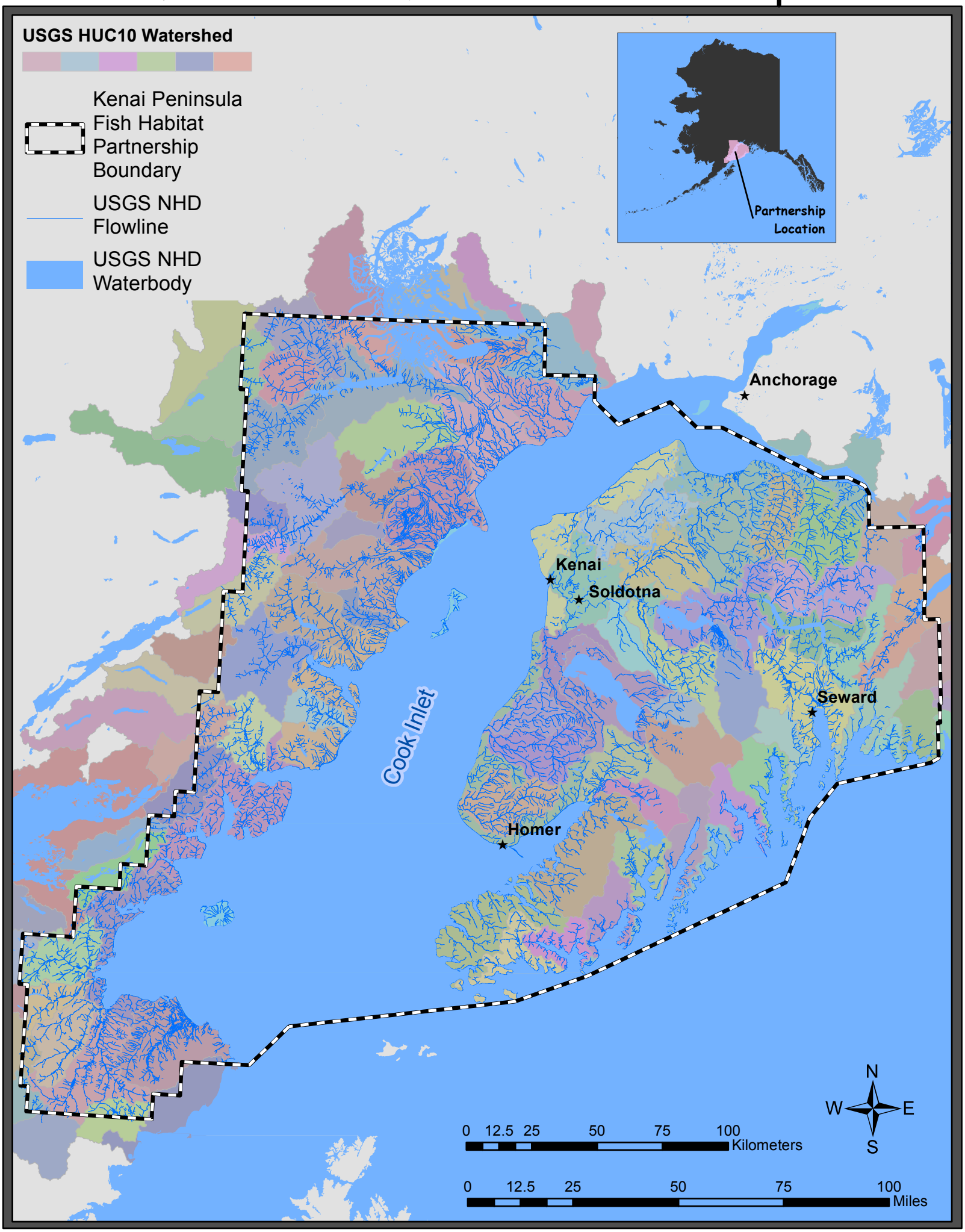
Linking Science To Action

SCIENCE SYMPOSIUM

April 17 & 18 • Islands & Ocean Visitor Center • Homer, AK

KENAI PENINSULA
FISH HABITAT PARTNERSHIP

Kenai Peninsula Fish Habitat Partnership



Linking Science to Action

Science Symposium

Welcome!

The Kenai Peninsula Fish Habitat Partnership would like to welcome you to their first Science Symposium! Thank you for choosing to join us for two days of interaction and collaboration focused on habitat of the Kenai Peninsula.

On January 15, 2010, The KPFHP was approved as a recognized Fish Habitat Partnership at the meeting of the National Fish Habitat Board. The Partnership became the 15th regional fish habitat partnership in the U.S. and the 3rd recognized partnership in Alaska. The KPFHP works closely with the Alaska Partnerships, the Mat-Su Salmon Partnership and the Southwest Alaska Salmon Habitat Partnership. The Partnership is also poised to welcome the Southeast Alaska Fish Habitat Partnership, which is in candidate status.

The geographic area covered by the KPFHP closely mimics those of the Kenai Peninsula Borough. This includes approximately 25,000 square miles, encompassing 14 major watersheds, over 20,000 miles of stream habitat as well as more than 350,000 acres of wetland habitat.

Purpose: To create and foster effective collaborations to maintain healthy fish, healthy people, healthy habitat, and healthy economies in the Kenai Peninsula Borough.

Mission: To protect, maintain, restore and enhance fish habitat.

Vision: For future generations to have healthy, sustainable fish and aquatic ecosystems.

Big thanks to Jessica Speed and the Mat-Su Salmon Partnership for supporting the KPFHP's efforts to host a Science Symposium. Ms. Speed and the Mat-Su Partnership were very generous with their documents and planning materials.

We hope you enjoy the Symposium!

KPFHP Steering Committee

Doug Limpinsel, NOAA	Mark Chilcote, USFS
Ginny Litchfield ADF&G	Ricky Gease, KSRA
Jeff Anderson, USFWS	Sue Mauger, CIK
Marie McCarty, KHLT	Peter Micciche, ConocoPhillips

Robert Ruffner, KWF, Coordinator

KENAI PENINSULA FISH HABITAT PARTNERSHIP

Linking Science to Action

Science Symposium

April 17 - Wednesday

9:30 Registration and Check-In

10:00 Opening/Welcome – Terry Thompson ~ Kachemak Bay Research Reserve
Mayor Mike Navarre ~ Kenai Peninsula Borough

10:20 Kenai Peninsula Fish Habitat Partnership CAP Presentation
Robert Ruffner, Jeff Anderson, Doug Limpinsel ~ KPFHP CAP & Steering Committee
CAP Overview ~ Freshwater Presentation ~ Marine Presentation ~ CAP Table Topics

12:30 Lunch Break ~ Breakout Workshop begins

1:30 Scientist Presentations

1:30 – 1:45 Sue Saupe ~ Cook Inlet Regional Citizens Advisory Council
Nearshore Biophysical Habitat Mapping: The Alaska ShoreZone Program from a Cook Inlet Perspective

Knowledge of the spatial distribution of shoreline features and habitats in Alaska can be critical for making coastal resource management decisions, identifying essential fish habitat, planning for and responding to oil spills, and a myriad of other uses. The Alaska ShoreZone program has been providing physical and biological characterizations of Alaskan shorelines since the first surveys in Cook Inlet in 2001. Based on aerial imaging surveys, this classification, inventory, and mapping system provides on-line access to photographs and a searchable geospatial database of features such as shoreline morphology, sediment substrate, beach exposure, and "biobands" such as eelgrass, canopy kelps, salt marshes, and numerous other biotic habitat descriptors.

In addition to ShoreZone's robust collection of online accessible data and digital imagery, several demonstration projects - developed as companions to the Alaska ShoreZone Program - have become integrated components of the new "flex" website hosted by NOAA Fisheries. Data and imagery from the Kenai Peninsula and Cook Inlet locales will be used to demonstrate these web-accessible tools, as well as the Cook Inlet Response Tool, a demonstration project that integrates ShoreZone habitat imagery and data with other resource data, real-time data sensors, and forecast models.

1:45 – 2:00 Jasmine Maurer ~ Kachemak Bay Research Reserve
Salmon in the Flats: Juvenile Salmon Use of an Estuary in a Glacial Watershed

Estuaries are widely accepted as diverse and productive habitats that can play a number of roles in the life of a juvenile salmon. However, every estuary offers a unique set of environmental conditions, and relatively little is known about how juvenile salmon interact with Alaska's diverse estuarine environments, especially those of glacial watersheds. To address this knowledge gap, we initiated studies in 2009 to determine timing of outmigration, habitat use, and foraging of juvenile salmonids in the glacially-derived Fox River delta, located at the head of Kachemak Bay in south-central Alaska. The Fox River delta is a complex intertidal mud flat and low-lying marshlands approximately 7.7 square kilometers and 6.6 river miles. Anadromous runs of coho (Onchorynchus kisutch), chum (O. keta), pink (O. gorbuscha), and sockeye (O. nerka) salmon, as well as Dolly Varden (Salvelinus malma) are supported in the

NOTES:

Fox River ecosystem. This study focused on juvenile coho and sockeye use of four side channels of the Fox River within the Fox River estuary. Preliminary diet analysis identified chironomids as the primary food source for coho and sockeye salmon, but terrestrial insects also were prominent. Coho and Sockeye salmon were present throughout the sampling period, May 1ST to Sept 27th. Coho ages one and two were present throughout the sampling period, but age zero weren't observed until after June 1st. Sockeye age one were present from May 1st to mid-July, very few were observed the last two weeks of July and none after August 10th. Age zero sockeye were present throughout the sampling period. The four side channels had different ranges of habitat variability, however fish were found in each channel whenever water was present regardless of temperature, sampling event, or channel proximity to shoreline.

2:00 – 2:15 Coowe Walker ~ Kachemak Bay Research Reserve
Salmon in the Hills: Headwater Streams as Rearing Habitat for Juvenile Salmonoids

Conservation and management of headwater streams amid rapid global change require an understanding of the spatial and environmental factors that drive ecosystem processes and species distributions. Using a hierarchical analytical framework we have modeled the effects of catchment-scale topography and wetlands geomorphic classes on stream physical habitat, chemistry, and macroinvertebrate and fish communities in headwater streams across the Kenai Lowlands. We identified 135 macronivertebrate taxa, 122 of which were aquatic insects, of which 79 were dipterans. We collected 6 species of fish; juvenile coho salmon and Dolly Varden were collected in 27 and 48 of the 53 streams, and reached densities of >500 and 1300/km, respectively. Flow-weighted slope, an indicator of water residence time and gradient, was the best catchment-scale correlate of macroinvertebrate and fish community structure, and it's effect was mediated by wetlands geomorphic classes and numerous water chemistry, substrate composition, and channel geomorphology variables measured at the reach-scale. Juvenile salmonids were segregated among streams by both species and age classes. Coho salmon fry and parr had significant unnimodal distributions that peaked in streams with intermediate slopes and gravel substrates, whereas presmolts were found only in lowest sloping streams with mostly peat substrate and deep, slow channels. Large Dolly Varden (>8cm) were found across the entire gradient, but were most abundant in high-sloping catchments, whereas small Dolly Varden (<8cm) followed a similar distribution but were absent from the lowest-gradient sites. Predictive modeling indicated that all of the 547 km of headwater streams in the study area might serve as potential habitat for at least 1 species and age class of salmonids. Our study should assist in development of catchment management tools for identifying and prioritizing conservation efforts in the region, and may serve as a framework for other studies concerning biodiversity and focal species conservation in headwater streams.

2:15 Poster Session

Kris Holderied ~ National Oceanic and Atmospheric Administration
Kachmak Bay Plankton Monitoring

Kris Holderied ~ National Oceanic and Atmospheric Administration
Gulf Watch Alaska Ecosystem Monitoring

Lisa Ka'aihue ~ Cook Inlet Aquaculture
Protecting the Cook Inlet Watershed

Tammy Hoem Neher ~ University of Alaska Fairbanks, Kachemak Bay Research Reserve
Influence of Estuaries on Expression of Juvenile Life History in Coho Salmon

NOTES:

Linda Robinson ~ Prince William Sound Regional Citizens Advisory Council
Science Projects of Prince William Sound Regional Citizens' Advisory Council
Shana Loshbaugh ~ University of Alaska Fairbanks
The History of Land Use on Alaska's Kenai River & Its Implications for Sustaining Salmon (2009)
Shana Loshbaugh ~ University of Alaska Fairbanks
Booms, Busts and Building on the Frontier: How Have Historical Forces and Land Use Interacted on the Kenai Peninsula, Alaska? (2008)
Susan Saupe ~ Cook Inlet Regional Citizens Advisory Council
Nearshore Biophysical Habitat Mapping: The Alaska ShoreZone Program

2:45 Tidbits (unscheduled 3 minute project summary or announcements)

3:00 Scientist Presentations

3:00 – 3:15 Branden Bornemann ~ Kenai Watershed Forum
Esri ArcGIS Online: A new perspective on Geographic Information Systems

ArcGIS Online is an entirely new part of ArcGIS and extends traditional ArcGIS into a platform technology for use across organizations and the geospatial community at large. As an integral part of this platform, ArcGIS Online provides open geospatial capabilities to any user and allows access by any application on any device anywhere, anytime. As a developing concept aimed at transforming GIS and how people use it, ArcGIS Online is rapidly developing in both capabilities and use. By providing cloud computing, rich content and services, ArcGIS Online facilitates the organization, sharing and use of geospatial content, maps and data through all user groups. New and advanced GIS users can use this platform for mapping, geographic analysis and data management, contributing to the creation and sharing of more than 1 million maps, datasets, and applications to date. This presentation will give a brief overview of the administration, publishing and collaboration made possible through ArcGIS Online for Organizations. The presentation will conclude with a short mapping demonstration.

3:15 – 3:30 Shana Loshbaugh ~ University of Alaska Fairbanks
Science on the Kenai River: A Brief History and Critique

I am finishing a dissertation examining the land-use history of the Kenai River Watershed and its implications for sustaining wild salmon runs. One question my project addresses is: "How can local science better aid efforts to sustain salmon habitat?" Via interviews, historical records, and existing scientific and planning literature, I explored what science has been done on the Kenai River and how that science has influenced land-use and fisheries management. My presentation provides an overview of major study initiatives dating from the 1960s to the present. It describes the context and usefulness of reports such as the US Army Corps of Engineers' floodplain surveys beginning in the 1960s, the state's Kenai River Comprehensive Management Plans, the Soil Conservation Service's cooperative river basin study, the interdisciplinary "309" studies in the 1990s, Chugach National Forest's landscape assessment series, the Kenai River Sportfishing Association's evaluations of riverbank restoration efforts, and current water-quality monitoring projects coordinated by the Kenai Watershed Forum and Cook InletKeeper. These works are impressive, but serious problems persist relating to coordination, prioritization, data quality, data gaps, methodological compatibility, long-term monitoring, access to the information, and communicating results to the public and decision-makers. I conclude with

NOTES:

recommendations on improving the links between science and meaningful actions to safeguard Kenai River fish habitat.

3:30 – 3:45 David Albert ~ The Nature Conservancy/Ecotrust
Salmon Decision Tools: integrated systems for planning, conservation and resource development in Alaska

Salmon are widespread in Alaska, and support local economies and cultures. As Alaska continues to develop, we believe that better information and tools are needed to minimize risks and maintain the continued productivity of Alaska salmon for future generations. The objective of this project is to convene a discussion among resource agencies and stakeholders to explore potential development of integrated mapping tools that support project planning, permitting, mitigation, restoration and conservation of salmon habitat in Alaska.

3:45 – 4:00 Coowe Walker ~ Kachemak Bay Research Reserve
Wintering Ecology of Juvenile Coho Salmon on the Anchor River

Freshwater wintering habitat for juvenile salmon is considered an important limiting factor to salmonid populations in Alaska, however, little is known about the ecology of wintering coho salmon populations here. Human population growth, coupled with ongoing climate change, is changing the quality and quantity of stream and groundwater flows that maintain juvenile salmon habitat. We recently conducted studies investigating densities and survival of juvenile salmon in different overwintering habitats along the Anchor River. The primary goal of this research was to identify and characterize potential juvenile coho salmon overwintering habitat in locations within the Anchor River watershed. According to analysis of water samples, our sites fell into a continuum of groundwater concentrations ranging from 37-96%. Groundwater had a profound effect on thermal characteristics of habitats, and, at the most extreme ends of groundwater contribution, oxygen content; however, other habitat features such a wood debris and substrate characteristics, did not covary with groundwater concentrations. The second goal of this research was to determine what features of peripheral habitats are best associated with the distributional patterns and abundance of age-1+ juvenile coho salmon. Through model selection and inference using the information-theoretic approach, we determined that proportion groundwater, mean dissolved oxygen, mean temperature, and invertebrate density, in order of importance, explaining a significant component of among-site variability in catch-per-unit-effort (CPUE, number of fish per trap hour, used as a surrogate for abundance) of juvenile coho salmon. Continuing this line of research, we have been conducting a pilot study investigating how winter habitat temperature, mediated by groundwater inputs contributes to juvenile fish growth. Our research provides new and necessary information on the relationship between wintering habitats and the density, survival, and fitness of juvenile coho for making informed decisions about conservation and restoration of critical coho habitat.

4:00 Sponsor Presentations

4:00 – 4:10 EPSCoR Alaska
4:10 – 4:20 ConocoPhillips

4:20 Evening Overview ~ Directions to Meet, Greet & Eat ~

4:30 Workshop ends ~ Dismiss to Meet, Greet and Eat!

6:00 Keynote Speaker ~ Randy Olson

NOTES:

April 18 – THURSDAY

8:30 Registration and Check-In

9:00 Q&A with Randy Olson

9:45 Scientist Presentations

9:45 – 10:00 Daniel Rinella ~ University of Alaska Anchorage
The Interaction of multiple drivers of environmental change: hydrological dynamics, aquatic ecology, and human dynamics of the Kenai River, Alaska.

The Kenai River watershed in southcentral Alaska exemplifies the interactions of multiple drivers of change and their effects – creating what has been termed a complex or "messy" social-ecological system. These drivers include global and regional temperature and precipitation changes; salmon population fluctuations; a recent tourism downturn; recreational pressure from Anchorage; shrinking wetlands and successional change; spruce beetle outbreaks; and forest fire dynamics. In this multi-year research initiative, funded by NSF's EPSCoR program, we will use an interdisciplinary approach to help understand these changes, their consequences for human communities, and the adaptive capacity necessary to respond to change. Salmon studies will focus on understanding and anticipating how changes in land cover, temperature, and hydrology will affect the abundance and stability of salmon returns and, in turn, the communities that rely on them.

10:00 – 10:15 Kacy Krieger ~ University of Alaska Anchorage
The South-Central Alaska Geospatial and Science Catalog

The Kenai River watershed and the Kenai Peninsula are a data rich resource, particularly in regards to aquatic habitat and species. Regional scientific and geospatial data collections however, are distributed among various regional, national and international organizations and acquiring this information is often tedious and difficult. Access to and distribution of this data can be improved through a cohesive data network, linking people to the data. Alaska EPSCoR and the University of Alaska, Geographic Information Network of Alaska (GINA), in collaboration with regional partners have developed the Southcentral Alaska Geospatial and Science Catalog, a one-stop destination for ongoing projects and existing regional data. This catalog serves as a central resource for the discovery, distribution, archiving, visualization and management of the best science-based, aquatic, geospatial (GIS), and engineering data for Southcentral Alaska and the Kenai Peninsula. The goal of Southcentral Catalog is to link scientists, policy makers, and the public to regional data products and projects, improve understanding, collaboration, and community outreach.

10:15 – 10:30 Mike Gracz ~ Kenai Watershed Forum
Peatland Contributions to Streamflow During the Summer Low Flow Period

Stream temperatures on the Kenai Peninsula have exceeded those recommended for adult salmon. Temperature is influenced by stream flow: higher flow equals lower temperatures. Activities in wetlands are regulated under section 404 of the Clean Water Act. Therefore, if wetlands are important contributors to stream flow during dry periods, Section 404 provides one mechanism for mitigating warmer stream temperatures. Using a water budget analysis and a mixing model I find that peatlands in one southern Peninsula watershed probably contribute around half of the stream

NOTES:

flow in a tributary to the Anchor River during a summer dry period although peatlands cover only 22% of the watershed.

10:30 Networking Break

11:00 Tidbits (unscheduled 3 minute project summary or announcement)

11:15 KPFHP/NHFP Funded Project Presentations

11:15 – 11:30 Jeff Anderson ~ US Fish and Wildlife Service
Application of a GIS-based Model to Predict Population Response of Chinook and Coho Salmon to Habitat Restoration and Climate Change in Southcentral Alaska

Existing habitat inventory data and assessments throughout Alaska are incomplete. This limits the capacity of resource managers to understand, anticipate, and prepare appropriate responses to changes in watershed processes that can result from anthropogenic and climate change. To address this need, the U.S. Fish & Wildlife Service is implementing a habitat assessment project on the Anchor River watershed in Southcentral Alaska. The goals of the project are to assess current habitat conditions for Chinook and coho salmon in the Anchor River watershed, to increase our understanding of the relationships of key life stages of salmon to these habitats throughout the watershed, and to model the potential responses of Chinook and coho salmon populations to restoration efforts and potential shifts resulting from climate change. We are using remotely sensed data, field data, refined hypothesis testing, and GIS tools to identify salmon habitats in the Anchor River watershed and applying a predictive model called RIPPLE to characterize locations critical to protect population productivity, and make predictions on how changes to existing habitats might translate into changes in productivity. Once the model is refined on the Anchor River, we will apply it to similar watersheds on the Kenai Peninsula. We plan to use the model as a prioritization tool for projects funded under our Fish Passage, Partners for Fish Wildlife, and National Fish Habitat Action Plan programs.

11:30 – 11:45 Rob Massengill ~ Alaska Department of Fish Game
Kenai Peninsula Invasive Northern Pike: Research and Control Efforts

Invasive northern pike on the Kenai Peninsula have decimated native fish populations in some areas and have caused the loss of hatchery-stocked fishing opportunity in others. Northern pike are likely to invade new areas and cause further fishery losses, particularly to areas where potential pike habitat is plentiful. ADFG has conducted northern pike control and research efforts on the Kenai Peninsula for over a decade and progress has been made. Of the nineteen waterbodies on the Kenai Peninsula where self-sustaining populations of northern pike have been identified, only twelve still contain northern pike. Control and eradication efforts have included liberalization of sport harvests, mechanical removal, fish barriers and pesticide treatments that have involved the cooperation of multiple agencies. The most recent pesticide treatment was at Stormy Lake (Nikiski) in September of 2012. A multi-year project to remove northern pike from the Soldotna Creek drainage has started and is currently in the pre-treatment data collection phase with work being done by ADFG and the KWF. Recent research has included studying the effects of intensive gillnetting on northern pike populations in the Soldotna Creek drainage and tracking northern pike movements with radio-telemetry methods. A new research project is being developed to evaluate the effectiveness of using environmental DNA (eDNA) techniques for detecting northern pike.

NOTES:

11:45 KPFHP Project Application Process Jeff Anderson ~ KPFHP Steering Committee

12:00 Lunch Break

1:00 Scientist Presentations

1:00 – 1:15 Lisa Beranek ~ Kenai Watershed Forum

Stream Watch: Volunteers Making a Difference on Kenai Peninsula Rivers!

Linking science to action! The Stream Watch program is a volunteer driven program jointly administered by the Kenai Watershed Forum and the Chugach National Forest. Through on-the-ground projects and environmental education, Stream Watch volunteers of all ages and backgrounds work together to leverage agency and other entity's river protection efforts through this effective program.

1:15 – 1:30 Sue Mauger ~ Cook Inletkeeper

Using Thermal Infrared Imagery for Strategic Salmon Habitat Protection

As stream temperatures rise in many non-glacial salmon streams in the years ahead, cold water refuges – areas within a stream which are persistently colder than adjacent areas during the summer – will be critical to the survival and persistence of salmonids and other fish species. Stream reaches with distinct groundwater interactions (i.e. springs and seeps) are potentially important for providing refuge from the warmest temperatures. In 2010 and 2012, we mapped cold water habitats using airborne thermal infrared (TIR) imagery along 66 miles of the Anchor River and 10 miles of the Ninilchik River on the Kenai Peninsula, Alaska. TIR imagery is a valuable tool for illustrating the location and thermal influence of point sources, tributaries and surface springs. Cook Inletkeeper will use these spatially-explicit thermal data, as well as other current research in these watersheds, to help Kachemak Heritage Land Trust determine which parcels with key Chinook and coho habitat are the highest priorities for permanent conservation. By linking state-of-the-art technology with conservation planning, we will improve landscape-scale resilience for salmon in Southcentral Alaska during a time of rapid climate and land-use change.

1:30 – 1:45 Branden Bornemann ~ Kenai Watershed Forum

A Collaborative Approach to Creating, Updating and Managing Southcentral AK Hydrology Datasets

The National Hydrography Dataset (NHD) in Alaska was mapped at 1:63,360 scale from USGS Historical Topographic Maps, and the data contains errors including streams outside of their channels, misrepresentations of flowlines in braided streams, and incorrectly disconnected streams. There is a predominant need in the state to correct these issues and improve the NHD in Alaska. On the Kenai Peninsula, there are several disparate hydrography datasets held by various entities. This data is not coordinated and is diverging further over time. There is no state agency in Alaska directly responsible for hydrography in Alaska, and no Geographic Information Office overseeing hydrologic mapping in the state. Currently, the most successful method of upgrading NHD in Alaska is to work with partner entities in their local areas to make data improvements where they are the most knowledgeable, have the highest investment and have committed and established coordination relationships. This presentation will give an overview of the agencies involved in this process, their motivations driving the interest and need for this resource, and what objectives are being met to meet the principal goal of updating the NHD in Southcentral Alaska.

NOTES:

1:45 – 2:00 Tammy Hoem Neher ~ University of Alaska Fairbanks/Kachemak Bay Research Reserve

Influence of Estuaries On Expression of Juvenile Life History in Coho Salmon

We examined the use of estuaries by juvenile coho salmon Oncorhynchus kisutch using microchemistry and microstructure analyses of sagittal otoliths. Or objectives were two-fold: 1) to determine if juvenile coho salmon were rearing in estuarine habitats; and 2) to characterize and compare patterns of expression in life history traits in juvenile coho salmon (size, age, condition,duration and timing of estuarine occupancy) occupying two estuary environments that contrasted in size and habitat complexity. Traits significantly differed between coho salmon using estuaries and those that did not: estuary residents were largeer with greater body condition and weights than non-residents. Our findings highlight the potential of estuaries as important alternative rearing and overwintering habitats and suggest that conditions within estuaries may provide supplemental habitats for those individuals that move out of upstream freshwater rearing areas due to habitat loss and/or density dependent processes.

2:00 – 2:15 Robert Ruffner ~ Kenai Watershed Forum

Anchor River Restoration

In 2005 and 2006, with support from the Alaska Coastal Conservation Program, the Kenai Watershed Forum (KWF) conducted a reconnaissance level assessment of the South Fork of the Anchor River to assess reaches of the river that had been altered by anthropogenic influence. During the course of this work, it was discovered that an abandoned gravel pit had captured the river channel during a flood event in 2002, resulting in an unnatural braided stream with an overburden levee (a relic of the gravel pit) acting as an island between the two most active channels. The property where the gravel extraction had previously occurred was purchased for the State of Alaska prior to the 2002 flood and is managed for the conservation of exceptional stream and riparian habitat value. Upon completion of the assessment work this site was identified as a high priority for restoration.

Thanks to Stimulus funding through the National Oceanic and Atmospheric Administration, KWF was able to restore natural stream morphology and reduce known sources of turbidity on this section of the Anchor River, directly benefiting anadromous fish and their habitat. During the summer of 2011 KWF restored a single channel to a 1,600 ft. reach of the Anchor River while also flattening the floodplain to allow future unimpeded flood flows, re-establishing a historic meander, stabilizing the channel by reinforcing banks with rock, vegetation, root wads, and log jams, and removing abandoned debris. This presentation will discuss the success of this restoration project.

2:15 Networking Break

NOTES:

2:45 Table Topics (20 minutes 1st choice table, 20 minutes 2nd choice table, 20 minutes sharing)

1) ATVs

*Are frequently used ATV crossing a problem for fish habitat on the Kenai Peninsula?
*Identify known problem areas
*What are some possible solutions
*Funding sources?

2) Collaborations

*Which groups are working together and how?
*How can information be shared better?
*Where should relevant fish habitat information be housed?
*Is there a better way or need to share GIS data?

3) KPFHP Feedback

*Any habitat protection or restoration project ideas for the Partnership to fund?
*How can we get the word out to the public and local conservation community about the Partnership?
*Any questions regarding the project application process?
*Comments or questions for the Partnership

4) Invasives

*Mechanical measures have been overrun, is it time to consider chemical measures?
*If so, when?
*Who and how?
*What other species should be on the radar?

5) Fish Passage

*What's out there we need to know about?
*How do we tackle the "big ones"?
*Are we winning the battle?

6) Climate Change

*What are the impacts to fish habitat likely to be on the Kenai Peninsula due to climate change?
*What kind of research could the KPFHP fund/support to improve our knowledge of these impacts?
*What kinds of adaption strategies would improve fish habitat resilience to climate impacts?

3:45 Thank You's & Event Evaluation Forms

4:00 DISMISS

NOTES:

KENAI PENINSULA FISH HABITAT PARTNERSHIP

Linking Science to Action

Science Symposium

Our Keynote Speaker
Dr. Randy Olson

Once upon a time ...
Randy Olson was a humble, mild-mannered professor of marine biology at the University of New Hampshire. But then his brain sort of turned inside out and he shifted from scientist to artist. It happened in his first year as a professor. He hit a point where he realized that after fifteen years of telling stories OF science he had grown more interested in telling stories ABOUT science.

Despite his Harvard Ph.D., four years of post-doctoral research in Australia and Florida, and years of diving around the world from the Great Barrier Reef to Antarctica, he tossed it all in, resigned from his tenured professorship and moved to Hollywood to explore film as a medium for communicating science.

Today he is an INDEPENDENT FILMMAKER and no longer considers himself a scientist, but is now fluent in the two languages of science and cinema. In addition to writing and directing his **own feature films** about major issues in science, he has worked with **a variety of clients** to assist them with the use of visual media in communicating science to the general public. Through his writings he has both **related his journey**, and **continues his exploration** into the role of storytelling in the mass communication of science.

We are thrilled to have Dr. Randy Olson join us for his keynote presentation, "Winning Hearts and Minds Through a More Critical Approach to Storytelling" on Wednesday, April 17.

KPFHP DRAFT CAP PLAN

DRAFT FRESHWATER TARGETS - WHAT WE WANT TO CONSERVE

Target #1: Steep coastal streams

Focal Target Description: Includes non-glacial high gradient streams and tributaries that flow directly into the ocean. Includes all instream and riparian habitat and associated wetlands. In general, these are relatively short (< 20 km), high gradient (>5%) watersheds that drain coastal mountains. These streams usually have a short low-gradient reach near tidewater that provides suitable spawning habitat for pink and chum salmon, and some streams have a short reach with gradients less than 3% that provides suitable spawning and rearing habitat for small populations of coho salmon. Although individual streams support small populations of salmon, collectively these coastal streams produce sizeable runs of pink, chum, and coho salmon. Hydrographs usually peak in spring and early summer with peaks in snowmelt run-off, but can also experience peaks during freshets associated with rainfall events, typically in the fall. Water temperatures in these streams are likely resilient to changes in air temperature.

Examples include Rocky River, Humpy Creek, Jakalof Creek, Seldovia River, Granite Creek, and other streams on the outer coast of the Kenai Peninsula.

Nested Target # 1: Pink & Chum salmon spawning
Nested Target # 2: Coho salmon rearing

Target #2: Non-glacial mountain rivers

Focal Target Description: Includes non-glacial rivers and tributary streams that drain mountainous terrain. Includes all instream and riparian habitat and associated wetlands. Some shorter (< 20 km) mountain streams and rivers become tributaries of larger glacial rivers and some longer (> 20 km) rivers flow directly into the ocean. These streams and rivers follow typical dendritic morphology with small high gradient tributary streams joining to form larger streams and rivers that gradually increase in size and decrease in gradient over their course. These rivers and streams typically provide spawning and rearing habitat for chinook and coho salmon. Hydrographs usually peak in spring and early summer with peaks in snowmelt run-off, but can also experience peaks during freshets associated with rainfall events, typically in the fall. Water temperatures in these streams and rivers are likely resilient to changes in air temperature.

Examples include the Chuit River, Sixmile Creek, Quartz Creek, Resurrection Creek, Ptarmigan Creek, Juneau Creek.

Nested Target # 1: Coho and Chinook salmon all life stages

Target #3: Glacial rivers without lakes

Focal Target Description: Includes glacial rivers and streams that are not associated with lakes. Includes all instream and riparian habitat and adjacent wetlands. These streams and rivers follow typical drainage basin morphology with small high gradient tributary streams joining to form larger streams and rivers that gradually increase in size and decrease in gradient over their course. These systems typically provide spawning and rearing habitat for sockeye and coho salmon, although individual spawning populations are generally small. Estuaries and sloughs are extremely important for fish production because of the general lack of good quality rearing habitat and fish in many of these systems likely complete some of their freshwater rearing in estuaries. These streams are fed by glacial melt and have hydrographs that peak during the summer. Water temperatures in these streams and rivers are likely resilient to changes in air temperature.
Examples include Fox River, Placer River, Sheep Creek, Battle Creek.

Nested Target # 1: Chinook, Sockeye and coho salmon all life stages
Nested Target # 2: Hooligan
Nested Target # 3: Pink and chum in spawning life stage

Target #4: Glacial rivers w/ lakes

Focal Target Description: Includes glacial rivers and streams that are associated with lakes. Includes all instream and riparian habitat and adjacent wetlands. These rivers provide spawning and rearing habitat for Chinook, coho, and sockeye salmon. These streams are fed by glacial melt and have hydrographs that peak during the summer. The large lakes associated with some of these rivers (Kenai Lake, Skilak Lake, Tustumena Lake) act as buffers to rapid changes in streamflow and changes in temperatures. Water temperatures in these streams and rivers are likely resilient to changes in air temperature.
Examples include Kenai River, Kasilof River, Crescent River (west side Cook Inlet), Bradley River.

Nested Target # 1: Sockeye, Chinook, coho salmon all life stages
Nested Target # 2: Rainbow trout/steelhead
Nested Target # 3: Lake trout
Nested Target # 4: Hooligan
Nested Target # 5: Dolly Varden

Target #5: Lowland groundwater/wetland-dominated systems

Focal Target Description: Includes most lowland streams and rivers that are primarily influenced by complex wetland and groundwater interactions. Includes all instream and riparian habitat and associated wetlands. These streams and rivers provide spawning and rearing habitat for most salmonid species. Hydrographs usually peak in spring and early summer with peaks in snowmelt run-off, but can also experience peaks during freshets associated with rainfall events, typically in the

fall. Water temperatures in these streams are closely linked to increases in air temperature.
Examples include Anchor River, Chickaloon River, Swanson River, Deep Creek, Ninilchik River, Stariski Creek.

Nested Target # 1: Chinook and coho salmon all life stages
Nested Target # 2: Dolly Varden
Nested Target # 3: Rainbow trout/Steelhead

Target #6: Closed-basin lakes

Focal Target Description: Includes all closed-basin lakes, ponds, and open-water wetlands, most of which occur in the Kenai Peninsula lowlands. Includes all in-lake and shoreline habitat and short connective stream segments. Water levels in these lakes and ponds are primarily influenced by complex wetland and groundwater interactions. These small lakes and ponds provide habitat for numerous endemic fish species including Arctic char, rainbow trout, longnose sucker, and stickleback. Water temperatures in these lakes are closely linked to changes in air temperature.
Examples include lakes in the Swanson and Swan River canoe systems and many named and un-named lakes on the northern Kenai Peninsula lowlands.

Nested Target # 1: Arctic char
Nested Target # 2: Suckers, stickleback
Nested Target # 3: Endemic populations/assemblage

Target #7: Clearwater connected lakes with associated streams

Focal Target Description: Includes clearwater lakes that are part of a larger watershed that ultimately drains to the ocean. Lakes are a primary hydrologic influence- if lakes were missing, the system would be very different. Includes all in-lake and shoreline habitat and short connective stream segments. Water levels in these lakes and ponds are primarily influenced by annual snowmelt. These lakes provide spawning and rearing habitat for sockeye salmon and lake trout, and provide rearing habitat for coho salmon. Water temperatures in these systems are closely linked to changes in air temperature.
Examples include Hidden Lake/Creek, Fuller Lakes, Juneau Lake, Crescent Lake, Fox Creek, Chenik Creek, upper and lower Russian River lakes.

Nested Target # 1: Chinook and Sockeye salmon all life stages
Nested Target # 2: Coho salmon rearing and spawning
Nested Target # 3: Lake trout
Nested Target # 4: Dolly Varden

KPFHP DRAFT CAP PLAN

FRESHWATER TARGET VIABILITY TABLE

	Conservation Targets	Landscape Context	Condition	Size	Viability Rank
	Current Rating				
1	Steep coastal streams	Very Good	Good	Good	**Good**
2	Non-glacial mountain rivers	Very Good	Good	Good	**Good**
3	Glacial rivers w/o lakes	Very Good	Very Good	Good	**Very Good**
4	Glacial rivers w/ lakes	Good	Good	Good	**Good**
5	Lowland groundwater/wetland-dominated systems	Fair	Fair	Good	**Fair**
6	Closed-basin lakes	Good	Good	Good	**Good**
7	Clearwater connected lakes with associated streams	Very Good	Good	Good	**Good**
	Project Health Rank				**Good**

FRESHWATER POTENTIAL THREATS RANKING TABLE

	Potential Threats Across Targets	Steep coastal streams	Non-glacial mountain rivers	Glacial rivers w/o lakes	Glacial rivers w/ lakes	Lowland groundwater/wetland-dominated systems	Closed-basin lakes	Clearwater connected lakes with associated streams	Overall Threat Rank
	Project-specific threats	1	2	3	4	5	6	7	
1	Injurious aquatic invasive species				Low	High	High	High	High
2	Warmer climate		Medium		Low	Medium	Medium	Medium	Medium
3	Incompatible road development		Low	Medium	Low	Medium		Low	Medium
4	Residential development in riparian zone				Medium	Medium			Medium
5	Hydro development	Low	Medium	Low	Low			Low	Low
6	Incompatible mining	Low	Low			Medium			Low
7	Catastrophic spill (vehicle, tank farm, pipeline)				Low	Medium			Low
8	Urbanization/development outside the riparian zone				Low	Medium			Low
9	Incompatible ORV use					Medium			Low
	Threat Status for Targets and Project	Low	Medium	Low	Medium	High	Medium	Medium	Medium

- **Many others noted, with a low rank.**

KPFHP DRAFT CAP PLAN

Potential Threats to our Partnership's Geography

All of the conservation targets are potentially impacted by multiple threats, which act together to alter their viability. Based on the information from surveys, monitoring and personal observations over the past several decades, the freshwater science team members collectively ranked the highest critical threats as:

1. Injurious invasive aquatic species (present and potential species)
2. Warmer climate
3. Incompatible road development
4. Residential development in riparian zones

These four potential threats have direct impacts for all freshwater system targets of the Kenai Peninsula Partnership.

At a local scale, many other impacts exist that can affect important aquatic habitats. One example is historic mining and hydro-development that significantly altered Cooper Creek. In that particular drainage, restoring habitat based on historic activities would be a high priority for our US Forest Service partner as they are the land manager for that creek and the partnership would be supportive of their efforts. Other similar examples exist; however, our task to identify and prioritize potential threats is at a larger landscape scale, focusing on impacts across our entire partnership geography.

Injurious Invasive Aquatic Species Strategies

Objective: Novel species of invasive flora and fauna that are injurious to native fish or their habitats will not be allowed to establish within the Kenai Peninsula Borough. Existing populations of Northern Pike, Reed Canary Grass and Elodea will be contained to the host watershed(s) and efforts to eradicate within sub-watershed boundaries will only be supported where a high probability of success exists.

Target(s): Three targets are at higher threat levels; Lowland groundwater/ wetland dominated systems; Closed basin Lakes; Clearwater connected lakes with associated streams

Key Attributes: Migratory pathways, food web dynamics, vegetation structure and complexity

Key Threats: Lowland groundwater/ wetland streams – Habitat connectivity, Nutrient dynamics; Closed Basin Lakes – Nutrient dynamics, spawning habitat; clearwater connected lakes and associated streams – Nutrient dynamics, spawning habitat, habitat fragmentation.

Overarching Approach – Watersheds without invasives remain free of invasives. Support mechanisms to rapidly respond to first detections of novel invasive species. Contain existing invasive species within the smallest watershed boundary practical while seeking to eradicate populations within the smallest watershed boundaries. Work with partners and the larger community to prevent the introduction of novel species and the reintroduction of eradicated species into the Kenai Peninsula Borough.

KPFHP DRAFT CAP PLAN

Warmer Climate Strategies

Objective: Maintain current cold-water temperatures and prevent increases in stressful water temperatures above the inevitable warming due to a changing climate.

Target: Lowland groundwater/wetland-dominated systems; Clearwater connected lakes with associated streams

Nested Targets: All cold-water fish species

Key Attribute: Water Temperature

Key Potential Threat(s): Loss of shade and groundwater connections; increase in water withdrawals

Overarching Approach – In response to the inevitability of some degree of regional warming, we need to improve watershed resilience to thermal change. As we gain more understanding of current stream temperature profiles and can assess which streams are most vulnerable to the impacts of climate change, we will implement conservation and protection measures to help keep cold water cold and reduce additional stressors to freshwater systems that are warm and will get warmer.

Incompatible Road Development Strategies

Objective: No new roads on the Kenai Peninsula will impede juvenile salmon movement. Existing barriers created by roads will continue to be restored for full aquatic organism movement and will be evaluated for sources of excessive sediment and mitigated for where necessary

Target: Glacial rivers without lakes, lowland groundwater/wetland-dominated systems

Nested Targets: All migratory fish species in their native assemblage

Key Attribute: Migratory corridors, water quality (sediment)

Key Potential Threat(s): Fragmentation, excessive sediment input

Overarching Approach Protection of habitat fragmentation for intact waterways will ensure the vast majority of our systems will support access to diverse aquatic habitats necessary to support all life cycles of migratory fish. The majority of low cost exiting barriers have been restored; the remaining known barriers should continue to be corrected with an emphasis on the more difficult barriers on our two major highways. Road crossings of waterways are also a prime source of sediment and more attention needs to be focused here.

KPFHP DRAFT CAP PLAN

Residential Development in riparian area strategies

Objective: Protect and maintain ecological integrity of existing riparian zone and restore degraded areas

Target: Glacial rivers with lakes, lowland groundwater/wetland-dominated systems

Nested Targets: Chinook, Sockeye and Coho all life stages, Hooligan, Rainbow Trout, Steelhead, Lake Trout, Dolly Varden

Key Attribute: Connectivity to off channel habitat, groundwater and wetland flow connections, timing and magnitude of adjacent surface water delivery, water quality (nutrient dynamics and toxic contaminate filtering), water temperature

Key Potential Threat(s): loss of direct surface water aquatic habitat connectivity to adjacent wetlands and other off channel habitat, loss or disruption of groundwater patterns, loss of primary nutrient input (grass, leaves, insects, etc.), increases in impervious surfaces.

Overarching Approach: Increasing residential pressures for waterfront development should be minimized and managed.

KPFHP DRAFT CAP PLAN

DRAFT MARINE TARGETS - WHAT WE WANT TO CONSERVE

Target #1: Salt marsh & estuarine system (Intertidal)

Focal Target Description: Salt Marsh and Estuarine System (low supratidal to upper intertidal) exist in coastal areas near or above intertidal zone where low wave energy provides stable, elevated, well drained sediment substrate. Floral species are typically perennial vascular with high tolerance to saline soil conditions, eg sedges and grasses. Associated marine infauna and inverterbrates predominate. Areas: Western Cook Inlet, Kamishack and Kachemak Bay, Chickaloon Flats.
Nested Target # 1: Forage fish
Nested Target # 2: Salmon - Juvenile rearing and emigration
Nested Target # 3: Larval and Juvenile Faunal Invertebrate

Target #2: Nearshore sediment substrates (Intertidal)

Focal Target Description: Nearshore Sediment Substrates (low supratidal to lower intertidal) six composition types are generally recognized, though substrate complexity is highly variable: 1) mud beaches, 2) fine-grained sand beaches, 3) coarse grained sand beaches, 4) mixed mud, sand and gravel beaches, 5) exposed tidal flats, and 6) sheltered tidal flats. Areas: Cook Inlet (clam beaches), Kamishack and Kachemak Bay.
Nested Target # 1: Razor clams
Nested Target # 2: Hard shell clams
Nested Target # 3: Larval and Juvenile Fish and Invertebrate Species

Target #3: Rocky nearshore (Intertidal & Subtidal)

Focal Target Description: Rocky Nearshore (intertidal through Subtidal) Four composition types are generally recognized, though substrate complexity is highly variable: 1)sheltered bedrock shores and out crops experiencing low to moderate wave energy, 2) sheltered bedrock, boulder and cobble complexes experiencing low to moderate wave energy, 3) exposed bedrock shores and out crops experiencing moderate to high wave energy, and 4) exposed bedrock, boulder and cobble complexes experiencing high to moderate wave energy. Kamishak and Kachemak Bay, outer coastal zones, tabletop reefs in Kamishak Bay.
Nested Target # 1: Spawning Herring and other Forage Fish Species
Nested Target # 2: Larval and Juvenile Fish and Invertebrate Species

Target #4: Canopy kelps (Subtidal)

Focal Target Description: Canopy Kelps (Subtidal) Kelp species occur in submerged nearshore, unconsolidated substrates. Their structure provides foundation and living substrate, microhabitat, and cover for numerous fish, invertebrate, and plankton species. Kelp beds also provide nutrient for trophic productivity through plant decay. Area: Kachemak Bay and numerous Kenai Peninsula Bays and Coves.
Nested Target # 1: Crab larvae
Nested Target # 2: Forage fish

Target #5: Seagrass beds (Subtidal)

Focal Target Description: Seagrass Beds (Lower Intertidal to Subtidal) Seagrass beds are predominantly found in submerged nearshore, unconsolidated substrates and provide foundation and physical structure, substrate and cover for numerous fish, invertebrate, and plankton species. Seagrass beds also provide nutrient for trophic productivity through plant decay. Areas: Kachemak Bay, Westside, Inniskin, Illmina, outer Coast.
Nested Target # 1: Forage fish
Nested Target # 2: Crab larvae
Nested Target # 3: Shrimp

Target #6: Reefs (Subtidal & Offshore)

Focal Target Description: Submerged rocky reefs (2m - 100m depth) are a predominant feature of the outer Kenai Peninsula coast. This habitat provides consolidated complexity in rock outcrops, caves and crevices. Between consolidated rock structure are unconsolidated sediment substrates. This contrasting substrate complexity fueled by off shore nutrient import provide nesting and nursery habitat to multitudes of fish and invertebrate species, algae, sea grass and kelp species. Area: Outer Coast and Kenai Peninsula Nearshore.
Nested Target # 1: Lingcod
Nested Target # 2: Rockfish (demersal shelf, pelagic shelf)
Nested Target # 3: Forage, Groundfish and Invertebrate Species at many life stages.

Target #7: Benthic habitat (Offshore - sand, mud, clay, gravel)

Focal Target Description: Benthic substrate in Southern Cook Inlet is generally a smooth bottom, ranging from relatively fine to coarse sands, gravel, cobble and boulder complex. In Northern Cook Inlet predominantly muddy silts, sand with gravel and cobble composite. Benthic substrate in Kamishak Bay ranges from mud, to sand and gravel composition. Inner Kachemak Bay is silty grading to mud and rippled sand in the outer Bay. Outer Kachemak Bay is characterized by shell debris, while the shallow subtidal area is a composite of boulder, cobble and gravel.
Area: Kachemak and Kamishak Bay. South Central Cook Inlet
Nested Target # 1: Scallop
Nested Target # 2: Shrimp
Nested Target # 3: Crabs
Nested Target # 4: Flatfish
Nested Target # 5: Slope rockfish

Target #8: Pelagic waters (Offshore)

Focal Target Description: Pelagic (Offshore 3-D) Pelagic habitat includes several layers of water with distinct characteristics in salinity, density, temperature, and light penetration. These characteristics fluctuate, influenced by weather, bathymetry, tides and currents, as well as terrestrial fresh water runoff provide soft moving substrate and nutrient availability. Area: Southern vs Northern is further discussed, though our discussion may want to focus on Southern? Area: Cook Inlet (all) and the outer coast (up to 12 miles offshore from Cook Inlet east to Cape Fairfield) remains undetermined?
Nested Target # 1: Salmon - adult & migration
Nested Target # 2: Cod & pollock - adult, spawning, juvenile

KPFHP DRAFT CAP PLAN

MARINE TARGET VIABILITY TABLE – WHAT IS THE PRESENT CONDITION OF OUR TARGETS

	Conservation Targets	Landscape Context	Condition	Size	Viability Rank
	Current Rating				
1	Salt marsh & estuarine system (Intertidal)	Good	Good	Good	**Good**
2	Nearshore sediment substrates (Intertidal - sand, mudflats, gravel including pebble, cobble, boulder)	Good	Fair	Very Good	**Good**
3	Rocky nearshore (Intertidal & Subtidal)	-	Fair	Very Good	**Good**
4	Canopy kelps (Subtidal)	Very Good	Good	Good	**Good**
5	Seagrass beds (Subtidal)	Very Good	Very Good	Good	**Very Good**
6	Reefs (Subtidal & Offshore)	-	Good	Very Good	**Very Good**
7	Benthic habitat (Offshore - sand, mud, clay, gravel)	Very Good	Fair	Very Good	**Good**
8	Pelagic waters (Offshore)	-	Good	-	**Good**
	Project Health Rank				**Good**

KPFHP DRAFT CAP PLAN

MARINE POTENTIAL THREAT TABLE – WHAT MIGHT CAUSE A CHANGE IN VIABILITY RANK IN THE NEXT 10 TO 20 YEARS?

	Potential Threats Across Targets	Salt marsh & estuarine system (Intertidal)	Nearshore sediment substrates (Intertidal - sand, mudflats, gravel including pebble, cobble, boulder)	Rocky nearshore (Intertidal & Subtidal)	Canopy kelps (Subtidal)	Seagrass beds (Subtidal)	Reefs (Subtidal & Offshore)	Benthic habitat (Offshore - sand, mud, clay, gravel)	Pelagic waters (Offshore)	Overall Threat Rank
	Project-specific threats	1	2	3	4	5	6	7	8	
1	Tanker/nontank vessel spill	High	Medium	Low	Low	Low	Low		Low	Medium
2	Incompatible shoreline development	Medium	Low	Medium		Low				Medium
3	Beach alteration/ modifications		Medium							Low
4	Pipeline / tank farm spill	Low	Low	Low	Low	Low		Low		Low
5	Chronic contaminant/oil discharges - point sources (platforms, waste treatment)		Low	Low	Low	Low		Low	-	Low
6	Chronic oil discharges - nonpoint (e.g. boats, runoff, production platforms?)		Low	Low	Low	Low		Low		Low
7	Global emissions/ocean acidification		Low					Low	Low	Low
8	Damage from incompatible recreational use	Low				Low				Low
9	Oil spill response		Low					Low		Low
	Threat Status for Targets and Project	Medium	Medium	Low	Low	Low	Low	Low	Low	Medium

- **Many others noted, with a single target low rank.**

KPFHP DRAFT CAP PLAN

Potential Threats to our Partnership's Geography

All of the identified conservation targets are potentially impacted by multiple threats, which act together to alter the ability of habitat to support viabile sustainable fisheries. Based on our current understanding of the science, the complexity habitat types and those roles, potential threats and history of impacts, the marine science team members collectively ranked the highest critical threats as:

1. Large Scale Oil Spill - Petroleum Discharge (Oil/Gas)
2. Incompatible shoreline development
3. Beach Armoring

Oil Spill Prevention

Objective: Assist in the prevention of large scale oil spills in Cook Inlet. Ensure all available measures are currently in position and being exercised to prevent rather than respond to a large scale oil spill. In the event of a spill, assure no long-term impairment (see KEAs) of vulnerable coastal and marine habitats.

Target: All marine habitats identified here are potentially impacted by a large scale spill/discharge. However, those habitats most likely to incur the greatest or prolonged impact are 1) salt marsh and estuaries, 2) near shore sediment substrates, and 5) nearshore sea grasses and vegetation.

Nested Targets: Include but are not limited to larval and juvenile stages of anadromous, forage, ground fish and invertebrates species. Numerous species of epi-vegetation and flora, countless infaunal species as well as water quality, all of which influence marine species productivity. The more permeable substrates listed here have the capacity to absorb and retain oil in substrate, thus increasing the impact as well as influencing the ability to restore to original condition.

Key Attribute: These nearshore habitats are essentially fisheries nurseries. Large numbers of species are represented within these categories and guilds, where they spawn, rear, feed, inhabit or migrate through these marine waters and habitats types during some life history phase.

Key Potential Threat(s): Decreases in habitat complexity and loss of productivity will ultimately degrade the sustainability of many of the populations of fish and the vegetative and nutrient sources that provide the habitat complexity defining our current understanding of these areas as fisheries nurseries.

Overarching Approach: Conduct an assessment of currently existing measures to prevent and respond to oil spills from these sources in regional marine waters. Consult

with regional expertise (Agencies, NGOS, Operators) to receive briefings and come to a better understanding of current needs and approaches in this discussion. Identify, more clearly who/what entities are responsible for identifying what oil production and transportation infrastructure are currently in operation or non- operational.

In currently active operations such as platforms, vessels and pipelines, learn what are the currently existing organizations, mechanisms and planning processes established to prevent and respond to large scale oil spills, discharges or near misses. On inactive operations, platforms and pipelines, learn what existing organizations are already established to monitor the condition of currently non-operating infrastructure.

Incompatible Shoreline Development

Objective: To assure no long-term impairment of vulnerable coastal habitats from incompatible shoreline development. Low impact near shore development is achievable when marine ecosystem processes and associated floral and faunal populations are considered in the early design of projects. Alterations to current and tidal regimes and influences on nearshore substrates and associated populations can be minimized in marine nearshore processes. Properly designed development can minimize long term impacts when implemented with marine ecosystem services and processes in mind.

Target: Intertidal marine habitats most likely to incur the greatest or prolonged impact from large scale development actions described here are, 1) salt marsh and estuaries, 2) near shore sediment substrates, and 3) nearshore sea grasses and vegetation beds.

Nested Targets: Of greatest concern are the intertidal and nearshore habitat containing sea grass and eel grass beds. These vegetative substrates are inhabited by countless larval and juvenile stages of anadromous, forage, ground fish and invertebrate species.

Vegetation and associated unconsolidated substrates are sensitive to alterations in intertidal and current regimes, and changes in water quality and characteristics.

Key Attribute: As previously mentioned in the marine discussion, these nearshore habitats are fisheries nurseries supporting large numbers of larval and juvenile and fish and invertebrate species who at some life history stage inhabit, rear, feed, or migrate through these intertidal waters.

Key Potential Threat(s): Depending on the development action, altering natural nearshore marine processes or degradation and fragmentation of marine habitats known to support fisheries population diversity.

Overarching Approach: Lay the scientific foundation for good decision making related to large shoreline infrastructure decisions (e.g. ports). Make the science information available to decision makers and other interested parties while bringing the Cook Inlet marine side into the larger development discussion.

KPFHP DRAFT CAP PLAN

Beach Alteration Strategies

Objective: Protect and maintain productive razor and hard shell clam habitat, especially where those habitat zones have been identified and already facilitate sustainable populations for commercial or non-commercial use.

Ensure all available measures are currently being exercised to prevent further degradation and alteration to these unconsolidated substrates. Assure no long-term impairment (see KEAs) of vulnerable coastal and marine habitats.

Target: Numerous combinations of substrate components/composition provide marine habitat for clam species in Cook Inlet and Kachemak Bay. Those habitat types most likely to incur the greatest or prolonged impact from human influenced shoreline development-disturbances are 1) salt marsh and estuaries, 2) near shore sediment substrates, and 3) nearshore sea grasses and vegetation.

Nested Targets: Razor and hard shell clam species, also include but are not limited to larval and juvenile stages of some fish and invertebrates species. Numerous species of flora, vegetation and numerous faunal species (infauna and epifauna).

Key Attribute: Intertidal unconsolidated sediment substrates.

Key Potential Threat(s): Beach alteration, disruption of larval transport, settling, feeding, and mobility. Incompatible structures and activities along the beach can disrupt sediment and nutrient transport, composition, distribution and quality thereby minimizing and degrading habitat values due to fragmentation. Clams, especially larval and juvenile stages are sensitive and subject to impacts when sediment substrates are altered or become impenetrable. Incompatible activities and/or structures can alter larval transport and settling to beaches. Sedimentation can suffocate clams. The identified strategies will be supported by the partnership and could be funded in whole by the partnership.

Overarching Approach –In response to incompatible structures and activities we need to gain a more thorough understanding of factors that impact clam populations including: larval transport and circulation patterns within and between Cook Inlet and Kachemak Bay, spawning, larval settling, juvenile survival and growth. Update and/or develop management plans to address structures and activities that are incompatable with razor clam habitats. Develop an outreach program that communicates the conservation and protections measures required for maintaining clam habitat. .

David Albert
The Nature Conservancy
Director of Conservation Science
416 Harris St., Suite 301
Juneau, AK 99801
dalbert@tnc.org
907-586-2301

Jeff Anderson
US Fish and Wildlife Service
Fish Biologist
43655 K-Beach Rd
Soldotna, AK 99669
jeffry_anderson@fws.gov
907-260-0132

Cheryl Anderson
US Fish and Wildlife Service
Fish & Wildlife Biologist
43655 K-Beach Rd
Soldotna, AK 99669
cheryl_anderson@fws.gov
907-260-0129

Steve Baird
Kachemak Bay Research Reserve
GIS Analyst/Biologist
95 Sterling Hwy, Suite 2
Homer, AK 99603
steve.baird@alaska.gov
907-226-4655

Libby Bella
US Fish and Wildlife Service
Ecologist
1 Ski Hill Rd., PO Box 2139
Soldotna, AK 99669
elizabeth_bella@fws.gov
907-260-2831

Mandy Benard
Kachemak Heritage Land Trust
Conservation Director
315 Klondike Ave
Homer, AK 99603
mandy@kachemaklandtrust.org
907-235-5263

Lisa Beranek
Kenai Watershed Forum
Stream Watch Volunteer Coordinator
44129 Sterling Hwy
Soldotna, AK 99669
lisa@kenaiwatershed.org
907-260-5449 x1205

Patti Berkhahn
Alaska Department of Fish and Game- Division of Habitat
Habitat Biologist III
PO Box 2872
Soldotna, AK 99669
patricia.berkhahn@alaska.gov
907-714-2476

Brian Blossom
Alaska Department of Fish and Game- Division of Habitat
Habitat Biologist I
PO Box 2872
Soldotna, AK 99669
brian.blossom@alaska.gov
907-398-1610

Deborah Boege- Tobin
University of Alaska Anchorage/Kenai Peninsula College
Associate Professor of Biology
533 E. Pioneer Ave.
Homer, AK 99603
dtobin@uaa.alaska.edu
907-299-8380

Jon Bonkoski
Ecotrust
Senior GIS Analyst
721 NW 9th Ave, Suite 200
Portland, OR 97209
jbonkoski@eco.org
503-467-0804

Branden Bornemann
Kenai Watershed Forum
Environmental Specialist
44129 Sterling Hwy
Soldotna, AK 99669
branden@kenaiwatershed.org
907-260-5449 x1206

Stacey Buckelew
Kachemak Bay Research Reserve
Coastal Training Program Coordinator
95 Sterling Hwy, Suite 2
Homer, AK 99603
stacey.buckelew@alaska.gov
907-226-4653

Christy Cincotta
Tyonek Tribal Conservation District
Executive Director
1689 C Street, Suite 219
Anchorage, AK 99501
ccincotta@tyonek.com
907-646-3109

Tom Dearlove
Kenai River Center
Coastal Zone Resource Planner
514 Funny River Road
Soldotna, AK 99669
tdearlove@borough.kenai.ak.us
907-714-2216

Pegge Erkeneff
Kenai Peninsula School District
Communications Specialist
148 N Binkley St
Soldotna, AK 99669
Pegge@kpbsd.org
907-714-8838

Lynn Fuller
Pacific Coast Joint Venture
Alaska Coordinator
PO Box 1814
Palmer, AK 99645
lfuller@mtaonline.net
907-355-8279

Marcus Geist
GeistMapWerks
Analyst
1707 E 27th Ave
Anchorage, AK 99508
marcus.geist@gmail.com
907-602-0834

Tammy Hoem Neher
NOAA Kasitsna Bay Laboratory
Science Coordinator
2181 Kachemak Drive
Homer, AK 99603
tdneher@gmail.com
907-299-6389

Lisa Ka'aihue
Cook Inlet Aquaculture Association
Special Projects Manager
40610 Kalifornsky Beach Rd
Kenai, AK 99611
lisak@ciaanet.org
907-283-5761

Kacy Krieger
University of Alaska Anchorage
Geospatial Technician
3211 Providence Dr.
Anchorage, AK 99508
kekrieger2@uaa.alaska.edu
907-786-7749

Angela Doroff
Kachemak Bay Research Reserve
Research Coordinator
95 Sterling Hwy, Suite 2
Homer, AK 99603
angela.doroff@alaska.gov
907-226-4654

Heather Fuller
US Fish and Wildlife Service
Fish and Wildlife Biologist
43655 K-Beach Rd
Soldotna, AK 99669
heather_fuller@fws.gov
907260-0130

Jade Gamble
ADEC - Spill Prevention & Emergency Response Program
Environmental Program Specialist
43335 Kalifornsky Beach Rd, Suite 11
Soldotna, AK 99669
jade.gamble@alaska.gov
907-262-3421

Mike Gracz
Kenai Watershed Forum
Wetlands Project Manager
44129 Sterling Hwy
Soldotna, AK 99669
mike@kenaiwatershed.org

Kris Holderied
NOAA Kasitsna Bay Laboratory
Director
2181 Kachemak Dr
Homer, AK 99603
kris.holderied@nooaa.gov
907-235-4004

Carol Kerkvliet
Alaska Department of Fish and Game - Sport Fish
Fisheries Biologist
3298 Douglas Place
Homer, AK 99603
carol.kerkvliet@alaska.gov
907-235-1739

Devony Lehner
Homer Soil and Water Conservation District
Special Projects Coordinator
4014 Lake St.
Homer, AK 99603
devony@homerswcd.org
907-235-8177 x5

Doug Limpinsel
NOAA Fisheries/Alaska Region/Habitat Conservation
Fisheries Biologist/Natural Resource Specialist
222 West 7th Avenue, Rm. 517
Anchorage, AK 99513
doug.limpinsel@noaa.gov
907-271-6379

Rachel Lord
Cook Inletkeeper
Outreach & Monitoring Coordinator
3734 Ben Walters Lane
Homer, AK 99603
rachel@inletkeeper.org
907-235-4068 x29

Robert Massengill
Alaska Department of Fish and Game - Sport Fish
Fishery Biologist
43961 K-Beach Road, Suite B
Soldotna, AK 99669
robert.massengill@alaska.gov
907-260-2928

Jasmine Maurer
Kachemak Bay Research Reserve
Fish and Wildlife Tech III
95 Sterling Hwy, Suite 2
Homer, AK 99603
jasmine.maurer@alaska.gov
907-226-4663

Rhonda McCormick
Kenai Watershed Forum
Accounting Manager/Office Manager
44129 Sterling Hwy
Soldotna, AK 99669
rhonda@kenaiwatershed.org
907-260-5449 x1203

Holly McQuinn
EPSCoR
AK EPSCoR UAA Outreach Coordinator
UAA CP-ISB, 3101 Science Cir
Anchorage, AK 99508
anhm1@uaa.alaska.edu
907-786-7765

Phil North
US Environmental Protection Agency
Ecologist
514 Funny River Road
Soldotna, AK 99669
north.phil@epa.gov
907-714-2483

Ginny Litchfield
Alaska Department of Fish and Game
Kenai Peninsula Area Manager
514 Funny River Road
Soldotna, AK 99669
ginny.litchfield@alaska.gov
907-714-2477

Shana Loshbaugh
University of Alaska Fairbanks
Doctoral Candidate
1257 Richard Berry
Fairbanks, AK 99709
sloshbau@alaska.edu
907-479-2113

Sue Mauger
Cook Inletkeeper
Science Director
3734 Ben Walters Lane
Homer, AK 99603
sue@inletkeeper.org
907-235-4068 x24

Marie McCarty
Kachemak Heritage Land Trust
Executive Director
315 Klondike Ave
Homer, AK 99603
marie@kachemaklandtrust.org
907-235-5263

Tim McKinley
Alaska Department of Fish and Game
Fisheries Biologist III
43961 K-Beach Rd, Suite B
Soldotna, AK 99669
timothy.mckinley@alaska.gov
907-262-9366

John Morton
US Fish and Wildlife Service
Supervisory Biologist
1 Ski Hill Rd., PO Box 2139
Soldotna, AK 99669
john_m_morton@fws.gov
907-260-2815

Josselyn O'Connor
Kenai Watershed Forum
Development Director
44129 Sterling Hwy
Soldotna, AK 99669
josselyn@kenaiwatershed.org
907-260-5449 x1201

Ted Otis
Alaska Department of Fish and Game
Area Finfish Research Biologist-CF
3298 Douglas Place
Homer, AK 99603
ted.otis@alaska.gov
907-235-1723

Linda Robinson
Prince William Sound RCAC
Outreach Coordinator
3709 Spenard Rd
Anchorage, AK 99503
robinson@pwsrcac.org
907-277-72222

Susan Saupe
Cook Inlet RCAC
Director of Science & Research
1130 W 6th Ave
Anchorage, AK 99501
saupe@circac.org
907-398-6214

Bob Shavelson
Cook Inletkeeper
Executive Director
PO Box 3269
Homer, AK 99603
bob@inletkeeper.org
9072354068 x22

Jessica Speed
The Nature Conservancy
Mat-Su Basin Salmon Habitat Partnershp Coordinator
715 L Street, Suite 100
Anchorage, AK 99501
jpeed@tnc.org
907-865-5713

Terry Thompson
Kachemak Bay Research Reserve
Reserve Manager
95 Sterling Hwy, Suite 2
Homer, AK 99603
terry.thompson@alaska.gov
907-226-4656

Brenda Trefon
Kenaitze Indian Tribe
Environmental Coordinator
PO Box 988
Kenai, AK 99611
btrefon@kenaitze.org
907-398-7933

Daniel Rinella
University of Alaska Anchorage
Aquatic Ecologist
3211 Providence Dr.
Anchorage, AK 99508
djrinella@uaa.alaska.edu
907-786-4963

Robert Ruffner
Kenai Watershed Forum
Executive Director
44129 Sterling Hwy
Soldotna, AK 99669
robert@kenaiwatershed.org
907-260-5449 x1204

Rebecca Shaftel
University of Alaska Anchorage
Aquatic Ecologist
3211 Providence Dr.
Anchorage, AK 99508
rsshaftel@uaa.alaska.edu
907-786-4965

Bill Smith
Kenai Peninsula Borough Assembly
Assembly Member
PO Box 150
Homer, AK 99603
billsmith@borough.kenai.ak.us
907-235-8932

Emilie Springer
University of Alaska
Graduate Student/Adjunct Faculty
PO Box 2882
Homer, AK 99603
esspringer@alaska.edu
907-399-1175

Arni Thomson
Alaska Salmon Alliance
Executive Director
PO Box 586
Kenai, AK 99611
acccrabak@earthlink.net
907-929-0388

Pamela Voeller
Natural Resources Conservation Service
Soil Conservationist
110 Trading Bay, Ste 100
Kenai, AK 99611
pamela.voeller@ak.usda.gov
907-283-8732 x106

Coowe Walker
Kachemak Bay Research Reserve
Watershed Project Lead
95 Sterling Hwy, Suite 2
Homer, AK 99603
coowe.walker@alaska.gov
907-226-4651

Gary Williams
Kenai River Center
Manager
514 Funny River Road
Soldotna, AK 99669
gwilliams@borough.kenai.ak.us
907-714-2462

Rebecca Zulueta
Kenai Watershed Forum
Environmental Specialist
44129 Sterling Hwy
Soldotna, AK 99669
rebecca@kenaiwatershed.org
907-260-5449 x1210

David Wigglesworth
US Fish and Wildlife Service
Habitat Restoration Regional Coordinator
1011 E Tudor Rd
Anchorage, AK 99503
David_Wigglesworth@fws.gov
907-786-3925

Christine Woll
The Nature Conservancy
Spatial Ecologist
416 Harris Street
Juneau, AK 99081
cwoll@tnc.org
339-793-1835

~~~~~~~~~~~~~~~~ ~~~~~~~~~~~~~~~~

THANK YOU…….

Terry Thompson and Stacey Buckelew for all your hard work to make this Science Symposium a success!

Kenai Watershed Forum Staff for pitching in as needed!
~~~~~~~~~~~~~~~~

KENAI PENINSULA FISH HABITAT PARTNERSHIP

Linking Science to Action

Science Symposium

Kenai Peninsula Fish Habitat Partners

Thank you!

We are grateful for the generous support of ConocoPhillips and Alaska EPSCoR for investing in KPFHP's first Science Symposium. Their support has made this event possible.