American Fisheries Society

The 28th Meeting of the Alaska Chapter
November 12-15, 2001
Sitka, Alaska

The American Fisheries Society (AFS), founded in 1870, is the oldest and largest professional society representing fisheries scientists. AFS promotes scientific research and enlightened management of resources for optimum use and enjoyment by the public. It also encourages a comprehensive education for fisheries scientists and continuing on-the-job training. The AFS publishes some of the world's leading fisheries research journals: The Transactions of the American Fisheries Society; North American Journal of Fisheries Management; North American Journal of Aquaculture (formerly The Progressive Fish Culturist); The Journal of Aquatic Animal Health , and Fisheries. It organizes scientific meetings where new results are reported and discussed. In addition to these primary functions, the Society has many other programs in areas such as professional certification, international affairs, public affairs and public information.

AFS Mission Statement

The mission of the American Fisheries Society is to improve the conservation and sustainability of fishery resources and aquatic ecosystems by advancing fisheries and aquatic science and promoting the development of fisheries professionals.

The Alaska Chapter is the local organization in Alaska for the American Fisheries Society. Our chapter is one of the larger ones with about 400 members. Major activities include our annual meeting which consists of technical paper presentations, special guest lecturers, and continuing education courses for fisheries professionals. We are also actively supporting the production of a comprehensive taxonomic key to Alaska's fishes. The Chapter has supported through resolution and letters to policy makers, continued conservation and stewardship of Alaska's fisheries.

Visit the Alaska Chapter AFS Website at http://www.fisheries.org/afs-ak/

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7:30	**Registration**
8:15	**Opening Remarks**
8:30	**Mountains, Glaciers, and Fish: Understanding the links between landscape dynamics and fish populations.**
9:45 - 12:00	**Session: Invasive Species**
12:00 - 1:15	**Lunch**
1:15 - 3:05	**Session: Early results from Alaska fisheries Traditional Ecological Knowledge research**
3:20 - 5:00	**Session: Contributed Papers**
7:00	**Social and Poster Session at the Northern Southeast Regional Aquaculture Association facility**

Wednesday, November 14

8:15	**RegistrationAnnouncements**
8:30 - 10:35	**Session: In Situ Aquatic Research**
10:50 - 12:00	**Session: Arts and Science of Communication**
12:00 - 1:15	**Lunch/ Past President's Luncheon - Location TBA**
1:15 - 3:20	**Session: Marine Invertebrate Aquatic Research**
3:40	**Business Meeting**
6:30	**Social**
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Thursday, November 15

8:00	**Registration**
8:15 - 10:20	**Session: Environmental Chemistry**
10:35 - 12:15	**Session: Contributed Papers**
12:15 - 1:15	**Lunch**
1:15 - 3:00	**Session: Contributed Papers**
3:15	**Awards**
4:15	**Adjourn**

AGENDA

Location: Harrigan Centennial Hall unless otherwise noted

Monday, November 12

1:00 **Continuing Education Course**
Data Visualization

5:00 **Adjourn**

5:30 - 7:30 **Registration/Social**

Tuesday, November 13

7:30 **Registration**

8:15 **Opening Remarks** -David Wiswar, President Elect, and Eric Knudsen, Western Division President

8:30 **Mountains, Glaciers, and Fish: Understanding the links between landscape dynamics and fish populations** - Patricia Heiser

9:30 **BREAK**

9:45 **Session: Invasive Species** - Gary Sonnevil, chair

9:50 **Biological invasions of marine ecosystems: patterns, research approach, and management challenges** - Anson H. Hines

10:50 **Atlantic salmon in the Pacific Northewest: a threat to Alaska** - Bob Piorkowski

11:10 T**he great Alaska Yellow perch invasion - is it over or just beginning?** - Larry Peltz

11:30 **Aquatic invasive species in Alaskan coastal waters** - Gary Sonnevil

12:00 **LUNCH**

1:15 **Session: Early results from Alaska fisheries Traditional Ecological Knowledge (TEK) research -** Taylor Brelsford, chair

1:25 **Copper River subsistence evaluation 2000 and traditional knowledge project** - William E. Simeone

1:45 **Yukon River salmon traditional ecological knowledge** - Jill Klein

2:05 **Whitefish and beaver ecology of the Yukon Flats, Alaska** - David B. Andersen

2:25 **The Klawock River and Sarkar Lake subsistence salmon project**-Nancy C. Ratner

2:45 **Federal Ofice of Subsistence Management TEK program** - Steve Klien

3:05 **BREAK**

3:20 **Session: Contributed Papers** - Carol Ann Woody, chair

3:20 **Tests of outbreeding depression in hybrids between spatially separated pink salmon populations** - S.E. Gilk

3:40 **The problems with hybrids: setting conservation guidelines** - John K. Wenberg

4:00 **Microsatellites, rare alleles and genetic stock identification: statistical concerns and suggestions** - Joel H. Reynolds

4:20 **Spatial covariation in survival rates of pink, chum and sockeye salmon in the Northeast Pacific** - Brian J. Pyper

4:40 **Temporal and spatial variation in minnow trap sampling results for resident stream-dwelling fish in Southeast Alaska** - Kim Hastings

7:00 Social and Poster Session - Hosted by Northern Southeast Regional Aquaculture Association and held at NSRAA Facilities- Jim Finn, poster chair

Using in-situ technology to identify and characterize essential fish habitat for classification as a marine reserve in the Eastern Gulf of Alaska -Victoria M. O'Connell

Opposite effects of sea-surface temperature on survival rates of three species of North east Pacific salmon in northern and southern areas - Franz J. Mueter

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Testing new electronic archival tags in Pacific Salmon - Jennifer Nielsen

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Demonstration of remote video system used to monitor fishwheel catch - David W. Daum

Genetic and life history characterization of steelhead and rainbow trout in Alaska - Christian E. Zimmerman

Alaska's first fishery, Pacific cod: Understanding changes in fishing power from historical and photographic records - Fritz Funk

Wednesday, November 14

8:15 **Announcements**

8:30 **Session: In Situ Aquatic Research** - Bill Bechtol, chair

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8:55 **Development of a SCUBA assessment program for shallow-water, nearshore pelagic rockfish** -Michael M. Byerly

9:15 **In situ assessment of sediment processing rates by the sea cucumber (*Parasitchopus californicus*)** - Molly O. Ahlgren

9:35 **Use of a remote video camera for surveys of sea cucumbers near Kodiak Island** - Dan Urban

9:55 **Comparison of weathervane scallop (*Patinopecten caurinus*) density estimates from dredge and video survey tows in Kamishak Bay, Alaska** - Gregg E. Rosenkranz

10:15 **Deep distance: submarine line transects and yelloweye rockfish (*Sebastes ruberrimus*) management in Southeast Alaska** - David W. Carlile

10:35 **BREAK**

10:50 **Session: Arts and Science of Communication** - Laurel Devaney and Andrea Mederios, co-chairs

11:00 **Research scientists and kids: making the connection with Sea Week activities** - Bonita Nelson

11:20 **Effective intercultural communications** - Jill Klein

11:40 **Putting together an effective poster: What's up with that?** - Jim Finn

12:00 **LUNCH - Past President's Luncheon**

1:15 **Session: Marine Invertebrate Aquatic Research** - Doug Woodby, chair
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1:40 **Seasonal variation in density and body composition of the commercially important sea cucumber, *Parastichopus parvimensis*** - Ginny L. Eckert
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2:20 **Geoduck clam (*Panopea abrupta*) commercial stock status in Southeast Alaska** - Marc Pritchett
2:40 **Living on the edge: the distribution of Dungeness crab, *Cancer magister,* in a recently deglaciated fjord** -S.J. Taggart
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3:20 **BREAK**
3:40 **BUSINESS MEETING**
6:30 **SOCIAL**
7:30 **BANQUET at The Westmark Shee Atika**

Thursday, November 15

8:15 **Session: Environmental Chemistry** - Ron Heintz, chair
8:20 **Photoenhanced toxicity of Alaskan North Slope crude oil to copepods** - Switgard Duesterloh
8:40 **Seasonal input of petroleum hydrocarbons into freshwater lakes from recreational use places salmonid rearing habitat at risk** - Stanley D. Rice
9:00 **Acute exposures of salmonid embryos to total dissolved solids** - B. J. Failor
9:20 **Water chemistry and stable isotope analysis (d15N and d13C) of a complex beaver pond system in the Copper River Delta, Cordova, Alaska** - Maria E. Lang
9:40 **Effect of supplementation with marine-derived nutrients on the lipid class and fatty acid composition of juvenile coho salmon** - Bonita D. Nelson
10:00 **Quantitative diet estimation using fatty acid composition data taken from northern fur seals and their prey** - Ron A. Heintz
10:20 **BREAK**
10:35 **Session:Contributed Papers** - Carol Ann Woody, chair
10:35 **Fish species identification errors, problems, and their conservation and management consequences** - Gordon R. Haas
10:55 **Head morphology, sound production and feeding kinematics of the Bay pipefish, *Syngnathus leptorhynchus*** - Zachary N. Hoyt
11:15 **Effects of catch-and-release fishing on the hooking injury and physiology of wild rainbow trout in the Alagnak River, Alaska** - Julie M. Meka
11:35 **Predicting growth of juvenile Arctic grayling in interior Alaska** - Cheryl A. Dion
11:55 **Methods for increasing the number of archival yellowfin sole otoliths available for annular measurements** - Ben Williams
12:15 **LUNCH**

1:15 **The ecological effects of salmon migrations in Southeast Alaska streams** - D.T. Chaloner

2:00 **Searching for a life history approach to salmon escapement management** - E. Eric Knudsen

2:20 **Influence of spawning salmon on the fall and early winter growth of juvenile coho salmon on the Copper River Delta, Alaska** - Dirk W. Lang

2:40 **Least cisco spawning area located using radio telemetry** - Randy J. Brown

3:00 **Discussion**

3:15 **Awards** - Andy Gryska

4:15 **Adjourn**

GUEST SPEAKER

Patricia Heiser

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Patricia Heiser is a geologist with the Cold Regions Research and Engineering Lab in Anchorage. She is also adjunct faculty at Alaska Pacific University and a research affiliate of the Alaska Quaternary Center of University of Alaska Fairbanks. After two years teaching at Ohio University, she has returned to Alaska to better pursue her research (and recreational) interests in the arctic. Her research has primarily focused on paleogeography, paleo-ecology, and landscape dynamics of the glaciated and unglaciated regions of Alaska. Her Ph.D. research was on the glacial and sea-level history of the Bering Strait region, including Chukotka Peninsula, Russia and St. Lawrence Island. Since then, she has worked on climate history and landscape dynamics at Great Kobuk Sand Dunes and coastal Seward Peninsula in northwest Alaska.

Her current research has moved south, and concerns the landscape evolution of Lake Clark National Park and the formation of salmon habitat since glaciers retreated from Lake Clark valley. This project is part of a multi-disciplinary, multi-agency collaborative effort among researchers in the fields of geology, limnology, salmon ecology, archeology, and hydrolology.

At the AFS meeting, Patricia will provide an overview of recent developments in our understanding of the links between landscape dynamics and fish populations. This will begin with examining the potential influence of large scale tectonic/geologic activity on the early speciation of Pacific salmon; followed by a discussion of Ice Age paleogeography and climate of Alaska. She will then discuss recent research, including her own, on the watershed-scale records of changing salmon abundance and the potential geologic and/or climatic drivers of change in fish populations.

ABSTRACTS

Invasive Species

Biological Invasions of Marine Ecosystems: Patterns, Research Aproach, and Management Challenges

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Background. In the past 20 yrs several high-profile species have invaded US coastal ecosystems. In 1996 Congress renewed the National Invasive Species Act to focus management on marine species for the first time. “NISA96” also established the National Ballast Water Information Clearinghouse at the Smithsonian Environmental Research Center (SERC) to track delivery/management of ballast water from ships from all foreign ports to all US ports. SERC conducts the largest, most comprehensive research program on introduced marine species, with intensive and extensive studies from AK to FL, Chesapeake Bay to SF Bay.

Purpose. This talk summarizes the taxonomic, temporal, spatial, and vector patterns of marine species introductions in North America, and provides an overview of databases and ongoing research.

Methods. Biological characteristics of ballast water are analyzed at key ports. Efficacy of mid-ocean exchange has been tested experimentally. Literature searches and field surveys of invasive species are conducted for port and bay systems along the 3 coasts of North America. Fouling communities provide a good standard assay for invasions. Expert taxonomic analysis is essential for assessing diverse species invasions.

Results. Introductions to North America began with arriving European ships hundreds of years ago, but invasions are attributed historically to many vectors. Species from all major taxa have invaded. The rate of biological invasions has increased markedly in recent decades. Recent introductions are mainly associated with shipping.

Conclusions. Further quantitative and experimental measures are crucial to resolve patterns and impacts of invasions, and determine efficacy of management strategies for successful reduction of the alarming rate of introductions. Shared databases, international cooperation, and improved technology for treating ballast water are key next steps.

Atlantic Salmon in the Pacific Northwest; a threat to Alaska

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In Alaska, most runs of wild salmon remain abundant and are a key component of both ocean and coastal ecosystems. These surviving runs are a renewable resource easily valued at many millions of dollars and thus are vital to subsistence, personal use, sport, and commercial fishing. Today the farming of Atlantic salmon in British Columbia and Washington poses a new and potentially devastating threat to the survival and abundance of wild Pacific salmon in Alaska. The are many problems associated with salmon farming. The chief threats are that not only do significant numbers of large maturing fish escape on a regular basis, but more importantly, 3-5% and more of all Atlantic salmon raised on the farms (possible millions of fish) are slow growers of little value so are deliberately released into the wild where they may survive and cause great ecological harm. We will briefly present the basic life history of Atlantic salmon and include information about salmon farming, accidental/deliberate escapes/releases/recoveries of farmed fish, economics of salmon farming and the problems directly related to Atlantic salmon farming in the Pacific. It is our conclusion that the deliberate or accidental introduction of non-indigenous Atlantic salmon poses a real threat to Alaska's salmon fisheries and call for the following; an immediate cessation to all deliberate releases of Atlantic salmon, the use of sterile fish only and the implementation of closed system farms with all deliberate speed.

The Great Alaska Yellow Perch Invasion
Is it over or just beginning?

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Background. Invasive species are rapidly spreading throughout the world. In many instances these species are causing severe negative ecological impacts. Alaska has been spared severe impacts thus far due to geographic isolation. In the spring of 2000, a population of yellow perch was discovered in a small landlocked lake on the Kenai Peninsula.

Purpose. This paper documents the chronology of events Sport Fish Division encountered in an attempt to eradicate the yellow perch population.

Method. Sport Fish Division made eradication of the yellow perch an extremely high priority. Despite trying to move as fast as possible, it took over 4 months to get all the permits and permissions to rotenone the lake.

Results. Rotenone was applied to the lake and the fish were killed. A subsequent newspaper article drew the ire of some members of the public for poisoning a lake. Some politicians also voiced their displeasure. A moratorium on the use of rotenone has been set until guidelines for use and a public process is established.

Conclusions. Fisheries management activities that used to be commonplace now require public and political input. The threat of invasive fish species is real in Alaska and a process is needed to allow for a quick response to an invasive threat.

Aquatic Invasive Species in Alaskan Coastal Waters

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Background. Biological invasions of coastal bays and estuaries are common throughout the world and are having significant ecological and economic impacts. Commercial ship ballast water has been identified as a major pathway for introducing aquatic nonindigenous species into coastal ecosystems. Port Valdez and Prince William Sound receive the third largest quantity of ballast water of all U.S. ports.

Purpose. The purpose of this investigation is to evaluate the risk of biological invasion of Alaskan coastal waters by nonindigenous species transported in oil tanker and cargo ship ballast water.

Methods. Biological characteristics of oil tanker ballast water arriving in Port Valdez was examined over a two year period. Temperature-salinity tolerance experiments were conducted on plankton collected from oil tanker ballast water to assess initial survival in conditions present in Port Valdez. Temperature-salinity tolerance experiments have also been initiated with larval green crabs to evaluate the survival and growth of this species in Alaskan coastal conditions. Field surveys and searches of existing collections and the literature were conducted to determine which nonindigenous species are established in Alaskan coastal waters.

Results. Oil tanker ballast water contained abundant and diverse planktonic communities including 14 nonindigenous species. Sediment samples from oil tanker ballast tanks contained an array of taxa including polychaete worms, adult crabs other crustacea, , mollusks, fish and other invertebrates. Laboratory experiments indicate that a wide range of ballast water species can initially survive the salinity and temperature conditions of Port Valdez. Field surveys and searches of existing collections and the literature identified 15 nonindigenous species established in Prince William Sound. Additional field surveys have been conducted in Kachemak Bay,Kodiak and Afognak Islands locations which have received ballast water from commercial shipping.

Conclusions. A diverse array of taxa have become established in Prince William Sound. However, none of the nonindigenous species found in oil tanker ballast water were found to be established. Field surveys to date have not found additional nonindigenous species although some results are prelininary. Additional surveys are planned for Dutch Harbor and Southeast Alaska locations which also have a history of receiving ballast water.

Traditional Ecological Knowledge (TEK)

Copper River Subsistence Evaluation 2000 & Traditional Knowledge Project

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Background. Although the Ahtna Athabaskans have fished for salmon in the Copper River for generations, their traditional knowledge of salmon has never been systematically documented.

Purpose. To document Ahtna elders traditional knowledge of salmon and provide an overview and update of current trends and characteristics of the Copper River subsistence fisheryMethod: Conducted both focused and open ended interviews with Ahtna elders in the Ahtna language. A particular focus of these interviews was to collect narratives about the elders long-term experiences connected with salmon fishing.

Results. We collected information on the traditional Ahtna self management system, salmon harvesting devices, the Ahtna fish camp & methods of processing salmon, Ahtna legends referring to salmon, observations on changes in the environment which effect salmon migration.

Yukon River Salmon Traditional Ecological Knowledge

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Background. After ten years of Yukon River Drainage Fisheries Association (YRDFA) annual gatherings, a high quantity of Traditional Ecological Knowledge (TEK) about salmon has been discussed. Unfortunately, the TEK revealed at the YRDFA meetings as well as salmon TEK in general has never been documented in a systematic manner. With a combination of the disastrous salmon runs, and the emergence of TEK as a respected source of knowledge in ecological restoration and conservation, the time is right to begin looking at ways to connect the federal and state agencies with a documented source of TEK along the Yukon River.

Purpose. The purpose of this study is to begin to collect and document king salmon TEK from residents living along the Yukon River. The collection of Yukon River salmon TEK will help to address current and future issues facing the Yukon River with the access to knowledge that can be utilized by local residents, organizations, Regional Advisory Council's, and federal and state agencies. The process of bringing people together to participate in this project is also part of the outcome to build trust and relationships between fishers and managers of the salmon resource.

Methods. Data was collected by discussing salmon TEK with meeting participants at YRDFA four-day annual meeting at Holy Cross in February 2001. YRDFA worked with ADF&G Subsistence Division to prepare for summer fieldwork. Four villages were visited and approximately five people were interviewed in each village. Local people were hired to help with video recording, note taking, map reading, translation and facilitation of the interviews. Interviews will be transcribed and then reviewed during village meetings with interviewees, villagers and fishery biologists and/or managers. YRDFA will then compile the information into a written report and a video to be shared.

Results. People discussed when, how and where they fish, factors such as break-up and weather that affect salmon arrival. Years that salmon arrived especially late or early, and years that salmon runs were especially strong or weak. Also discussed was depth and location of salmon in the water, different kinds of king salmon such as whitenoses and bluebacks, connection between salmon and weather, salmon diseases, changes in size, and times of salmon shortage. Spawning locations were also noted when people lived near the tributaries.

Conclusions. Documentation of TEK is key for preserving the knowledge that elders possess about their resource base. While it is important to document TEK, it is also important to utilize TEK in the annual management of the Yukon River salmon fishery. This is helpful for both users and managers, as they can begin to listen to one another and learn from each other about better managing the Yukon salmon resource.

Whitefish and Beaver Ecology of the Yukon Flats, Alaska

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Background. In recent years, the Alaska Department of Fish and Game has heard comments from residents of the Yukon Flats that area whitefish populations have declined. High beaver populations and an increase in the number of beaver dams disrupting whitefish movements is typically cited as the cause of this decline.

Purpose. The purpose of this study was to collect and compile traditional ecological knowledge (TEK) from Yukon Flats residents on the life history of whitefish and perspectives on the effects of beaver dams on whitefish stocks.

Methods. Data were collected through key respondent interviews with 15 life-long residents of theYukon Flats identified as local experts on whitefish. Interviews were recorded on audio tape. The average age of respondents was 59 years and their expertise with regard to whitefish had resulted from decades of observing, fishing for, and harvesting whitefish.

Results. Native (Gwitch'in Athabascan) names and taxonomies for six whitefish species were documented. Seasonal movements of fish, harvest methods, and subsistence uses of whitefish were also described. On the key topic of how beaver dams affect whitefish, respondents described a complex and dynamic natural system involving the movement of water through the Yukon Flats and the regular occurrence of high water events allowing fish to pass beaver dams. Respondents noted climate changes in recent decades that have resulted in these critical flood events being less common.

Conclusions. While whitefish are still broadly distributed across the Yukon Flats, whitefish populations appear to have declined despite decades of reduced subsistence exploitation. Beaver dams have probably contributed to localized declines in whitefish populations in some drainages. Whether high beaver populations are the primary cause for the more generalized decline in the whitefish resource over the entire Yukon Flats is less clear given other factors advanced by respondents. Local experts suggest that larger scale changes in Yukon Flats weather patterns and hydrology also play prominent roles.

The Klawock River and Sarkar Lake Subsistence Salmon Project

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Background. Successful management of a subsistence fishery necessitates understanding both the biology of fish stocks and the social and cultural components affecting the fishery. The Alaska Board of Fisheries and the Southeast Regional Advisory Council have requested information on subsistence fishing patterns at Klawock River and Sarkar Lake in order to address regulatory proposals pertaining to these fisheries.

Purpose. The purpose of this study was to document traditional ecological knowledge and provide a descriptive analysis of the historic and contemporary subsistence sockeye salmon fisheries at Klawock River and Sarkar Lake.

Methods. Agency staff and local tribal members conducted on-site observations and twenty interviews with Tlingit and Haida elders and contemporary harvesters in Craig and Klawock. Key respondent interviews focused on both the past and present fishery and were audiotaped and confidential unless respondents requested otherwise. Researchers also consulted non-native individuals with knowledge of the fishery or sockeye stocks. Previously published reports, technical papers, documents and harvest data were reviewed and analyzed.

Results. Although the research has not been completed, preliminary results address harvest and processing methods, patterns of distribution and use, traditional management of sockeye fisheries, perceived impacts to sockeye abundance and problems with current regulations.

Conclusions. Research is on going; however, implications for management are emerging from the data. Current regulations adversely affect traditional harvest, distribution and processing methods. Perceived impacts have been identified that may not have been recognized by the scientific community. Conflicts exist between contemporary and traditional fish management.

Contributed Papers

Tests of Outbreeding Depression in Hybrids between Spatially Separated Pink Salmon Populations

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Background. Productivity losses can result from hybridization between distinct populations. Such losses are a concern in conservation of salmon populations. Outbreeding depression occurs either because the environments of parental populations differ or because coadapted gene complexes are disrupted. Effects of the latter may not appear until the F_2 generation. Outbreeding depression has been demonstrated in even/odd broodyear pink salmon crosses.

Purpose. The purpose of this study is to detect effects of outbreeding depression in intercrosses between two spatially separated pink salmon populations. Outbreeding depression can be observed directly from reduced survival and indirectly from traits related to fitness, such as homing ability and changes in family size distribution.

Methods. Experiments begun in both fall 1996 and 1997 consisted of control crosses of Auke Creek (Southeast Alaska) pink salmon and intercrosses between Auke Creek females and Pillar Creek (Kodiak Island, about 1000 km away) males to produce the F_1 generations. Each broodyear, approximately 20,000 control and 20,000 hybrid fry were differentially fin-marked and released. F_2 hybrids and controls were released in 1998 and 1999.

Results. In 1998, the proportions of released fry returning as adults for F_1 hybrid (1.53%) and control (1.57%) fish were similar. In 1999, F_1 control returns (5.57%) were significantly ($P < 10^{-4}$) higher than those of hybrid fish (4.55%). In 2000, F_1 control returns (1.07%) were significantly ($P < 0.0005$) higher than hybrid returns (0.65%). In 2001, F_2 control returns (1.31%) were significantly ($P < 0.05$) higher than hybrid returns (1.03%). Weekly recovery efforts in nearby (about 1 km) Waydelich Creek revealed similar straying rates (about 2% or less) from Auke Creek fish by both hybrid and control fish in all years.

Conclusions. Outbreeding depression effects on F_1 hybrid survival were not significant in even year crosses, and significant in odd year crosses. Effects on F_2 hybrid survival were significant in both years, suggesting the disruption of coadapted gene complexes. Efforts are underway to apply microsatellite techniques to estimate effective population sizes and determine levels of inbreeding in the experimental fish.

The problems with hybrids: setting conservation guidelines

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Rates of hybridization and introgression are increasing dramatically worldwide because of translocations of organisms and habitat modifications by humans. Hybridization has contributed to the extinction of many species through direct and indirect means. However, recent studies have found that natural hybridization has played an important role in the evolution of many plant and animal taxa. Determining whether hybridization is natural or anthropogenic is crucial for conservation, but is often difficult to achieve. Controversy has surrounded the setting of appropriate conservation policies to deal with hybridization and introgression. Any policy that deals with hybrids must be flexible and must recognize that nearly every situation involving hybridization is different enough that general rules are not likely to be effective. We provide a categorization of hybridization to help guide management decisions.

Microsatellites, rare alleles and genetic stock identification: statistical concerns and suggestions

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Background. The high polymorphism of microsatellite markers has been viewed as a promise of more powerful and refined genetic stock identification (GSI). However, high polymorphism also increases the chance that a given population sample will fail to detect alleles actually present in the population ('sampling zeros'). While low frequency alleles are mainly at risk of receiving sampling zeros, the large number of such alleles require one consider the impact of sampling zeros on standard GSI methods.

Purpose. Sampling zeros can cause a population's mixture contribution to be underestimated by standard conditional GSI methods. The size of this bias, as a function of allele richness and number of loci used in the GSI, will be empirically investigated.

Methods. The empirical investigation will use genetic data from both the statewide chinook salmon baseline and the under-development Bristol Bay sockeye salmon baseline. Baseline sampling will be simulated to explore the impact of (i) allele richness and sample size on population-specific single-locus GSI bias, and (ii) allele richness and number of loci on population-specific multi-locus GSI bias. The GSI package SPAM will be used with simulated mixtures to investigate across-population multi-locus GSI bias.

Results. The results will be discussed in terms of the implications for baseline sample sizes, loci selection for GSI, and possible alternative estimation methods for GSI.

Spatial covariation in survival rates of pink, chum and sockeye salmon in the Northeast Pacific

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Background. Survival rates of salmon populations exhibit considerable variation over time. To improve management of salmon stocks, it is necessary to better understand environmental sources of variability in their survival rates.

Purpose. Our purpose was to examine patterns of covariation in survival rates across numerous salmon stocks to draw inferences about the spatial scales over which environmental processes influence survival. Such knowledge may facilitate finding causal relationships with environmental indices that would not emerge from single-stock analyses, where power may be low and chance of spurious correlations is high.

Methods. For each of 43 pink, 40 chum, and 37 sockeye stocks, we computed an index of spawner-to-recruit survival rate (time series of residuals from stock-recruitment curves). Data sets covered 15 to 47 years from the 1950s to mid-1990s, and provided very complete geographical coverage (extending over 3000 km from Washington to Alaska). To examine covariation in survival rates, we computed correlations among stocks within each species as well as between species.

Results. Positive covariation in survival rates declined rapidly as the distance between stocks increased. For example, for pink salmon, correlations declined from about 0.5 between nearby stocks (i.e., separated by 100 km or less) to half that value by 400 km, and to zero between stocks separated by 1000 km or more. Similar patterns were found among chum stocks and among sockeye stocks, as well as for comparisons between the three species.

Conclusions. These results indicate that survival rates of pink, chum and sockeye salmon are primarily influenced by environmental processes that operate at local or “regional” spatial scales (e.g., < 500 km). There was little evidence that large-scale processes (e.g., across 1000 km or more) commonly influenced salmon stocks over the period examined. Therefore, future investigations into causes of variation in survival rates should focus on environmental processes that operate at local or regional scales.

Temporal and Spatial variation in Minnow Trap Sampling Results For Resident Stream-Dwelling Fish in Southeast Alaska

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Background. In order to compare results from streams sampled for fish at different points during the field season, or to know how representative a few samples from a larger stream are, it is important to know how sampling results vary across space and time.

Purpose. The purpose of this study was to quantify temporal and spatial variation in minnow trap captures of resident fish (cutthroat trout and Dolly Varden char) in representative streams of central Southeast Alaska.

Methods. To examine temporal variation, we repeatedly fished three resident fish streams overnight with 15 minnow traps each from May through November 2001. To capture spatial variation, we trapped the entire length of a resident fish stream for 2100m, from the top of a complete upstream movement barrier to the upper end of fish habitat. Traps were set every 5-10m wherever there was a suitable site; each trap was fished for 1.5 hours.

Results. Minnow trap capture rates in all three streams were quite low throughout May and early June (CPUE was about 0.25). By late June, capture rates were roughly 8 times what they were in May, and they stayed near that level throughout the summer, with one exception. Spatially, CPUE varied along the one stream from 0-25 fish/trap. Spatial autocorrelation between trap catch rates was low; in many reaches one trap caught nearly all the fish.

Conclusions. Generally speaking, our results suggest that minnow traps sample equally well throughout the summer field season, and temporal bias in summertime minnow trap sampling can therefore be ignored. On the other hand, catch rates are quite low in late spring and early summer, and during that period minnow traps should not be relied on to detect fish. Our results also suggest that because of spatial variation a minimum number of minnow traps is needed to reliably estimate fish densities, and that minnow trap results from a single reach cannot be considered representative of the stream overall without further investigation.

Poster Session

Using in-situ technology to identify and characterize essential fish habitat for classification as a marine reserve in the Eastern Gulf of Alaska

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Background. The Alaska Department of Fish and Game has used a submersible to obtain habitat-specific density estimates of demersal shelf rockfishes in the Eastern Gulf of Alaska since 1990. Habitat is mapped using a variety of techniques including sidescan sonar. These direct observations have allowed us to identify areas that appear to be of critical importance to a variety of fish species.

Purpose. A specific habitat that is particularly important is an area off Cape Edgecumbe dominated by 2 large volcanic cones that rise abruptly from the seafloor. This analysis allows us to clearly defend the definition of this area as an "Essential Fish Habitat" under the Magnuson-Stevens Fishery Conservation and Management Act and lead to its classification as a no-take groundfish marine reserve.

Methods. During rockfish research surveys we have made over 450 submersible dives in depths between 40 m and 200 in the Eastern Gulf of Alaska. Using a combination of technology, including submersibles, lasers, sidescan sonars, and 3-D visualizations of bathymetric data, we were able to characterize this habitat, determine habitat-specific fish densities, and complete detailed quantification of habitat.

Results. The "Edgecumbe pinnacles" rise abruptly from the seafloor at the entrance to Sitka Sound where ocean and tidal currents create massive water flows over this habitat. These pinnacles have extremely complex rock habitats and support a diversity and density of fishes not seen in surrounding areas. The boulder field at the base of the southern pinnacle provides important refuge for adult fishes including large numbers of rockfishes and is also used as spawning habitat by lingcod. The sides of the pinnacle are comprised of columnar basalts and *Primnoa* gorgonians provide biogenic habitat for fishes on the steep walls of the pinnacles. Juvenile rockfishes occur in great abundance at the top of the pinnacle and utilize the dense assemblages of sessile invertebrates for cover. Lingcod occur in extremely dense aggregations at the top of the pinnacle during the late spring and summer. The small size of the area, high density, and feeding behavior make them extremely susceptible to fishing pressure.

Conclusions. This is the first no-take groundfish reserve in the State of Alaska. The use of in-situ technology was key to providing the information needed to having the Edgecumbe Pinnacles designated as a marine reserve.

Opposite effects of sea-surface temperature on survival rates of three species of Northeast Pacific salmon in northern and southern areas

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Background. Identifying environmental effects on recruitment of individual salmon stocks has proven elusive due to high variability in spawner and recruit data and short time series. One possible approach to overcoming these difficulties is to examine environment-recruitment relationships across multiple stocks.

Purpose. Our purpose was to use a multi-stock modeling approach to estimate the effects of coastal sea-surface temperature (SST) on recruitment of three salmon species.

Methods. We used spawner and recruit data for 43 pink, 40 chum, and 37 sockeye salmon stocks extending over 3000 km from Washington to Alaska. Data sets ranged from 15 to 47 years in length. As a potential predictor of recruitment, we used average values of coastal SST corresponding to the approximate temporal and spatial distribution of juveniles during their first few months at sea. Initial parameter estimates from single-stock models showed strong geographical gradients in the effect of SST on recruitment, with different effects on Alaska stocks compared to stocks in British Columbia and Washington (WA/BC). Thus, to estimate the effects of SST across multiple stocks of each species, we fit mixed-effects models separately to stocks in these northern and southern areas.

Results. Parameter estimates from mixed-effects models suggested large differences in the effect of SST on recruitment between northern and southern stocks, but relatively little stock-specific variation in the effect within each area. The estimated SST effects were positive for Alaska stocks of each species, but were negative for southern stocks (WA/BC) of pink and sockeye salmon (SST had little effect on southern chum stocks).

Conclusions. The results suggest that effects of SST on recruitment can be estimated with higher precision by combining multiple stocks in a single model, under reasonable assumptions about the distribution of SST effects across stocks. Furthermore, results strongly support the hypothesis that northern and southern stocks of salmon respond in opposite ways to variations in coastal SST in the Northeast Pacific.

A large Rockfish Habitat on Fairweather Ground, Southeast Alaska

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Background. Yelloweye rockfish are habitat specific in their distribution, occurring in rocky habitats, particularly in complex habitats with overhangs, crevices, and cracks.

Purpose. Scientists from the Alaska Department of Fish and Game and Moss Landing Marine Laboratories have been conducting geophysical surveys to define and characterize rockfish habitat as part of a stock assessment for demersal shelf rockfishes.

Methods. We used a 150 kHz AMS 150 side-scan sonar to survey 780 sq km of the western bank of the Fairweather Ground. This resulted in a high resolution side-scan sonar mosaic. In addition, we have conducted 56 Delta submersible dives in the mosaic area. These direct observations aid in interpretation of the sidescan data as do commercial fishery logbook data. The mosaic was then characterized as habitats and these habitats digitized to allow display in GIS.

Results. We characterize the western Fairweather Ground as a large continental shelf bedrock megahabitat that is comprised of various mesohabitats. Twelve different types of mesohabitats have been defined, primarily including: bedded sedimentary rock with high relief; fractured and deformed bedded rock; glaciated sedimentary rock; highly folded sandstone with sculptured high relief; sand; and glacial deposits including, boulders and pinnacles, cobbles, pebbles, and gravel. Submersible observations show that the highest concentrations of the yelloweye rockfish exist along high relief near vertical bedrock faces that are the interface between rock exposures and sediment. In addition, areas of poorly sorted large boulders also showed a high concentration of yelloweye rockfish. In the area sidescanned, 452 km^2 was rock habitats.

Conclusions. Sidescan sonar data in combination with direct observations made from the submersible Delta allows detailed mapping for rockfish habitats and increaseing the accuracy of habitat-based rockfish stock assessments. Differential erosion, glacial advance and retreat, and the last marine transgression sculptured the sandstones and shales that form this bedrock marine benthic environment into variable relief features that afford excellent habitat to rockfishes.

Testing new electronic archival tags in Pacific Salmon

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Background. Many questions persist concerning the early distribution of Pacific salmon smolts and post smolts in the marine environment. The first year in a marine habitat is the most dangerous and difficult for young salmonids and the effects are crucial to the development of healthy adult salmon stocks. With the aid of archival tags, we can document critical marine habitats and their relationship to the health and survival of salmonids in their first year at sea.

Purpose. Test the effectiveness of archival tags in collecting habitat data in marine environments from salmonids in Alaska. Newly designed archival tags are small enough to be surgically implanted into the body cavity of young salmon. These tags record temperature, pressure, and ambient light of the surrounding habitat and can be used to define critical habitat and plot movement patterns of Pacific salmon in the marine environment.

Methods. A sub-population of coho salmon juveniles at the Fort Richardson Hatchery was held inside to optimize accelerated growth potential. Coho pre-smolt reaching >150mm fork length were tagged with soft visual implant tags (VI-alpha tags) and had their adipose fin clipped for project identification. A sub-group of coho reaching >180mm (FL) were surgically implanted with in-active archival tags with an external light stalk and monitored for up to two weeks. The study group was included in the annual coho pre-smolt release into Ship Creek, May 2001. Sports fishermen and the ADF&G fish trap located on Ship Creek will be used to collect returning tagged coho.

Results. 60 coho salmon pre-smolt >180mm (FL) were surgically implanted with an in-active archival tag (5.6 to 9.2 % body wt.) with a 95% survival rate up to two weeks. Three surgically implanted coho died before release, upon which autopsies showed no obvious signs of death. Swim performance testing on similar size fish, done at the University of Waterloo, Canada, showed no significant differences between tagged and control fish. However, post-surgical observations on coho indicated some *insitu* behaviors indicating more research is needed to determine the full extent of tagging effects.

Conclusions. Coho pre-smolt (>180mm) are capable of withstanding surgically implanted tags (up to 9.2% body wt.) with a high survival rate (95%) under hatchery conditions. Subsequent tagging with active archival tags and release will follow in the spring of 2002 and 2003. The return of tagged fish is anticipated to start with jacks (precocious males) in the fall of 2001 and continue through 2004.

Stock-recruitment Relationships for Alaskan Crab Stocks

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Background. The shape of the stock-recruitment (S–R) curve is an important determinant of a stock's capacity to sustain harvest. The development of crab S-R relationships is quite challenging, because a lack retainable hard body parts prevents age determinations, complex reproductive biology complicates estimation of spawning biomass, and growth variability causes recruitment over a range of sizes. As a result, S-R relationships have been estimated for few crab stocks worldwide.

Purpose. The purpose of this study was to estimate S–R relationships for Bristol Bay red king crab *(Paralithodes camtschaticus)*, Bristol Bay Tanner crab *(Chionoecetes bairdi)*, and eastern Bering Sea snow crab *(C. opilio)*. The study updates our previously published analyses of red king and Tanner crabs and provides new results for snow crab.

Methods. Time series of recruitment and abundance were estimated by length-based analyses of survey, catch-sampling, and commercial landings data. For each stock, effective spawning biomass was estimated from estimates of mature female biomass and male reproductive potential. Recruitment was modeled using general and autocorrelated Ricker curves and fitted by ordinary linear regression and autocorrelation regression, respectively, by maximum likelihood.

Results. For Bristol Bay red king crab, weak recruitment is associated with low spawning biomass and strong recruitment is produced by intermediate spawning biomass, suggesting density dependence. However, recruitment patterns are also consistent with decadal climate shifts. For Tanner and snow crabs, autocorrelated Ricker models fit the data better than general Ricker models, and recruits are weakly associated with spawning biomass. For Tanner crab, recruitment variability is cyclic, whereas snow crab have a circular recruitment pattern.

Conclusions. Aside from equivocal evidence of density dependence for Bristol Bay red king crab, our results imply that environmental factors play a major role in crab recruitment success. Previously, we found that decadal climate changes are associated with recruitment of Bristol Bay red king crab and six other crab stocks in the Gulf of Alaska, perhaps due to changes in water column stability and prey fields of crab zoea. Also, statistical evidence indicated that strong recruitment of Bristol Bay Tanner crab coincides with warm bottom temperatures favorable to gonadal development and NE winds favorable to larval advection to suitable nursery habitats. The biophysical mechanisms behind wide fluctuations in Alaskan crab productivity remains an area of ongoing investigations.

Influence of Intragravel Environment on the Survival of Chum Salmon Eggs and Alevins

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Background. The relationship between intragravel conditions and salmon egg to fry survival is important to understand because a significant and variable proportion of mortality occurs during the incubation period. Other studies have shown intragravel survival of salmon to be influenced by dissolved oxygen (DO), temperature, water velocity, pH, substrate size, siltation, redd superimposition, redd scour, predation and disease. In Interior Alaska little is known about which of these variables are limiting survival and by how much. Defining intragravel environments and factors limiting fresh water survival of chum salmon will aid managers in conservation and rehabilitation strategies.

Purpose. To evaluate egg to fry survival of chum salmon in relation to selected intragravel characteristics at one summer-run and fall-run spawning area. We chose to examine velocity, temperature and DO because other variables were outside the scope of measurement using a piezometer.

Methods. During 1999 we systematically deployed mini-piezometers (stand pipes) along transects in Hodgins Slough, Chena River and Bluff Cabin Slough, Tanana River. These piezometers allowed us to measure the hydraulic pressure differential between subsurface and surface waters, substrate permeability, and subsurface water velocity. In addition, we monitored temperature, conductivity, and DO within each piezometer during the incubation period. Survival of eggs and alevins was evaluated using *in situ* incubation baskets associated with individual piezometers. Three incubation baskets with 100 chum salmon eggs were buried 30 cm from each randomly selected piezometer.

Results. Summer-run study site measurements revealed both spatial and temporal gradients in intragravel temperature (0-10^{O}C) and DO (0-6 mg/L). Egg to fry survival was positively correlated with DO concentration. Temperature greatly influenced developmental rates but no relationship was found between survival and velocity. Fall-run study site measurements revealed a relatively homogenous environment with stable temperatures (4-5^{O}C) and DO (10-12 mg/L). Average survival decreased dramatically after the eyed egg stage (from 87% to 2.7%) but DO and temperature did not appear to be factors directly limiting survival. During the study we noted increased silt within incubation baskets.

Conclusions. Egg and alevin survival within the summer-run spawning study site was not related to temperature but did influence development rates. Summer-run survival was primarily regulated by DO concentrations. In contrast, the fall-run was not directly limited by temperature or DO concentrations. The infiltration of silt would reduce velocities therefore decreasing delivery rates of DO and metabolite removal from eggs and alevins. This observation may explain the decreased survival after the eyed egg stage within the study site.

Development of high resolution imaging techniques for the computer analysis of salmonid scale structure

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Background. Collecting and analyzing salmon scales to obtain age information is a fundamental component of fishery management programs. In Alaska, tens of thousands of salmon scales are routinely collected and examined each year. Many applications, such as stock analysis and retrospective growth studies, involve measuring patterns in the scales. However the methods used to extract these measurements are labor-intensive, rely on subjective determinations, and utilize technology that is in many cases obsolete and no longer replaceable. As a result, these applications are limited in scope, and the data obtained cannot be combined with other datasets for larger comparisons.

Purpose. Recently, we embarked on a project to develop a comprehensive approach for deploying high-resolution image analysis to scale patterns as a means to address these concerns. The approach includes three components: 1) a data management system to efficiently combine individual sampling information with scale images and pattern data, 2) the application of high resolution imaging technology for capturing, storing and transmitting images of scales, and 3) the application of image analysis routines to automate the extraction of pattern data from saved images under reader supervision.

Methods. By way of joint projects with USGS, UAF, NMFS and ADFG, we are applying this approach to produce retrospective time series of sockeye and chum salmon growth contained in several escapement scale collections maintained by ADF&G. These projects call for the creation of a digital archive of scale images and the extraction of circuli and annuli measurements from the scale focus to the outer margin. This poster contains details of the methods employed and examples of the data provided.

Conclusions. This approach appears promising and could serve as platform for new projects, however further software development is needed to increase production rates, and deployment state-wide will require the development of a common data structure.

Steller Sea Lions (SSL) and Fisheries Management in Alaska

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Background. The North Pacific Fishery Management Council (NPFMC) was charged to develop a fishing plan that meets the mandates of the Endangered Species Act in relation to Steller sea lion (SSL) protection measures, and the Magnuson-Stevens Fishery Conservation and Management Act, while conserving marine biodiversity and sustaining viability of the diverse fishing communities dependent on Alaska's fishery resources.

Purpose. This project's purpose was to gather available data on SSL populations in the Gulf of Alaska, Bering Sea, and Aleutian Islands, and on commercial fisheries harvest and management in these areas, and summarize the data in a usable format for the NPFMC's sub-committee charged with recommending SSL protection measures for 2001 and beyond.

Methods. We obtained data from several agencies detailing SSL abundance, trends, and diet composition, fish abundance and catch data, current fishery management restrictions and closed areas, fishing vessel accidents, and bathymetry. The data were then processed and analyzed in a GIS database according to various committee requests.

Results. The database was used in meetings for specific queries and information processing by staff in support of the committee's decision-making process, and later for the Alaska Board of Fisheries. We carried the GIS in on laptop computers and used a projector to show spatial and relational database queries in real-time.

Conclusions. We were able to provide the committee with everything from simple overlays of current fisheries restrictions and SSL population trends, to calculating the percentage of SSL critical habitat area that would be closed to commercial fishing under different management scenarios, to the numbers and locations of SSL protected in closed areas, to historic amount of groundfish catch in certain areas, to potential site locations for Pacific cod localized depletion studies as part, and also recommendations for further research.

Demonstration of Remote Video System Used to Monitor Fishwheel Catch

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A complete remote video system will be set-up and operated. The system is used for fish species identification, tag recovery, and CPUE calculations from fishwheel catch. The system eliminates the handling stress associated with live box holding. Video capture, using various trigger mechanisms, will be demonstrated. Also, specific software used for counting and tabulating fish species CPUE from computer video files (avi) will be shown. All system components will be available for inspection and an equipment list will be available. Other fisheries applications of this technology will be discussed. This is an open presentation, with participation from interested parties encouraged.

Genetic and Life History Characterization of Steelhead and Rainbow Trout in Alaska

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Background. The USGS Alaska Science Center has initiated a survey of steelhead and rainbow trout. This poster describes that survey.

Purpose. This study will address the relationship of steelhead and resident rainbow trout, the genetic population structure of steelhead and rainbow trout, and ecology of steelhead and rainbow trout throughout Alaska. We will be testing hypotheses concerning the correlation between genetic diversity and population structure based on life history, genetic isolation by distance, and dispersal patterns.

Methods. We are using microsattelite and mtDNA markers from fin clips to describe population genetic structure. Life history patterns and chronology of freshwater to saltwater migrations will be examined with otolith microchemistry.

Results. This study is in its initial stages and results are pending.

Alaska's first fishery, Pacific cod: Understanding changes in fishing power from historical and photographic records

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Long time series of fisheries information are usually difficult to interpret because of information gaps, sparse data documentation and loss of supporting descriptive information. Subjective interpretation of fisheries data from photographic imagery and historical information can greatly enhance the interpretation of time series of historical fishing catch, effort and fishing power. Long time series of such fishery information can provide important clues about ecosystem changes such as regime shifts and species composition changes where few other long time series of biological information about ecosystems exist.

The Pacific cod fishery was the first U.S. commercial fishery in Alaska waters, predating commercial salmon fisheries by fifteen years. The cod fishery began as a distant-water dory fishery, using motherships carrying stacks of rowing dories, in the style of east-coast Grand Banks fishermen. Later, because of the extreme long distances to the fishing grounds, shore-based cod processing plants appeared. During 1916, the peak year of the shore-based fishery, over 800 people were employed in salt cod processing in the remote fishing villages of the Shumagin Islands. This fishery provides a record of catch and fishing effort from 1863 through the present, comprising perhaps the longest time series of biological observations in the North Pacific.

The time series contains dramatic trends, such as a remarkably steady increasing trend in the annual cod catch per vessel from the start of the fishery in 1863 through 1940. While quantitative data to describe changes in fishing power over this period are lacking, historical photos provide an understanding of the magnitude of the fishing gear changes which is not readily apparent nor available in text, figures, and numbers. Against this backdrop of the historical and photographic records of fishing power changes, unexplained drops in catch and CPUE may be indicative of regime shifts or other changes in the North Pacific Ocean.

In Situ Aquatic Research

Testing Satellite Pop-Up Tags as a Tool for Identifying Critical Habitat

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Background. Identification of critical habitat is essential for preserving healthy commercial and sports fisheries in the marine environment. Pop-up Satellite Archival Transmitting (PSAT) tags provide a fishery independent method of collecting preference data (depth and water temperature) as well as daily geolocation estimates based on ambient light conditions. This information will aid fisheries managers and scientists in assessing and evaluating critical habitat areas of the Pacific halibut (*Hippoglosus stenolepis*) in the Gulf of Alaska.

Purpose. Test the appropriate application and effectiveness of a new technology, satellite pop-up tags, that could assist in the assessment of critical marine habitat in the Gulf of Alaska. We will determine the effectiveness of light sensors for geolocation, the duration of light measurements, and the data sequence design needed for the most efficient and informative transfer of data via satellite pop-up tags from the Gulf of Alaska.

Methods. Fourteen Pacific halibut were captured by long line and tagged with PSAT tags in the Gulf of Alaska. Seven halibut were brought into husbandry for up to 11 months at the Alaska SeaLife Center to observe tagging effects. Four PSAT tags were attached to a stationary buoy to assess the validity of existing geolocation algorithms at northern latitudes.

Results. A commercial fisherman recovered one PSAT tag and the remaining PSAT tags are scheduled to pop off on November 15, 2001. Analyses of tag data indicate three unique behaviors: 1) the tagged halibut performed a maximum dive of 502 meters (February 9) suggesting movement off the coastal shelf; 2) seven short, steep ascents (168m) late January to early February; 3) halibut moved to more shallow locations (200m) in the spring.

Conclusions. Preliminary results suggest geolocation estimates are difficult to establish during the winter months likely due to climatic and environmental influences. The recovered tag indicated that halibut migrate offshore during the winter months into deeper water, returning to shallow depths in spring. Further analyses of the remaining PSAT tag data are needed to establish more concrete conclusions and to develop a base line database from the fixed tags on a stationary buoy array at the mouth of Resurrection Bay.

Development of a SCUBA Assessment Program for Shallow-Water, Nearshore Pelagic Rockfish

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Nearshore rockfish species are an integral component of the commercial, recreational, and subsistence fisheries prosecuted by shore-based fleets in Southcentral Alaska. These rockfish resources also play a significant role in the nearshore ecosystem with links to a variety of other marine species. One of the most prolific pelagic rockfish species is black rockfish (*Sebastes melanops*). Fish aggregations are easily located and harvested, but assessment, particularly abundance estimation, continues to be problematic due to fish behavior, physiology, life history characteristics, and habitat preferences. As a result, fishery management typically relies on historical harvest patterns, a risk-prone approach. The intent of this study is to develop an *in situ* assessment approach to estimate abundance of black rockfish and associated species in nearshore waters of Southcentral Alaska. The primary sampling tool is scuba, coupled with mark-recapture tagging. The 2001 field season involved two 10-day charters. During the first charter, fish populations were explored along the Outer Kenai Peninsula at Harris Bay, Nuka Bay, Windy Bay, and Rocky Bay, and East Chugach Island. Methods during this charter involved (1) using sonar to locate fish aggregations; (2) tagging rockfish caught by jig gear from the surface; and (3) using scuba gear to swim underwater transects and count tagged and untagged fish. A second charter focused on fish at systematically selected sites in Harris Bay. Methods during the second charter involved: (1) tagging rockfish caught by jig gear from the surface; and (2) using scuba gear to swim underwater transects and count tagged and untagged fish.

Preliminary results from the first field season of this three-year project suggest this is a reasonable approach for black rockfish assessment. Several issues of future exploration are discussed, including fish attraction to divers and the potential distribution of fish deeper than 30 m.

In Situ Assessment of Sediment Processing Rates by the Sea Cucumber (*Parasitchopus californicus*)

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Background. The red sea cucumber (*Parasitchopus californicus*) is a benthic deposit feeder that ingests a mixture of inorganic and organic sediment from the sea floor and defecates long tubes of unassimilated sediment. The red sea cucumbers' importance as a "bioturbator" that reworks and redistributes sediment that constantly settles onto the sea floor is largely unknown. *In situ* measurements of the quantity of benthic sediment sea cucumbers redistribute provide a first step toward assessing this function.

Purpose. The purpose of this study was to measure defecation rates of red cucumbers feeding *in situ* on a soft bottom shallow subtidal habitat (< 40' depth) in Sitka Sound throughout the year.

Methods. The quantity of sea cucumber feces deposited on the sea floor was determined from enclosure experiments conducted during February and June of 1998 and 1999. SCUBA divers collected fecal material deposited under bottomless mesh cages that enclosed a sea cucumber and 0.44 m^2 of sea floor for 24 hours. Fecal material was dried to a constant weight in the laboratory.

Information about the body size and population density of sea cucumbers in the study area is required to extrapolate sediment deposition values determined from the enclosure experiments to units of $g \cdot m^{-2} \cdot day^{-1}$ for the study area as a whole. Therefore, SCUBA divers monitored sea cucumber population density and body size monthly throughout the duration of the study.

Results. Red sea cucumbers defecated over 60% of their body weight per day during all seasons sampled. Fecal deposition during June (130.5 g dry wt m^{-2} day^{-1}**)** was a little over 1.5 times greater during February (78.2 g dry wt m^{-2} day^{-1}).

Conclusions. Red sea cucumbers redeposit sizable quantities of benthic sediment. Our capacity to manage red sea cucumber fisheries from an ecosystem perspective will be enhanced by further insight into the ecological significance of this behavior.

Use of a Remote Video Camera for Surveys of Sea Cucumbers Near Kodiak Island

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Background. The sea cucumber fishery around Kodiak Island is not large enough to support a comprehensive dive survey. Remote video techniques might prove a cost effective alternative to maintaining a dive program.

Purpose. The purpose of this study was to compare the results of a remotely operated video system when compared to a traditional dive survey. Population estimates generated by each technique could then be compared the harvest guideline which is based on historic harvest levels and logbook information.

Methods. Cucumber habitat along the coast of one section of the Kodiak District was located by examining historic commercial dive logs. Thirty transects were then equally spaced along this shoreline. Transects extended perpendicular to shore out to 60 m. A video camera with live feed to the surface and equipped with a pan and tilt mechanism was used to survey a quadrate of approximately 2 m^2. Three quadrats were sampled per transect, stratified by depth: 10-20 m, 21-40 m, and 41-60 m. Divers surveyed the same area by counting all cucumbers within two 2-meter wide transects.

Results. Heavy kelp cover obscured cucumbers from view by the camera in many of the shallow quadrats. In addition, the camera system was relatively cumbersome compared to the divers and could only cover only roughly 1/10 the square area of the divers resulting in greater precision for the diver cucumber estimate.

Conclusions. We conclude that divers remain the superior survey tool for sea cucumbers, but video techniques show some promise if more area can be covered. An ROV system may be a good alternative. Additional work on calibrating video and diver counts in areas obscured with kelp is needed. It may be possible to determine a consistent “kelp obscuring factor”.

Comparison of Weathervane Scallop (*Patinopecten caurinus*) Density Estimates from Dredge and Video Survey Tows in Kamishak Bay, Alaska

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Estimates of dredge efficiency are necessary to convert density estimates from scallop dredge surveys to estimates of abundance. During a May 2001 Alaska Department of Fish and Game survey of weathervane scallops (*Patinopecten caurinus*) in Kamishak Bay, Alaska, we sampled along the same tow paths with both a 2.45 m (8 ft) New Bedford offshore survey dredge and an underwater video sled. Our objectives were to compare scallop density estimates obtained from the 2 techniques and to film freshly made dredge tracks. Density estimates from dredge tows were lower than those from video tows for each of 21 dual samples successfully completed (average 60%). Scallops were relatively easy to detect on video due to abundant epifauna attached to their upper valves. Assuming that the video density estimates provided an accurate census of the scallop population along each tow path, the ratio video density/dredge density is a naive estimator of dredge efficiency. We found a linear decrease in this quantity with increasing scallop density. Video of fresh dredge tracks revealed Tanner crabs (*Chionoecetes bairdi*) and various flatfish (family Pleuronectidae) feeding on benthic organisms that were either damaged or uncovered by passage of the dredge. This study was an important step in ongoing work aimed at development of stock assessment methodology for weathervane scallops in Alaska.

Deep Distance: Submarine Line Transects and Yelloweye Rockfish (*Sebastes ruberrimus*) Management in Southeast Alaska

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For over a decade, we have been using line transect methods to estimate yelloweye rockfish (*Sebastes ruberrimus*) abundance off the coast of Southeast Alaska. Abundance estimates are used to determine allowable catch and prevent overharvest in a relatively small, but locally-valuable, commercial rockfish fishery. Where other commonly-used methods of fish stock assessment are ineffective, due to biological and ecological characteristics of rockfishes, line transects seem to be an effective method for estimating abundance. Line transects are conducted at ocean depths as deep as 180 m from a two-person, 4.6-m long, research submersible. Perpendicular distances from tracklines to rockfish are visually estimated by observers inside the submersible, calibrated regularly with hand-held sonar devices. The limitation of viewing only one side of the trackline, and problems associated with surveying one side of the line, prompted us to use two lasers to "paint" visible tracklines on the ocean bottom. The laser-"drawn" lines provide visual reference points of the actual trackline for the observer and a video-recorder. These visual references minimize inadvertent counting of fish from both sides of the trackline, when fish are near the line, and facilitate estimation of perpendicular distances. Transects are videotaped to confirm observer counts and distance estimates and to quantify association of rockfish with habitat. Trackline length is measured using an ultrashort-baseline acoustic underwater tracking system linking the submersible to an integrated navigation software package operating on a computer aboard a surface support ship. Line transect abundance estimates are used in combination with sidescan sonar surveys of available habitat to yield habitat-based estimates of rockfish abundance. Density of adult yelloweye rockfish on rock habitat ranged from 834 fish/km^2 to 2,534 fish/km^2 depending on management area and CVs ranged from 0.17 to 0.31. Based on these results, estimated biomass of adult yelloweye rockfish in the Southeast Outside Management Subdistrict is 14,695 mt and Total Allowable Catch for 2001 is 330 mt. We conclude that, despite some problems with working in-situ, line transect techniques applied to habitat-based assessments are an effective tool for assessing abundance of yelloweye rockfish.

Arts and Science of Communication

Research Scientists and Kids: Making the Connection with Sea Week Activities

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The Auke Bay Laboratory participates in the Juneau school district's Sea Week program by providing educational activities during on-sight visits for 1200 students annually. The Sea Week curriculum introduces students to the state's marine and wetlands-related resources. Our activities provide opportunities to learn about intertidal and near shore organisms as well as research programs conducted by NOAA fisheries all using hands-on activities. Two age groups are targeted: kindergartners (45 minute visits) and 6th graders (90 minute visits).

All students participate in our two main activities: salt water aquaria viewing and exploring a "touch tank". To enhance the aquaria viewing, students receive age appropriate identification cards and can browse through books, make shell rubbings and explore interactive habitat displays. The "touch tank" contains 10-15 species of invertebrates that students are allowed to hold. Staff volunteers are available to answer questions. The students are at each of these two stations for approximately 20 minutes each.

The older students are also introduced to various types of fisheries research programs and topics by participating in a series of fun hands-on activities in both group and individual settings. Currently, the group activities involve creating oil spills in pie pans and learning about by-catch using jellybeans and chocolate candies. Displays of kelp forests, the deep sea abyss, sharks and plankton sorting gear are available for independent exploration. Students learn that science careers involve many types of interests and disciplines and also that science can be fun.

Effective Intercultural Communications

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Background. Cultural barriers exist to communications. Communication is central to working together with people of diverse backgrounds and/or viewpoints. Effective communication skills are an important tool for working together in multicultural settings. Communication means the transference and understanding of meaning. The process is not complete until the receiver has understood the meaning sent by the sender. This is a human process with many barriers that interfere with the complete transference of meaning.

Purpose. While cultural barriers exist, there are skills to help intercultural communicators. To learn about the process of communication as defined by Samovar and Porter in their book, *Intercultural Communication: A Reader.* For the manager working and communicating in a multicultural environment, there are practical guidelines that can serve to develop skills towards becoming a more effective intercultural communicator.

Program Description. Cultural barriers to communications will be reviewed. Five guidelines to assist the intercultural communicator will be offered from Samovar and Porter, along with variables in the communication process. Variables are influenced by values that are determined by some extent to culture. It is important to be cognizant of these and seek to learn the cultural specifics of the people and places you are working with. Professionals working in multicultural environments can ask themselves a set of questions to learn about the ways that culture influences individual or organizational behavior.

Putting together an effective poster: What's up with that?

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How many of us have had any formal training in putting together an effective poster? Are posters just a less painful alternative to an oral presentation? Or are they a worthwhile method to present information? Unlike an oral presentation, a poster has to stand on its own without the author standing by to answer questions or clarify points. But, a well-made poster has the advantage of being used to convey information at other locations long after the original conference.

What is it about some posters that catch your eye and get the message across before you eye lids start to droop? Is this just luck, the subject matter, or are skills and strategies involved? We will present the elements that make up an effective poster and how they should relate to and support each other. We will present guidelines for content and formatting. This will include discussion of: The number of points/topics a poster should cover, How much time it should take to read it, Font size and consistency, How many and what type of graphics, colors and backgrounds to use. We will provide examples of good and not-so-good posters and discuss their merits and weaknesses.

Marine Invertebrate Aquatic Research

Seasonal population characteristics of the red sea cucumber (*Parastichopus californicus*) near Sitka, Alaska

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Background. Accurate assessment of biological characteristics such as population density, size class composition, individual growth rates, and sex ratios are essential to sound fishery management. Although the red sea cucumber (*Parastichopus californicus*) has supported a commercial fishery in Southeast Alaska since 1987 little is known about the biology of the red sea cucumber in Alaska.

Purpose. The purpose of this study was to assess seasonal and annual variation in the population density, body length, and sex ratio of red cucumbers on a soft bottom habitat (< 40' deep) near Sitka.

Methods. Divers counted the number of sea cucumbers present in random circular plots within the 20-40' depth zone monthly from March 1998 - October 2001. The body length of 50-100 individuals was measured to the nearest cm with a meter stick after standardizing the sea cucumber's state of muscle contraction. Monthly sex ratios were determined by dissecting sea cucumbers collected at the same site from June 1994 - December 1996.

Results. Population density and body length cycled seasonally during all three years.. Lower densities (< 1 m^{-2}) occurred from September until February. Higher densities (> 3 m^{-2}) occurred from February through July/August. Mean body length increased from December through June (38%, 0.6 mm / day) and decreased from June - December (26%, 0.5mm /day). Preliminary sex ratios were close to 50:50 for all months except October when the % females exceeded 90% during all three years.

Conclusions. The relative abundance, mean body length, and possibly the sex ratio of red sea cucumbers occurring on a shallow soft bottom habitat (< 40') near Sitka showed consistent seasonal patterns over a 3 year period. Our capacity to estimate the absolute abundance and growth rate of red sea cucumbers will be enhanced by further insight into the seasonal nature of sea cucumber biology on other habitat types.

Seasonal variation in density and body composition of the commercially important sea cucumber, *Parastichopus parvimensis*

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Background. The sea cucumber *Parastichopus parvimensis* is currently fished in several areas of the west coast of the U.S. and Baja California, Mexico with few restrictions. This is, in part, due to the fact that there is little known about its ecology and reproductive biology .

Purpose. The purpose of our study was to determine how density and body composition vary seasonally in P. parvimensis.

Methods. We studied *P. parvimensis* at two sites in Santa Barbara, California from October 1998 to October 1999. Densities were counted monthly along randomly placed band transects. Body composition was determined each month by collecting and dissecting thirty specimens to assess changes in mass and presence of body parts, including gut, respiratory tree, body wall, and gonad.

Results. Throughout the study, trends in sea cucumber densities were similar at both study sites. Densities were low in the fall, and began increasing in January, until peak values were reached in June. A steep decline occurred in July, and low densities persisted through October. Body composition varied seasonally. The mean proportion of body wall was highest in the fall, declined January through April, and increased May through October. The mean proportions of dry gonad and dry gut both followed seasonal patterns that were opposite that of the body wall. Animals without guts or gonad were observed in August, September, October, and December, but not January through July.

Conclusions. The results of this study lead to the conclusion that there are distinct and coinciding seasonal trends in reproduction, resource allocation, and densities of *P. parvimensis*.

Red sea urchin (*Strongylocentrotus franciscanus*) growth and mortality rates in Southeast Alaska

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Background. Southeast Alaska's red sea urchin fishery developed rapidly in 1994 when declining west coast harvest generated interest in Alaska. Urchin populations are assessed for biomass triennially and quotas are set at 6% of surveyed biomass. Harvest rate is based on an instantaneous natural mortality rate (*M*) of 0.16.

Purpose. *M*=0.16 was derived from size distribution data of limited sample size requiring assumptions of growth rate. The goal is to derive from individual growth rates more realistic estimates of mortality rate and potential for annual yield.

Methods. *In situ* growth rates are estimated by measuring test diameter of urchins marked with passive integrated transponder (PIT) tags, which are unique identifiers. Red urchins are tagged at five sites of variable marine conditions and located near areas supporting commercial harvest. Annually 250 urchins are tagged per site, measured and replaced by hand using SCUBA. Urchins recaptured one year later are re-measured and returned to site. Growth, size-at-age and mortality rate is modeled using variations of Bertalanffy's growth equation (Gulland 1983) and Van Sickle's (1977) mortality equation.

Results. During 1994-2000 4,146 PIT-tagged urchins were released. Including multiple recaptures, 962 (23%) tags were recaptured. Natural and fishing mortality is assumed minimal or non-existent, however, mortality from handling is unknown. Growth rate is generally greatest among urchins between 30 and 40 millimeters, with large variation among locations. Slower growth occurs in areas exposed to open ocean conditions. By age ten urchins reach 90% of asymptotic diameter, after which growth slows considerably. Instantaneous natural mortality rate is also variable among sites.

Conclusions. Currently quotas for all Southeast Alaska red urchins targeted for harvest are calculated using *M*=0.16, which assumes little difference in dynamics among populations occupying different marine environments or locales. These results indicate there may be large differences among populations or habitats that should be considered when applying harvest rates.

Geoduck Clam (*Panopea abrupta*) Commercial Stock Status in Southeast Alaska

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Background. The geoduck clam is widely distributed from Alaska through Washington State where they are very abundant in Puget Sound. Southeast Alaska is at the extreme northern limit of the geographic range. Known geoduck clam beds in Southeast Alaska have a patchy distribution in the central and southern portions, primarily in protected waters near the outside coast.

Purpose. Between 1985 and 1997, four major areas have been open for the commercial harvest of geoducks in Southeast. From 1998 to present, working closely with commercial harvest divers, additional areas have been surveyed to expand this fishery. This abstract will briefly outline the current known commercial stock status of geoduck clams in Southeast Alaska.

Methods. Beginning in 1998 and continuing through present, industry has supplied the department with reconnaissance data, locating potential commercial geoduck harvest areas. The department then conducts population assessment surveys of these areas to determine the feasibility of a commercial harvest.

Results. Virgin (unfished) biomass between 1985 and 1997 in the four major commercial areas is estimated to have been 3,664,741 kg (8,079,371 lb). Between 1998 and June 2001, an additional seven areas have been surveyed adding 5,108,510 kg (11,262,337 lb) to the original estimated virgin biomass. Between the 1985 and 2000/01 seasons, 1,384,091 kg (3,051,411 lb) of geoduck clams have been commercially harvested during Southeast Alaskan fisheries.

Conclusions. Current (July 2001) geoduck clam biomass for those areas surveyed in Southeast Alaska is estimated at 7,389,154 kg (16,290,298 lb). Approximately 16% of the currently surveyed areas virgin biomass has been harvested commercially. Available industry reconnaissance data indicates that additional areas exist that may contribute to this fisheries expansion. Additional funds currently exist supporting continued reconnaissance surveys, potentially increasing this commercial fishery.

Living on the edge: the distribution of Dungeness crab, *Cancer magister*, in a recently deglaciated fjord

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Background. Dungeness crab populations in Alaska are near the northern boundary of their range (Hart 1988), which is also approximately the northern limit for all members of the genus *Cancer* (MacKay 1943). Because there was no crab fishery effort in the upper portion of Glacier Bay and we had not found Dungeness crabs during SCUBA transects in the upper Bay, we hypothesized that one or more limiting abiotic factors prevented crabs from surviving in the upper Bay.

Methods. We tested this hypothesis by systematically sampling for relative abundance of Dungeness crabs from the mouth (south) to the head (north) of the Bay. We measured salinity, temperature, and turbidity at each of the sampling sites to characterize changes in habitat from the lower to the upper Bay. The same water quality measurements were collected at permanent stations to characterize the habitat within and among years.

Results. Dungeness crabs were captured much further from the mouth of the Bay than we anticipated. Our original hypothesis that crabs were eliminated from the upper Bay by an abiotic limiting factor was rejected. Instead of a truncated distribution, we found an abrupt decrease in relative abundance that was not entirely truncated. Crabs were found as far up Bay as Russell Island, 84 km from the mouth of the Bay, in the West Arm and at the mouth of McBride Inlet in the East Arm. Although we did not find a truncated distribution, the number of crabs per pot declined markedly at distances greater than 40 km from the mouth of the Bay. The proportion of male crabs was significantly higher in the upper Bay than in the lower Bay. Male crabs in the upper Bay were significantly larger than male crabs in the lower Bay. The size of female crabs was not significantly different between the 2 areas, although this analysis should be viewed with caution because the sample size from the upper Bay was small. Mean water temperatures at 3 depths (0, 10, and 50 m) showed a strong seasonal cycle, with maximum temperatures in June through October, depending on depth and minimum temperatures in March. From June to September at all 3 depths there was a significant decline in temperature from the lower to upper Bay, with the steepest gradients at shallower depths. During winter months, most of the gradients from lower to upper Bay did not have a significant slope. Because of the colder temperatures, the predicted growth rates for juvenile crabs in the upper Bay were substantially less than the growth rates for crabs in the lower Bay. In the upper Bay, the surface waters typically have substantially reduced salinities during summer months due to glacial run-off.

Conclusions. Contrary to our prediction, adult Dungeness crabs can survive in habitats heavily influenced by glaciers, where the water is cold and characterized by high sediment loads and low surface salinity. We expected to find a truncated spatial distribution, but instead found an abrupt decrease in relative abundance at approximately 40 km from the mouth of Glacier Bay. The area above 40 km had a very low density of predominately adult male crabs that persisted into areas near tidewater glaciers. The steep drop in relative abundance from the lower to upper Bay suggests that the threshold value of one or more limiting factors was exceeded, resulting in a reduced density of the population at one or more stages in the life cycle. The narrow size frequency distribution and the lack of small crabs in the upper Bay is consistent with poor survival in one of the pre-adult life stages.

Freaky parasitic barnacles on hermit crabs in southeast Alaska

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Background. The parasite *Peltogaster paguri* belongs to a group of parasitic barnacles known as the rhizocephalans. The life history and morphology of these soft-bodied parasites differ markedly from the shell-forming barnacles. The brightly colored external brood sac easily identifies late stages of rhizocephalan parasitism in hermit crabs. The externa is attached to the host abdomen with a short stalk and extends a root network through the host tissues. The hairy hermit crab, *Pagurus hirsutiusculus* is a common member of the intertidal community in southeast Alaska and a likely host for parasitism.

Purpose. The purpose of the study was to determine the incidence of parasitism of the rhizocephalan barnacle *Peltogaster paguri* on the hairy hermit crab *Pagurus hirsutiusculus* and compare the incidence between two different sites.

Methods. Hermit crabs were collected from two sites, one being relatively sheltered by wave action, the other relatively exposed. Crabs were coaxed from their shells and rhizocephalan parasitism was determined by the presence of mature externae.

Results. *Peltogaster paguri* parasitized 12.6% of the crabs in the sheltered cove and 13.4% of the crabs in the exposed cove, with no significant difference between the two. Hyperparasitism by a bopyrid isopod, *Liriopsis pygmaea,* was observed in 36% of the barnacles.

Conclusions. The incidence of parasitism by *P. paguri* was higher than had been reported for the genus and one of the highest published rates of rhizocephalan parasitism. The discovery of *Liriopsis pygmaea* in southeast Alaska resulted in a range extension for the species, previously having been reported only as far north as Puget Sound.

Environmental Chemistry

Photoenhanced toxicity of Alaskan North Slope crude oil to copepods

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Background. Photoenhanced toxicity occurs when organisms that have accumulated polycyclic aromatic compounds (PAC) are exposed to the ultraviolet component of sunlight. Biota inhabiting the upper water column and the inter- and shallow subtidal are routinely exposed to UV in sunlight, and may be readily exposed to PAC dissolved from chronic or catastrophic oil pollution sources. Crude and refined oils are potent sources of bioavailable PAC, but the sensitivities of ecologically or economically important marine species vulnerable to photoenhanced toxicity are largely unknown.

Purpose. The purpose of this study was to assess the sensitivity of dominant copepod species to photoenhanced toxicity and to provide data to support an explanation of the chemical interaction of the factors involved.

Methods. Copepods were exposed to the water soluble fraction of weathered North Slope crude oil for 24 hours and subsequently exposed to ambient daylight. PAC concentration and length of daylight exposure were altered to assess sensitivity. Biological response was observed microscopically immediately following the sunlight exposure and again several hours later.

Results. Copepods bioaccumulate PAC at high rates (e.g. ~8000 * for *Calanus marshallae*) without changing the chemical signature of the oil. Mortality, immobilization and tissue damage were observed even on low radiation (rainy) days. The interaction effects of the two factors PAC concentration and UV dose are highly significant (P=0.001). Biological response is a function of oil concentration and UV dose.

Conclusions. Our results clearly indicate that PAC dissolved from crude oil may be phototoxic to marine biota at aqueous PAC concentrations encountered in the field. Copepods rapidly bioaccumulate PAC because of their high ratio of surface area to volume and their high lipid content. Opaque lipid sacs may be evidence of an internal triplet-oxygen mediated lipoprotein denaturation reaction.

Seasonal input of petroleum hydrocarbons into freshwater lakes from recreational use places salmonid rearing habitat at risk

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Background. Auke Lake is a productive water body that provides rearing and/or spawning habitat for four salmon and three trout species, but receives hydrocarbon inputs that may expose these populations to long term degradation of the water quality. Water quality may be degraded from several sources, such as seasonal recreational use of two stroke motors, or continually from urban run-off.

Purpose. Water sampling devices were deployed into Auke Lake to determine seasonal input of toxic aromatic hydrocarbons into the lake.

Methods. Passive sampling devices (LDPEs) were deployed into the lake at different times of the year for 21 day periods. These devices collect and concentrate non-polar contaminants dissolved in the water column. The mass of polynuclear aromatic hydrocarbons (PAHs) adhering to the LDPEs was evaluated by gas chromatography and mass spectrophotometry. Masses for the sum of all PAHs were compared to determine if there was seasonal variation in PAH inputs. The composition of the contaminants was evaluated to determine if the source of PAHs could be identified.

Results. PAH inputs varied seasonally with peaks occurring during times of highest recreational use. Further, the characterization of the aromatic hydrocarbon profiles is consistent with the output of small combustion engines, rather that from fuel oil spills from nearby neighborhoods.

Conclusions The effectiveness LDPEs has been demonstrated in controlled exposures to known concentrations of hydrocarbons. Their ability to retain hydrocarbons is excellent, particularly the larger multi-ringed hydrocarbons. Auke Lake, like many recreational lakes, has seasonal spikes of petroleum hydrocarbon input, primarily into the surface waters. Further increases in use of 2 stroke engines will continue to degrade the water quality, possibly to levels that are insufficient to maintain healthy populations of salmonids.

Acute Exposures of Salmonid Embryos to Total Dissolved Solids

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Background. Water quality standards in the state of Alaska are set based on what the water will be used for, leaving industrial discharge limits to be set on a site by site basis. Of recent concern are discharges containing high concentrations of common ions or total dissolved solids (TDS) such as those produced by mining operations. In order to set regulatory limits useable protocols need to be developed to assess the effects of TDS on indigenous species (salmonids, daphnia).

Purpose. The objective of this research was to measure the effects of embryonic exposure to TDS on the fertilization rates, growth and survival of Pacific salmon.

Methods. Coho (*Oncorhynchus kisutch*), steelhead (*O. mykiss)* and chum (*O. keta*) salmon embryos were exposed to various concentrations of TDS up to 2,500 mg/L. Ion content of exposure solutions attempted to simulate that of wastewater flowing from Alaskan gold mining operations. Twenty-four hour assays were performed at fertilization, and 96-h assays were performed at benchmark stages of embryonic development. Embryos were exposed in 1L aerated containers maintained at ambient temperatures in a flowing water bath. Following the 96-h exposures, embryos were placed in flow-through incubators and monitored for survival, physical deformities and time to hatch.

Results. Embryos exposed at fertilization showed a significant trend of decreasing fertilization rates with increasing concentration. Exposure to TDS only during water hardening only had a slight effect. There was no difference in time to 50% hatch in any of the 96-h exposures. Other life stages assayed showed no detectable effects of TDS exposure.

Conclusions. Salmonids are not adversely affected by cute exposure to TDS solutions during embryonic development except during fertilization. The fertilization event is a more sensitive stage than subsequent water hardening. We propose 24-hour salmonid fertilization bioassay as a means to quickly screen discharge waters for toxicity.

Water chemistry and stable isotope analysis ($d^{15}N$ and $d^{13}C$) of a complex beaver pond system in the Copper River Delta, Cordova, Alaska

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Background. Pacific salmon (*Oncorhynchus* spp.) annually contribute vast amounts of marine-derived biomass to fresh water when they return to spawn, potentially subsidizing aquatic and adjacent riparian food webs. The ecological effects of this biomass influx are not well understood.

Purpose. This study looked at nutrient levels and stable isotopes in the Eighteen-Mile drainage of the west Copper River Delta, Cordova, Alaska, in response to spawning salmon.

Methods. Three types of beaver ponds – four naturally enriched by spawning salmon, two artificially-enriched via carcass and egg addition, and three control ponds with no salmon enrichment – were sampled during 1999 and 2000. In the naturally enriched ponds, adult salmon accessed the ponds directly, and spawned in the stream channel immediately upstream. The control and artificially-enriched ponds were located in side channels and were inaccessible to adult salmon. All ponds supported juvenile coho (*Oncorhynchus kisutch*) salmon. Salmon carcasses and eggs were added to the two artificially-enriched ponds between September and November, 2000. Selected food web components (vascular plants, invertebrates, juvenile coho, and three-spined stickleback (*Gasterosteus aculeatus*)) were collected seasonally for stable isotopes during 1999 and 2000. Water chemistry samples were collected monthly beginning October 2000.

Results. Results indicated that enrichment with marine nutrients occurs in the Delta ecosystem. Nitrogen concentrations were highest in the carcass-enriched ponds, followed by ponds receiving spawners naturally, and lowest in control ponds. Stable isotope data showed enrichment of juvenile coho salmon, and more variably sticklebacks, in the carcass-enriched ponds.

Conclusions. Returning salmon appear to play a vital role in the aquatic-riparian systems in the Copper River Delta and likely in its productivity. Understanding the ecological role of marine-derived biomass in these freshwater systems will help advance fisheries management in the Delta and other coastal ecosystems, as well as in the adjacent marine environments.

Effect of Supplementation With Marine-Derived Nutrients on the Lipid Class and Fatty Acid Composition of Juvenile Coho Salmon

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Background. Returning adult salmon represent an important source of nutrients to their impoverished natal streams. Consequently, the arrival of adult salmon may have a quantitative impact on the energy levels of resident fish populations.

Purpose. The purpose of this study was to compare the growth, lipid class and fatty acid composition of resident coho salmon that were exposed to varying amounts of salmon carcasses.

Methods. We constructed simulated coho salmon streams, loaded them with various amounts of pink salmon carcasses and, after 60 days, evaluating the growth, lipid class and fatty acid composition of resident coho salmon.

Results. After 60 d, coho displayed substantial changes in the size, energy reserves and biochemical composition. Fish in untreated channels lost weight during the experiment, while those in the channel with 1 carcass per m^2 increased their weight by 45% and those rearing with 4 carcasses per m^2 increased by 65%. Triacylglyceride (TAG) concentrations of coho increased with carcass load from 0.78 mg/g lipid in unloaded streams to 28.9 mg/g in the most heavily loaded streams. In contrast, phospholipid concentrations were constant across all treatments. Increases in TAG resulted from the storage of marine-derived long-chain n-3 fatty acids. Juveniles from unloaded streams averaged one tenth the n-3 fatty acid content of coho from the most heavily loaded streams.

Conclusions. These data demonstrate an immediate nutritional benefit resulting from the introduction of carcasses in coho rearing habitat. In addition, the presence of carcasses likely influences the overwinter survival of resident fish.

Quantitative diet estimation using fatty acid composition data taken from Northern fur seals and their prey

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Background. Fatty acid analysis has been proposed a method for quantifying the diets of marine mammals which avoids the limitations imposed by analyzing stomach contents or feces.

Purpose. We demonstrate a conceptual approach to modeling diets using fatty acid data taken from a set of predators and their prey. The demonstration used data drawn from two populations of Northern fur seals known to have different diets. The diets estimated by the modeling procedure are compared to previously reported diets.

Methods. Blubber from juvenile male fur seals was collected during the 1997 harvest, and samples of fur seal prey were collected from 1997 trawl surveys. Fatty acid compositions of the fur seal blubbers and their presumptive prey were determined by gas chromatography and mass spectrophotometry. The contributions of each prey type to each fur seal's diet was estimated by a multivariate least squares technique.

Results. Fur seals from St. Paul and St. George Islands had distinctly different fatty acid compositions. The diets estimated for both islands by the least squares model demonstrated the importance of gonatid squids to the seal diets. However, the contributions from specific squid species differed between islands. In addition seals from the different islands appear to have consumed differing amounts of herring and pollock.

Conclusions. Modeling of seal diets from their fatty acid compositions shows promise and development of the method should continue. The conclusions drawn from the least squares approach we employed are robust in their conclusions regarding the importance of squid in fur seal diets. This is broadly consistent with previous reports of fur diets that were based on analysis of stomach and fecal contents.

Contributed Papers

Fish Species Identification Errors, Problems, and their Conservation and Management Consequences

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Background. Accurate taxonomy is essential to all biology. Correct species collections, identifications, and recognition of all within-species variability have become more critical with present interest in conservation and management of biodiversity. Real recognition, understanding, and support to address these issues often remain lacking and needed.

Purpose. The fundamental ability to correctly identify freshwater fish was tested on 793 specimens composed of 30 species from 410 sample sites.

Methods. The collections and original identifications were through an inventory program to establish Forest Practices Code (FPC) guidelines in BC, Canada. These were then re-examined.

Results. The mean species identification error rate was ~ 26 %, with substantial mistakes also for genera and families. Four species submitted were not in the samples and three species present were not identified. The errors ranged from 0 – 100 %, with the worst for species listed as threatened or vulnerable. These misidentifications could have resulted in 16 sites (4 % of total) receiving decreased protection and in 6 sites (1.5 %) getting increased protection. This could have impacts on biodiversity and economics. There was a collection bias towards sport/commercial fish, which comprised 72% of specimens. The substantial numbers of non-sport fish species officially listed as 'Forest Dependent' and not collected could be a serious concern if they are indeed present in low or restricted abundance. Additionally, species that receive no BC FPC protection were regularly collected.

Conclusions. Identification is not necessarily an easy skill and should not be underestimated. In-depth, testable, and regionally based training from appropriately skilled instructors is recommended. Its main concerns should be developing overconfidence and a species archetype view. Basic natural history and taxonomy should again become a real part of college education too. Representative population-level specimens should also get placed into, and have their species' identifications verified at, a central and permanent museum with necessary specialized facilities.

Head morphology, sound production and feeding kinematics of the Bay pipefish, *Syngnathus leptorhynchus*

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Background. The bay pipefish, Syngnathus leptorhynchus, possesses an elongated neurocranium and suspensorium with a small mouth located at the anterior tip. Anecdotal reports of sound production during feeding and reproduction have been reported in this species, however the sources have not been fully investigated.

Purpose. The objectives of this project were to ascertain the source of sound production during a feeding event in the bay pipefish and to investigate head morphology and feeding kinematics and compare these with related species.

Methods. Mechanisms of prey capture and sound production are discussed based on anatomical observations and high-speed video (1000 images s^{-1}) linked with hydrophone recordings of feeding sequences for twenty-nine feeding events in 8 bay pipefish. Fish were collected at Jackson Beach, San Juan Island, WA using a beach seine from July 20 to August 7, 2001. Stomach contents were examined and morphology was described using cleared and stained specimens.

Results. Inspection of stomach contents revealed the two predominate prey types were copepods and mysid shrimp and these items were found whole in the digestive tract. Fish would approach the prey slowly while lowering the head ventrally until the prey was within striking distance. The strike consisted of a rapid head elevation. The mouth was opened before peak head lift and the prey was drawn in by suction. This was very rapid with most strikes lasting less than 4 ms. No jaw protrusion was observed. Recovery of hyoid and head position took approximately 350 ms. Sound was produced during all feeding events.

Conclusions. Sound was evident 1 to 2 ms before peak head lift but after the prey was consumed supporting the hypothesis that sound production is an artifact of bone striation between the neurocranium and the crown. The bay pipefish exhibited the general teleost plan of prey capture with head elevation and hyoid depression followed by mouth opening and prey consumption.

Effects of catch-and-release fishing on the hooking injury and physiology of wild rainbow trout in the Alagnak River, Alaska

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Background. Alagnak River rainbow trout are subjected to stresses including handling, exhaustion, and repeated air exposure during capture and a high probability of hooking injury with heavy catch-and-release fishing pressure.

Purpose. The goal of this study is to assess the immediate stress response, incidence of hooking injury, and changes to seasonal growth trajectories associated with a catch-and-release fishery, and relate those factors to the overall health of the population.

Methods. Rainbow trout were caught by hook and line (fly and spin) in the Alagnak River and the Nonvianuk Lake outlet in 2000 and 2001. Fish that were sampled for blood were anesthetized in clove oil after capture, and blood was withdrawn from the caudal vessels. Trout were released when equilibrium was reached.

Results. For fish captured during both years (n=502), 23% had at least one previous hooking scar and approximately 58% of fish captured experienced at least one new hooking injury. Of the 58% of fish injured in this study, regardless of fishing method (fly vs. spin), the majority of injured fish were captured using barbed hooks. Degree of injury, as indicated by bleeding intensity, was higher in fish captured with barbed hooks for both fishing methods.

Plasma cortisol, glucose, and lactate concentrations were analyzed for fish sampled for blood in 2000 (n=63). Capture by fly and spin fishing caused a significant elevation in cortisol and glucose levels. Plasma lactate concentrations did not elevate significantly following capture by hooking. Analysis of plasma collected in 2001 will be completed during winter 2001-2002.

Conclusions. Preliminary results suggest that the degree of injury was higher when barbed hooks were used, and hooking injuries were similar in trout caught by fly and spin gear. The elevated cortisol and glucose levels suggest that catch-and-release fishing has significant physiological effects on fish.

Predicting growth of juvenile Arctic grayling in interior Alaska

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Background. Fish growth depends on fish size, water temperature, and daily ration. If we make certain assumptions about ration size it is possible to predict the seasonal growth curve of fish from a description of the seasonal temperature regime. This approach can be used to assess the quality of fish habitat, and determine whether there is evidence for food limitation when the observed growth rate falls below the predicted growth curve.

Purpose. The purpose of this study was to determine if a growth model developed for European grayling (*Thymallus thymallus*) (Mallet et al. 1999. Can. J. Fish. Aquat. Sci. 56: 994-1000) could predict the growth rate of juvenile Arctic grayling (*Thymallus arcticus*) in interior Alaska.

Methods. We recorded daily temperatures in two riffles during the summers of 2000 and 2001 and sampled juvenile Arctic grayling weekly to determine mean length and growth rates. We then used Mallet et al.'s growth model to generate predicted growth curves for comparison with the observed growth data.

Results. At one site there was a close match between observed and predicted growth curves in both years and the model accurately accounted for a sizable between-year difference in growth rates. At the second site the observed growth curve fell below the predicted curve suggesting food limitation. Following this bottleneck there appears to have been compensatory growth, with fish growing more rapidly than predicted.

Conclusions. Results show that Mallet et al's growth model can be a valuable tool in assessing the growth potential in a rearing area yet it is also necessary to consider factors affecting food supply.

Methods for increasing the number of archival yellowfin sole otoliths available for annular measurements

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Background. A large number of archived otoliths are necessary to explore the relationship between otolith growth increment measurements and environmental information. Due to clouding over time, archived yellowfin sole otoliths (unbroken) are often not in a suitable condition to be used for growth increment measurements.

Purpose. This study examines the relationship of measurements obtained from unbroken and cracked-and-burned yellowfin sole otoliths. Cracking-and-burning enables clouded archived yellowfin sole otoliths to be used for growth increment measurements, increasing the number of otoliths available.

Methods. The first five annuli (zones) of age eight unbroken yellowfin sole otoliths (n=57) were measured from the nucleus anteriorly, using image analysis equipment (Optimas). These same measurements were then taken along the frontal plane of the otoliths after they were cracked-and-burned. The relationship between the two measurement methods was evaluated with ANOVA and linear regression.

Results. No significant differences were observed between the two measurement methods across any of the factors (year, sex, zone, and their interactions). For most zones, the slope of the cracked-and-burned otolith measurements regressed on the unbroken otolith measurements did differ significantly from 1.

Conclusions. Results indicate cracked-and-burned otoliths provide comparable data to whole otoliths, and can be used to increase the number of archived yellowfin sole otoliths available for time series analysis.

The ecological effects of salmon migrations in Southeast Alaska streams

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Background. Stream food webs of Southeast Alaska may be nutrient-limited but are able to support populations of Pacific salmon (*Oncorhynchus* spp.). A mechanism that could explain this apparent paradox is the delivery by spawning salmon of energy and nutrients to streams, in both dissolved and particulate form, through excretion and as carcasses and eggs.

Purpose. Our objective was to determine ecological effects on stream food webs of marine-derived nutrients (MDN) transported into fresh water by spawning salmon.

Methods. We measured the response of several trophic levels to the presence of spawning salmon in Fish Creek, near Juneau, Alaska. Several salmon species spawn in the lower reach of Fish Creek, whereas waterfalls 4 km upstream of saltwater make the upper reach inaccessible to salmon. We compared water chemistry, benthic primary productivity, macroinvertebrate densities, and fish standing stock between reaches, both before and after salmon returned to the lower reach.

Results. The presence of spawning salmon increased concentrations of ammonium and soluble reactive phosphorus and rates of primary production, but did not appear to influence macroinvertebrate densities or resident fish standing stock. Stable isotope analyses of nitrogen and carbon indicated that macroinvertebrates and fish assimilated marine-derived nitrogen and carbon.

Conclusions. Our results suggest that MDN transported by salmon can stimulate stream primary production. However, other factors, such as sediment disturbance by spawning activities and size of salmon runs, may modulate the incorporation of MDN into higher trophic levels of stream food webs.

Searching for a Life History Approach to Salmon Escapement Management

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Background. Interactions between Pacific salmon harvest and nutrient supply to the freshwater portion of the salmon ecosystem have played an as yet unquantified role in the notable decline and loss of some populations and in the sustainability of all populations. We assert that previous spawner-recruit methods for assessing the effects of harvest on long-term population health have in many cases been inadequate.

Purpose. We developed a heuristic, life-history based, spreadsheet survival model to analyze effects of various harvest scenarios on population sustainability. The model also incorporates salmon carcass-driven nutrient feedback from the marine to the freshwater components of the salmon ecosystem.

Methods. We used the model to simulate the life history survival steps for a hypothetical coho salmon population. The model employs survival rates from the literature and individual, stochastically varied, terms for spawner to egg, egg to fry, fry to smolt, and smolt to adult survival. The effects of climate variation and nutrient feedback on survival were simulated, as were density-dependent effects of the numbers of spawners and fry on freshwater survival of eggs and juveniles.

Results. We subjected the unexploited equilibrium population to 100 years of 20, 40, and 60% harvest and found each of these harvest rates gradually reduced the population to a steady state of respective reduction, regardless of generous compensatory survival at low population sizes. The harvest rates also similarly reduced the positive effects of nutrients contributing to the population growth necessary for rebuilding.

Conclusions. We encourage salmon researchers to continue exploring this approach and recommend that managers consider this type of modeling for helping to establish escapement goals and evaluating escapement decisions. Until this and other management techniques are refined, managers should strive for generous escapements to support nutrient rebuilding as well as egg deposition, both necessary for strong future salmon production.

Influence of spawning salmon on the fall and early winter growth of juvenile coho salmon on the Copper River Delta, Alaska

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Background. The influence of spawning anadromous salmonids and carcasses on freshwater ecosystems is currently the focus of much research. Most studies have examined the influence of only carcasses on juvenile fish, and have been conducted in heavily altered streams, in laboratories, or in stream microcosms.

Purpose. The purpose of this study was to examine the immediate effects of spawning coho salmon (*Oncorhynchus kisutch*) on the fall and early winter growth of juvenile coho salmon rearing in beaver ponds on the Copper River Delta.

Methods. We determined the growth rate of juvenile coho salmon by placing PIT tags in 4,349 individuals (>60 mm FL) in 6 beaver ponds. Two ponds were immediately downstream from spawning areas and naturally received eggs and carcasses. The other four ponds were off the main channel and did not naturally receive eggs or carcasses. Two of these ponds had eggs and carcasses introduced into them in 2000 and the other two served as controls. We sampled fish monthly from August to December in 1999 and July to December in 2000.

Results. Results indicate differences in growth rates between ponds that are naturally influenced by spawning and those that are not. The addition of eggs and carcasses rapidly increased growth rates in the ponds that did not receive eggs and carcasses naturally. In some ponds of both types, the greatest growth occurred during periods of high flows associated with fall rains.

Conclusions. The spawning process is important to growth and overwinter survival of juvenile coho salmon on the Delta. The availability of an abundant, high quality food resource (eggs) can lead to rapid growth in juveniles. Flow and connectivity with the floodplain may also be important in juvenile growth. Efforts to restore salmonid populations should consider not only nutrients from carcasses, but all components of spawning. Spawner density and duration have implications on resource availability to stream rearing juveniles that should be considered in escapement goals.

Least cisco spawning area located using radio telemetry

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Background. Least cisco *Coregonus sardinella* are small whitefish common to many areas of Alaska, northern Canada, and Russia. Migratory and non-migratory populations have been described, and they are found in lakes, rivers, and estuary regions. They are a primary food source for a wide range of upper trophic level predators. Despite their widespread distribution and ecological importance, few spawning areas have been located.

Purpose. During fall 2000, least cisco were discovered migrating into the Chandalar River, Alaska. A gonadosomatic index of a small sample of fish revealed that they were preparing to spawn. This study was designed to locate the spawning destination of least cisco migrating upstream into the Chandalar River drainage.

Methods. Twelve radio transmitters were surgically implanted into pre-spawning least cisco in early September 2001 in the lower Chandalar River. Fish were captured using a 90 m beach seine. Selected fish were anesthetized with a clove oil solution. A 1.5 cm long incision was made just to the left of center on the ventral side between the pelvic and pectoral fins for tag insertion. The antenna was threaded out a hole posterior to the pelvic fin using a grooved director and a long, flexible hypodermic needle. Two monofilament sutures were required to close the incision. A veterinary tissue adhesive was then applied to the wound. Tagged fish were released immediately when they recovered from anesthesia. Boat tracking was conducted to evaluate post-tagging response. Aerial tracking was then employed to locate upstream destinations.

Results. All least cisco receiving radio transmitters survived the surgery and resumed upstream movements. Tagged fish migrated up to 25 km upstream from the tagging site, where they were found on two successive aerial telemetry flights during late September and early October, the expected spawning period. Their destination was in the lower reaches of a highly braided section of the Chandalar River, where they presumably spawned.

Conclusions. This radio telemetry project successfully revealed the upstream destination of tagged least cisco. If we assume that tagged fish migrated to the same location as untagged fish, the location can be tentatively designated as a spawning area. A site visit in coming years will be important to verify these findings. Further study to discover the origin of the least cisco migration will be required to define the range and distribution of this spawning population in the Yukon River drainage.

Business Meeting Agenda November14, 2001

Sitka, Alaska

Determination of Quorum
Call to Order

Approval of Minutes from Alaska Chapter Business Meeting, Fairbanks, November 15, 2000

Introductions
Treasurer's report

Committee reports

Aquatic Education	Laurel Devaney and Andrea Mederios
Awards	Andy Gryska
Chapter Historian	
Continuing Education	Joel Reynolds
Cultural Diversity	Jerry Berg and Gretchen Bishop
Electronic Communications	Allen Bingham
Environmental Concerns	Catherine Coon
Fishes of Alaska Key	Bill Wilson
International Relations	Fred DeCicco
Membership	Carol Kerkvliet
Oncorhynchus Newsletter	John Thedinga
Past Presidents	Cindy Hartmann
Resolution and By-laws	Dennis Tol
Salmon Stock Status	
Student Sub-unit	Theresa Tanner
Wally Noerenberg Award	

Outgoing President's Address
Installation of New Officers

New Business

Comments on the 2001 Chapter Meeting

2005 Parent Society Meeting — Anchorage, Alaska

Open forum
Adjourn

Fairbanks 2000 Business Meeting Minutes

Alaska Chapter, American Fisheries Society
Annual Business Meeting, Fairbanks, Alaska
November 15, 2000

Quorum was determined by head count; 35 members of the Alaska Chapter, not including the Executive Committee (ExCom) officers, were present. Meeting was called to order by Bill Bechtol at 6:35 PM.

Bill Bechtol, president, introduced the chapter Ex Com and guests: Carol Ann Woody, president-elect; David Wiswar, vice-president; Sue Walker, treasurer; Lee Ann Gardner, secretary; and Kalei Shotwell (not present), the UAS Student Subunit president. Also present and introduced were past presidents Buck Bryant, Cindy Hartmann, Bill Hauser, Tom Kron, Joe Reynolds, Alex Wertheimer, and Bill Wilson. Other persons introduced were Eric Knudsen, president-elect Western Division (WD) AFS; Joe Margraf, AFS Parliamentarian; invited guest Kitty Mecklenburg, *Fishes of Alaska* author; and Paul Rusanowski of Bristol Bay Science and Research Institute that provided funding for this year's Tuesday evening social event at the Alaska Chapter's Annual Meeting.

Bill Bechtol then asked Eric Knudsen to provide an update on WD activities. Eric indicated the WD has been revived. He reported WD highlights:

- The WD annual meeting will be co-convened with the Parent Society's 131st annual meeting in Phoenix, AZ August 19-23, 2001; the meeting is titled *2001: A Fisheries Odyssey - The Journey of Science and Education Continues.* Eric is on the program plan committee. Carl Burger, past president of the Alaska Chapter, will be Parent Society president at that meeting. Eric encouraged Alaska members to attend. He noted that the call for papers is on the Parent Society web site.
- Allen Bingham assisted the WD in getting the WD home page up and running and is currently responsible for its maintenance.

Eric Knudsen added that it is important to explain how the Alaska Chapter, WD, and Parent Society interrelate. The WD president and president–elect sit on the Parent Society governing board and have votes. The WD needs participation of ExCom members to achieve quorum. Bill Bechtol attended the recent WD retreat. The WD also has an annual ExCom meeting that the Alaska Chapter President is encouraged to attend. The only way the Alaska Chapter has representation at the Parent Society is through the division. For example, this past year Carol Ann Woody brought to Bill Bradshaw of the Membership Committee a mentorship idea for students that will now be put before the entire membership at the Parent Society annual meeting, thereby reflecting an idea that originated out of the Alaska Chapter.

Bill Bechtol thanked Eric Knudsen for his presentation and then thanked Carol Ann Woody for her efforts in organizing this year's Alaska Chapter annual meeting. Bill also presented an award to Sue Walker for her efforts these past two years as Alaska Chapter Treasurer.

Bill Bechtol then asked for approval of last year's business meeting minutes. Minutes from the November 10, 1999 business meeting were amended to include Tom Kron on the Retired Members Committee and members present then approved the minutes.

Treasurer's Report

Sue Walker gave a monetary breakdown of the chapter's accounts in the treasurer's report (see attachment). She reported that to date there were 204 registered attendees at this year's annual meeting; 43 percent of the attendees were non-members. There was a good turnout at the short courses offered at this year's annual meeting (i.e., 22 genetic course attendees and 25 bootstrapping course attendees). Also there were steady sales of other miscellaneous items. Student raffle sales were already better than last year.

Sue noted that the monetary figures in the attached Treasurer's Report would change once the expenses for the annual meeting were tallied. She reported that the Chapter currently has $88,195.46 in total chapter assets (before approximately $15,000 in annual meeting expenses). Chapter assets were currently as high as they have ever been. It was noted that the Chapter had substantial profit from the Anchorage annual meeting two years ago. Bill Hauser noted that for the first 5 to 10 years of the Chapter's existence, the Chapter typically only had enough money to pay for *Oncorhynchus* and had no funds left over for socials, travel awards, etc.

Members present accepted the Treasurer's Report.

Committee Reports

Aquatic Education – Laurel Devaney reported this is a new committee that has not been extremely active. Their goal is to form a loose network to share resources among persons doing education in aquatic sciences. One lesson learned from this year's annual meeting was that timing is essential—the Committee scheduled their committee meeting 1 hr before annual meeting registration; there were no attendees. That will change in the future. This year the committee did development an Educator's Resource Guide. This guide contains curriculum guides, videos, posters, kits, etc. i.e., resources you can use if you want to do aquatic education. Copies are available at this meeting. It is currently in draft form so that the committee can make it grow and expand. Laurel noted that the committee would like to receive member comments on the guide. Bill Bechtol also added that at the WD Sacramento meeting, Bill had mentioned the development of the directory and it generated considerable interest there.

Awards.— Nicky Szarzi reported there were no nominations for the Meritorious Service Award for this year (i.e., an award for recent contributions to Alaska fisheries). Other committee awards included an Alaska Chapter Service award and judging of presentations at the annual meeting. This past year, the committee did revise award judging criteria and procedures, as well as the evaluation form. This judging form will be put on the Alaska Chapter web site and the committee welcomes input and comments. The next step for the revised criteria and procedures will be for them to be voted on and approved by the Chapter.

The Awards Committee also had a co-chair, Andy Gryska, for organizing the judging of Chapter annual meeting presentations. Their committee report is attached.

Chapter Historian – Jim Reynolds reported that he wrote a description of historian duties for the Alaska Chapter Procedures Manual per Cindy Hartmann's request.

Continuing Education—Bill Bechtol reported that there were a high number of attendees at this year's short courses. A bootstrapping workshop was offered on Monday morning and a genetics workshop in the afternoon. Bill noted that Pat Hansen has decided to step down as committee chair; anyone who has interest in setting up courses for the chapter and being on this committee, please let Carol Ann Woody know.

Cultural Diversity—Bill Bechtol noted that Kate Wedemeyer is actually the committee chair. Due to Kate's recent accident, committee members Carol Kerkvliet and Doug Molyneaux handled the application process for this year's Cultural Diversity award. For that award, there were three applicants; the winner this year was Kalei Shotwell (the Juneau Student Subunit president).

Electronic Communications— Bill Bechtol noted that Allen Bingham is the webmaster for the Alaska Chapter and the WD home page. Allen reported that this year he has tried to reorganize the Chapter web site to make it easier to host and update; he noted that it is currently not conducive to committee use. He would like to include more information AND make it more helpful to committees. Allen noted that the way he initially organized the WD web site has made it more user-friendly for committee use (as well as members) and he would like to see similar features implemented for the Alaska Chapter site. Allen also added that he wanted to thank Gail Heineman who reviewed all changes made on the web sites and wanted to thank her for her efforts.

Environmental Concerns— Bill Bechtol reported that Phil Mundy was the chair this past year. Bill noted that the position turned into more than Phil had anticipated and has resigned. Bill reported that this past year the committee was active in writing a letter on behalf of the Alaska Chapter regarding inclusion of the Tongass in the roadless forest initiative. The committee also brought to the Chapter ExCom a position paper to remove the lower four Snake River dams; the ExCom, however, did not feel comfortable in acting on that. Bill noted that the Alaska Chapter is looking for a new committee chair and Bill understands that Jan Konigsberg would also like to be involved. Bill encouraged members to contact Carol Ann Woody if they are interested in chairing or being on the committee.

Fishes of Alaska— Bill Wilson reported that he has vowed he will NOT give a report on this project next year. Bill Wilson noted that last year at this time, the book was completed in draft form. At the time of last year's annual meeting, the book was going through peer reviews. Since then, Kitty and Tony Mecklenburg and Lyman Thorsteinson have completed integration of all peer review comments. At this point, Bill Wilson introduced Kitty Mecklenburg who was in attendance and briefly reviewed the history of the project. Bill Wilson related that the Alaska Chapter ended up with this project. Rae Baxter, the author of the *Netpicker's Guide,* was killed shortly after the Alaska Chapter took over the project.

Bill Wilson reported that this book would be published in early 2001. The book is nearly complete; all plates must be converted to PageMaker. Therefore, the book is now in production. Bill noted that he and Lyman still need to write introductory materials and that there are several small details to finish. Bill will write a memorial to Rae Baxter and the book will be dedicated to Rae Baxter. Bill noted that the USGS has funded completion of the book over the last 3 years and provided funds toward printing costs. Bill has asked the Alaska Chapter to provide some funds for printing. Bill feels that the Chapter should benefit financially from this project. Bill will be meeting with Lyman in early December 2000 and will then turn introduction material over to Kitty for final PageMaker conversion. An index also still needs to be done.

Bill Wilson noted that we are still trying to establish price for *Fishes of Alaska*—he noted he will be going to the ExCom for those decisions. Bill would like to see the book be affordable. He noted that it will be the reference manual for fishes of Alaska (marine and freshwater) and will include Outer Continental Shelf species as well. International experts reviewed all fish families and we have also recently received additional Russian material. It will be a working key and a current classification system. It is anticipated to be about 1,100 pages in 8.5" by 11" format in hardbound cover. Every fish will have a drawing, updated distribution map, and detailed bibliography. There will be a centerpiece of color plates for several hundred species.

Following Bill Wilson's presentation, the question was asked as to who was the publisher. Bill Wilson indicated they have identified a printing house but the actual publisher has not yet been identified. The Parent Society will do the marketing for the book, e.g., will provide storage, advertising, distribution, etc. Bill Wilson noted that Lyman Thorsteinson was past chairman of the AFS committee on this. The USGS/BRD will either co-hold copyright or solely hold copyright but the book will be an AFS publication. Alex Wertheimer noted that a revenue stream to the Chapter would be great—but would like to see the book as accessible as possible by keeping the price low so it can be put in libraries and on shelves everywhere. The Committee report is attached.

Retired Members (AdHoc)– A new committee was created at last year's business meeting. Bill Hauser became chair. Bill Hauser presented his one-time *ad hoc* committee report. Bill noted that the intent of the committee was to target non-working biologists who have allowed their membership to lapse. This meeting had come about because, at last year's meeting, a previously active Alaska Chapter member (who resided in Kodiak), had no idea the annual meeting was being held in his hometown. The ExCom wanted to have such individuals be able to participate in annual meetings. Bill indicated that some of the committee recommendations included: providing free Alaska Chapter newsletters to these members; provide tickets for members and/or their spouses to attend to bring some of the history of the chapter to the annual meetings; and to allow these members to make presentations at annual meetings along with other members. The one-time committee report is attached.

International Relations – Committee Chair Fred DeCicco reported that they were in the process of updating procedure manuals, which have been put together in printed materials. They would like input from members on the procedures and would also like to hear from anyone who would like to be actively involved. Fred noted that the committee had been in existence for some time but was very inactive; they are trying to increase their activity level. Fred DeCicco described the committee duties as: 1) attempting to widen the program at the Alaska Chapter meeting by inviting representatives from other countries to attend/participate in meetings; 2) facilitate international conference exchanges (see attached Committee Report).

Fred DeCicco reported that the committee had its first meeting a few days ago with committee members to talk about how to accomplish things. They have been accumulating old copies of donated journals and sending them to Russia. They have also unofficially sponsored a speaker from Scotland for presentations in Fairbanks. For the future: Rather than blindsiding ExCom with requests, they would like to organize a session and invite an expert in that field. The Committee will also be requesting travel funding to have someone come and speak at the annual meeting. Mark Stofa will be acting as an exchange coordinator to accumulate information on international exchanges; Mark recently did some work in Haiti. As he gets information, he will put articles in *Oncorhynchus*. Fred noted that there are lots of short-term exchanges available if you are flexible (e.g., agriculture in third-world nations). Mark will keep the Alaska Chapter abreast of those opportunities.

Bill Bechtol asked if they had any information on the third-world fisheries conference; Bill noted that the Parent Society was approached about the Alaska Chapter making a donation of $300 to support sending AFS members there in October 2001.

Membership – Committee Chair David Wiswar thanked Allen Bingham for being Membership Manager and maintaining the membership lists/addresses and producing Membership Reports for the Parent Society. David noted there has been a decreasing trend this past year (a decrease from 479 to 374 members between August 1999 and August 2000). David attempted to call 25 people from the member-lapsed list i.e., those that were only a member for about one year before they lapsed. Of those 25, 17 had moved onto other careers or had moved out-of-state. A number had also paid late or were not recorded. David noted that student enrollment had also decreased from 51 to 32 during the same time period; he had not yet talked to any student members to see what the reasons were for their not renewing.

Joe Reynolds asked if the mandatory membership for attendance at the annual meeting could be the reason for the increase and then decline in members. David noted that, in the mid-1990s, there was a steady decline; there was no climb to offset the difference. He also noted there were low levels of graduate students in Fairbanks now; this was partly due to the changeover in UAF faculty—all new faculty. Previous UAF faculty were active student recruiters. In contrast, the Juneau campus still has a strong Juneau faculty contingent. Therefore, Juneau vs. Fairbanks roles have reversed as far as relative student membership numbers.

Allen Bingham noted that, in 1998, because of the joint meeting with the Lowell Wakefield Symposium, there was no member/non-member rate. Non-member attendees were encouraged to become members but were not required to do so—this did not really show up until 1999. Kodiak was not a huge meeting so it didn't pump membership numbers back up. Following the Kodiak meeting, there was a misunderstanding of the process, and the membership money and names of the new members were not sent to the Parent Society. So, we had two years in a row where we had few or no new members as a result of our annual meeting.

Bill Bechtol noted that continuing education has dropped off considerably in recent years—the Alaska Chapter used to have four short courses a year; the lack of short courses may make AFS membership less attractive; making continuing education a focus once again may also help membership numbers. Bill Bechtol also noted that people are faced with lots more meetings as professionals—each conference competes for your time and your budget dollars. Due to the lengthy discussion, Eric Knudsen suggested that further discussion be deferred to the membership meeting.

Oncorhynchus Newsletter— Bill Bechtol noted that John Thedinga, the newsletter editor, has been very accommodating and because of his efforts, it is one of the better newsletters in the whole division.

Past Presidents— No report was presented.

Program – Carol Ann Woody thanked all session chairs and committee members for making this year's annual meeting such a success. She noted that the diverse program contributed to the outstanding attendance (e.g., Michelle Ridgeway's session on Marine Protected Areas and the marine session on effects of bottom trawling).

Resolutions and By-laws — Bill Bechtol reported that one major change initiated in the past year was that the Student Representative has been added as a voting member of the ExCom.

Salmon Stock Status— Committee Chair Alex Wertheimer noted that to do a comprehensive job on the salmon stock status issue, the Alaska Chapter would need a data manager and analyst. The committee met earlier this week. At that meeting, it was concluded that the atmosphere has changed fundamentally since the Southeast status review was done; there is now lots of activity on the agency side. As a result, the committee did not think the Alaska Chapter should go forward with this as a project. There was concern that it would be viewed as competitive with agency mandates. The Committee felt that the Alaska Chapter can still offer advice and expertise—e.g., have a workshop to bring experts together OR do a white paper to show how such an effort should be done. The Committee will be discussing this matter further with Carol Ann Woody.

Student Subunits— No student representative was present to make a report.

Wally Noerenberg Award — Committee Chair Gordon Kruse presented his committee report. He noted that this award is the most prestigious Chapter award. The committee is composed of three past presidents. Recommendations go to the committee and then are forwarded to ExCom. For this year, they had two nominations. One nomination did not have a complete application; the second application did not have complete information. Therefore, there was no award this year. Gordon has completed his term and announced that the committee is seeking a new chair (that person cannot be a past president). Gordon added that he hoped that the committee will push for more nominations and for complete applications next year.

OTHER BUSINESS

Procedures Manual— Cindy Hartmann has generated a first draft of the revised manual. Cindy thanked everyone who had provided input. Cindy will continue to work on the draft until January 2001. She asked for those that haven't done so, to send her their comments and revisions. Also, if anyone would like a copy for review, to please let Cindy know.

Outgoing President's Address— Final address was made by Bill Bechtol.

Installation of New Officers—Bill Bechtol presented Carol Ann Woody with the Alaska Chapter gavel to denote her assuming the duties of president. Other new officers for the Alaska Chapter for the coming year are Bob Ourso as treasurer, Carol Kerkvliet as vice president, and Bill Bechtol as Past President. David Wiswar assumes the duties of president-elect. Bill Bechtol noted that only about 30 ballots were received for this year's election with most voters choosing to vote electronically.

NEW BUSINESS

President's Address—Carol Ann Woody indicated her primary goal during her term of office will be to provide a mentorship program for new young biologists. Carol Ann went on to thank the Local Arrangements Committee for their support in putting the meeting together. Carol's agenda for the coming year will focus on advocating members to mentor and sponsor new fisheries biologists.

Future Meetings—Cindy Hartmann passed out a flier (see attached one-page information sheet) regarding the AFS 2005 Annual Meeting. Cindy noted that the ExCom needs input as to whether the Chapter should submit a bid to host the Parent Society meeting in September 2005. Hotel space is not available in sufficient quantities or at a reasonable price in August, so the Anchorage Convention and Visitors Bureau (ACVB) is putting a bid package together for two September dates to choose from. The ACVB is excited about the possibility of a meeting of this size coming to Anchorage. They offer many services in meeting planning and said that they thought we could get free use of the convention center. Eric Knudsen asked if someone in Anchorage has volunteered to be local arrangements chair—Eric noted there would need to be a major commitment by someone. Cindy noted that, if the Alaska Chapter is interested in submitting a bid packet for the 2005 meeting, it is due for submission to the time and place committee chair, Betsy Fritz, in August 2001.

Meeting adjourned at 7:05 PM.

Special thanks to all those who made this meeting possible

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Northern Southeast Regional Aquaculture Association
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Session Chairs

Bill Bechtol
Taylor Brelsford
Laurel Devaney
Jim Finn
Ron Heintz
Andrea Mederios
Gary Sonnevil
Doug Woodby
Carol Ann Woody

Local Arrangements

Sheila Jacobson

Meeting Program

Bob Ourso

Notes

Notes