their allotments. The allotments could be purchased using funds from the *Exxon Valdez* oil spill Trustee Council or other sources. The State would like to acquire the other native allotments if they become available.

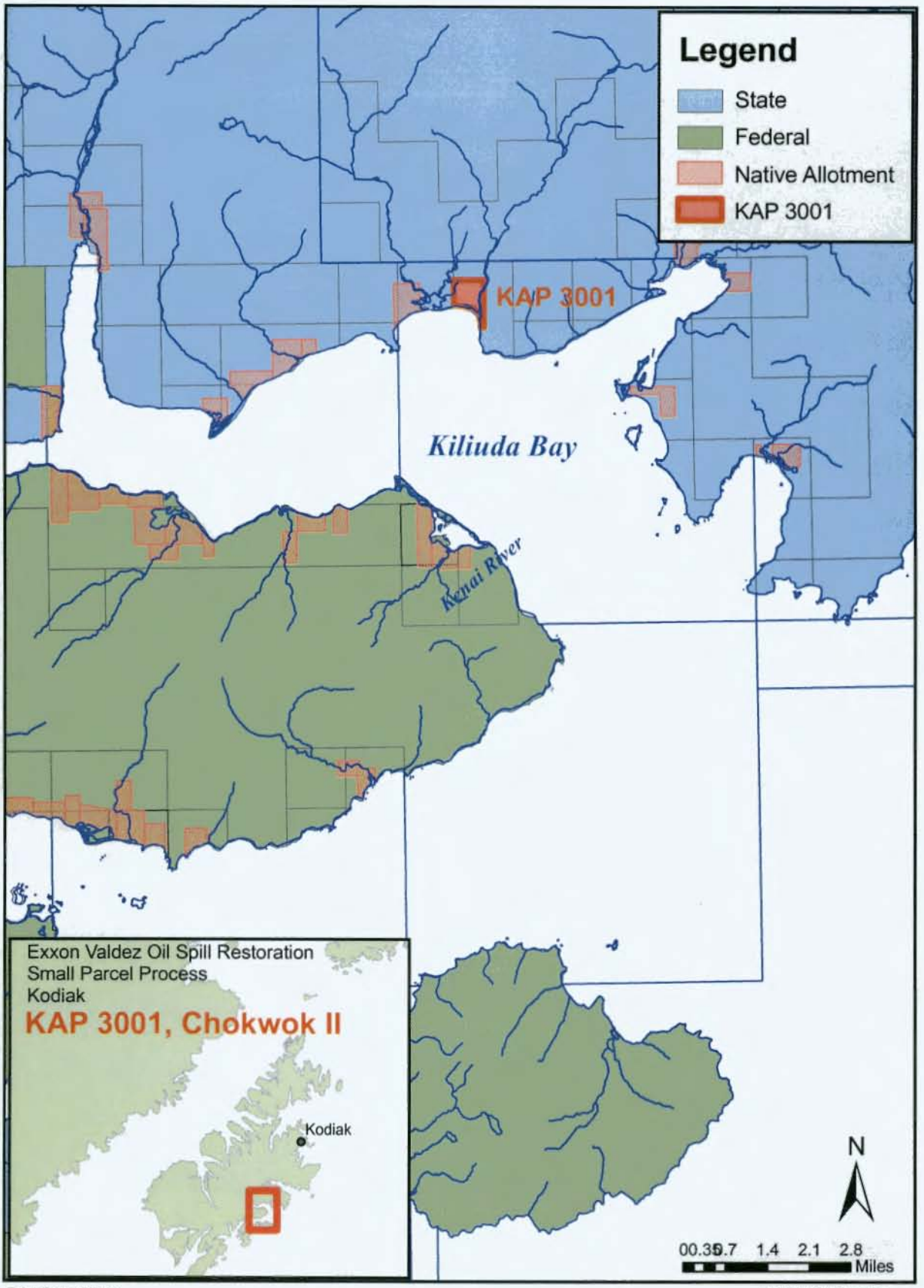
Physical Description: The Chokwak property is located in Kiliuda Bay just north of Old Harbor. The bay has notable wilderness qualities and the parcel is in its natural condition absent permanent buildings or continuous human habitation. Anadromous Stream #258-20-100 4 0 flows through the parcel to a rich intertidal, providing valuable riparian and intertidal habitat as well as important access to the adjacent state owned uplands.

Linkage to Restoration: The property has particular habitat value to injured species and services including bald eagles, harlequin ducks, pink salmon, Sockeye salmon and Dolly Varden, as well as herring that spawn in Kiliuda Bay. Marine bird nesting colonies of cormorants and pigeon guillemots are found in Kiliuda Bay and likely utilize this area for feeding. The parcel is an important access point for sport hunting, sport fishing, camping and bear viewing. This area is also important for subsistence use by residents of Old Harbor. The wildlife and habitat values of the Chokwak parcel support subsistence, recreation, sport fishing, passive use, and wilderness services impacted by the Exxon Valdez Oil Spill.

Proposed Management: Acquisition of this parcel will enhance access to state lands acquired through the Old Harbor Exchange and enhance the protection of important intertidal and riparian habitat in this area. This parcel should it be acquired, will be managed consistent with the management of the lands acquired by the State through the Old Harbor Exchange and the Chokwak I small parcel previously acquired.

Attachments:

Parcel Map, KAP 3001
Map of the Old Harbor Land Exchange



Print Date 5/9/06

ADNR, EVOS Proj. Office
(carolf\c\mxdfiles\kap3001.mxd)

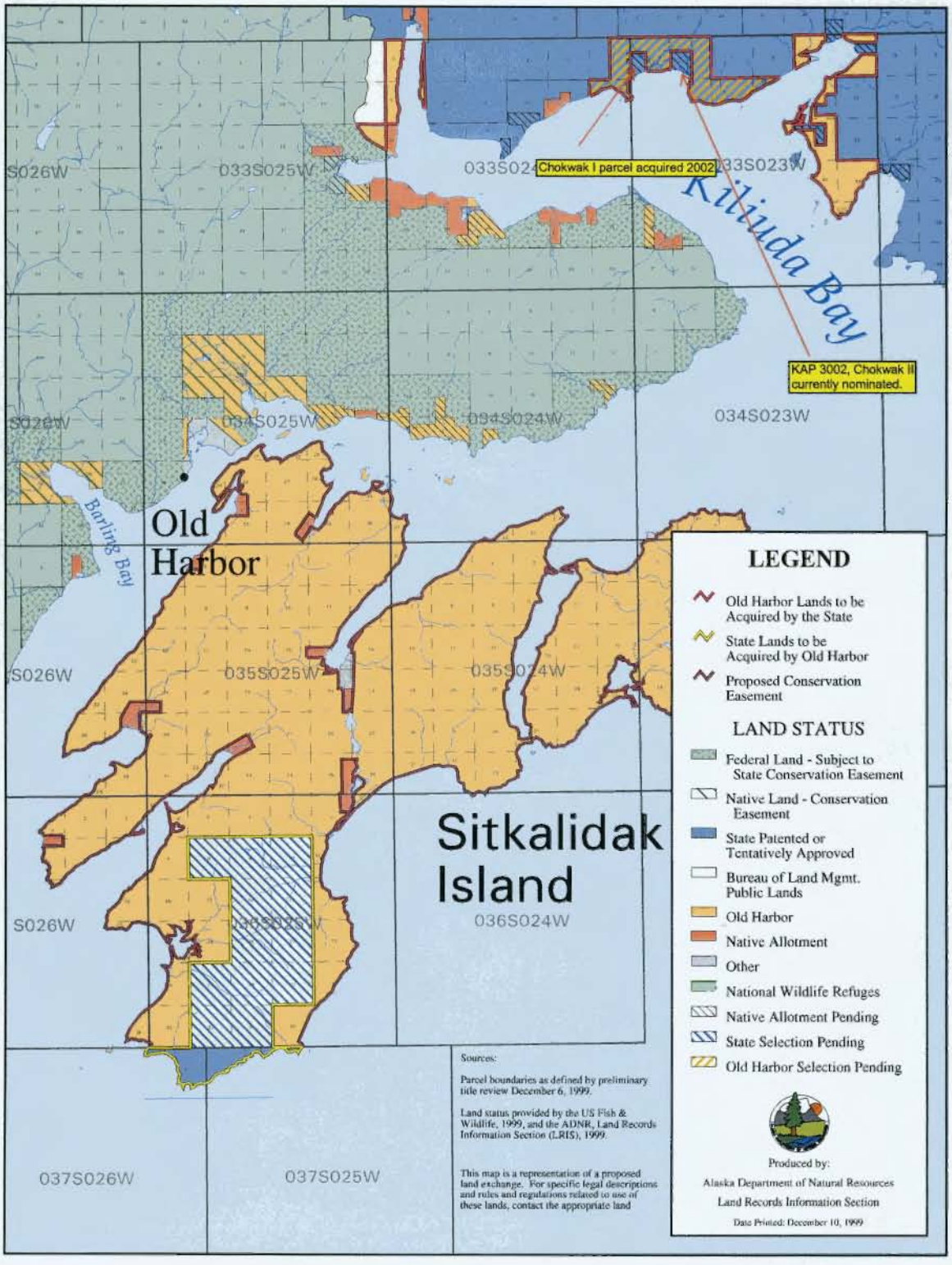
EVOS TRUSTEE COUNCIL

OLD HARBOR EXCHANGE

Scale 1:150,000

0 5.0 miles

Albers Equal-Area Projection



KAP 3002, Capjohn

Owner:	Mr. Ralph Capjohn
Location:	Kiliuda Bay, Shearwater Peninsula, Kodiak Island
Legal Description:	Lots 1 & 2, U.S. Survey No. 10878 AK, located in Secs. 28, 29, 32, & 33, T.32S., R.24W., SM
Acreage:	159.97 acres
Agency Sponsor:	DNR
Appraised Fair Market Value:	$160,000 (estimated)
Total Cost to EVOS:	$185,000 (estimated)
Cost Breakdown:	$160,000 fee simple; $15,000 estimated for title, hazmat, and appraisal review and other tasks as necessary to meet State due diligence requirements.

Background: This 160-acre Native allotment is located on the north shore of Kiliuda Bay on the east side of Kodiak Island. The Capjohn tract is adjacent to State land and just north of land recently received through a land exchange between the State and the Old Harbor Native Corporation, a component of the larger Old Harbor acquisition package acquired by USFWS. Before undertaking the exchange, the state identified the inholdings on the north shore of Kiliuda Bay as priorities under the small parcel program. The Old Harbor Exchange has been completed. The objectives of the Old Harbor exchange and subsequent acquisition of inholdings were to improve public access to state acquired lands and protect and restore species and associated services injured by the oil spill.

The Capjohn tract is located in the northwestern end of Kiliuda Bay at the end of the North Arm. The owners of the Capjohn property have made the parcel available for sale after completing BIA requirements. Mr. Capjohn has approached the State in hopes of having the State purchase the property.

The following comment received, and response provided, are part of the public record created during the public comment period relative to the Old Harbor Land Exchange:

> *Comment:*
> The Alaska Department of Fish and Game (ADF&G) commented that the most used access points in the lands to be acquired by the State were native allotments that would remain in private hands. ADF&G requested that efforts be undertaken to acquire these in holdings.
>
> *Response to the comment*:
> Owners of two of the allotments have already approached the state to sell their allotments. The allotments could be purchased using funds from the

Exxon Valdez oil spill Trustee Council or other sources. The State would like to acquire the other native allotments if they become available.

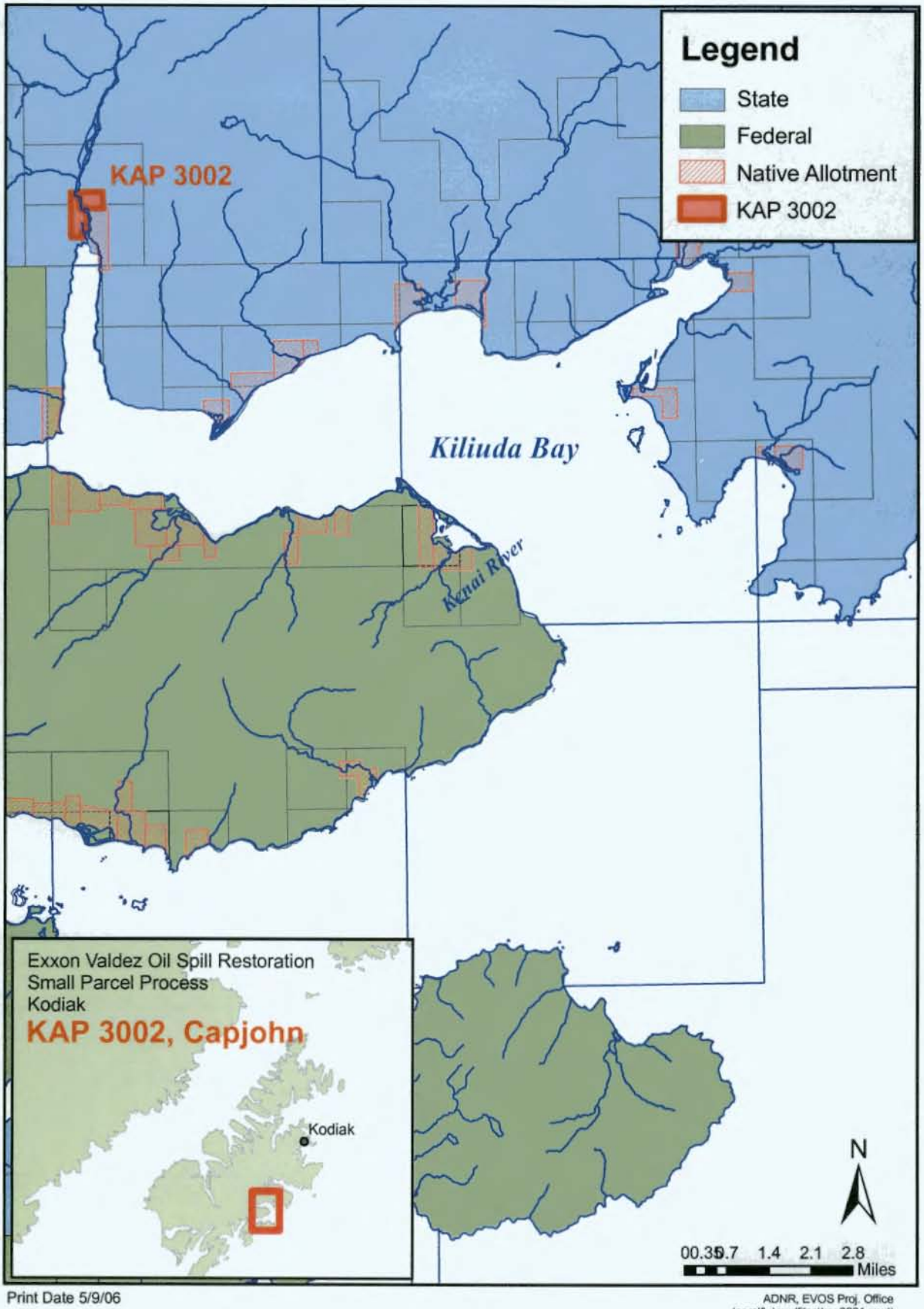
Physical Description: The Capjohn property is located in Kiliuda bay just north of Old Harbor. The bay has notable wilderness qualities and the parcel is in its natural condition absent permanent buildings or continuous human habitation. Anadromous Stream #258-20-100 6 0 flows through the parcel, a portion which is a marsh identified as a waterfowl concentration area, to a rich intertidal, providing valuable riparian and intertidal habitat as well as important access to the adjacent state owned uplands.

Linkage to Restoration: The property has particular habitat value to injured species and services including bald eagles, harlequin ducks, pink salmon, Sockeye salmon and Dolly Varden, as well as Pacific herring that spawn in the North Arm of Kiliuda Bay. Marine bird nesting colonies of cormorants and pigeon guillemots are found in Kiliuda Bay and likely utilize this area for feeding. The area is also identified as a winter waterfowl concentration area and harlequin ducks are likely to be found in this area. The parcel is an important access point for sport hunting, sport fishing, camping and bear viewing. This area is also very important for subsistence use by residents of Old Harbor. The wildlife and habitat values of the Capjohn parcel support subsistence, recreation, sport fishing, passive use, and wilderness services impacted by the Exxon Valdez Oil Spill.

Proposed Management: Acquisition of this parcel will enhance access to state lands acquired through the Old Harbor Exchange and enhance the protection of important intertidal and riparian habitat in this area. This parcel should it be acquired, will be managed consistent with the management of the lands acquired by the State through the Old Harbor Exchange. The surrounding lands are managed as wildlife habitat according to the terms of the Terror Lake Hydro Agreement.

Attachments:

Parcel Map, KAP 3002
Map of the Old Harbor Land Exchange



Print Date 5/9/06

ADNR, EVOS Proj. Office
(carolfc\mxdfiles\kap3001.mxd)

EVOS TRUSTEE COUNCIL

OLD HARBOR EXCHANGE

Scale 1:150,000

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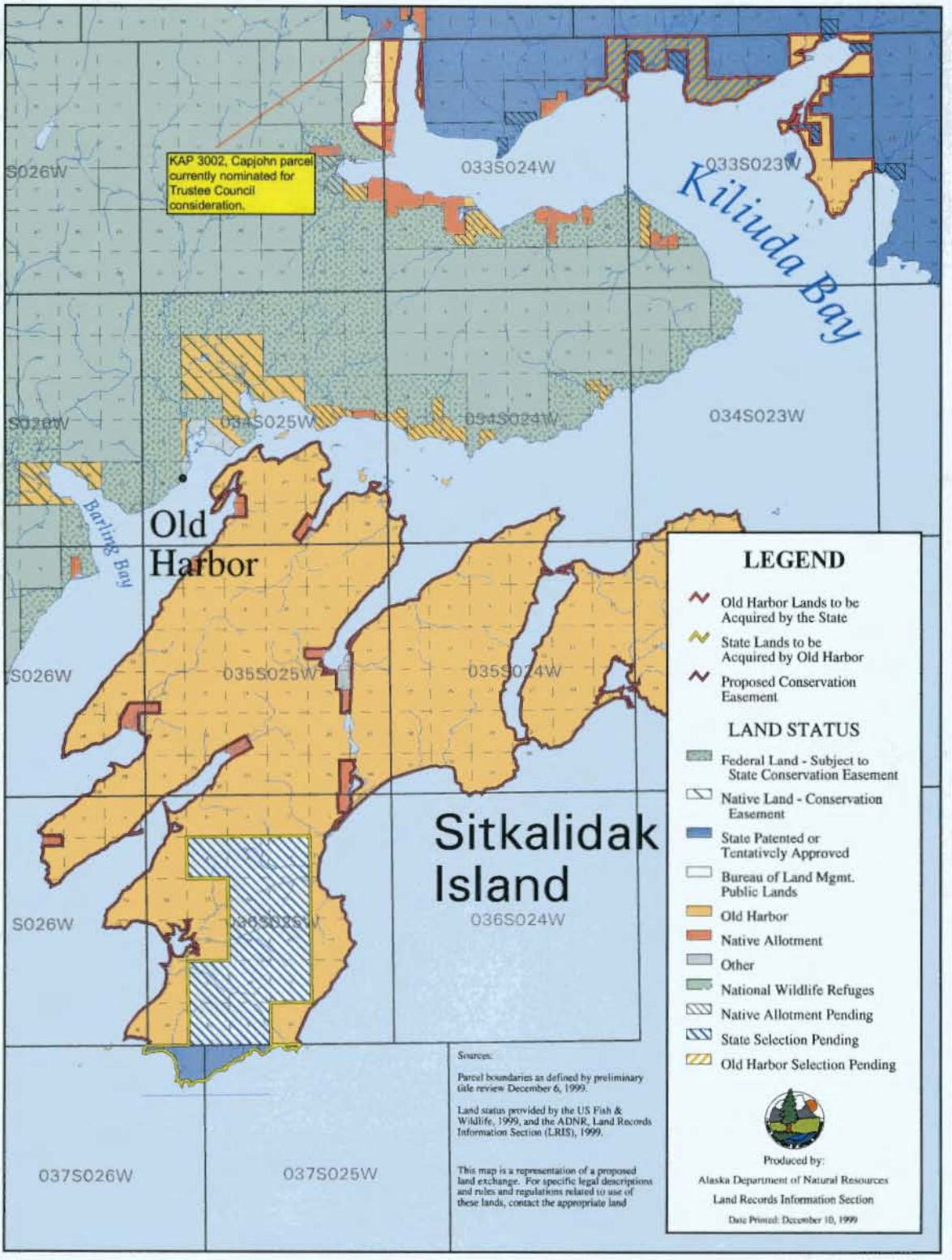


Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, AK 99501-2340 • 907 278 8012 • fax 907 276 7178

MEMORANDUM

TO: Trustee Council

FROM: Michael Baffrey
Executive Director

DATE: May 12, 2006

SUBJECT: DOI request for additional travel funds

An additional $4,800 are necessary to reimburse the Department of the Interior for anticipated travel costs associated with Drue Pearce's attendance at future Trustee Council meetings in Anchorage. The original $8,000 has been expended. There may be three additional meetings during the remainder of federal fiscal year 2006.

The original $8,000 was figured at $1,600 per meeting for five meetings. The Trustee Council has met six times so far during federal fiscal year 2006 (October-September), five in-person meetings and one teleconference.

Motion to approve additional travel funds for DOI ($4,800), ADEC ($1,000) and ADFG ($3,000) to allow travel to future FY 06 Trustee Council meetings.

COMMENTS/HANDOUTS

The need for funding for GAK1 and the other three continuous monitoring programs

EVOS TC meeting **23 May 2006**

Tom Royer, Professor, Physical Oceanography, Old Dominion University
Brenda Norcross, Professor, Fisheries Oceanography, University of Alaska Fairbanks

My name is Brenda Norcross. I am Professor of Fisheries Oceanography at the University of Alaska Fairbanks where I have been employed since January 1989, two months before the *Exxon Valdez* oil spill. I am speaking today on the behalf of myself and Tom Royer, Professor of Oceanography at Old Dominion University. Tom was at UAF from 1970 to 1997. We both were involved in research immediately following the oil spill. Tom's work on the Alaska Coastal Current was vital to explain the transport of the oil. I have been actively involved in many aspects of herring exploration since the spill, most of which were supported through EVOSTC. We presently serve as co-Chairs of STAC, though this testimony is not an official statement from STAC.

We would like to provide you with a little background to explain how knowledge of physical oceanography in the Gulf of Alaska and herring survival in PWS are inseparable.

Let's start with 1989. Very unusual weather conditions occurred in March 1989 that affected the currents in the Gulf of Alaska and Prince William Sound. An abnormal high pressure atmospheric system dominated the region bringing clear skies and low air temperatures. The Alaska Coastal Current transport was probably the weakest ever observed and probably caused the Columbia Glacier ice to remain in Prince William Sound rather than being swept westward out of the sound. How did we know this? The knowledge of this coastal flow was gained through the temperature and salinity measurements at GAK1. Those observations also allowed the prediction of the trajectory of the oil spill as it finally swept out of the Sound. This information was passed on to Senator Stevens and others to help them plan for containment and impacts along the western side of the Gulf of Alaska. There was never any doubt about its westward path rather than heading toward Yakutat, Sitka and Juneau.

We now know, based on the temperature and salinity measurements at GAK1, that since 1970, there has been an increase in water temperature of more than 1.8° F throughout the 850-ft water column at GAK1 near Seward (Royer and Grosch, 2006). In addition, the upper 350 ft is getting fresher while the lower 500 ft is becoming saltier. This freshening is due to increased storminess (rain) and faster melting of the mountain glaciers within the Gulf of Alaska's coastal drainage. There are no observations in the ocean north of the Canadian border. Therefore the only method that exists to determine these changes in the ocean climate are the observations at GAK1 that EVOSTC is currently supporting.

Warming and freshening in the ocean could impact the entire ecosystem. The temperature and salinity determine the flow pattern and strength of the Alaska Coastal Current. These influence the supply of nutrients from the deep Gulf of Alaska onto the shelf and up into the euphotic (light) zone. The currents affect the distribution of plankton on the GOA shelf and into Prince William Sound. Actually, the distribution of marine organisms in the whole Northeast Pacific is linked to the processes that are being measured at GAK1. The knowledge of the temperature and salinity in the Gulf of Alaska is vital to the detection of long term changes and the separation of those changes from the anthropogenic influences such as an oil spill. Improvements to our understanding of this marine ecosystem are critical to understand the ecosystem damage from the oil spill.

The long history of collecting temperature and salinity at GAK1 has paid off. Payment for this time series has been from many sources since Tom Royer had the idea to monitor in the GOA in 1970. The knowledge from the early collections benefited the state immediately following the *Exxon Valdez* oil spill. Many other entities have made use of information from GAK1 since then. There are exceedingly few consistent time series of this caliber in the whole US. Alaska is lucky to have this, especially in light of recent knowledge of Arctic warming. The continued ocean monitoring at GAK1 is essential to the evaluation of the oil spill damage to this marine habitat. This monitoring is analogous to "the canary in the coal mine" though it requires decades of measurements to detect these changes.

GAK1 (Weingartner) is the linchpin that anchors all of the monitoring studies under consideration today. The ferry box sampling (Cokelet) collects measurements on the Alaska Marine Highway system. The information from this extends a one-point collection (GAK1) into a horizontal collection along the south central coast of Alaska. These measurements are complemented and expanded in depth with additional temperature and salinity (Okkonen) and zooplankton (Batten) collections. The combination of these four sets of measurements provides excellent time and space coverage to monitor oceanic and atmospheric changes in the Gulf of Alaska, which are indicative of PWS and the Arctic. Not only is the information invaluable, as we have shown, but these collections are inexpensive because the ship time is provided by other sources.

In addition to informing us about global warming, these collections are directly useful to understand the plight of herring in PWS. Recent results from the EVOS-funded Herring Synthesis studies (Norcross et al. 2006) show that high survival rates of herring larvae are critical for the herring population in PWS to recover. The same Alaska Coastal Current that sweeps through PWS and influenced where the oil went in 1989 determines where herring larvae go after they spawn. It is critical that they be carried to good nursery grounds with adequate food. While specific studies are needed in PWS to test nurseries, these monitoring programs are needed to develop models of water current movements (Weingartner, Cokelet and Okkonen) and food available (Batten). Scientists (reviewers, STAC), the public (PAC) and the PWS fishermen (PWSFRAP – PWS Fisheries Application Planning Group) recognize the need for these basic measurements to address

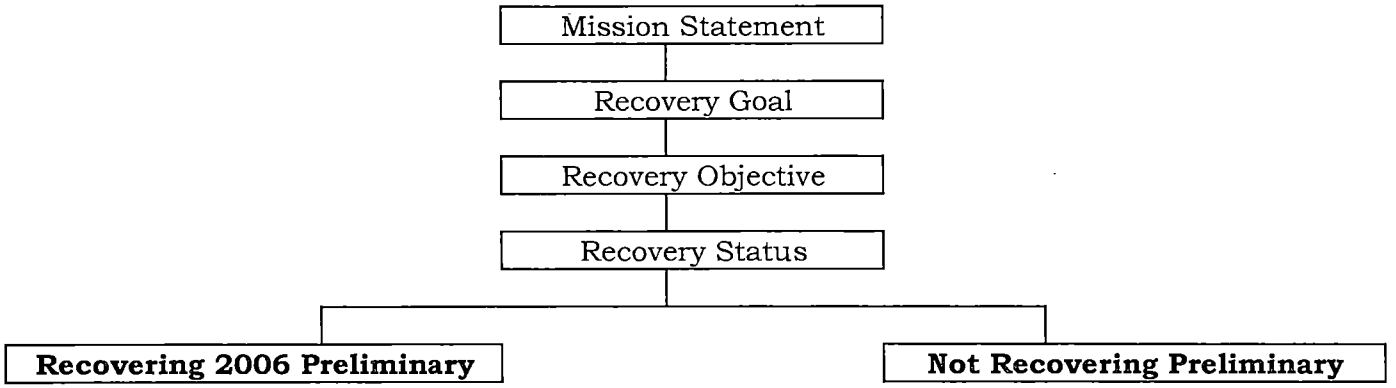
the herring problem. We hope that you, too, will acknowledge this need and fund these studies.

The State of Alaska recently issued its "Ocean Research Priorities". While the EVOSTC is not supposed to directly fund state-mandated research it does support the overall needs of the state. We believe that EVOS funding of these four monitoring programs will contribute significantly to six of the sixteen priorities on the state's list. These collections provide the foundation for understanding **large-scale relationships (#1)** and **fine-scale management (#2)** needed for sustainable harvest of species. Monitoring is the tool by which **marine water trends (#6)** and **fresh surface water (#7)** is identified and interpreted. Finally, the connection between oceanography and herring success, as I mentioned at the outset, is established through **climate change effects on fisheries (#9)** and **integrated physical, chemical and fisheries oceanographic studies (#10)**. These six priorities for the State of Alaska Ocean Research, as well as the EVOSTC desire restoration of non-recovered species and services can all be addressed by financial support of the four monitoring projects (Weingartner, Cokelet, Okkonen and Batten) that under consideration today. We urge you to fund these projects without further delay.

Royer, T. C. and C. E. Grosch. 2006. Ocean Warming and Freshening in the Northern Gulf of Alaska. Under review, *Geophysical Research Letters*

Norcross, B.L. S-B. Kelly, P-J Hulson and T.J. Quinn. 2006. An early life history model for Pacific herring in Prince William Sound, Alaska. To be submitted, *U.S. Fishery Bulletin,*

EXXON VALDEZ OIL SPILL RESTORATION PLAN
November, 1994



	Recovering 2006 Preliminary	Not Recovering Preliminary
Injured Biological Resources	Sea Otter (Northern Knight Island) AB Killer Whale Pod Harlequin Duck	Pacific Herring AT 1 Killer Whale Pod
Injured Resources	Sediment (Lingering Oil) Wilderness Areas	
Injured Services	Commercial Fishing Passive Use Recreation & Tourism Subsistence Use	

Restoration Strategies	Restoration Strategies
• **Rely on Natural recovery**	• **Research why not recovering**
• Monitor recovery	• **Initiate, sustain or accelerate recovery**
• Protect injured resources and habitats	• Monitor recovery
	• Protect injured resources and habitats

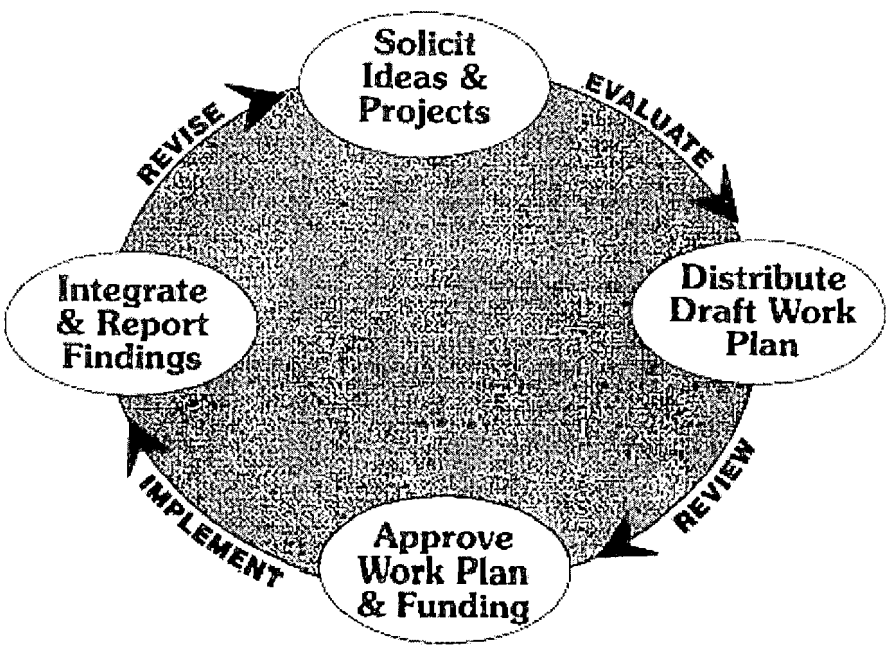
Excerpt from *Exxon Valdez Oil Spill Restoration Plan*
November 1994

Chapter 1: Introduction
Section: Implementing the Restoration Plan: *The Adaptive Management Cycle*

The Restoration Plan provides long-term guidance for restoring the resources and services injured by the oil spill. It does not list individual restoration projects. Each year, the Restoration Plan will be implemented through an annual or multi-year work plan. The work plan describes the projects funded by the Trustee Council from the restoration fund. To be funded, projects must be consistent with the Consent Decree and Memorandum of Agreement, and with the policies, objectives, and restoration strategies of this Restoration Plan.

Figure 1 shows the Adaptive Management Cycle that is used to determine the work plans. The figure shows that restoration is a cyclical activity - that the restoration priorities and needs embody a long-term, ecosystem view that is continually updated as new information is acquired. Thus, the most current information is used to determine the needs of injured resources and services and the priorities for restoration. On the basis of those priorities, the Trustee Council annually invites proposals and ideas for restoration from government agencies, universities, private industry and the public. Submissions undergo scientific, policy, and legal review. Important projects that need additional work may be further developed. Following that review, a draft of that year's restoration program is distributed for public review. The Trustee Council uses information received from the public, scientists, the Trustee's Public Advisory Group, and agency staff to decide which restoration projects to fund that year.

Figure 1. The Trustee Council Adaptive Management Cycle



Interim Guidance Document

This Guidance Document focuses on several areas for study to assist the Council in their decision making process. It will remain throughout the development of the FY07 Work Plan. Planned actions include:

1. Determine the fate and impact of lingering oil in the spill area.
2. Determine the status of injured resources and services and issue an updated list.
3. Determine the status and future of the habitat acquisition program.

Relationship of the Guidance Document to the FY07 Invitation for Proposals

It is the intent of the Council to accomplish these priority, short-term actions while adhering to the EVOS annual process and schedule as described in the Restoration Plan to the extent practical. This is to be done with the understanding that some adjustments may be made to the process to accomplish the Injured Species and Services review and update and the assessment of lingering oil and restoration in a timely and efficient manner.

During this time the annual adaptive management cycle outlined in the 1994 Restoration Plan will continue to be used for preparation, review and issuance of the FY07 Invitation.

Following approval and funding, projects are implemented by trustee agencies, private industry, communities, and non-profit organizations. Each year, the results of that year's restoration activities are synthesized, integrated, and distributed so that scientists and the public have an up-to-date view of the condition of the injured resources and services and know what has been learned during that year. The Trustee Council annually publishes a status report for the public describing the restoration program and the current condition of the resources and services injured by the spill. On the basis of the updated status, the cycle begins again.

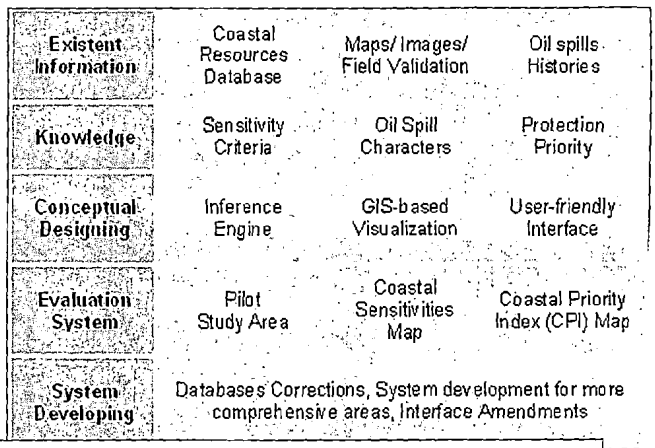
Within the adaptive management cycle, there are multiple opportunities for meaningful public participation at all levels - planning, project design, implementation and review - not just during the public comment period of officially distributed documents. These opportunities - group meetings, Public Advisory Group meetings, and project planning groups – involve the public in an on-going fashion.

The public and the scientific community will be provided timely access to all levels of restoration information. In addition to the status report, more detailed information will be made available to scientists and the interested public in a timely manner and in an easily usable form.

Oil Spill Management Through a Decision Support System

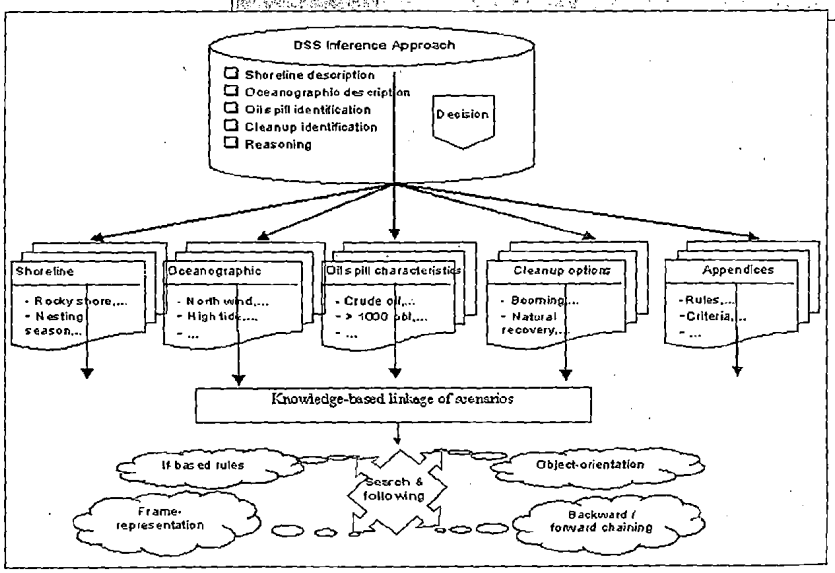
Knowledge Helps to Set Priorities and Assist in the Decision-Making Process

By S. Zahra Pourvakhshouri
Ph.D. Candidate
Shattri B. Mansor
Head of the Spatial and Numerical Modeling Laboratory
Institute of Advanced Technology
and
Zelina Z. Ibrahim
Head of the Department of Environmental Sciences
University Putra Malaysia
Selangor, Malaysia



(Right) Components of the DSS engine.

(Below) A detailed design of the proposed DSS for oil-spill management.



Oil spills are serious environmental disasters, often leading to significant, long-term impacts on the environment, ecology and socio-economic activities of an area. Worldwide, from 1978 to 1995, there were more than 4,100 major oil spills of 10,000 gallons or more.[1] Several serious oil-spill incidents have taken place since 1995 too, one notable example of which is the *Sea Empress*, which spilled approximately 5,000 tons of oil that reached the United Kingdom's coastline.[2]

Each contamination site has different characteristics, depending on pollutants' properties, hydrological conditions and a variety of physical, chemical and biological properties. Thus, the methods selected for dealing with each different site varies significantly. The decision for a suitable method at a given site often requires expertise on both remediation technologies and site conditions. Because of this, a great amount of information should be used to improve the management of each site's emergency, which generally means making the best decision at the right moment.[3]

Malaysia has more than 4,670 kilometers of coastal borders, including valuable mangrove swamps, shrimp prawns' and birds' breeding and nesting areas, turtles' egg-laying regions and recreation and tourist resorts. Malaysia's coastal waters experience oil pollution from bilge pumping and tank cleaning, which leads to the dumping of oil and sludge by ocean-going vessels.

Collisions and groundings of ocean-going tankers also cause oil pollution. Each of these reasons encouraged researchers to create supporting systems for assisting with the decisic making process when oil spills occ

Oil Spills and Decision Making

Decision making is a complex p cess, influenced by many factors, b human and non-human. Acade research in the decision support s tem (DSS) field dates back to the w of A. Gorry and M. Scott-Morto 1971. A DSS may be defined as integrated, interactive and flex

computer system that supports, not replaces, all phases of decision-making with a user-friendly interface, data and expert knowledge.

Some, but by no means all, recent DSS textbooks include geographic information systems (GIS) as a component of management support systems. GIS software provides a link between the interface and database that allows a user to easily query spatial data. GIS can even be used as a DSS generator to create spatial DSSs.

There are many reasons to develop a prioritization system; one is to determine the points and problems which require the most attention, and to direct an approach for specific needed actions. Once the targeted areas have been identified, an optimized management system can be used via implementation of various best-management practice options.[4]

The proposed contingency plan in this project illustrates how DSS constitutes the central nucleus, which receives all information from different groups of the contingency team. DSS provides easily understandable assistance for non-technical decision-makers to enable them to manage equipment and facilities in the most proper way and time.

DSS Components

Almost all of the reviewed models concentrated on three distinct areas: the language system, the problem processing system and the knowledge system.[5] Another study broke down the three areas as the data manager, the model manager and the dialog manager.[6] A third study suggested the "Triple S" model that included screening, scooping and scanning phases.[7] This model is an integrated approach for the sustainable development of coastal zones.

However, there is a general consensus in the definition of DSS that interface, database and model components are usually required to fully support decisions. One DSS paradigm examined has two modules: the supporting environment and the intelligent user interface.[8] The supporting environment consists of resources (such as data, model and knowledge) required for decision-making and a mechanism (such as an inference engine) to retrieve and apply these resources.

Methodology

The duty of DSS for oil-spill management was considered based on the

Coastal priority indexing.

Matrix value	Priority ranking	Priority sub-ranking	Coastal Priority Index (CPI)
< 45	Low	Low	
45 - 93		Low – Medium	
93 - 108	Medium	Medium	
108 - 139		Medium – High	
139 - 157	High	High	
157 - 224		High – Very high	
224 - 325	Very high	Very high	
325 - 337		Very high - Extreme	
337 - 483	Extreme	Extremely high	
> 483		Critical	

general components mentioned earlier in this article. It is simple, but comprehensive, idea to cover the objectives of the project.[9]

The coastal information is divided to three major parts that are stored in the system: physical, biological and human use resources. Some portion of the data must enter the system in real time through the interface (wind, current, oil spillage point, etc.). One part of the system also considers sample scenarios and historical cases.

The system can establish a link between spilled oil characteristics and location, shoreline sensitivity and different clean-up methods. Significant information is extracted through a knowledge-based archive. Most links are based on expert system engineering methods such as if-based rules, backward/forward chaining and frame representation. Preparation of the user interface was done using Visual Basic 6 and Macromedia Dream-Weaver programs.

Regarding the project's proposed aims, some criteria were considered before choosing the primary study area: availability of more data with manageable volume, having environmental sensitivity in both natural and human activity form, and exposure to oil-related activities with a pollution occurrence history. The study area selected was the Strait of Malacca, from the north part of Port Dickson to south of Melaka, the estuary of the Muar River. A trip to check the site was conducted during July 2004 to validate the existing data from the

sitive coastal areas. The system will also provide simple assistance even for non-technical decision-makers to prioritize resources in the marine coastal area.

Analysis and processing functions of digital images, together with GIS, have been applied to develop a CPI map to protect the vulnerable environmental and socio-economic resources of the Malacca Straits as a necessary part of any oil-spill control and clean-up program.

References

For a complete list of references, contact author S. Zahra Pourvakhshouri at zp@itma.upm.edu.my. *ST*

For more information on this subject matter, visit our Web site at www.sea-technology.com and click on the title of this article in the Table of Contents.

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