Special thanks to all those who made this conference possible

Alaska Chapter of the American Fisheries Society

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Meg Cartwright, Alaska Department of Fish and Game
Ethlyn Dunbar, Alaska Department of Fish and Game
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Communications

Allen Bingham, Alaska Department of Fish and Game

Plenary

Eric Knudsen, Western Division, AFS
Bill Wilson, LGL Alaska Research Facility
Catherine and Tony Mecklenburg, Point Stephens Research
Adelheid Herrmann and Ira New Breast, Native American Fish and Wildlife Society
Phil Pister, Desert Fish Council and California Department of Fish and Game (retired)

Banquet

DeeDee Jonrowe, Iditarod Racer
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Session Chairs

David Cannon, Kuskokwim Native Association
Laurel Devaney, U. S. Fish and Wildlife Service
John Eiler, National Marine Fisheries Service
Christopher Estes, Alaska Department of Fish and Game

Steven Fried, U. S. Fish and Wildlife Service
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Continuing Education

Joel Reynolds, Chair, Alaska Department of Fish and Game

Instructors

Dave Bella, Oregon State University
David Daum, U.S. Fish and Wildlife Service
John Eiler,National Marine Fisheries Service
Ted Otis, Alaska Department of Fish and Game

Vendors

Advanced Telemetry System, (http://www.atstrack.com/)
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Contributing Sponsors

A $5,000 grant was received from NOAA's Coastal Training Program (CTP), via the **Kachemak Bay Research Reserve**, to help sponsor the session: Human Nature, Human Influence-Are Alaska's Fisheries Resources Really That Different?

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A grant supporting the Remote Video Continuing Education Workshop was received from the **Kachemak Bay Research Reserve's Coastal Training Program** (CTP), a NOAA sponsored training program for resource managers.

USGS Alaska Science Center supported travel for speakers.

Advanced Telemetry System (http://www.atstrack.com/) - $500 for banquet
Detlef Buettner (http://home.gci.net/~lifesize.fish/) – October Steelhead print
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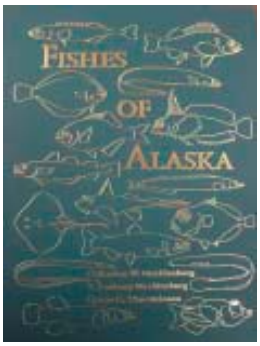

FISHES OF ALASKA, Signed by Authors
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TICKETS

- ONE for $5

- FIVE for $20

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Drawing to be held during the Banquet on Wed, October 22, 2002

[1] Thanks to McAfees Fly Shop, 750 West Dimond, Anchorage, http://www.mcafeesflyshop.com/ and donation from Alaska Flyfishers, http://www.akflyfishers.org/
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Alyeska Prince Hotel - Girdwood, Alaska - October 21-24, 2002 - Schedule at a glance				
Day/Date	Time Period	Columbia Ballroom A	Columbia Ballroom B	Prince Court
Monday, October 21	Morning	Continuing Education Course - Using Remote Video Technology in Fisheries/Wildlife Research Applications	Continuing Education Course - Using Telemetry to Study Aquatic Systems	
	Afternoon		Continuing Education Course - Human Systems: The Whole May Be Less Than the Sum of the Parts	
	Evening			Opening Reception
Tuesday, October 22	Early Morning	Plenary Session		
	Late Morning	Session: Current applications of mark-recapture methods in fisheries assessment and management in Alaska	Session: Contributed Papers	
	Early Afternoon	Session: Using Telemetry in Alaska		
	Late Afternoon	Session: Advances in Marine Biology, and the Associated Fishery Management Implications		
	Evening			Poster Session/Vendor Social
Wednesday, October 23	Morning	Session: Identifying True Carrying Capacity in Anadromous Salmonid Ecosystems	Session: Instream Flow Reservation and Protection	
	Afternoon	Special Session - Kvichak River Sockeye Salmon: Combining Past and Present Knowledge for More Effective Management	Session: No Fish Habitat = No Fish Management	
	Late Afternoon –Early Evening		Business Meeting	
	Evening			Social and Banquet
Thursday, October 24	Early Morning	Session Title Human Nature, Human Influences-Are Alaska's Fisheries Resources Really That Different?	Session: Contributed Papers	
	Late Morning	Session: Marine Protected Areas	Session: Communication as a Fisheries Management and Research Tool	
	Early Afternoon	Session: Twenty-eight years of private, non-profit hatcheries in Alaska: what have we learned about hatchery-wild stock interactions?		
	Late Afternoon	Awards and Adjournment		

Note that the Registration Desk, Breakfasts, Lunches, and Breaks are currently planned for the Columbia Ballroom FOYER.

Agenda

Location: Alyeska Prince Hotel

Monday, October 21

Continuing Education Courses

Columbia Ballroom (Room A)

8:30am – 5:45pm Using Remote Video Technology in Fisheries/Wildlife Research Applications – *Ted Otis and Dave Daum, instructors*

Columbia Ballroom (Room B)

8:00am – 12:00pm Using Telemetry to Study Aquatic Systems – *John Eiler, instructor*

1:00pm – 5:00pm Human Systems: The Whole May Be Less Than the Sum of the Parts – *David Bella, instructor*

Prince Court

5:30pm – 9:30 pm Opening Reception, Vendor Display, Key to Fishes of Alaska Book Signing

Vendors

- Advanced Telemetry System
- Lotek
- Fuhrman Diversified
- SeeMoreWildlife Systems, Inc
- SalmonSoft
- MECCO
- ABS
- Archipelago Marine Research

Tuesday, October 22

Columbia Ballroom Foyer

7:00am – 10:30am Registration

7:30 am Breakfast Buffet

Columbia Ballroom (Room A)

8:00am – 9:40am Plenary Session

8:00am – 8:10am Opening Comments by AFS president – *David Wiswar*

8:10am – 8:20am Opening Comments by AFS Western Division past president – *Eric Kundsen*

8:20am - 8:40am Fishes of Alaska Address – *Bill Wilson* and Kitty Mecklenburg

8:40am – 8:50am Building Communications and Awareness between AFS and the Native American Fish and Wildlife Society - *Adelheid Herrmann and Ira New Breast*

8:50am – 9:40am NEW DIRECTIONS AND ETHICS IN MANAGEMENT OF WESTERN FISHERIES RESOURCES – *Edwin P. (Phil) Pister*

9:40am - 10:00am BREAK

Concurrent Session 1 (Columbia Ballroom A)

10:00am - 12:00am Session: Current applications of mark-recapture methods in fisheries assessment and management in Alaska – *Patricia Hansen, chair*

10:00am – 10:20am Using Mark-Recapture Methods to Estimate Escapement in Small Sockeye Salmon Systems - *Jan Conitz*

10:20am – 10:40am Seven Seasons of Fall Chum Salmon Mark and Recapture on the Yukon River - *Tevis Underwood*

10:40am – 11:00am Declining Mark-Rates With Distance From The Rampart Mark-Recapture Study Site - *Jeff Bromaghin*

	Continued Session: Current applications of mark-recapture methods in fisheries assessment and management in Alaska – *Patricia Hansen, chair*
11:00am – 11:20am	Stress Effects in Fall Chum Salmon (*Oncorhynchus keta*), from Mark-Recapture: Plasma Stress Indicators and Non-Esterified Fatty Acid Analysis - *Pete Cleary*
11:20am – 11:40am	Mission Impossible? Tagging 200,000 wild juvenile fall chinook on the Hanford Reach - *Jeff Fryer*
11:40am – 12:00pm	Use of radio tags in a two-sample mark recapture experiment to estimate abundance of chinook salmon in the Copper River - *Matthew J. Evenson*
12:00pm – 1:20pm	**Lunch Buffet** *(Columbia Ballroom Foyer)*
12:00pm – 1:20pm	Past Presidents Meeting *(Portage Room)*
1:20pm – 3:00pm	**Session: Using Telemetry in Alaska – *John Eiler, chair***
1:20pm – 1:40pm	Freshwater to marine migration of post-spawn steelhead determined with acoustic tags and moored receivers, Ninilchik River, Alaska - *Derek Wilson*
1:40pm – 2:00pm	Radio telemetry as a means to estimate proportions of chinook, chum, and coho salmon passing through the Kogrukluk River weir - *Matthew J. Evenson*
2:00pm – 2:20pm	Migratory behavior of radio tagged adult eulachon *(Thaleichthys pacificus) - Elizabeth A. Kitto Spangler*
2:20pm – 2:40pm	Testing electronic archival tags in Alaska salmon - *Phil Richards*
2:40pm -- 3:00pm	Using Radio Telemetry to Study Chinook Salmon in the Yukon River Basin - *Toshihide Hamazaki*
3:00pm – 3:20pm	**BREAK**
3:20pm – 4:40pm	**Session: Advances in Marine Biology, and the Associated Fishery Management Implications – *Dan Urban, chair***
3:20pm – 3:40pm	Black Rock Fish Observations in the Western Gulf of Alaska - *Dan Urban*
3:40pm – 4:00pm	Seasonal Abundance and Diversity of Nearshore Fishes around Steller Sea Lion Haulouts and non-Haulout areas of Kodiak Island - *Cathy Hegwer*
4:00pm – 4:20pm	Spawning season and length at maturity for Dover sole in the Gulf of Alaska - *Alisa A. Abookire*
4:20pm – 4:40pm	Fisheries Science as a Sub-discipline of Ecology: How and Why Basic Research is Important to Resource Managers - *Peter van Tamelen*

Concurrent Session 2 (Columbia Ballroom B)

10:40am – 12:00pm	**Session: Contributed Papers – *Hal Geiger, chair***
10:40am – 11:00am	Fishes of Alaska and Nearby Waters: New Geographic Range Records and Information on Morphological Features - *Catherine W. Mecklenburg*
11:00am – 11:20am	Polymorphism, Precision, & Power - *Joel H. Reynolds*
11:20am – 11:40am	Microsatellites reveal unique patterns of fine-scale and broad-scale population structure in Alaskan coho salmon - *Jeffrey B. Olsen*
11:40am – 12:00pm	Application Of Amplified Fragment Length Polymorphism (AFLP) To Genetic Stock Identification Of Yukon River Fall Chum Salmon - *Blair G. Flannery*
12:00pm – 1:20pm	**Lunch Buffet** *(Columbia Ballroom Foyer)*
12:00pm – 1:20pm	Past Presidents Meeting *(Portage Room)*
1:20pm – 2:20pm	**Session: Contributed Papers – (continued)**
1:20pm – 1:40pm	Effects of catch-and-release fishing on the hooking injury and physiology of wild rainbow trout in the Alagnak River, Alaska - *Julie M. Meka*
1:40pm – 2:00pm	The Feasibility of Estimating Salmon Passage in Turbid Rivers with a Dual frequency Identification Sonar (DIDSON) - *Suzanne Maxwell*
2:00pm – 2:20pm	Probing the Upstream Limits of Anadromous Whitefish Migrations in the Yukon River - *Randy J. Brown*

Prince Court

6:30pm – 9:30pm **Poster Session/Vendor Social – *Cecil Rich, chair***

Posters

- Application of Microsatellite Loci in Population and Mixed-Stock Analysis for Dolly Varden **Continued Poster Session/Vendor Social – *Cecil Rich, chair*** in the Togiak River, *Penny Crane and John Wenburg*
- Early marine ecology of juvenile salmon from Norton Sound, Alaska, *Matthew J. Nemeth and Beth E. Haley*
- EFFECTS OF ACETATE CARD PRESSING ON SCALE SIZE, *Jessica Simeone, Beverly A. Agler, Dion S. Oxman, Peter T. Hagen and Wendy Whalen*
- Partners for Fisheries Management Program, *Karen Pletnikoff*
- Whitefish of Whitefish Lake, *Ken Harper, Wayne Morgan, and David Cannon*
- Hetta Lake Sockeye Salmon Stock Assessment Project, *R.William Bale*
- Preliminary Investigations into the Application of a New Sonar System for Assessing Chinook Salmon Abundance in the Kenai River, *Debby L. Burwen*
- Growth and Movement of the Sea Cucumber *Parastichopus californicus* in Southeast Alaska, *Kristin Cieciel & Ginny Eckert*
- Use of Multiple Gear Types and Inriver Fisheries to Estimate the Abundance of Stikine River Chinook Salmon, *John Der Hovanisian, Keith Pahlke, and Peter Etherton*
- American Fisheries Society Hutton Junior Fisheries Biology Program – Summer at Ft. Richardson Hatchery, *Daryl Lecsanec*
- American Fisheries Society Hutton Junior Fisheries Biology Program – Working with Biologists in Sport Fish Division, Alaska Department of Fish and Game, *Jason Lynch*
- The Alaska Fishery Research Bulletin, *Sue Merkouris*
- Utility of Climate Variation in Western Alaska Chum Forecast, *S. Kalei Shotwell, Milo D. Adkison & William W. Smoker, Harold Geiger*
- Testing Archival Tags in Steelhead, Ninilchik River, Alaska, *Christian E. Zimmerman, Jennifer L. Nielsen, Derek Wilson, Thor Tingey, and Phil Richards*
- Akalura Creek Remote Video Feasibility Project, *Sagalkin, N.*
- An Escapement Goal Evaluation of Saltery Lake, Kodiak, Alaska, *Sagalkin, N. and S.G. Honnold*
- How to build a “fish friendly” fishwheel, *Bill Fliris, Stan Zuray, and Dave Daum*
- Landlocked Lampreys in Southeast Alaska, Kim Hastings, *Mark Stichert and Gordon Haas*
- Pacific cod in Captivity, *Carrie Worton and Alisa Abookire*
- Alaska Fish Habitat Inventory: An Introduction., *Michael Wiedmer*
- Juvenile Sockeye Salmon Research in the Eastern Bering Sea: Possible Factors Affecting Early Marine Survival - *Edward V. Farley, Jr.*
- Summer movements of beluga whales captured in the Kvichak River, Alaska, May 2002 - *Lori Quakenbush*
- Genetic population structure of sockeye salmon in Lake Clark, Alaska - *Kristina M. Ramstad*
- Sockeye Salmon Spawning Distribution in Lake Clark, Alaska - *Dan Young*

Vendors

- Advanced Telemetry System
- Lotek
- SalmonSoft

Wednesday, October 23

Columbia Ballroom Foyer

7:00am – 9:30am Registration
7:30 am Breakfast Buffet

Concurrent Session 1 (Columbia Ballroom A)

8:00am – 11:20am **Session: Identifying True Carrying Capacity in Anadromous Salmonid Ecosystems – *Eric Knudsen, chair***

8:00am – 8:20am Striving toward a new science for estimating salmon production potential – *Eric Knudsen*
8:20am – 8:40am Practical spawner recruiting - *Benjamin W. Van Alen*

Continued Session: Identifying True Carrying Capacity in Anadromous Salmonid Ecosystems – *Eric Knudsen, chair*

8:40am – 9:00am Multi-stock state-space models for estimating trends in stock-recruit dynamics of Pacific salmon - *Brian J. Pyper*

9:00am – 9:20am Climate and the life cycle of coho salmon - *Peter W. Lawson*

9:20am – 9:40am Use of stream habitat surveys to predict carrying capacity for steelhead trout - *Steve Cramer*

9:40am – 10:00am A model framework for relating life-history, freshwater habitat, and the ocean environment to Pacific salmon production and capacity - *Mark Scheuerell*

10:00am – 10:20am **BREAK**

10:20am – 10:40am Methods for estimating carrying capacity for coho, chinook, and steelhead, and cutthroat trout - *Steve Cramer*

10:40am – 11:00am Developing Habitat Selection Theory to Predict the Distribution, Migration, and Abundance of Salmon in the Ocean: A Research Project in Progress - *Nick Hughes*

11:00am – 11:20am Discussion

11:20am – 12:40pm **Lunch Buffet** *(Columbia Ballroom Foyer)*

12:40pm – 4:40pm **Special Session - Kvichak River Sockeye Salmon: Combining Past and Present Knowledge for More Effective Management – *Steve Fried, chair***

Historical Perspective and Current Circumstances

12:40pm – 1:00pm Management of Kvichak River Sockeye Salmon - *Steve Morstad*

1:00pm – 1:20pm Kvichak River Sockeye Salmon Production, Escapement Goals, and Forecasting - *Lowell Fair*

1:20pm – 1:40pm Kvichak and Lake Clark Sockeye Salmon Escapement: Past and Present - *Carol Ann Woody*

1:40pm – 2:00pm Traditional Ecological Knowledge of Sockeye Salmon in Lake Clark - *Mary McBurney*

Factors Influencing Production

2:00pm – 2:20pm Climatic and density-dependent regulation of growth and survival of juvenile sockeye salmon in the Kvichak River, Alaska - *Daniel E. Schindler*

Poster Juvenile Sockeye Salmon Research in the Eastern Bering Sea: Possible Factors Affecting Early Marine Survival - *Edward V. Farley, Jr.*

Poster Summer movements of beluga whales captured in the Kvichak River, Alaska, May 2002 - *Lori Quakenbush*

2:20pm – 2:40pm **BREAK**

Population Structure and Management Implications

2:40pm – 3:00pm Allozyme, mitochondrial DNA, and microsatellite DNA markers determine distribution and migration of sockeye salmon from the Kvichak River - *J. E. Seeb*

3:00pm – 3:20pm Habitats in the Kvichak River Watershed - *Ian J. Stewart*

Poster Genetic population structure of sockeye salmon in Lake Clark, Alaska - *Kristina M. Ramstad*

Poster Sockeye Salmon Spawning Distribution in Lake Clark, Alaska - *Dan Young*

Modeling and Synthesis Efforts – Putting It All Together

3:20pm – 3:40pm Ecosystem Modeling of Species Interactions Affecting Sockeye Salmon Production in Iliamna Lake, Bristol Bay, Alaska - *Norma Jean Sands*

3:40pm – 4:40pm **Panel Discussion**

- Will current management strategies and practices allow the Kvichak River sockeye salmon run to increase in abundance, maintain its key role in the ecosystem, and fulfill the needs of subsistence, commercial and recreational users?
- Can the five-year sockeye salmon abundance cycle be maintained, now that the peak year has failed, and should it be maintained?
- Is the current management system adaptive, or does it need to be modified so that it can more effectively gather information, answer key questions, and respond to findings?

Concurrent Session 2 (Columbia Ballroom B)

8:30am – 11:40am	**Session: Instream Flow Reservation and Protection – Christopher Estes, chair**
8:20am – 8:40am	Status of the USFWS Instream Flow Program, *Alan Peck*
8:40am – 9:00am	HYDROELECTRIC POWER DEVELOPMENT IN ALASKA**, -** *Clayton Hawkes*
9:00am – 9:20am	Examples of Ecosystem-level River Concepts Applied to Alaskan Rivers, *Jason Mouw*
9:20am – 9:40am	The Nature Conservancy's Instream Flow Initiative, *Paul Jackson*
9:40am – 10:00am	Hydrologic Protocols for Instream Flow Assessments, *Joe Klein*
10:00am – 10:20am	**BREAK**
10:20am – 10:40am	Alaska's Clean Water Actions Initiative (ACWA), *Speaker to be announced*
10:40am – 11:20am	Status of Legislation and Issues Relating to Instream Flow Protection in Alaska, *Christopher Estes*
11:20am – 12:50pm	**Lunch Buffet** *(Columbia Ballroom Foyer)*
12:50pm – 3:40pm	**Session: No Fish Habitat = No Fish Management – *Bill Hauser, chair***
12:50pm – 1:00pm	Introduction – *Bill Hauser*
1:00pm – 1:20pm	The effect of dams on Alaska's anadromous streams & potential benefits of their removal, *Megan Boltsworth*
1:20pm – 1:40pm	Culvert Barriers to Fish Migration In South-central Alaska: A Preliminary Assessment- *Cecil F. Rich*
1:40pm – 2:00pm	Urban Salmon Habitat: Applying Research to Restoration Planning - *Matthew Whitman*
2:00pm – 2:20pm	AS 16.05870 Protection of Anadromous Fish Habitat **-** *Ed Weiss*
2:20pm – 2:40pm	**BREAK**
2:40pm – 3:00pm	A Cooperative Approach to Fish Passage on the Tongass National Forest - *Bill Hanson*
3:00pm – 3:20pm	Salmonids on the fringe: Distribution, habitat use, and response of salmonids to upslope riparian forests in high gradient headwater streams, Southeast Alaska - *Mason D. Bryant*
3:20pm – 3:40pm	The non-profits' role in facilitating collaboration among agencies and governments to secure funding for fish passage - what does it take - a case study from the Kenai Peninsula Borough - *Robert Ruffner*
5:00pm – 6:15pm	**Business Meeting**

Prince Court

6:30pm – 7:00pm	**Social (no host bar)**
7:00pm – 9:30pm	**Banquet**

Thursday, October 24

Columbia Ballroom Foyer

7:30am – 8:30am	Registration
7:30am	Breakfast Buffet

Concurrent Session 1 (Columbia Ballroom A)

8:00am – 10:20am	**Session Title Human Nature, Human Influence-Are Alaska's Fisheries Resources Really That Different? – David Cannon, chair**
8:00am – 8:20am	Human Nature, Human Influence-Are Alaska's Fisheries Resources Really That Different? – *David Cannon*
8:20am – 8:40am	MAKING A DIFFERENCE - Lessons Learned by Natural Resource Professionals: About Institutions, Incentives, and the Tepid Pursuit of Conservation - *Michael Fraidenburg*
8:40am – 9:00am	Speaker - *Mike Menfredo*
9:00am – 9:20am	Consequences on Fisheries Resources Due to Climatic Change – *Dave Klein*
9:20am – 9:40am	Systemic Outcomes in Human Affairs, *David Bella*

9:40am – 10:00am	PEOPLE, POLITICS, AND FISHERY RESOURCES, *Phil Pister*
10:00am – 10:20am	Panel Discussion
10:20am – 10:40am	**BREAK**
10:40am – 12:20am	**Session: Marine Protected Areas – *Doug Woodby and Katharine Rowell, chairs***
10:40am – 10:55am	ADF&G's Marine Protected Area Program – *Doug Woodby*
10:55am – 11:10pm	An Inventory of Marine Protected Areas in Alaska Waters - *Kristin R. Mabry*
11:10am – 11:40am	Distribution of Corals and Associated Communities in the Aleutian Islands - a long term study - *Robert Stone*
11:40am – 12:00pm	Testing the Effectiveness of a High Latitude Marine Reserve Network: A Multi-Species Movement Study in Glacier Bay National Park, Alaska - *James Taggart*
12:00pm – 12:20pm	Spatial distribution and relative abundance of Tanner and abundance of red king crab inside and outside marine reserves in Glacier Bay, Alaska - *Jennifer Mondragon*
12:20pm – 1:40pm	**Lunch Buffet** *(Columbia Ballroom Foyer)*
12:20pm – 1:40pm	**2005 AFS Parent Society Planning Meeting** *(Columbia Ballroom B)*
1:40pm – 2:00pm	**Session: Twenty-eight years of private, non-profit hatcheries in Alaska: what have we learned about hatchery-wild stock interactions? – *Chris Habicht, chair***
1:40pm – 1:50pm	Introduction – *Chris Habicht*
1:50pm – 2:10pm	The history of salmon hatcheries in Alaska - policies and regulations to protect wild stocks - *Steve McGee*
2:10pm – 2:30pm	Disease transmission from cultured salmonids to wild fish stocks: perspectives on the Alaskan hatchery program - *Theodore R. Meyers*
2:30pm – 2:50pm	Reexamining Alaska's Salmon Aquaculture Policy - *Jan Konigsberg*
2:50pm – 3:10pm	Managing Hatchery and Wild Salmon - *Benjamin W. Van Alen*
3:10pm – 3:30pm	Is the North Pacific Ocean Carrying Capacity for Pacific Salmon Limited*?* - *Douglas M. Eggers*
3:30pm – 3:50pm	Effects of Hatchery Releases and Environmental Variation on Wild-stock Productivity: Consequences for Sea Ranching of Pink Salmon in Prince William Sound, Alaska - *Alex C. Wertheimer*
3:50pm – 4:20pm	Discussion

Concurrent Session 2 (Columbia Ballroom B)

8:20am – 9:20am	**Session: Contributed Papers – *Hal Geiger, chair***
8:20am – 8:40am	Life history and migration of *Oncorhynchus mykiss* on the Kamchatka Peninsula, Russia - *Christian E. Zimmerman*
8:40am – 9:00am	The Wave Drag Hypothesis: An Explanation for Size-Based Lateral Segregation of Migration Routes During the Upstream Migration of Salmonids - *Nicholas F. Hughes*
9:00am – 9:20am	How To Destroy A World-Class Sockeye Run In 150 Years: The Columbia Basin Experience - *Jeff Fryer*
9:20am – 9:40am	**BREAK**
10:40am – 11:00am	**Session: Communication as a Fisheries Management and Research Tool - *Laurel Devaney and Andrea Medeiros, chairs***
10:40am – 11:00am	Public Speaking Tips for Scientists – *Eric Havelock*
11:00am – 11:20am	Why Does the Media Always Get It So Messed Up? – *Craig Medred*
11:20am – 11:40am	Working Successfully With Native Communities – *Polly Wheeler*
11:40am – 12:00pm	Working with Small Native Communities-Lessons Learned, *Michael Black*
12:00am – 12:20am	The Andreafsky River Science Camp: Bridging the Gap Between Alaskan Native Villages and Fishery Resource Agencies – *Laural M. Zabkar*
12:20pm – 1:40pm	**Lunch Buffet** *(Columbia Ballroom Foyer)*
12:20pm – 1:40pm	**2005 AFS Parent Society Planning Meeting** *(Columbia Ballroom B)*
4:30pm – 4:45pm	**Awards**
4:45pm	**Adjourn**

Plenary Session

Fishes of Alaska

Bill Wilson
LGL Alaska Research Associates, Inc., 1101 E. 76th Avenue - Suite B, Anchorage, AK 99518.
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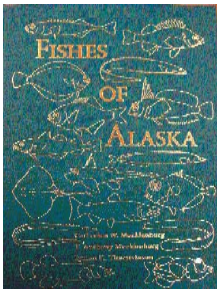
In 1990, the Alaska Chapter of the American Fisheries Society formed a “Fish Key Committee” to oversee the production of a Key to the Fishes of Alaska, originally drafted by Rae Baxter, retired fishery biologist with the Alaska Department of Fish and Game. The original project scope was to assist Rae with technical editing and completion of his draft fish key. However, early in the project Rae died, leaving three versions of the uncompleted draft plus miscellaneous notes and other materials. The Committee was faced with a dilemma - to end the project or continue, and if we continue, how can we complete the project without the author? The Committee decided to continue, and with the Chapter’s approval started a process to seek funding and hire a contractor to revise and complete the work. The Committee’s decision unknowingly created a 12-year project for itself, a project of considerable scope and cost that was unimaginable when we started. So the “Fish Key Committee” embarked on a journey that included continuous fund raising and coordination of the research and writing of a new book on Alaskan fishes. Point Stephens Research of Auke Bay, Alaska (Kitty and Tony Mecklenburg), was hired as the contractor in 1991. Throughout the past 12 years, the Mecklenburgs have meticulously researched and written a new book, Fishes of Alaska that contains keys and descriptions of over 600 species of fishes that inhabit freshwater and marine habitats of Alaska. Largely through the efforts of Lyman Thorsteinson, USGS/BRD, the Alaska Chapter was endowed with funds in the mid 1990s that were sufficient to bring the project to completion. The “Fish Key Committee” completed its work with publication of the book early in 2002. The book was published jointly by both the Alaska Chapter and USGS, and is now being advertised and sold through various marketing channels. The “Fish Key Committee” is (was?) perhaps the longest-serving committee of the Alaska Chapter, and we are pleased to report that the project is now finished.



Building Communications and Awareness between AFS and the Native American Fish and Wildlife Society

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Ira New Breast and Adelheid Herrmann will give a presentation to the American Fisheries Society on the workings of the Native American Fish and Wildlife Society. The Society's mission is to protect, preserve and enhance the wise use of Native American Fish and Wildlife resources. In doing this, the Society has developed partnerships with tribes, local entities and other governmental entities and organizations. We continue to develop these partnerships by inviting non-tribal entities to participate in our National and regional conferences. In addition, we have developed partnerships with educational institutions. At the American Fisheries Society meeting we would like to begin communications and build awareness between AFS and NAFWS.

Native American Fish and Wildlife Society

The Native American Fish & Wildlife Society (NAFWS) is a national tribal organization established informally during the early 1980's. NAFWS was incorporated in 1983 to develop a national communications network for the exchange of information and management techniques related to self-determined tribal fish and wildlife management.

Members

The Society has evolved into a dynamic organization that represents professional biologists, natural resource managers, technicians, and conservation law enforcement officers. The Society strives to be responsive to the emerging needs of political and technical decision-makers. In addition, the Society shares educational, legislative, bio-technical, economic, legal, fiscal, and enforcement programs to help form a progressive agenda of tribal management pursuits.

Preserving Our Precious Resources

To ensure that these vast resource bases are kept in tact for future generations, the NAFWS aims to support tribal decision-makers in their efforts towards astute natural resource management. Native Americans as a group have always demonstrated environmental sensitivity towards the earth's precious resources and are looked to by many to 'show the way' to replenish the earth's resources. In today's changing world, however, tribes are faced with a complexity of situations demanding a marriage of traditional management practices with the cutting-edge of biological management. This task places enormous strain on those in leadership and management roles. These leaders are charged not only with the maintenance of diminishing resources, but also with the responsibility of shaping resource management into a flexible entity sensitive to the needs and concerns of Native Americans. To this end, the Society strives to provide assistance to tribes and tribal leadership, and support them in their self-determined march towards a secure natural resource future.

Ira New Breast – NAFWS Executive Director

Ira New Breast is the Executive Director of the Native American Fish and Wildlife Society. Ira was recently hired by the NAFWS Board of Directors and started his post on June 17, 2002. His previous job was working for the Blackfeet Fish and Wildlife Department in Montana. In his **Building Communications and Awareness between AFS and the Native American Fish and Wildlife Society** address to the National conference of the Native American Fish and Wildlife Society's meeting in Anchorage he stated: "It's been said that we are one large extended family within the Native American Fish and Wildlife Society. I've tried to understand why I can't get the other world that's not associated with fish and wildlife to have the same heartfelt connection I have for fish and wildlife resources. I very strongly believe in that there is a way to incorporate our spiritual values into the direction and management of our fish and wildlife resources." In addition, in an interview in the Eagles Nest Ira stated, "My keenest interest stems from a grassroots background. And so my affinity to champion on the

ground, fish and wildlife tribal managers is a personal commitment based on experience and knowledge of needs and especially of hopes and dreams. The NAFWS reflects the need of people helping themselves through unity. I perceive it as my duty to see that our focus does not waiver from that simple principle."

Alaska Regional Office

NAFWS has established a regional office in Alaska. Michelle Davis was the first Alaska Regional Coordinator and solicited many grants to keep the office open. The grant that now keeps the Alaska Regional office open is a grant funded by the Environmental Protection Agency. The Water Quality and Aquatic Environment Monitoring Program is the current grant and gives the tribes the training to monitor and run tests on their water.

Adelheid Herrmann, Alaska Regional Coordinator

Ms. Adelheid Herrmann took over as the Alaska Regional Coordinator on July 19th, 2002 with responsibility for the Water Quality monitoring program. Adelheid previously served on the Board of Directors of NAFWS and has been an advocate and organizer of Society activities. She has vast experience and continuing interest in advocacy of fisheries on local, State, national and international levels. Ms. Herrmann served in the Alaska State Legislature, House of Representatives for six years, chairing the House Special Committee on Fisheries and co-chairing the House Resources Committee. Ms. Herrmann was also a founding member of the Pacific Fisheries Legislative Task Force, serving with legislative representatives from California, Oregon, Washington, Idaho and Hawaii. Gaining an understanding of the environment has always been a strong motivational force for Ms. Herrmann, since the age of six she has participated as a fisherman in Bristol Bay's salmon fishery and has also observed the herring and bottom fish fisheries. A personal goal of hers is to see courses on the fishing and seafood industry made a part of the curricula at all levels in Alaska's educational system.

NEW DIRECTIONS AND ETHICS IN MANAGEMENT OF WESTERN FISHERIES RESOURCES

Edwin P. (Phil) Pister
Desert Fishes Council and California Department of Fish and Game (retired)

As human populations throughout the western states continue to expand into the 21st century and beyond, with accompanying impacts on already depleted resources, direction of management agencies will inevitably shift from concepts of maximum sustained yield to include and emphasize preservation of biodiversity. This will become necessary if we are to retain even a modicum of our remaining aquatic ecosystems and their associated life forms.

Applicable methodologies have been developed throughout the American Southwest, where the science of conservation biology has been applied to threatened fishes and aquatic ecosystems for more than 30 years in fields as diverse as mitochondrial DNA research, design of refuges, and legal involvement leading to decisions of the U.S. Supreme Court. Case histories are presented, and the inseparability of species from their habitats is emphasized. Hope for a seemingly bleak future may be derived from an evolving conservation ethic not only within the American public, but even more significantly within historically intransigent Western fish and wildlife agencies.

At some point Aldo Leopold's land ethic will become obvious and axiomatic in the minds of thinking Americans. However, we have a long journey ahead before this occurs, a journey requiring increased emphasis on management of endangered and depleted species and stocks, riparian habitats, native plants, livestock grazing, fire, and other ecological components in our quest to attain an acceptable and sustainable level of biological diversity and habitat integrity.

BIOGRAPHICAL SKETCH - EDWIN P. (PHIL) PISTER

Phil Pister retired in February, 1990 following 38 years as a fishery biologist with the California Department of Fish and Game. He studied wildlife conservation and zoology under A. Starker Leopold at the University of California (Berkeley) and has spent virtually his entire career supervising aquatic management and research within an area encompassing approximately a thousand waters of the eastern Sierra/desert regions of California, ranging from the 14,000 foot crest of the Sierra Nevada to the floor of Death Valley lying below sea level. He founded and serves as executive secretary of the Desert Fishes Council and is involved in desert ecosystem preservation throughout the American Southwest and adjoining areas of Mexico. He holds special interest in the fields of conservation biology and environmental ethics and has served on the Board of Governors of the American Society of Ichthyologists and Herpetologists and of the Society for Conservation Biology. He also serves on the President's Advisory Committee of the University of California's system-wide White Mountain Research Station. He teaches regularly at the National Conservation Training Center (U.S. Fish and Wildlife Service) in West Virginia, has lectured at more than 70 universities in North America and the United Kingdom, and has authored 74 published papers and book chapters.

Banquet

DeeDee Jonrowe will commemorate Rae Baxter as part of the celebration of the long-awaited publication of “Fishes of Alaska”. Why DeeDee, you may wonder? Before she became famous as a top Iditarod competitor and inspirational speaker, DeeDee worked for the Alaska Department of Fish and Game Commercial Fisheries Division in Bethel as a fisheries manager in the late 1970’s and early 1980’s. Rae was not just her colleague; he was also her cherished friend.

Rae Baxter
1929-1991

Rae was employed as a fisheries biologist by the Alaska Department of Fish and Game. He worked for the Division of Commercial Fisheries for most of his career, but also worked in Bristol Bay, Cook Inlet, and Prince William Sound. He was a superb field biologist and his travels to survey fish stocks in remote areas under difficult conditions were legendary. Since retiring in 1984, he spent most of his time working out of his private Kachemak Bay research laboratory. Rae was and internationally recognized authority on the taxonomy of Alaskan Mollusks and also initiated the book “Key to Alaskan Fishes”.

Rae and and his wife Sera graduated from Humboldt State University. Early in his career he was stationed in Cordova where he assisted in the management of the Copper River salmon fishery and conducted studies of the effects of the 1964 earthquake on razor clams and other marine resources.

Stationed in Bethel from the mid 1960’s until his retirement in 1984, he managed commercial and subsistence salmon and herring fisheries in Goodnews Bay, Quinhagak, and the Kuskokwim River. He initiated and supervised counting tower, weir, test fishing, and tagging projects to obtain information on the numbers, destinations and run timing of migration and spawning salmon. Another project under his supervision was an extensive survey of subsistence salmon and herring fishermen to determine their harvests. He also conducted aerial and boat surveys to determine the distribution and abundance of spawning herring and salmon.

He held annual meetings in many small fishing communities to explain Department programs and to obtain public input on management plans and regulations. He made fishery presentations and regulatory proposals to the Alaska Board of Fisheries.

He conducted pioneering research of freshwater fish species (whitefish, sheefish, pike) in the Kuskokwim-Yukon Delta region. Basic species identification, life history and harvest information was obtained for the first time for these species.

Mr. Baxter was the only Department biologist assigned to the Bethel office for a number of years and he willingly performed many tasks outside his normal fishery duties such as issuing hunting and trapping licenses and sealing beaver pelts. His genuine interest in the local residents coupled with his friendly, easy-going manner, meant he was well-liked by the public.

He was an extremely competent outdoorsman capable of building cabins and weirs or operating field camps and navigating boats in the remotest regions. Unique in this age of specialization, he was an excellent naturalist and his knowledge and observation of all wildlife species proved valuable to the other wildlife disciplines.

By Ron Regnart,
ADF&G-Commercial Fisheries
Arctic-Yukon-Kuskokwim regional supervisor, retired

Abstracts

Session: Current Applications of Mark-Recapture Methods in Fisheries Assessment and Management in Alaska

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Using Mark-Recapture Methods to Estimate Escapement in Small Sockeye Salmon Systems

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Background: In the Southeast Alaska subsistence sockeye salmon projects we evaluate harvest, escapement, juvenile populations, and lake productivity in small systems important to local subsistence users. Obtaining reliable estimates of sockeye returns and escapements, over several years, is critical for setting escapement goals and sustainable harvest levels.

Purpose: We are testing spawning grounds mark-recapture assessments as a less expensive alternative to weirs for estimating escapement.

Methods: We use a modified Jolly-Seber estimate, developed at Sitkoh Lake over the last six years, in lakes with beach-spawning sockeye populations. The design consists of two sampling stages: 1) a two-sample mark-recapture to estimate fish present at each trip, and 2) a multiple trip mark-recapture over at least four trips. A bootstrap procedure for estimating confidence intervals was developed in 2001. The mark-recapture estimate applies to a designated “study area” only. A rough expansion to total lake population is made based on visual counts. At Falls Lake we compared mark-recapture estimates with weir counts.

Results: In Falls Lake, the 2001 study area estimate was 570 (95% CI 535-606), which expanded to 748 (95% CI 670 - 845) for all beach areas; 33-54% of beach spawners were counted in the study area. About 1,084 (95% CI 800 – 1,543) fish were inlet-stream spawners, estimated by a different method. This total of 1,832 (range 1,470-2,388) underestimated the weir count of 2,570 sockeye salmon.

Conclusions: Given adequate sample sizes, the modified Jolly-Seber method produced population estimates that met our objective for precision (cv ≤ 15%). How well the limited “study area” population estimate represents the whole lake population depends on many factors, including shoreline topography, distribution of spawners, and complexity of the system (e.g. sub-populations that spawn at different times or use different parts of the system).

Seven Seasons of Fall Chum Salmon Mark and Recapture on the Yukon River

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A mark and recapture experiment on fall chum salmon in the Yukon River was initiated in 1996. Initial reporting to the Alaska Chapter occurred in that year, but much has been learned about the application of the methods since that time. Since 1996, the project has reported estimates to managers on a weekly and seasonal basis for every run except in the year 2000 when only a partial season was completed. Yearly tag deployment ranged from 4,222 to 18,631 tags. Estimates of seasonal abundance have ranged from 189,724 to 652,269 among the years. Coefficients of variation of the abundance estimate have ranged from 0.02 to 0.06. Much effort has been expended examining the data for selective sampling based on size or gender characteristics of the population, but no significant selectivity has been found. We have found that the project has gained credibility through time and has been useful to managers. We are currently working toward understanding the handling effects on fish and are moving to reduce handling and holding through management of the fish wheels and by using video to affect the recovery of tags.

Declining Mark-Rates With Distance From The Rampart Mark-Recapture Study Site

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The U. S. Fish and Wildlife Service has operated a mark-recapture project for fall chum salmon in the middle Yukon River near Rampart, AK annually since 1996. Mark-rates, the proportion of a catch bearing tags, at upriver locations have consistently been less than at the project recapture site. This phenomenon could be caused by one or more violations of mark-recapture model assumptions or by mortality of marked fish. Either of these possibilities is of obvious concern. For example, in response to the weak fall chum salmon return in 2000, the project was terminated prematurely to avoid the potential of increasing mortality. We summarize existing information relating to possible causes of this phenomenon, ongoing efforts, and future study plans.

Stress Effects in Fall Chum Salmon (Oncorhynchus keta), from Mark-Recapture: Plasma Stress Indicators and Non-Esterified Fatty Acid Analysis

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Background: Fish wheels are used annually to monitor salmon runs in the Yukon River drainage by the Alaska Department of Fish and Game, the United States Fish and Wildlife Service, and the Canadian Department of Fisheries and Oceans. There has been concern that fish wheels used to assess run strength and estimate abundance through mark-recapture studies may be causing delayed mortality.

Purpose: To compare the physiological condition of tagged and untagged fall chum salmon at the Toklat River fish wheels to determine if the effects of fish wheel capture and tagging are manifested in chum salmon captured in recovery fish wheels.

Method: Fall chum salmon were captured in August and September of 2000 and 2001 in a fish wheel on the lower Kantishna River and all healthy chum salmon were tagged with spaghetti (Floy) tags and released. Blood plasma samples were collected at this location and from tagged and untagged chum salmon on the lower Toklat River (139 km upstream) during the same period and at an additional site (139 km upstream) in 2001.

Results: Plasma samples collected at the Kantishna River tag deployment wheel in 2000 indicated no significant difference between female and male chum salmon in any of the stress indicators. Samples collected at the Toklat River tag recovery fish wheels showed cortisol values were lower in tagged salmon ($p=0.04$). The stress indicators, glucose chloride and lactate values showed no significant difference between tagged and untagged chum salmon however male tagged male chum salmon had lower mean glucose values than untagged.

Plasma samples collected at the Kantishna River tag deployment wheel in 2001 showed no significant difference in non-esterified fatty acid (NEFA) values between sexes. Tagged chum salmon at the Toklat River tag recovery fish wheels had lower NEFA's than untagged chum salmon ($p = 0.02$).

Conclusions: These results verify that fish wheel capture and tagging has a measurable effect on the physiology of migrating fall chum salmon and suggest that there is a metabolic cost associated with capture and handling.

Mission Impossible? Tagging 200,000 wild juvenile fall chinook on the Hanford Reach

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Since 1987, Pacific Northwest fisheries agencies have cooperated in a project to annually coded wire tag 200,000 wild Columbia River fall chinook salmon smolt on the Hanford Reach, making it probably the largest wild fish tagging program in the world. Running this program on a large river in a remote location can be a logistical nightmare, and presents unique challenges. The fish are captured over 12 days with seines, adipose clipped and tagged in a tagging trailer, and released. A similar program is carried out on fall chinook salmon at the adjacent Priest Rapids Hatchery. The Hanford Reach stock is the last healthy wild salmon stock in the Columbia Basin and both the Hanford and Priest Rapids Hatchery stocks contribute heavily to fisheries off the Alaska, British Columbia, and Washington coasts, as well as to in-river fisheries. Tag recoveries are used to determine stock specific harvest rates for these fisheries. Tag recoveries can also be used to estimate stray rates for the two stocks. An estimated 30% of fish returning from Priest Rapids fall chinook actually spawn on the Hanford Reach spawning grounds, comprising 9% of all fish spawning on the Hanford Reach.

Use of radio tags in a two-sample mark recapture experiment to estimate abundance of chinook salmon in the Copper River

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Radio telemetry techniques were incorporated into a two-sample mark-recapture experiment to estimate inriver abundance of chinook salmon *Oncorhynchus tshawytscha* in the Copper River, 1999-2001. During the first sample, chinook salmon were captured, radio-tagged, and released in the Copper River downstream from the Chitina subdistrict subsistence fishery near Chitina, Alaska. The second sample was comprised, predominantly, of reported harvest in the fishery. Five ground-based receiving stations were placed at the upper and lower boundaries and at the mid-section of the fishery. Marked salmon entering the fishery were recorded at two stations at the lower boundary. Marked fish harvested in the second sample were obtained from fishers, or if tags were not returned, were inferred as harvested based on data collected by the receiving stations. Use of radio tags as the primary mark allowed for explicit testing of some model assumptions, such as tag loss and emigration, and allowed for use of the reported harvest in the second sample. This negated the need to actively sample large numbers of fish. A shortfall of the design was that a comprehensive second sample was dependent on frequent and prolonged fishery openings. In the latter two years of the study, supplemental sampling in the second sample was necessary to adequately sample over the span of the run. Other methods of total run enumeration in this system are either not feasible or are subject to high variability. This technique yielded estimates of total abundance that were reasonably precise and demonstrably unbiased.

Session: Using Radio Telemetry to Study Chinook Salmon in the Yukon River Basin

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Freshwater to marine migration of post-spawn steelhead determined with acoustic tags and moored receivers, Ninilchik River, Alaska.

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Background: The Pacific Ocean Salmon Tracking project (POST) is a Census of Marine Life (CoML) pilot project aimed at testing methods of tracking salmon and steelhead populations on the continental shelf and in the open waters of the North Pacific Ocean using electronic tags and acoustic arrays. The U.S. Geological Survey, Alaska Science Center is initiating one of three pilot studies within the POST project. Archival and sonic tags are being deployed to describe the distribution of steelhead as they leave freshwaters and range into the North Pacific Ocean.

Purpose: Little is known about the distribution and behavior of salmonids in the ocean or the role of environmental variation on the survival of salmonids within estuary and ocean habitats. Understanding this role and how it varies with changes in environmental conditions requires a better understanding of movements and habitat utilization at all life history stages. Post-spawn steelhead were tagged with acoustic and archival tags that will provide the opportunity to monitor migration back to the ocean, through the marine environment, and ultimately back to freshwater on subsequent spawning migrations.

Methods: An ultrasonic gate surrounding the Ninilchik River and Deep Creek was constructed by mooring acoustic receivers around the combined boundary of each river mouth. Post-spawn steelhead were caught in a downstream trap within the Ninilchik River, anaesthetized in a clove oil bath solution, and surgically implanted with coded acoustic pingers and/or archival tags. At the conclusion of the experiment, he acoustic monitors were recovered. Time between tagging and initial detection, residence time within the buoy array, and direction of out-migration was determined for each fish. Archival tags, deployed in a separate group of fish, will be collected on subsequent spawning migrations.

Results: Of 50 steelhead tagged with acoustic pingers, 38 were detected by the acoustic gate. Detection duration, the amount of time a fish spent near the mouth of the Ninilchik River, was dependent upon tidal activity and ranged up to 7.5 hours. Directional movement from the river mouth was also dependent on tidal activity.

Conclusion: Acoustic tags were successful in describing the out-migration of post-spawn steelhead in the Ninilchik River. Based on the findings and experience of this study, further research concerning marine ecology and migration of salmonids in the North Pacific Ocean using acoustic tags and acoustic detection arrays is a feasible and productive approach.

Radio telemetry as a means to estimate proportions of chinook, chum, and coho salmon passing through the Kogrukluk River weir

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Radiotelemetry was used to estimate the proportion of chinook salmon *Oncorhynchus tshawytscha*, chum salmon *Oncorhynchus keta*, and coho salmon *Oncorhynchus kisutch* returning to the Holitna River drainage that passed through the Kogrukluk River weir, and to estimate the abundance of chinook, chum, and coho salmon escaping into the Holitna River drainage by proportional expansion of the weir counts. We captured 150 chinook salmon, 409 chum salmon, and 276 coho salmon fishing with drift gillnets near the mouth of the Holitna River. Eighty-five chinook salmon, 127 chum salmon, and 115 coho salmon were fitted with radio transmitters and resumed their upstream migrations. Subsequent movements of radio-tagged salmon were monitored with two ground-based receiving stations placed approximately 50 km upstream of the capture site, one station placed at the weir, and by aerial and boat surveys. An estimated 0.26 (95% C.I. = 0.15-0.37) chinook salmon and 0.31 (95% C.I. = 0.22-0.40) coho salmon migrated through the Kogrukluk River weir. The proportion of chum salmon passing through the weir and abundance of chum salmon in the Holitna River drainage were not estimated because sampling biases were apparent and insufficient numbers of chum salmon passed the weir (17) to correct for the bias. An estimated 25,404 (SE = 6,207) chinook salmon $\geq$ 650 mm MEF and 63,442 (SE = 10,064) coho salmon $\geq$ 510 mm MEF returned to the Holitna River drainage. Radio-tagged chinook, chum and coho salmon were located in numerous areas throughout the Holitna River drainage. Chinook and coho salmon predominantly spawned in second order tributaries, while most chum salmon spawned in the mainstem Holitna River. Numbers of radio-tagged fish located upstream from Nogamut, a proposed replacement site for the Kogrukluk River weir, indicated that a larger proportion of the total runs would be enumerated if the weir were moved. However, it is recommended that the weir remain at the current site until completion of this study in 2003.

Migratory behavior of radio tagged adult eulachon *(Thaleichthys pacificus)*

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Background: Eulachon are an anadromous forage fish that inhabit temperate regions of North America. Little is understood of their migratory behavior in freshwater.

Purpose: We investigated the feasibility of using radio telemetry for tracking adult eulachon and then successfully applied this technique to learn more about their migration and spawning behavior.

Method: Procedures for inserting gastric tags were determined by trial operations on live fish. Necropsies were conducted to ensure proper tag location in the stomach. To test for tag retention, 15 fish were implanted with radio tags and held with 15 control fish in a live well. After three days there was no difference between the survival of tagged and control fish. Radio tracking was conducted daily from 15 May to 22 June 2000 and 19 April to 20 June 2001 in Twentymile River, a tributary of Turnagain Arm, Cook Inlet.

Results: The tagging procedure averaged 15 seconds and fish were docile enough to preclude use of an anesthetic. Of the 23 fish tagged in 2000 we successfully tracked 22 fish, with one tag remaining stationary. Of the 108 fish tagged in 2001, 93 were successfully tracked and 15 with one tag remaining stationary. The maximum upstream distance for males was 9,470 m in 2000 (3,684 ± 201 m; mean ± SE) and 8,097 in 2001 (688 ± 45 m; mean ± SE). The maximum upstream distance for females was 6,855 m in 2000 (3,919 ± 1006 m; mean ± SE), and 7,761 m (2,723 ± 41 m; mean ± SE) in 2001. Retention time for fish within the river was longer for males when compared with females. There were four main locations of radio-tagged eulachon observed in 2000 and five locations in 2001. These locations that contained clusters of eulachon were considered possible spawning sites. Four of the sites were in similar locations in both years varying by less than 330 m.

Conclusions: We have demonstrated that radio telemetry is a useful tool for studying the migration behavior of adult eulachon in fresh water.

Testing electronic archival tags in Alaska salmon

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Background: Little is known about the distribution and behavior of salmonids in the ocean or the role of environmental variation on the survival of salmonids within estuary and ocean habitats. Understanding this role and how it varies with changes in environmental conditions requires a better understanding of movements and habitat utilization at all life history stages. Electronic archival tags offer the opportunity to identify environmental conditions encountered during the marine stage.

Purpose: Newly developed archival tags provide new opportunities to examine movement and environmental conditions encountered during the ocean stages of salmon. Testing and refinement is a critical stage in the application of new technologies to biological questions. The goal of this study is to test the effectiveness of archival tags in collecting habitat data in marine environments from salmonids in Alaska. Coho salmon from the Fort Richardson Hatchery are being used as a test case to refine techniques of tag implementation, recovery, and data analysis.

Methods: In 2001 and 2002, juvenile coho salmon were raised under optimal temperature and feeding condition to maximize growth. Fish greater than 180 mm (fork length) were selected from these groups for tagging. All fish, regardless of size, were tagged with visual implant (VI) tags, in 2001, and with PIT tags, in 2002, to allow for identification of individual fish. In 2001, 60 fish were tagged with inactive tags and, in 2002, 174 fish were tagged with active archival tags capable of collecting temperature and pressure for 18 months. In each year, tags were fitted with an inactive light stalk. Tags were surgically implanted in the body cavity. A reward program was advertised and the sport fishery at Ship Creek was monitored to recover tags collected by anglers. In addition, all coho salmon returning to the Alaska Department of Fish and Game trap at Ship Creek are interrogated to recover tags.

Results: Archival tags ranged from 5.6 to 9.2 % of body weight in all fish tagged. Survival to 30 days was greater than 95% in both years. Necropsy of those fish that died prior to release failed to identify obvious tag-related cause of death. Two in-active archival tags and 4 VI tags from the 2001 release were recovered in adult coho during the 2002 Ship Creek sport fishery. Two active archival tags, released in 2002, were recovered from juvenile mortalities within 2 months of release.

Conclusion: Surgical implantation of archival tags (up to 9.2% body wt) is possible in pre-smolt coho salmon with a high survival rate (>95%) under hatchery conditions. Recovery of active archival tags will provide critical information concerning marine migration and environmental conditions encountered by salmon. Results from this study will provide important guidelines and a tested protocol for the implementation of archival tagging programs throughout the range of salmonids.

Using Radio Telemetry to Study Chinook Salmon in the Yukon River Basin

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Background: Chinook salmon is an important commercial and subsistence fisheries in both the U.S. and Canada. Due to dramatic decline of returns, allocation of harvests has been the major focus of disputes among multiple constituents. To assess and establish proper harvest allocation, information is needed to improve management and facilitate conservation efforts.

Purpose: A basin-wide radio telemetry study was conducted on Yukon River chinook salmon to determine stock composition and timing, and estimate basin and tributary wide run abundance. The study was initiated in 2000-2001 studies focused on preliminary feasibility of the project, and a full scale tagging and tracking program was conducted in 2002.

Method: Adult chinook salmon migrating upriver were captured in with drift gill nets in the lower river near the villages of Marshall and Russian Mission. The fish were tagged with pulse-coded transmitters and tracked upriver using remote tracking stations located on important travel corridors and spawning tributaries. Aerial surveys were flown to collect detailed information on movements and distribution in selected reaches of the drainage.

Results*:* In 2000, of the 53 tracked 70% (37) moved upriver: 28% (15) to Tanana River (875 km), and 25% (13) to Canada (849 km) (Table 8). In 2001, of the 108 tracked 97% (105) move to upriver: 4% (3) to the Anvik River, 4% (3) to the Koyukuk River, 11% (9) to upriver of Galena, 28% (23) to the Tanana River, and 36% (29) to Canada. Of fishes caught in the US fisheries (17%, 2000; 20%, 2001), majority (78%, 2000; 61%, 2001) was caught in District 3 and Subdistrict 4a fisheries.

Conclusions: Radio telemetry was used successfully to study the distribution and movement patterns of adult chinook salmon in the Yukon River. Study has provided new information useful in addressing conservation and management issues.

Session: Advances in Marine Biology, and the Associated Fishery Management Implications

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Black Rock Fish Observations in the Western Gulf of Alaska

Dan Urban

Background: Occurring from Baja California to the Western Aleutian Islands, the black rockfish is just beginning to be exploited in the northwestern portion of its range. It is difficult to survey and basic life history parameters are lacking from many parts of its range.

Purpose: Research was initiated in the Western Gulf of Alaska to gather information needed to establish growth and natural history parameters, as well as make general observations of black rockfish behavior. Documentation of habitat and food preferences was also attempted. An exploited and virgin population were targeted.

Method: Commercial jig vessels were chartered to capture specimens in an exploited population from the Shumagin Islands and Sanak Island, which is considered virgin. Otoliths, length, weight and capture location were recorded for each fish. An acoustic bottom classification system and video camera were used to record bottom type and behavior.

Results: Video observations and the catch record confirm that black rockfish exhibit hook avoidance after an initial fishing episode. Fish from the virgin population were larger, but analysis of the age structures is not yet complete. Adult fish occurred over a wide range of rocky bottom types, generally on coastline exposed to the open ocean while fish less than 30 cm were generally found nearby in more protected waters. Adults were eating mysids, sand lance, and jellyfish. Schools of black rockfish were found to persist in the same location from year to year.

Conclusions: While hook avoidance may help prevent the rapid depletion of a resident school of black rockfish, the fact that schools are persistent in small-localized areas may help fishermen target them and lead to localized depletions. Note: A black rockfish was recently captured in the Pribilof Islands, the first documented record.

Seasonal Abundance and Diversity of Nearshore Fishes around Steller Sea Lion Haulouts and non-Haulout areas of Kodiak Island

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The Western Stock of Steller Sea Lions (SSL, *Eumetopias jubaus)* declined 80% from the 1960' s-1990. The current rate of decline has slowed to an annual 5-10%, and although we are still unclear as to the mechanism causing the decline, one possible explanation is that survival between weaning and adulthood is somehow compromised. Presence of nearshore fishes has been hypothesized to be important to SSL pups as they learn foraging behavior and increasingly supplement their milk diets during weaning. We hypothesized that there was a difference in the nearshore fish species composition, diversity, and abundance between haulout and non-haulout sites. SCUBA based surveys were conducted in the nearshore waters adjacent two Steller Sea Lion haulouts of Kodiak Island at five depth profiles to quantify seasonal fish diversity and abundance, as well as to collect habitat information about these nearshore areas. Identical surveys were also conducted at three areas of similar exposure, but which are not historical SSL haulouts. Although heavy seas prevented sampling on some occasions, a total of 419 thirty meter transects were done in the five sampling periods. Diversity and abundance of fishes was analyzed seasonally, as well as seasonal abundance at the various depths at both SSL and non-SSL sites. Correlations were then drawn between the seasonal fluctuations of the kelp bed habitat and the associated fish fauna. While preliminary analysis shows little difference between haulout and non-haulout sites, analysis of seasonal patterns indicates a greater abundance and diversity of fishes during the summer sampling periods. Black rockfish *Sebastes melanops* observations in the Western Gulf of Alaska.

Spawning season and length at maturity for Dover sole in the Gulf of Alaska

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Dover sole (*Microstomus pacificus*) have a wide distribution throughout the North Pacific, ranging from southern Baja California (26º N) to the Gulf of Alaska (GOA, 59º N). We tested the hypothesis that cohorts near the northern extent of their range in the GOA spawn later in the year and mature at a larger size than populations of Dover sole at southern latitudes off California and Oregon. Female Dover sole (*n* = 273) ranging in length from 198 - 663 mm were collected opportunistically around Kodiak Island, Alaska, (55 - 59º N) from February 2000 to October 2001, with sampling concentrated in the months February-April, June-July, and October-November. Ovaries were examined to determine the maturity stage using standard histological criteria. The spawning season of Dover sole in the GOA spanned 4 months, from February to May, which is shorter in duration and later in the year than at more southern latitudes. Length at 50 % maturity (ML_{50}) for female Dover sole in the GOA was 439 mm, which is larger than in California and Oregon. The estimated age at 50 % maturity (MA_{50}) was 6.7 years. Minimum age at maturity was 5 years, and nearly all females had reached maturity by age 9. We attribute the latitudinal variation in ML_{50}, combined with the similar MA_{50} across latitudes, to spatial differences in growth rates. Knowledge of latitudinal variation in the reproductive history of Dover sole is a first step toward more accurate predictions of potential larval supply and estimated adult population size in the GOA.

Fisheries Science as a Sub-discipline of Ecology: How and Why Basic Research is Important to Resource Managers

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Background: Basic ecologists study the distribution and abundance of mostly unexploited organisms, while fisheries scientists assess the abundance and distribution of commercially exploited species to aid fishery management. I contend that this difference is trivial and urge fishery scientists to become familiar and keep current with the basic ecological literature and trends.

Purpose: In support of this contention, I will review three management-related studies that benefited from an understanding of basic ecology.

Methods and Results: First, I am currently assessing the effects of cold air exposure on crabs and the efficacy of various management regulations aimed at reducing handling mortality. This project relied upon techniques developed by several authors to predict the body temperature of various organisms including desert lizards and intertidal seaweeds. Second, ecologists have shown that the morphology of seaweeds can be highly plastic due to water motion and that this plasticity is beneficial. This information was used to assess the proportion of *Macrocystis* kelp that would be desirable for herring spawn-on-kelp fishers. Third, using mostly barnacles, basic ecologists collected newly settled individuals almost daily to assess larval settlement strength and this was related to subsequent adult population size. A similar project was initiated in Kodiak to relate larval settlement rates of red king crabs to future population sizes. Very little variation in red king crab larval settlement was observed because the larval collectors were deployed for the entire summer and it was subsequently shown that there was strong density dependent mortality among newly settled red king crabs. If this study had sampled collectors more frequently, it may have achieved its original goals.

Conclusions: I encourage fishery scientists to pay more attention to basic ecology even though the species are different; the techniques, theories, conclusions, and ideas will often be applicable to commercially important species and useful to fishery scientists and managers.

Session: Identifying True Carrying Capacity in Anadromous Salmonid Ecosystems

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Striving Toward a New Science for Estimating Salmon Production Potential

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Although many Alaskan salmon populations continue to produce apparently sustainable harvestable surpluses, there are a number of runs, particularly in western Alaska, that appear to be depressed relative to historic production. Because of critical implications to human economic, social, and cultural needs, as well as aquatic ecosystem and wildlife health, questions have been raised about whether salmon populations are performing at their full biological productivity. Five lines of evidence are presented that, taken together, indicate that many populations are producing at less than their potential: traditional knowledge, sedimentary marine-derived nutrient records, historic run trends, habitat/spawner observations, and simulation models. Contemporary fisheries science methods do not account for all aspects of the salmon production relationship, particularly the role played by marine-derived nutrients, and therefore often underestimate the true carrying capacity of the salmon ecosystem. Fisheries scientists must provide managers with alternative methods for setting escapement goals, predicting run sizes, and estimating harvestable surpluses. Advancements in salmon science will require fundamental research on the roles of marine-derived nutrients, marine survival, environmental variation, and other variables, as they influence predictability of run sizes. Until the science of salmon management has improved, managers should integrate diverse sources of information that support maximum productivity for each run.

Practical Spawner Recruiting

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“Ricker recruitment curve” data is needed to estimate the status and escapement goal ranges of salmon stocks and to validate the assumptions inherent in habitat-based carry capacity models. All factors influencing the survival and recruitment of salmon are in this relationship – spawning/rearing capacities, climate/ocean conditions, within/between species competition, predator/prey interactions, terrestrial/carcass-derived nutrient influences, growth/survival, stocking/fertilization, and fishery effects on the “natural” distribution and “quality” of spawners. Habitat-based models are most useful for initial assessments of stock status and escapement goals, and to estimate factors limiting production, but their assumptions must eventually be tested against, and reflect, actual recruitment observations. Thus, it is important to invest in reliable estimates (or indices) of escapements and recruits. Recruitment models also require validation and refinement. I suggest that the classical Ricker model underestimates escapement goals for rearing species (notably lake rearing sockeye stocks). Escapement goals and production will decline unless the productivity boost from carcasses-derived nutrients is considered. Recruitment-based goals must also be conservative if production is obviously limited by escapement. We want recruits to be in a scatter of points that shows no relationship with spawners - where recruits are mostly dependent on natural variations in survivals and returns are near impossible to forecast but average the highest. Recruitment curves for several stocks will be presented and discussed.

Multi-stock state-space models for estimating trends in stock-recruit dynamics of Pacific salmon

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Background. Growing evidence suggests that fish populations, especially those from similar geographical regions, may be subject to shared, decadal-scale trends in productivity (e.g., systematic changes over time in recruits produced per spawner). By incorporating such features into multi-stock models of stock and recruitment, it may be possible to better estimate productivity parameters (e.g., intrinsic growth and carrying capacity) and escapement goals for individuals stocks.
Purpose. Our purpose was to use simulation and empirical analyses to examine the potential utility of multi-stock state-space models for improving estimates of productivity parameters and escapement goals of typical stocks of Pacific salmon.
Method. We developed several multi-stock state-space models that are extensions of the Ricker stock-recruit relationship. Parameters of these models can be estimated via Kalman filtering. To simulate the effects of shared, climate-induced trends in productivity, we formulated these models to have a common Ricker-*a* parameter across stocks that followed deterministic or stochastic trends over time (e.g., a sine wave, step function or AR(1) process). We then simulated stock-recruit data sets of typical stocks of Pacific salmon and compared the performance of the multi-stock models to several single-stock forms of the Ricker model. In addition, we fit our multi-stock models to eight stocks of Bristol Bay sockeye salmon to examine their applicability for real data sets.
Results. For various scenarios of shared trends in productivity, we found that the multi-stock models provided more accurate and precise estimates of parameters and escapement goals than either single-stock state-space models or conventional forms of the Ricker model. The benefits of using multi-stock models were greatest for short (e.g., 20-year) data sets in which there was considerable stock-specific interannual variation or “noise.”
Conclusions. In situations where several stocks of Pacific salmon experience similar trends in their productivity, multi-stock state-space models may provide improved estimates of parameters, and hence, improved management via better estimation of appropriate escapement goals or other management-related reference points (e.g., low spawner abundances that trigger conservation concerns).**Climate and the life cycle of coho salmon**

Closing the Loop: Environmental Variability Throughout the Life-cycle of Oregon Coastal Natural Coho Salmon.

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Background. Oregon Coastal Natural (OCN) coho salmon, spawning and rearing in the river basins of the coast range of Oregon, have shown marked fluctuations in abundance over the past 30 to 50 years and are currently at critically low numbers. Logerwell et al. (in press) have identified four environmental factors correlated with smolt to adult survival in the Oregon Production Index area. These factors are winter sea surface temperature (SST) in the smolt year, spring transition date, spring upwelling, and winter SST in the adult year.

Purpose. The purpose of this study was to investigate climate effects on OCN coho in freshwater using smolts and smolts per spawner as indices of productivity and survival respectively. The results were then combined with the marine factors identified by Logerwell et al. to produce a life-cycle assessment of climate effects on OCN coho salmon production.

Method. Stream flow indices were developed for four time periods deemed important to successive stages of coho salmon development (first winter; eggs, first summer; parr, second winter; smolts, and second spring; out migration). In addition we created an index of the fall transition based on the date when winter storms first caused a rise in stream flows. Annual mean air temperature was used as a proxy for water temperature.

Results. Air temperature, fall transition, second winter flows and second spring flows were all significant predictors of smolt production. Fall transition and second winter flows predicted smolts per spawner, but correlations were weaker. The four marine factors identified by Logerwell et al. correlate with annual mean air temperature such that all five variables tend to be negative or positive for coho production in synchrony. In addition, spring transition and spring upwelling correlate with second winter and second spring flows so that good (poor) freshwater conditions are associated with poor (good) ocean conditions.

Conclusions. Smolt numbers are relatively independent of spawners in the range of observed values. Environmental factors influence both freshwater and marine stages of the OCN coho salmon life cycle. These factors may interact to amplify variability in adult recruitment of naturally produced fish.

USE OF STREAM HABITAT SURVEYS TO PREDICT CARRYING CAPACITY FOR STEELHEAD TROUT

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Studies of steelhead and their habitat use throughout the West Coast were used to derive a model that could estimate stream carrying capacity for steelhead, based on data from typical habitat surveys. The model estimates capacity for parr rearing, because growth and survival of steelhead parr are frequently observed to be density-dependent. The model requires data on the surface area, depth, cover, and substrate of channel unit types (e.g. pool, riffle, glide). A standard parr density was applied to each unit type, and the resulting parr capacities in each unit were decremented or incremented according to the amount that depth, cover, and substrate deviated from average. Standard parr densities determined from fully-seeded coastal streams were greatest in pools and least in riffles. Effects were included from snorkel surveys that demonstrated use by steelhead in large channels drops off sharply at distances over 40 ft from shore, and in the calm mid section of pools longer than 4 channel widths. Effects of depth were included the finding that parr completely avoid areas with depths < 6 inches, and densities increase sharply as unit depths increase up to at least 3 ft. The model also accounts for findings that steelhead show strong preference to hold behind boulders, and their densities in boulder dominated riffles average about 5 times greater than in riffles with other substrate types as dominant. The capacity model was applied to existing data from habitat surveys on 52% of 116 miles of steelhead-bearing streams in the Trout Creek watershed of the Deschutes River, Oregon. Estimated capacity was within the range of observed smolts produced from the stream during 5 years of study, and was much closer to observed smolt production than capacity estimates from the Columbia Basin System Planning Model. While gradient is not directly incorporated into the model, its impact on habitat characteristics is indicated by the correlation ($r = -0.66$, $P<0.05$) between decreased gradient and increased estimated capacity for steelhead parr in reaches of the Trout Creek watershed.

A model framework for relating life-history, freshwater habitat, and the ocean environment to Pacific salmon production and capacity

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Background. Declines in Pacific salmon returns and our inability to predict population dynamics with traditional models have helped fuel the search for new approaches to evaluating the causes and consequences of declines in salmon stock, and the establishment of escapement goals under the prospect of an uncertain future.

Purpose. We will present a life-history based model for evaluating the population dynamics of Pacific salmon in an ecosystem context. This approach provides a quantitative, yet transparent, framework for relating productivity and capacity to freshwater habitat, ocean conditions, harvest, and hatcheries.

Method. The user defines a particular salmon life history with 2 to *n* life stages (e.g., spawners, eggs, fry, smolts, and adults). At each stage, the number of individuals is determined from a multi-stage Beverton-Holt model, with survival from one stage to the next driven by freshwater habitat quantity and quality, ocean conditions, and harvest. The user also has the ability to add habitat improvement (or degradation) over time, and include other stochastic effects on survival.

Results. Model results vary with the type of problem and specific application.

Conclusions. We suggest that this framework allows for analyses that move beyond simple stock-recruit models by relating multiple characteristics of the environment to salmon survival at specific life stages.

Developing Habitat Selection Theory to Predict the Distribution, Migration, and Abundance of Salmon in the Ocean: A Research Project in Progress

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To my knowledge there are no process based models capable of predicting the distribution, migratory routes, and abundance of salmon in the ocean. In this presentation, I will describe the progress I am making to develop a model capable of making these predictions. My starting point is an existing model of habitat selection that combines Ideal Free Distribution (IFD) Theory for unequal competitors with a physiological model of fish growth to predict the distribution of size-structured populations of fish when food abundance and temperature vary spatially. This model can be used to predict the distribution pattern of age-structured groups of salmon in the ocean, provided we know the spatial variation in resource renewal rates and water temperature, and neglect the time and energy costs of migration. In parallel to this work, Dr. Pete Rand (North Carolina State University) and I have been working to develop a model that predicts the migratory routes of salmon during their ocean life that does account for the costs of migration. Our model used a generic algorithm to find routes that make the best use of the spatial and temporal variation in food abundance, water temperature, and ocean currents, to maximize the fish's final ocean weight. The current challenge is to combine the IFD/growth model that takes account of competition but not the costs of movement, with the migration model that neglects competition but accounts for the costs of movement. I hope to accomplish this by developing the genetic algorithm model of salmon migration that incorporates the effect of fish density on growth rates, this model should be capable of predicting both migratory routes and distribution simultaneously. This model may have applications in predicting how ocean conditions will influence the abundance of salmon.

Special Session – Kvichak River Sockeye Salmon: Combining Past and Present Knowledge for More Effective Management

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Historical Perspective and Current Circumstances

Management of Kvichak River Sockeye Salmon

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The Bristol Bay Region of Southwestern Alaska, produces the most sockeye salmon (*Oncorhynchus nerka*) of any area in the world. Commercial fishing for these fish has been the mainstay of the local economy since the early 1880's with catches first exceeding 10 million fish in 1901. Ten river systems containing substantial sockeye salmon runs drain into Bristol Bay. One of these systems is the Kvichak River, which at times is the world's largest sockeye salmon producer. Sockeye salmon returns to the Kvichak River are cyclic with runs ranging from a high of approximately 40-million fish to a low of approximately one-half million fish. The fishery is managed by the State of Alaska using management plans adopted by the Alaska Board of Fisheries.

The Kvichak River as well all of the sockeye salmon producing systems of Bristol Bay is managed to meet a biological escapement goal. This goal is based on a critical evaluation performed by both Fish and Game staff and outside reviewers of historic spawner-return relationships. The fishery is managed using several measures of in-season run strength to meet the escapement goal while distributing the escapement through time to reflect the historical escapement run timing curve. Commercial fishing in Bristol Bay is closed unless opened by emergency order. Fishing periods are typically short in duration and the effects of the fishery are evaluated on an every tide basis. Periods of no fishing are intermixed with the fishing periods to allow fish to escape the fishery relatively untouched.

Returns to the Kvichak River have been generally lower for the past six years than for the years 1980-1995. The present level of return is not unprecedented. Smaller returns were observed in the 1960's and early 1970's. To expedite the rebuilding of the population, the Alaska Board of Fisheries, with input from the resource users and the Alaska Department of Fish and Game, implemented additional management plans in the spring of 2001 that were designed to limit the incidental harvest of Kvichak River bound sockeye salmon. While these restrictions were effective in minimizing the catch of Kvichak fish, the total escapement still fell below the lower end of the biological escapement goal. While this low escapement level restricts the commercial and sport fisheries, we do not feel that it threatens the sustainability of the population at this time.

The Kvichak River watershed is relatively pristine and provides excellent spawning and rearing habitat for sockeye salmon.

Kvichak River Sockeye Salmon Production, Escapement Goals, and Forecasting

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The Alaska Department of Fish and Game manages the sockeye salmon commercial fishery in Bristol Bay for maximum sustained yield by allowing a specific number of fish to escape harvest and spawn. To increase the likelihood of a strong return, biological escapement goals are developed and triennially reviewed by a panel of Fish and Game staff and outside specialists. Escapement goals are set through the evaluation of spawner-return and smolt-return relationships as well as average surplus yield analyses. Escapement goal management has –ensured sustainable Kvichak River returns, even through the current period of reduced productivity.

Each year the department collects biological data from the catch and escapement that are used to build brood tables and better understand production. Additionally, the following year's run is forecast each fall using the most recent production data. Reliable predictions of future returns are important for (1) identifying stocks which may need a more conservative management approach to protect against overharvest, (2) estimating commercial harvests, and (3) providing information for planning purposes to seafood processors and buyers. Kvichak River production has historically exhibited strong four- to five-year cycles. The mechanism driving the cycle is not known. As a result, forecasts of Kvichak River returns typically perform more poorly than do forecasts for other Bristol Bay systems.

Kvichak and Lake Clark Sockeye Salmon Escapement: Past and Present

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Background: Spawning goals form the basis for managing sockeye salmon runs in Bristol Bay, Alaska, and all major freshwater systems have counting tower projects to estimate total spawning escapement. Recent depressed sockeye salmon runs to the Kvichak River system, often the largest producer of sockeye salmon has increased the need for more detailed information on spawner distribution within this large drainage. This led to resumption of monitoring the Lake Clark run component in 2000.

Purpose: The purpose of this study was to obtain abundance, age, sex, and size information on sockeye salmon entering the Lake Clark system to spawn. This information will be used to evaluate, refine, and achieve sockeye salmon spawning goals, which for the basis for managing this resource.

Method: Visual observations from counting towers on the upper Newhalen River were used to estimate numbers of sockeye salmon entering the Lake Clark drainage to spawn during 2000-20002. Sockeye salmon captured at the counting site, using beach seines, were sampled to obtain age, sex, and size information. These monitoring efforts were similar to those conducted on upper Newhalen River during a 1980-1984 study.

Results: The Lake Clark drainage comprised 7% -30% (mean = 16%) of the total sockeye salmon return to the Kvichak River system in the 1980s, and 10%-30% (mean = 20%) of the return in the 2000s, even though Lake Clark sockeye salmon mean abundance has declined from 1.1 million to 0.2 million over the same period. No change in median return time, the date by which 50% of the run arrives each year, is evident at either the Kvichak or Newhalen River counting sites between the 1980s and the 2000s. Run duration, the time elapsed between passage of the 25 and 75 percentile of the run, also showed no change at the Kvichak River counting site between these same time periods, but has been halved at the Lake Clark site. Hydrologic monitoring in 2001 corroborated findings from 1980 that water flows over 25,000 cfs prevent or delay sockeye salmon migration into the lower Newhalen River. Preliminary age and size data are still being compiled, and results will be examined in relation to ecology and conservation of Lake Clark sockeye salmon.

Conclusions: The sockeye salmon run to Lake Clark has continued to comprise about 20% of the total run to the Kvichak River system, even though abundance has greatly declined in recent years. Understanding the relationship between sockeye salmon spawning populations in Lake Iliamna and Lake Clark should improve managers' abilities to sustain this important fishery resource.

Traditional Ecological Knowledge of Sockeye Salmon in Lake Clark

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Background: Due to changes in sockeye salmon abundance in the Kvichak River drainage, subsistence users in Nondalton have reported changing their subsistence harvest patterns to secure adequate supplies of sockeye salmon to meet subsistence needs.

Purpose.: The purpose of this study is to document changes in subsistence harvest and use, as well as changes in spawning locations and abundance, of sockeye salmon in Lake Clark.

Method: n 2001, the National Park Service in partnership with the Nondalton Tribal Council collected and recorded traditional ecological knowledge by interviewing village elders and other knowledgeable people in Nondalton. People interviewed during the project were asked to identify salmon harvest sites traditionally used by Nondalton residents to describe any changes in subsistence harvest patterns over time, to identify sockeye salmon spawning areas, and to describe any changes they observed in relative abundance of salmon in those locations in recent years.

Results: Spatial information was recorded on quad maps and incorporated into an existing mapping project for Lake Clark sockeye salmon. This makes it possible to link qualitative traditional knowledge with current quantitative data within a single database.

Conclusions: Traditional knowledge can provide important contextual information on subsistence fish harvests and uses as well as salmon biology.

Factors Influencing Production

Climatic and density-dependent regulation of growth and survival of juvenile sockeye salmon in the Kvichak River, Alaska

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Background: Low production of Kvichak River sockeye salmon in recent years has contributed to an economic crisis in Bristol Bay, yet causes of these population declines are not understood. The basis of strong cyclic population dynamics, and their consequences for management, have been a focus for research for decades, but have not yet been placed in the context of recent recruitment failures. Long-term changes in climatic conditions have been superimposed on cyclic population dynamics, and may have important interactions with density-dependent processes that regulate these cycles. However, a limiting understanding of interactions between density-dependent and climatic regulation of sockeye populations is hampering management.

Purpose. We evaluated how climate-driven changes in growing conditions may interact with density-dependent factors to account for both the cyclical and long-term changes in size, age structure, and survival of Kvichak River sockeye salmon smolt.

Methods: Dynamic linear models, a type of Bayesian time-series model, were fit to data, collected by the Alaska Department of Fish and Game since the 1950s, describing the age composition, size, and timing of smolt leaving the Kvichak River system. Relative performance of competing models for explaining the cyclic and long-term trends in growth and survival rates of sockeye salmon were evaluated using Bayesian inference.

Results: Long-term trends towards increasing proportions of age-1 smolt have been associated with substantial increases in their body condition, but also with reduced marine survival. Age-2 smolt marine survival is about double that of their age-1 cohorts. Increased body condition in juvenile sockeye points to improved conditions for growth in Iliamna Lake since the 1950s, but suggests that changes in timing and age composition of smolt migrations may have created a mismatch with oceanic conditions in ways that reduce marine survival.

Conclusions: Our study provides evidence that poor production of sockeye salmon from the Kvichak River during the last decade may be explained by potential interactions between density-dependent feedbacks in the cyclical component of population dynamics and long-term trends in climatic conditions. Strategies to promote slower fry growth and delay migration until smolt are two years old may improve future sockeye production in this system.

Juvenile Sockeye Salmon Research in the Eastern Bering Sea: Possible Factors Affecting Early Marine Survival
Poster

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Background: Eastern Bering Sea research cruises have been conducted by scientists from the Auke Bay Laboratory, Ocean Carrying Capacity (OCC) program during July 1999 (summer) and late August and September 1999 –2002 (fall) to study the early marine distribution, migration, and growth of juvenile sockeye (*Oncorhynchus nerka*) salmon from Bristol Bay.

Purpose: The principal goal of this research is to understand the relationship between adult Bristol Bay sockeye salmon survival and annual variations in the biological characteristics (growth, migration, and distribution) of juvenile Bristol Bay sockeye salmon.

Method: Juvenile sockeye salmon are captured using a rope trawl at stations located along longitudinal transects within the eastern Bering Sea (161°W to 166°W). Length and weight and scale samples to document age and growth are taken from subsamples of juvenile sockeye salmon captured at each trawl station. Juvenile sockeye salmon are frozen whole and brought back to the laboratory for genetic stock identification. Sea surface temperature is collected at each station using a conductivity, temperature at depth device. Zooplankton are collected at each station using a bongo net fitted with 505 and 335 micro mesh nets and codends.

Results: Sea surface temperatures within the eastern Bering Sea can influence the westward extent of juvenile sockeye salmon distribution and their migration rate. Zooplankton densities are generally greatest in offshore, deeper, waters of the eastern Bering Sea; therefore, seaward migration rates of juvenile sockeye salmon may affect their early marine growth. Early marine growth rate may affect survival rate of juvenile salmon during their ocean residence.

Conclusions: Additional research will focus on stock identification of juvenile sockeye salmon samples collected during the OCC eastern Bering Sea research cruises. Stock-specific information on distribution, migration, and growth information of juvenile sockeye salmon will be compared to oceanographic characteristics that may, in turn, provide stock-specific information on future run strength.

Summer movements of beluga whales captured in the Kvichak River, Alaska, May 2002
Poster

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Background: Sockeye salmon runs to the Kvichak River, located in northeastern Bristol Bay, have been well below forecasted levels since 1997, and spawning goals have not be achieved in recent years. The reasons for these poor runs are unknown. However, beluga whales are known predators of smolt and adult sockeye salmon, and there are indications that the Bristol Bay beluga population may be increasing.

Purpose: The purpose of this study was to document the amount of time individual beluga whales spend within the Kvichak River system during the salmon smolt and adult migrations. This information can be used to evaluate their potential impact as salmon predators.

Methods: Five beluga whales were captured with nets and fitted with satellite transmitters in May 2002. The capture crew included beluga whale hunters from Levelock and Elim, Bristol Bay Native Association personnel, as well as researchers from National Marine Fisheries Service and the Alaska Department of Fish and Game.

Results: Locations were received from all five whales from May through August 2002. To date, only one transmitter has failed, and four were still transmitting in September. In general, all five whales remained within Kvichak Bay until late June when a juvenile female moved west approximately 130 km to Nushagak Bay. By 30 June, an adult male had moved into Nushagak Bay, and by 11 August a second juvenile female had moved into Nushagak Bay as well. The other two whales remained in outer Kvichak Bay through August. By mid-September, all but one whale had moved from Kvichak Bay into Nushagak Bay. No locations were recorded outside of Bristol Bay.

Conclusions: All beluga whales remained in the Kvichak area for at least three weeks after being tagged there. The average duration all five whales remained in Kvichak Bay was 2.6 months. Belugas that left Kvichak Bay entered northern Nushagak Bay and have not returned to Kvichak Bay to date.

Population Structure and Management Implications

Allozyme, mitochondrial DNA, and microsatellite DNA markers determine distribution and migration of sockeye salmon from the Kvichak River

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The Alaska Department of Fish and Game has used genetic stock identification (GSI) to provide insight into improved management strategies for commercially harvested salmonids for nearly 30 years. Unanticipated variations in the normally cyclic production of Kvichak River stocks prompted our focus on Bristol Bay to improve our understanding of the production cycles and migration corridors.

Objectives are to use gene markers to:

1. test for the presence of adult Kvichak River fish in the Naknek River Special Harvest Area. In recent years managers have moved the fleet out of the Kvichak/Naknek District into the Naknek River to reduce exploitation on the Kvichak River stocks. GSI will test the efficacy of this measure.
2. test for stock-specific migration corridors as juveniles exit the Kvichak River and Bristol Bay. Teaming with NOAA investigators we plan to track migration and relative survival of populations of sockeye salmon juveniles exiting Bristol Bay and the eastern Bering Sea. Linking migration and ecosystem variables may elucidate possible processes that control stock-specific early marine survival of juvenile sockeye salmon
3. test for interception of Bristol Bay stocks in high-seas or Asiatic fisheries.

We've analyzed tissues from approximately 100 fish each from 60 populations representing the major drainages of the Bering Sea for allozyme, microsatellite, and mtDNA variation. Initial tests suggest that each locus class provides different but meaningful results when applied to the three objectives. GSI modeling and baseline alignment is in progress and mixture analyses for objectives 1 and 2 will be conducted this winter.

Coherence of Observed Adult Sockeye Salmon Abundance Within and Among Spawning

Habitats in the Kvichak River Watershed

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Background: Despite coherent trends in aggregate abundance of Pacific salmon species at ocean-basin scales, individual populations often fluctuate out of phase with one another. A better understanding of how and why these fluctuations can be used to improve salmon population monitoring and management. We chose to examine information for Kvichak River sockeye salmon since this run has often been the largest in the world for this species, and a long time-series of data on spawner relative abundance and distribution is available.

Purpose: The purpose of our study was to examine relationships among sockeye salmon spawner abundance within and among spawning habitats within the Kvichak River system, Bristol Bay, Alaska.

Method: We used spatial covariation in shared environmental conditions to examine correlations among proximate populations in survival, recruitment and subsequent adult abundance.
Results. We found strong covariation in 45 years of aerial abundance estimates of adult sockeye salmon in 93 spawning populations in the Kvichak River system. A significant negative relationship with geographic distance accounted for just 3% of the variability in both correlation of abundance between populations, and a related similarity coefficient. There was no evidence for a threshold of rapid decay in this relationship, despite distances of up to 175 km between populations. Island beaches showed significantly higher covariation than other types of spawning habitat, even after removing the effect of distance.

Conclusions: We conclude that these patterns are likely a result of the commercial fishery; broad environmental patterns experienced by populations throughout the drainage; and differences in population-specific early life-history survival rates among habitats. These results are relevant to the refinement of salmon population monitoring and management approaches.

Genetic population structure of sockeye salmon in Lake Clark, Alaska Poster

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Background: Lake Clark accounts for 20% to 50% of sockeye salmon production within the Kvichak River system located in Bristol Bay, Alaska. This system is one of the world's most lucrative commercial salmon fisheries, but planned shoreline development and significant decreases in recent returns of Lake Clark sockeye salmon have raised concerns among area residents and fishery managers.

Purpose: The purpose of this study was to estimate the genetic population structure of Lake Clark sockeye salmon, information that is critical to estimating and mediating impacts of fisheries and development on Lake Clark sockeye salmon. This study represents the first estimates of genetic variation and differentiation among spawning populations throughout the Lake Clark system.

Method: In 1999 and 2000, fin tissue was collected from 957 sockeye salmon representing 10 Lake Clark spawning populations. Sample sizes ranged from 47 to 207 individuals per population. Sockeye salmon samples were genotyped at 11 microsatellite loci, and resulting data were analyzed for genetic variation and population differentiation.

Results: Allele frequencies differed significantly in 36 of 45 pair-wise population comparisons. Pair-wise estimates of F_{ST} ranged from zero to 0.081. Overall F_{ST} was 0.029, which was significantly greater than zero ($P<0.001$). The pattern of differentiation suggests 1) divergence between populations of lower and upper Lake Clark, 2) a strong tendency for Sucker Bay Lake fish to be distinct from all other populations, and 3) a weaker tendency for Kijik system fish to be distinct from other upper Lake Clark populations.

Conclusions: Significant genetic differentiation exists among spawning populations of Lake Clark sockeye salmon. Estimates of F_{ST} between major population groupings are of a magnitude typically found among populations of different lake systems.

Sockeye Salmon Spawning Distribution in Lake Clark, Alaska Poster

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Background: Recent declines in the annual sockeye salmon run to the Kvichak River system highlighted a lack of basic information regarding spawning habitat in Lake Clark. Counting tower data from the Newhalen River indicated that Lake Clark might account for up to 50 % of the total Kvichak River system sockeye salmon spawning escapement. The Kvichak River system has historically often been the largest sockeye salmon producer in the economically troubled Bristol Bay salmon fishery.

Purpose: Understanding where and when salmon spawn will provide fishery managers with information necessary to protect critical spawning habitats.
Method. Sockeye salmon spawning locations within Lake Clark were determined through radio telemetry. A total of 332 salmon were tagged with radio transmitter during 2000-2001, and their locations recorded every five to ten days. Spawning locations for 247 of these tagged sockeye salmon were determined and verified by seining or visual observation.

Results: We identified, mapped, and entered data into a Geographic Information System for 30 distinct spawning areas, including 10 that had not previously been reported. Approximately two thirds of tagged sockeye salmon spawned in beach habitats, and more than half of all tagged sockeye salmon spawned in glacial areas that precluded visual observations (turbidity >5 NTU during peak spawning in September).

Conclusions: Our data indicate that previous estimates of available spawning areas have been grossly underestimated. This has occurred because glacially influenced beaches and tributaries comprise much of the spawning habitat within the Lake Clark watershed.

Modeling and Synthesis Efforts – Putting It All Together

Ecosystem Modeling of Species Interactions Affecting Sockeye Salmon Production in Iliamna Lake, Bristol Bay, Alaska

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Background: Sockeye salmon *Oncorhynchus nerka* from Bristol Bay represents a renewable resource that can continue to provide food and income for human exploiters if managed well. Returns to the Kvichak River system have been highly cyclic in the past. Ecosystem modeling can help us understand these cycles in relation to other components of the ecosystem, including humans.

Purpose: The purpose of this study was to construct a bioenergetics model of the Iliamna Lake ecosystem in order to 1) understand linkages between nutrients, primary production, competitors, predators, and salmon production in this system, and 2) help determine causes and maintenance mechanisms for the cycles.

Method: Isotope analysis of samples taken from various species composing the lake ecosystem was conducted to determine trophic levels. Sockeye salmon adult and smolt abundance and productivity estimates, along with trophic level data, were entered into an ECOPATH model to determine how energetic balances change over the course of a five-year cycle of salmon returns.

Results: Our model runs showed that nutrient inputs from carcasses were important to primary and zooplankton productivity that support sockeye juveniles during their freshwater residence. However, it appeared that maximum food production did not correspond to maximum salmon abundance or productivity.

Conclusions: Increased biomass in sockeye juveniles needs to be supported by increased primary and secondary productivity related to carcass abundance. Predators in the lake can be maintained at near constant abundance, with no predator-prey cycle, if food selectivity changes during years of high salmon returns. However, additional information on predator abundance is needed to determine if cyclic predator-prey relations actually exist.

Session: Instream Flow Reservation and Protection

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HYDROELECTRIC POWER DEVELOPMENT IN ALASKA

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Many potential hydroelectric power sites have been identified in Alaska. Currently, there are a number of projects under review by Alaska Department of Fish and Game and other agencies that have the potential to adversely affect aquatic habitat. This talk will review how hydroelectric projects affect instream flow and go over measures commonly recommended to protect aquatic and riparian resources. Examples of instream flow issues at projects in Alaska will be discussed. We will also discuss the potential for growth of hydro-power in Alaska and the forces that will drive growth, including interties and state vs. federal jurisdiction.

Examples of Ecosystem-level River Concepts Applied to Alaskan Rivers

Jason E.B. Mouw
Alaska Department of Fish and Game

The hydrologic transfer of physical, chemical, and biological components characterizes rivers over time through three physical dimensions: longitudinal (upstream - downstream), lateral (lateral circulation of river water onto flood plain), and vertical (surface - subsurface water exchange within bed sediments and the flood plain). This paper describes how a strong conceptual foundation of key physical and biological processes operating on each river dimension can be used to develop successful conservation strategies for aquatic habitats associated with Alaska's rivers. At the foundation of ecosystem-level concepts is the recognition that flow variability determines levels of hydrologic connectivity throughout each river dimension, and subsequent levels of biodiversity. These concepts include an understanding of the extent in which a river's flow regime promotes hydrologic connectivity in space to produce shifting mosaics of riparian wetlands where hydrologic connectivity is high on each river dimension. Supporting empiricism for predictions of the river continuum (longitudinal dimension), flood pulse (lateral dimension), and hyporheic corridor (vertical dimension) concepts is presented in the context of northern rivers. Since few rivers in Alaska have been altered by flow modifications and floodplain development, water resource managers and researchers have the unique opportunity to integrate current river concepts into management strategies and expand upon them through research.

Session: No Fish Habitat = No Fish Management

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The effect of dams on Alaska's anadromous streams & potential benefits of their removal

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The role of salmon in Alaska is not difficult to define. Salmon are the heart of Alaska's economy, culture and ecosystem. These migrating fish have the ability to bind and separate communities. They are celebrated when they return from the ocean and fought over in the days that follow. State and federal agencies, non-profit organizations, commercial fishermen, fish processors, citizens and visitors all have strong opinions about the management of Alaska's salmon.

Alaska's fisheries employ more people than any other industry in the state. Fishermen harvest between 100 and 200 million salmon each year. Sport anglers annually catch over a million salmon. Over 15,000 families rely on salmon for subsistence.

While unsustainable harvesting may pose the most visible threat to Alaska's salmon, many human-made obstructions throughout southeast and southcentral Alaska prevent anadromous fish from reaching spawning grounds. There are several types of obstructions blocking fish migrations in Alaska, including thousands of failing culverts; but this study focused on abandoned or limited use dams effecting fish passage.

Abandoned and limited use dams, including structures that once belonged to defunct canneries and abandoned mines, have little or no economic value. The exact number of dams in Alaska is difficult to determine because a large number of pre-statehood dams escaped state and federal regulatory review.

The 21 dams identified in this report have limited economic value and affect the spawning of anadromous fish. Beyond the areas and criteria of this study, the extent of Alaska's fish passage problem remains unknown. Further study of abandoned and limited use dams and active and proposed hydroelectric projects is needed to determine the effect of dams on anadromous fish across the state.

Through the cooperation of local communities, federal agencies and nonprofit organizations, the restoration of these 21 identified river systems can be achieved.

Culvert Barriers to Fish Migration In South-central Alaska: A Preliminary Assessment

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Background: Recent investigations of fish passage characteristics of culverts on the Tongass National Forest and other Federal forests in the Pacific Northwest have shown that barriers to fish passage are common, occurring at approximately 66% of culverts on anadromous streams in the Tongass National Forest and as many as 60% of culverts on Federal forests in the Pacific Northwest. Because of increasing levels of urbanization and development, concerns that the percentage of culverts preventing fish passage in south-central Alaska may also be high have prompted calls for assessment of these culverts.

Purpose: The purpose of this study was to adapt, develop, and test methods currently used to identify culvert barriers to fish migration on the Tongass National Forest for use in identifying culvert barriers in south-central Alaska and to implement these methods by assessing fish passage on the Kenai Peninsula.

Methods: Surveys were conducted of stream crossings on State highway system roads on the Kenai Peninsula from June through September 2001. Parameters recorded at each crossing included: quantitative and qualitative measures of the culvert and adjacent stream channel, culvert and stream channel gradient; natural channel width; water velocities; outlet pool characteristics including outfall height, tailcrest cross-sectional profile, pool depth within five feet of the culvert; and stream discharge. Culverts were classified as either green (no barrier), red (barrier), and yellow (requiring further analysis) based upon three indicators of barrier status (gradient, outfall height, and encroachment ratio). Culverts requiring further analysis are analyzed using the U.S. Forest Service FishXing program, which determines barrier status based on analysis of fish swimming abilities versus culvert current velocity.

Results: Surveys were conducted on 100 culverts at stream crossings throughout the Kenai Peninsula. Examples will be given of the methodology and its use in classifying barrier status of culverts.

Urban Salmon Habitat: Applying Research to Restoration Planning

Matthew Whitman
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Salmon abundance has declined in many urban streams. The causes of these declines can be hard to identify because urban impacts on stream ecology are complex and can vary between watersheds. This makes it difficult to develop appropriate and effective strategies for stream restoration or mitigation aimed at increasing salmon productivity. In an attempt to address this issue, a habitat quality assessment protocol based on established research was developed for urban coho salmon (*Oncorhynchus kisutch*) to help identify significant habitat degradation as a prelude to restoration planning. The protocol was used to assess coho habitat quality in Chester Creek, Anchorage, Alaska, an urban stream that once supported a large population of coho salmon but now only supports a remnant population. Habitat characteristics from one non-urban and two urban study reaches were compared to "healthy" standard guidelines. This application of the protocol showed that the most significant adverse effects of urbanization on coho salmon in urbanized reaches were increased flood intensity, barriers to adult and juvenile migration, reduced physical habitat complexity, siltation of spawning gravels, stressful water quality conditions, and stocking of potential predators and competitors. These results provide useful information for prioritizing rehabilitation and mitigation efforts in Chester Creek.

AS 16.05870 Protection of Anadromous Fish Habitat

Ed Weiss
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Protection of inland freshwater habitat for anadromous fish species is critical to the continued sustainable management of those species. As fisheries biologist's we understand and support this concept. However, Alaska Statute 16.05.870(a) requires the Alaska Department of Fish and Game (ADF&G) to specify the various rivers, lakes, and streams that are protected. Adopted into regulation by reference under 5 AAC 95.010, the *Atlas to the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* ("Atlas") and the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* ("Catalog") are the documents used to make this specification. The only real protection for fish habitat comes from this statute and to a lesser extent 16.05.840. Protection however, is contingent upon the streams being "specified" within the AWC. Streams, rivers and lakes or portions of them that contain anadromous fish habitat and are **not** within the AWC <u>are not</u> protected.

Currently there are over 15,200 individual streams and lakes listed in the AWC. We estimate that statewide this is less than 25% of the actual habitat utilized by anadromous fish species. The department has a process for specifying and protecting these streams and that process relies heavily on you the fisheries biologist. By involving yourself you not only ensure protection and sustainability of the resource through fisheries and population management but through habitat protection and management.

You can gain many benefits from the program as well. The AWC program has seen many improvements in the last several years including the conversion of the paper Atlas data to digital GIS layers, internet site to disseminate information and data, intranet site to provide internal staff with historical information and data and the establishment of an Internet Map Server (IMS). These resources and data are available to all staff for work in fisheries, wildlife, subsistence or habitat work.

A Cooperative Approach to Fish Passage on the Tongass National Forest

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John McDonell
Assistant Forest Fisheries Biologist, Tongass National Forest

Over the last 6 years, the USDA Forest Service and the Alaska Department of Fish and Game (ADF&G) have worked closely to evaluate fish passage problems and erosion risks across the Tongass National Forest. An interagency workgroup of biologists, engineers and hydrologists developed and implemented a road condition survey protocol for collection of data and analysis of fish passage, including criteria to sort culverts into those that provide efficient fish passage (green) and those that do not (red).

For three years, joint teams of ADF&G habitat biologists and Forest Service engineers conducted field reviews. FS personnel and contractors have conducted subsequent road condition surveys. With approximately 98% of the 3550 miles of permanent roads surveyed through the 2002 field season, approximately 78% of the resident fish stream culverts and 59% of the anadromous fish stream culverts on the Tongass were classified as red culverts, and do not provide efficient fish passage (juvenile coho salmon as the design species). It is important to note that many of these culverts are not complete blocks to fish and would provide varying levels of fish passage at some flow levels.

The workgroup also agreed to a protocol to conduct fish habitat assessments upstream of red culverts. The Forest Service has conducted upstream assessments above more than half of all red culverts.

FS investment in remediation has grown with continued increases expected. Some red culverts strand minimal amounts of habitat (50-150 feet above culvert), but may be very expensive to remediate. Others block obvious high value habitat and are a very high priority. The workgroup is currently exploring methods to formally prioritize the order in which culverts should be repaired.

Salmonids on the fringe: Distribution, habitat use, and response of salmonids to upslope riparian forests in high gradient headwater streams, Southeast Alaska

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High gradient, 1st to 2nd order tributaries to flood plain channels are a substantial proportion watershed throughout mountainous landscapes. Our goal was to determine the extent and seasonal use of these streams by salmonids. Our objectives were to determine the longitudinal distribution, seasonal use, and the physical features that influenced salmonid abundance and distribution. Our study area was located in the Maybeso Creek and Harris river watersheds on Prince of Wales Island, southeast Alaska. Salmonid distribution and abundance was estimated in spring, summer, and fall in low, moderate, and high gradient zones of six sample streams. Most juvenile coho salmon were found in the low gradient flood plain zone. A small percent were found in the high gradient transition zone. Dolly Varden were found in all zones. Most steelhead were captured in the spring and fall. Anadromous Dolly Varden were captured in the fall and used the upper reaches of the tributaries for spawning. Juvenile coho salmon were captured in reaches that exceeded 10 % in gradient and Dolly Varden were found at gradients greater than 20 %. As gradient increased, fish density decreased. Density of coho salmon parr and resident Dolly Varden increased with abundance of pools and, in the case of coho salmon, the amount of large wood. Use of marginal habitats in the high gradient reaches of the watershed may provide important rearing and refuge areas for Dolly Varden and cutthroat trout where they can avoid competitive interactions with the more abundant and more aggressive juvenile coho salmon. The presence of spawning Dolly Varden illustrates the importance of access to the upper reaches of watersheds throughout southeast Alaska.

The non-profits' role in facilitating collaboration among agencies and governments to secure funding for fish passage - what does it take - a case study from the Kenai Peninsula Borough

Robert Ruffner
Kenai Watershed Forum

In the fall of 2000, the Kenai Watershed Forum a small locally based non-governmental organization (NGO), participated in a site conservation planning effort with The Nature Conservancy of Alaska. One high priority strategy was to address habitat fragmentation that occurs through barriers to fish passage. A high value conservation action was to address the concern of improperly functioning culverts on the Kenai Peninsula that can block 10's of miles of available habitat. While expensive to correct, these are very cost effective in comparison to the more traditional bank restoration projects that address 10's to 100's of feet of a single bank for the same cost.

The effort to address this concern involved collaboration from the lead agency, the Alaska Department of Fish and Game (ADF&G). Upon inquiry, we learned that ADF&G was engaged in culvert assessment and prioritization of culverts. After assisting the department by providing one field staff, we had the opportunity to identify a high priority culvert in Silver Salmon Creek owned by the Kenai Peninsula Borough.

Non-profits are in the unique non-threatening position to call issues to the attention of local government without the authority to impose regulations. This often sets the stage for a more collaborative effort to finding creative solutions. Non-profits are also often in the unique position to seek a wider array of funding sources to address these expensive conservation concerns. In this case study of Silver Salmon Creek, the KWF was able to form a partnership among the U.S. Fish and Wildlife Service, ADF&G, and the Kenai Peninsula Borough and raise over $75,000 in direct cash support within 6 months of identifying this particular culvert of concern. Agencies could and should work with local NGO's to find similar unique opportunities to address conservation concerns.

Session: Human Nature, Human Influence-Are Alaska's Fisheries Resources Really That Different?

David Cannon, chair

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Human Nature, Human Influence-Are Alaska's Fisheries Resources Really That Different?

David Cannon

By many people's standards, Alaska is quite different than the lower 48, especially considering its sparse population and abundant natural resources. However, fisheries around the world, including Alaska's fisheries, are under immense or increasing pressure from human activities. As resource managers we're expected to use adaptive management strategies, but unfortunately we're dealing with a relatively non-adaptive, or slow to adapt society. It appears that as the human population increases and encroachment expands there is a progression of events (and attitudes) which are the consequence of human nature which often result in pressures on natural resources. Given the influence of human beings, the lag time associated with "adaptive management", and environmental uncertainty one might ask if scientific knowledge and management can keep pace to ensure sustainability. The intent of this presentation is to provide an introduction to the session and the other presenters. Hopefully the session will generate thought about the future of Alaska's natural resources and to reflect on how human influence may hinder long term sustainability of our resources.

MAKING A DIFFERENCE - Lessons Learned by Natural Resource Professionals About Institutions, Incentives, and the Tepid Pursuit of Conservation

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Careers are learning experiences. Much of this learning is not covered in colleges and universities. In the slang used by my colleagues, "G*ood fish biologists pick up a lot a street smarts during their careers."* From interviews I've collected for a book on these "lessons learned", several common themes are emerging as advice to professionals wishing to mold their careers toward greater effectiveness. I will present several findings from the interviews and a discussion of the implications for professionals wishing to improve their personal and their agency's stewardship achievements. Career issues, shared across the states and across management organizations will be emphasized.

Consequences on Fisheries Resources Due to Climatic Change

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Consequences of a changing climate are evident on the lands of Alaska, through thawing of permafrost, slowing of tree growth through summer drought and associated insect epizootics, and increased area burned by wild fires. The marine environment, however, is the major driver for Alaska's weather systems in both coastal and inland areas. Evidence from oceanographic studies in the North Pacific, Bering, Chukchi, and Beaufort seas, showing northward shifts in distribution of several marine species from jelly fish to whales appear to foreshadow major changes taking place in our marine ecosystems as a consequence of global changes in climate.

What are the consequences for Alaska's fisheries of these climate-induced changes taking place in the marine and fresh water systems? Can current fishery management structures be adapted to deal with the dynamics of change that now characterizes our marine and fresh waters?

Systemic Outcomes in Human Affairs

David A. Bella, Ph.D.

My earlier research, beginning in the 1960's, included computer simulation of aquatic ecosystems. Experience taught me, however, that the real problems were to be found in human systems. Competent and even brilliant studies of natural ecosystems were too often accompanied by simplistic and naive views of human systems. Until we learn to better address human systems, I have little hope that environmental problems will be effectively addressed.

This presentation will briefly outline several systemic outcomes in human affairs that challenge common views. First, cumulative outcomes can and often do arise that are contrary to the values of the people involved. Second, we should expect relative ignorance (the gap between our ability to take actions and our ability to foresee consequences) to grow with time. Third, information tends to be distorted to propagate the organizations that produce it, but, such distortion does not require fraud from the individuals involved. Time permitting, I will point to examples of such outcomes from the lower 48 States.

PEOPLE, POLITICS, AND FISHERY RESOURCES

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The various fields of environmental science are more abundantly endowed with technological expertise than with a broad philosophical base to guide application of this technology. Particularly lacking is a keen and visionary knowledge of political realities and the effects of inexorable and insidious human population growth that so strongly influence, and ultimately determine, the management of seemingly unlimited fish and wildlife resources. Resource management curricula in our universities seldom emphasize related course work because of pressures to produce qualified entry-level biologists, often resulting in graduates resembling missiles without guidance systems. As entry-level biologists rise through the ranks to assume administrative positions, it becomes increasingly necessary for them to face these more complex problems and become sufficiently knowledgeable to explain often politically unpopular environmental realities to an unsympathetic electorate and the politicians whom they elect.

The illusion of unlimited resources relative to small human populations has long been apparent in Canada, a vast nation with a human population significantly less than that of California (currently 35 million); similar manifestations have been noted in Alaska. It was not all that long ago that California's population was less than the current population of Alaska. It is naïve and potentially disastrous to assume that resource demands from within Alaska, combined with similar demands from the lower 48 states and foreign nations, will not ultimately exceed nature's ability to meet them. Recognition of this inevitability, visionary leadership, and competent early planning are therefore necessary to assure the sustainability of Alaska's seemingly infinite resource base.

More broadly-based university curricula and a visionary and comprehensive planning structure are presented as means of meeting these challenges which, although great, can yet be recognized early enough to prevent the irreversible problems which currently plague other areas of the United States. The presentation draws upon a 50-year career as a California fishery biologist, supported by the teachings of Aldo Leopold and the views of contemporary environmental scientists and philosophers.

Session: Marine Protected Areas

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ADF&G's Marine Protected Area Program

Doug Woodby

Background: In 2001 the Alaska Board of Fisheries requested the Alaska Department of Fish and Game to develop recommendations for a Marine Protected Area (MPA) program in Alaska.

Purpose: To provide science-based recommendations for an MPA program and a public process.

Methods: Development of recommendations focused on no-take marine reserves as the type of MPA of most interest and concern to the public and the Board. Recent literature on effects of reserves on fisheries was reviewed to develop recommendations on goals and selection criteria. Successes and failures of MPA programs in other Pacific coast jurisdictions (CA, OR, WA, and BC) were reviewed to develop recommendation for a public process, and legal processes of the Board of Fisheries and the North Pacific Fishery Management Council were also reviewed. Also, a preliminary inventory of existing MPAs in Alaska was developed.

Results: The marine reserve literature is clear that reserves generally benefit fish populations and biodiversity within reserves. Fisheries outside of reserves are most likely to benefit when overfished, particularly for sedentary species, including some rockfish. Proposed goals are to: 1) reduce risk of stock collapse, 2) rebuild overfished populations, 3) provide research controls, 4) conserve biodiversity, 5) enhance fishery yields, and 6) protect sensitive and important marine habitats.

Based on experiences elsewhere, the task force recommended 1) a public process focused on meaningful and effective stakeholder involvement, 2) development of a master plan with clear principles, 3) starting with a blank slate for site recommendations, and 4) allowing adequate time for the process to unfold.

Conclusions: A summary of public comments will be provided, and actions by the Board at their October meeting will be summarized.

An Inventory of Marine Protected Areas in Alaska Waters

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Steven Gebert

Timothy J. Haverland

Douglas A. Woodby

Background: One of the initial tasks given to the ADF&G Marine Protected Area Task Force was to "inventory the current protected areas, no-take zones, etc. in Alaska."

Purpose: project brings together (1) an inventory of current closed waters in Alaska (discussed here) with (2) marine fisheries and oceanographic data. Using this GIS system will enable an analytical approach to evaluating marine protected areas.

Methods: Many areas in Alaska waters have been closed to fishing or other activities, in order to protect endangered populations, spawning populations, critical habitat, subsistence use, etc. Acquiring these spatial datasets is an on-going effort. In addition, many closures currently exist in regulation as text only, and need to be digitized in order to accurately display mapped areas for the first time. Meanwhile, research is required to determine exactly why some areas were closed and if/when any evaluation of or change has been made.

Results: Currently, the inventory lists over 300 areas. 19 types of MPAs in the database include areas as small as coastal management district special areas, and as large as federal fisheries restrictions in the Bering Sea. Activities restriction varies widely, ranging from recreation areas where a permit is required to fish, to true marine reserves where extraction and disturbance are prohibited.

Conclusions: The spatial data is currently maintained in ArcGIS while the attribute data sits in an Access environment. The next step will be to create a geodatabase where spatial queries and overlays can be performed in real time. In addition, quality control and peer review will be essential for assessing the accuracy of the closed areas as depicted in maps and text. Products will include a hard copy atlas as well as internet and CDROM applications.

Distribution of Corals and Associated Communities in the Aleutian Islands - a long term study

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Background: Summaries of archived data and recently acquired fisheries bycatch specimens indicate that the Aleutian Islands may harbor the highest abundance and diversity of temperate water corals in the world. Unfortunately these data reveal little about the distribution of corals in relation to the overall underwater landscape and the importance of corals to marine ecosystems. Since major fisheries presently occur throughout the Aleutian Island Archipelago and down the summit platform of the Aleutian Ridge to at least a depth of 1500 m, interaction between coral habitat and fisheries are likely substantial.

Purpose: The scientific goals of this work are to study the zoogeography, ecology, and life history aspects of deep-water corals. Ultimately, the goal is to construct a model that predicts the distribution and density of coral habitat throughout the Aleutian Islands based on depth, substrate type, habitat type, oceanographic parameters, and geological features. This information will directly assist managers in developing methods to minimize fishing interactions with coral habitat in the Aleutian Islands.

Methods: SCUBA, manned submersibles and ROV's will be used over a five-year period to study coral habitat in three broad geographical areas and two depth strata (shallow, <350 m and deep, 350 to 2750 m). *In situ* observations and/or videographic data will be collected on strip transects between 0 and 2750 m depths. The density and diversity of corals will be determined in depth bins along each transect. Multibeam bathymetry +/- backscatter data will be collected along each transect and basemaps will be created to determine geological features.

Results: Scientists used the *DSV Delta* in July 2002 to study coral habitat in shallow water (0 - 350 m depth) near the Andreanof Islands and on Petrel Bank in the Bering Sea. Dive observations confirmed that coral was widely distributed in that region; corals and sponges were found at 30 of 31 dive sites investigated. Disturbance to epifauna, likely the result of fishing activity, was observed at most dive sites and may have been more evident in heavily fished areas. Percent coverage of corals ranged from approximately 5% on low-relief pebble substrate to 100% coverage on high-relief bedrock outcrops. Unique coral habitat consisting of high density "gardens" of corals, sponges, and other sessile invertebrates was found at 5 sites between 150 and 350 m depth. These "gardens" were similar in structural complexity to tropical coral reefs and shared several important characteristics with true reefs including complex vertical relief and high taxonomic diversity.

Conclusion: Coral "garden" habitat, previously not documented in the North Pacific Ocean or Bering Sea, appears to be particularly sensitive to bottom disturbance.

Testing the Effectiveness of a High Latitude Marine Reserve Network: A Multi-Species Movement Study in Glacier Bay National Park, Alaska

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Background: In 1999, the U.S. Congress closed commercial fishing in parts of Glacier Bay National Park, Alaska and effectively created one of America's largest temperate marine reserve networks. This decision created a socially and scientifically important research opportunity to test the effectiveness of a marine reserve network as a marine conservation management tool. During the 1990's, collapsing fisheries around the world caused doubt about the long-term sustainability of certain fisheries. Alaskan crustacean fisheries are particularly prone to serial depletion and collapse. An emerging theoretical and empirical body of information hypothesizes that "no-take marine reserves" may promote marine biodiversity, increase scientific understanding and enhance the long-term sustainability of many fisheries.

In order to be effective, a marine reserve must be large enough to protect a sufficient proportion of the population for positive effects such as increased size, density, or fecundity to be realized. In addition, an effective reserve must include relevant habitat for the protected species. The retention of breeding adults in marine reserves is quantified in simulation models as transfer rate; these models demonstrate that transfer rate is central to reserve effectiveness. Although theoretical concepts and simulation models are rapidly developing for marine reserves, their effectiveness at protecting breeding adults has been demonstrated primarily in tropical areas. Data on the effectiveness of marine reserves are especially limited from temperate ecosystems.

Methods and Results: The objective of this project is to attach sonic tags to Pacific Halibut (*Hippoglossus stenolepis*), Tanner Crab (*Chionoecetes bairdi*), and red king crab (*Paralithoides camtschaticus*), and measure the exchange between the reserves and the area remaining open to commercial fishing by deploying ultrasonic gates along the boundary of the reserves. This study will allow us to quantify the effectiveness of the reserves and determine the transfer rate of the selected populations.

Spatial distribution and relative abundance of Tanner and abundance of red king crab inside and outside marine reserves in Glacier Bay, Alaska

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Background and Purpose: Recent closures of commercial fishing for Tanner crab (*Chionoecetes bairdi*) and red king crab (*Paralithoides camtschaticus*) in parts of Glacier Bay National Park created a network of five protected areas that vary in shape and range in size from 40 to 280 km^2. Glacier Bay presents unique opportunities to test the value of marine reserves for managing crab populations for several reasons: 1) the Bay exhibits high spatial variability in oceanographic, sedimentary, and successional processes and thus represents a range of environmental conditions found elsewhere in Southeast Alaska; 2) Tanner crab distribution is typically patchy suggesting a strong relationship between crabs and some habitat characteristic; 3) the closures have created open and closed fishing areas providing opportunities to test the ecosystem-wide effects of the commercial Tanner crab fishery.

Methods and Results: Using a 1.5 km grid, we systematically sampled for Tanner and red king crab throughout Glacier Bay and estimated the relative density and relative abundance of the crabs inside and outside of the newly created reserves. This is the first step in testing the efficacy of the marine reserves and will allow us to quantify the proportion of the population protected by the reserve.

Session: Twenty-eight years of private, non-profit hatcheries in Alaska: what have we learned about hatchery-wild stock interactions?

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Introduction

Chris Habicht

Description: This session focuses on the state of knowledge concerning the effects, or lack of effects, of hatchery stocks on wild stocks in Alaska. In 1974, the state legislature passed a bill to allow private, non-profit (PNP) hatcheries to release salmon for the primary purpose of augmenting commercial fishery harvests. Since that time, new hatcheries were built by PNP associations and all but two of the 23 hatcheries built by the state were either closed or production passed on to PNP associations. Today, three federal hatcheries, two state hatcheries, and 31 PNP hatcheries operate in the state. Ninety-nine percent of the 1.5 billion fish released from Alaska hatcheries into the ocean come from the PNP hatcheries. This session is intended to bring differing perspectives on the potential ecological, genetic, harvest, and disease effects of these ocean-released fish on wild stocks.

The history of salmon hatcheries in Alaska - policies and regulations to protect wild stocks

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The salmon hatchery program in Alaska was initiated in the 1970s to rehabilitate the state's depleted and depressed salmon fisheries. This program was intended to supplement, not supplant, wild stock production. For this reason, the state developed policies and regulations to guide hatchery development and to safeguard wild stocks. Alaska's constitution mandates sustained yield management and wild salmon are given added protection under statute. Development of comprehensive salmon plans to guide fisheries enhancement are required.

Alaska's habitat is largely intact; cultural eutrophication and diversion of streams rare; and the deleterious effects of logging and hydropower are relatively minor. These factors, coupled with sound inseason escapement-based management of commercial fisheries, have resulted in recent record harvests of salmon. Statewide, approximately 25% of the salmon harvested in commercial fisheries are produced by hatcheries. However, for some species in some areas, enhanced fish now comprise a majority of the harvest. Such situations now require marking of hatchery production to enable inseason evaluation of the mix of wild and hatchery fish.

ADF&G's genetics and pathology policies and its hatchery permitting regulations restrict hatchery projects to minimize interactions between wild and hatchery fish. ADF&G also operates fish pathology and genetics laboratories that support the policies with diagnostic services and field research. Fish transport regulations require hatchery inspections, reporting and control of specific diseases, and prohibit the importation of live fish for stocking purposes. Hatcheries are limited to areas where reasonable segregation from natural stocks occurs. Hatchery permits are nontransferable. Donor stocks must be pre-approved and must be taken first from stocks that are native to the area. Hatchery stocks must be inspected before release. These restrictions have resulted in a salmon hatchery program that has been successful in enhancing common property harvests without obvious deleterious effects on wild stocks.

Disease transmission from cultured salmonids to wild fish stocks: perspectives on the Alaskan hatchery program

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Background: Pacific salmon (including some trout, char and grayling) have been cultured for 28 years in hatcheries located throughout Alaska. In 2001 operational hatcheries included 1 federal, 2 state, 2 tribal and 29 private non-profit facilities that collected almost 1.8 billion eggs resulting in 1.5 billion fry released. These egg-take and release numbers were similar to previous years indicating a very stable Alaska hatchery program that produces about 24.5% of the commercially harvested fish in the common property fisheries. Fish health in both wild and hatchery fish stocks is protected by state regulations and a stringent fish disease policy administered by the Alaska Department of Fish and Game that are directed towards preventing dissemination and amplification of significant fish pathogens as well as their diseases.

Purpose: The purpose of this discussion is to examine whether hatchery practices and enhancement of fish stocks in Alaska have negatively impacted wild salmonid stocks regarding dissemination or amplification of fish pathogens.

Methods: A fish health database maintained for approximately 20 years recorded prevalences of pathogens in both wild and hatchery stocks of Alaskan salmonids. The annual prevalences of two infectious agents, IHNV in sockeye salmon and *Renibacterium salmoninarum* (Rs) in all salmonid species, were examined as indicators of change in pathogen occurrence for the last 22 and 13 years, respectively. IHNV was detected by cell culture and identified by serological and molecular methods. Rs antigen in kidney tissues was detected by the enzyme-linked immunosorbent assay (ELISA).

Results: Both pathogens were indigenous to wild and hatchery fish stocks. Although cyclical changes in pathogen prevalences were observed, there were no apparent trends toward sustained increases of infection in the salmonid stocks examined. Most of the IHNV data were from wild and mixed wild/enhanced sockeye salmon spawned at remote egg-takes because few programs had captive sockeye broodstocks returning to the hatcheries. Returning hatchery broodstocks were typical for the other Pacific salmon species and the percentages of Rs-infected wild and hatchery stocks were not significantly different.

Conclusions: No apparent change in the status quo of pathogen prevalences have been observed in wild or hatchery salmonid stocks that could be attributed to hatchery practices or enhancement programs.

Reexamining Alaska's Salmon Aquaculture Policy

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In 1933, the new U.S. Fisheries Commissioner declared that hatcheries were a waste of public monies and an unjustified subsidy to a special industry. Since the mid-1970s, however, salmon ranching has been sanctioned by the State of Alaska. What is the justification for this aquaculture policy? Has Alaska's salmon-ranching program fulfilled its public policy objectives? In other words, does salmon ranching increase total salmon biomass, and are impacts to wild salmon populations within acceptable limits? In light of the theoretical relationship between biodiversity and production of salmon biomass, how should the statutory requirement of conserving wild stocks be interpreted and implemented? What has been the institutional response to concern about the scientific uncertainty and ignorance associated with salmon ranching? What are the social ramifications of the state's aquaculture policy? How does the precautionary principle embodied in the Sustainable Salmon Fishery Policy apply to aquaculture? Would salmon farming be less risky than salmon ranching? Theory and the limited body of evidence suggests hatchery production supplants rather than augments natural production. Therefore, it is imperative for the State to revisit its aquaculture policy. Reexamining salmon ranching will entail consideration about the nature and extent of the science; the identification of risk, the meaning of wild stock priority, and the socio-economic costs and benefits.

Managing Hatchery and Wild Salmon

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Background: In Alaska, circumstances of poor runs (escapements), an overly competitive fishing industry, can-do technically savvy biologists, traditional use of hatcheries, and oil money led to financing hatchery programs in the 1970s. Meanwhile, projects to estimate and manage for wild stock escapements remained chronically under funded. Is the hatchery effort boosting salmon production, a wise investment, needed, and natural? Or are we simply operating hatcheries because we can?

Purpose: After 20+ years of hatchery experiments it is time for a broad application of the "scientific method" to reassess hypothesis concerning how best to maximize production.

Method: I'll review biological facts important to the production of wild and hatchery salmon and equate these to the business facts of hatchery production. Then, I'll look at our principal null hypothesis – that there's an untapped rearing potential out there for hatchery fish. Spawner-recruit data will be used in this assessment.

Results: Name a sockeye back-planting effort that has proven successful (e.g., Klawock, Tatsamenie, Chilkat, Big Lake, Nunavaugaluk, …). Why are wild pink salmon in Prince William Sound (PWS) still depressed yet Southeast and Kodiak pinks at historical high levels? Are remote releases natural? Are we managing for wild stocks? Are there still "wild" pink salmon in PWS? Are hatcheries a wise investment, a priority for funding?

Conclusions: Production of both wild and hatchery salmon is ultimately dependent on the carrying capacity of shared freshwater and marine habitats. We are able to fully seed available rearing habitat by maintaining wild stock escapements. An increase in hatchery production increases competition, increases straying, decreases fitness, decreases growth, increases predation, decreases survivals, decreases management precision, and increases harvest pressure on wild fish. Why spend money to produce fish when Mother Nature will do it for free? Better to spend limited funds on assessment and management of wild stocks.

Is the North Pacific Ocean Carrying Capacity for Pacific Salmon Limited?

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Background: Concerns have been raised about the limited capacity of the North Pacific Ocean to support salmon. This view is largely based on widespread observations of decreasing size increasing age of salmon at maturation with the increasing abundance of salmon throughout the North Pacific rim. The increase in abundance of salmon is partially due to successful establishing of large-scale hatchery runs of chum and pink salmon.

Purpose: To put the increases in hatchery runs in perspective, this study endeavored to reconstruct the historical (since 1925) biomass of hatchery and wild pink, chum, and sockeye salmon in the North Pacific Ocean.

Methods: Annual adult runs in numbers and mt of sockeye, pink, and chum salmon to North America and Asia were estimated from catches and escapement. Various data sets of smolt releases from hatcheries or for wild salmon estimates of smolt outmigrants, and subsequent adult returns by age and size, were assembled. Age structured models were fit these data sets to estimate brood year specific rates of natural mortality, growth, and maturation; reconstruct total biomass of the “smolt data” stocks; and expand the historical time series of terminal run biomass on a species and area basis.

Results: The present total biomass (5.9 million mt) of sockeye, chum and pink salmon in the North Pacific Ocean is at historically high levels and has tripled since the low levels in the 1970’s. The present total biomass of salmon is substantially greater than the high levels observed in the 1930’s (4.9 million mt). Approximately 45% of the present salmon biomass is attributed to hatchery stocks of chum and pink salmon.

Conclusions: There appear to be ocean basin scale limits as reflected to density dependent growth and maturity of salmon. There does not appear to be ocean basin scale limits to the abundance of salmon.

Effects of Hatchery Releases and Environmental Variation on Wild-stock Productivity: Consequences for Sea Ranching of Pink Salmon in Prince William Sound, Alaska

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Background: In Prince William Sound (PWS), Alaska, the total run of pink salmon for the years 1990-2001 averaged 31 million fish per year. Sea ranching from a system of large hatcheries produced over 80% of the run. The degree to which hatchery production actually may have replaced, rather than enhanced, wild stock production is controversial.
Purpose. The purpose of this study was to determine how environmental variability and the scale of hatchery releases of pink salmon have affected the productivity of wild stocks of pink salmon in PWS, and to use these results to determine whether hatchery production has replaced or enhanced wild production in the region.

Method: We used a generalized linear version of the Ricker spawner-recruit model to analyze the relationship of wild stock productivity with the number of hatchery juveniles released and an array of other environmental variables. Three time periods of wild stock spawner-recruit data were analyzed; the time periods were defined by the availability of the associated environmental data.

Results: For all time periods, indices of conditions in the marine environment best explained the variability in wild stock production in PWS. No significant effect of hatchery releases on productivity was observed for the1980-1998 brood years (with the most comprehensive set of environmental variables) or for the 1960-1998 brood years (with the longest time series of spawner/recruit data and measures of environmental change). For the time period for the1975-1998 brood, hatchery releases were identified as affecting wild stock productivity, but did not explain as much of the variability as did an index of density-independent marine survival conditions. Based on these results and a simulation model for the time period in which a detectable hatchery effect was identified, we estimated for return years 1990-2000 that the annual loss in wild production due to displacement by hatchery fish was 0 – 4.6 million pink salmon, and that the commensurate annual net gain in total returns was 20.6 million – 25.3 million pink salmon.

Conclusions: We conclude that sea ranching of pink salmon in PWS has provided large net benefits to the salmon fisheries of the region.

Session: Communication as a Fisheries Management and Research Tool

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Public Speaking Tips for Scientists

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Ever wonder how you can effectively convey years of research results to an audience so they can understand what you know so well? Or have you ever sat through a presentation where the speaker put everyone to sleep and decided that you will not make that same mistake? In this presentation, we will discuss techniques that you can use to help convey your thoughts to the public. We will talk about the difference in presenting technical presentations, presenting formal proposals, speaking to a non-technical audience, presenting a technical paper and a giving a team technical presentation.

You will also learn how to systematically organize your speech to target your audience, effectively express your viewpoint in a logical and convincing manner using the inverted-pyramid approach, effectively use visual aids, understand the principals of communicating complex information to non-technical listeners, handle the question and answer session, and understand the nature and develop the process of a team technical presentation.

By using the tips learned in this presentation, you will become a more effective public speaker by being better able to communicate your ideas to the listening audience so they will understand and support your point of view.

Why Does the Media Always Get It So Messed Up?

Craig Medred
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Fisheries biologists often have a message they need to get out. Sometimes it's as simple as asking the public for help in recovering tags. Sometimes it is almost as difficult as trying to explain the theory of relativity. At best, the media can be an assistant as close as your e-mail and as useful as a secretary. At its worst, the media sometimes seems to have major problems getting anything straight.

Both the strengths and the weaknesses of the media are inherent. This presentation will give you tips on how to use the media to your best advantage.

Working Successfully With Native Communities

Polly Wheeler, Anthropologist
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Why is it that some research projects in rural Alaska seem to go off without a hitch, while others just never get off the ground? Is it the project itself? The researchers? The communities? The people? Or is it just plain luck, or lack thereof? I would suggest that completing a successful project in rural Alaska requires a bit of all of the aforementioned, as well as some well placed communication, understanding and effort.

This presentation will provide some background along these lines, and offer some helpful guidelines and hints for dealing with people and communities in rural Alaska. In addition, I will offer some resources that will help you prepare for, implement, and finalize your project.

Working with Small Native Communities-Lessons Learned

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Offered for your consideration are the mistakes made and small successes achieved over 25 years of working with small communities in western and southwestern Alaska. This is not from the perspective of a cross cultural expert, but a government employee whose mission it is to get information to and from community leadership. Many lessons have been learned by making communication mistakes. Some were the result of misunderstanding the values of a rural Native population. Others were miscues resulting from a lack of preparation and forethought. The worst were the deliberate decisions of agency policy makers based upon stereotypes and narrow missions.

This presentation will help you plan a more successful project in rural Alaska by looking at mistakes made in the past.

The Andreafsky River Science Camp: Bridging the Gap Between Alaskan Native Villages and Fishery Resource Agencies

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During the 1998 field season, the Kenai Field Office established the Andreafsky River Science Camp. This program provides a stimulating environment for students to learn about the Service's fishery resource monitoring projects. The science camp, located at the Andreafsky River fish weir, within the Yukon Delta National Wildlife Refuge, offers a different method for introducing students to the integration of science and education. Students from the Alaska native village of St. Mary's, learn about fish biology, water quality, aquatic insects and their importance, adult and juvenile salmonid identification, and management issues associated with salmon resources. The science camp expands our outreach efforts, encourages young people of the Yukon Kuskokwim Delta to pursue a college education in the sciences, and inspires local involvement.

The key ingredient to the success of this program is the integration of students into the operations of the weir. We work closely with the local community and high school to provide interesting hands-on lessons interspersed with students participating in actual operations of the weir. An important component of the program is the interaction and mutual respect, which develops between the weir crew and the students. The science camp is not only an ongoing success for the students of St. Mary's high school, but has also established a unique relationship between the local community and the U.S. Fish and Wildlife Service.

Session: Contributed Papers

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Fishes of Alaska and Nearby Waters: New Geographic Range Records and Information on Morphological Features

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In the few months since publication of the *Fishes of Alaska* book much new information on the fishes of our state and surrounding waters has become available. This presentation gives examples of new range records and morphological features which have accrued from examination of museum specimens, specimens collected during last summer's field work, and information contributed by various fishery biologists and ichthyologists, as well as the literature. The rapid rate at which new information is accumulating shows that documentation of Alaska's ichthyofauna is a dynamic pursuit, and one that must continue in order to contribute to the greater body of world ichthyological knowledge. Part of this contribution would be a future edition of the book. In many ways Alaska is still a pioneer state and there is much yet to be learned about our fishes.

About me:Although her professional affiliations are with California institutions, Catherine is based at Point Stephens north of Auke Bay, Alaska, and much of her work is funded by proceeds from her and husband-coauthor Tony's ichthyological consulting and fishery science database-GIS business, Point Stephens Research.

Polymorphism, Precision, & Power

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In high gene flow species, including most marine invertebrates and fishes in Alaska coastal waters, the expected level of divergence between populations is very small. As a result, the magnitude of F_{ST}, a measure of genetic divergence between populations, is of the same order of magnitude as its sampling error, assuming commonly used sample sizes. Since the signal-to-noise ratio is high, inadequate sample sizes of molecular genetic markers may fail to detect small, but biologically significant, differences between populations. This source of Type II error can lead to the mismanagement of heterogeneous populations through the failure to recognize discrete stock boundaries and through inaccurate estimates of demographic structure from stock assessments. It is known that using markers with more alleles provides more statistical power to detect low levels of divergence. However, it is often not appreciated that there is a tradeoff in power between selecting a single highly polymorphic marker versus a set of less polymorphic independent markers that provide the same number of independent alleles. Monte Carlo simulations were used to examine this tradeoff between locus polymorphism, precision of allele frequency estimates, and power to detect population structure.

Microsatellites reveal unique patterns of fine-scale and broad-scale population structure in Alaskan coho salmon

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Little is known about the genetic diversity of coho salmon in Alaska, although this region represents half of the North American range of this species. We used nine microsatellite loci to genotype 32 putative coho salmon populations from seven biogeographic regions of Alaska. Our primary objectives were to estimate and evaluate the degree of population structure and the spatial distribution of genetic diversity in Alaskan coho salmon. Our genetic analysis yielded four results that provide insight into forces influencing genetic diversity in Alaskan coho salmon and have important conservation implications: 1) significant population differentiation was found within each region; 2) the degree of differentiation (F_{ST} = 0.099) over all populations was as large or larger than that reported for other Pacific salmon species in Alaska; 3) the phylogeny of coho populations showed only weak evidence of a geographic hierarchy; 4) strong genetic isolation by distance was apparent only at the finest geographic scale (within a river system). These results suggest that coho salmon populations are small relative to populations of other Pacific salmon, and coho population diversity is influenced primarily by genetic drift because gene flow is relatively low. Our analyses also indicate that important diversity exists within the seven regions and that conservation units for coho will likely be as numerous as those of diverse species such as sockeye and chinook salmon. This study provides an important genetic foundation to guide more intensive sampling to precisely define conservation boundaries for coho salmon in Alaska.

Application Of Amplified Fragment Length Polymorphism (AFLP) To Genetic Stock Identification Of Yukon River Fall Chum Salmon

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In order to manage the Yukon River fall chum salmon effectively and to allocate catches equitably between the United States and Canada, harvest estimates for individual populations must be determined. This task is difficult because the harvest of these populations takes place before they segregate into spawning populations. Past studies of populations using allozymes, microsatellites, and mtDNA-RFLP have been unable to produce mixed stock analysis (MSA) estimates acceptable to the countries of origin. Here we examine another genetic marker type, Amplified Fragment Length Polymorphisms (AFLP) in an attempt to increase our ability to distinguish between U.S. and Canadian fall Yukon chum salmon. Ten U.S. and Canadian chum salmon populations were analyzed at thirty AFLP loci. Results show that Yukon River chum salmon populations are structured by both run time and regional location. MSA was most successful when allocation of mixtures was to the regional groups. The AFLP data set was able to provide improved MSA estimates for the border populations by country of origin with a 6.5% improvement for the Canadian populations over microsatellite analysis. In general, the results from this and past studies were similar, suggesting concordance and that the dominant force acting on the populations is geographically restricted gene flow or large effective population sizes (N_e). Therefore, it does not appear to be the failure of a marker system that precludes attaining higher accuracy in MSA. AFLP shows promise in MSA applications because, of all the markers tested, AFLP maybe the least expensive, quickest to run, and accurate.

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: With heavy catch-and-release fishing pressure, Alagnak River rainbow trout are subjected to stresses including handling, exhaustion, and repeated air exposure during capture, and hooking injuries.

Purpose: To assess the immediate physiological 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 at the outlets of Kukaklek and Nonvianuk lakes in 2000-2001. Fish 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 all years, 29% had at least one previous hooking scar and 58% of fish captured experienced at least one new hooking injury. Of the 58% of fish injured in this study, most were captured using barbed hooks. The time required to remove the hooks was significantly longer for barbed J hooks as compared to barbless J hooks. There were significant changes in cortisol and glucose levels relative to total sampling time and body size. During both years, the amount of time required to land fish was significantly related to fish size, indicating the time it takes to land a fish (as determined by body size) will ultimately influence the elevation of plasma cortisol levels.

Conclusions: The results of this study will have direct application for management decisions regarding catch-and-release fishing throughout cold-water regions, and will help restore the naturally occurring rainbow trout population in the Alagnak Wild River to a more pristine state.

The Feasibility of Estimating Salmon Passage in Turbid Rivers with a Dual frequency Identification Sonar (DIDSON)

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The Dual frequency Identification Sonar (DIDSON) is a high frequency (1.0 and 1.8 MHz), 12^{o} x 29^{o} multiple beam sonar (96 and 48 beams) designed and manufactured by University of Washington's Applied Physics Lab. This sonar produces a video-like image of underwater objects. Because high-frequency sonar has been shown to attenuate with range, especially in turbid water, the range of the DIDSON was tested in the extremely turbid Copper River, Alaska, and found to be capable of detecting salmon at ranges of 17-20 m. We tested the feasibility of using the DIDSON to estimate sockeye salmon passage in Wood River, Bristol Bay, Alaska. For this test, sockeye salmon were counted simultaneously using counting towers, a video camera system, and DIDSON, Bendix, and split-beam sonars. Preliminary results indicate a strong agreement between the tower, video, DIDSON, and Bendix sonar counts at passage rates up to 100 fish/minute with less conclusive results from the split-beam sonar. Sockeye and chinook salmon were tethered at the chinook salmon sonar site on the Kenai River and ensonified simultaneously with both the DIDSON and a split-beam sonar to test whether length or width measures from the DIDSON and pulse width measures from the split-beam can separate chinook from sockeye salmon. Preliminary results indicate the two species can be distinguished, but only within a very short distance (~11 m) of the sonar. We deployed the DIDSON at the Kenai and Kasilof River sockeye salmon sonar sites and the Anchor River. Fish targets even in the rocky Kasilof and Anchor Rivers were easily distinguishable, although detection issues at these sites have not been addressed. Our preliminary conclusion is that the DIDSON can be used to effectively estimate salmon passage in rivers within 20 m of the sonar. Handling the large data load (~20 MB/minute) and the lack of an automated counting method are remaining challenges. Further investigations are required to assess the accuracy in classifying fish by size and/or species.

Probing the Upstream Limits of Anadromous Whitefish Migrations in the Yukon River

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Background: Fish in the Coregoninae subfamily, commonly known as whitefish, range throughout the Yukon River drainage. Seven whitefish species have been identified in the drainage: round whitefish *Prosopium cylindraceum*, pygmy whitefish *P. coulterii*, Bering cisco *Coregonus laurettae*, least cisco *C. sardinella*, humpback whitefish *C. pidschian*, broad whitefish *C. nasus*, and inconnu *Stenodus leucichthys*. Migrations of whitefish are difficult to detect.

Purpose: To detect the presence of anadromous whitefish in the upper reaches of the Yukon River drainage in Alaska, and to evaluate whether there may be an upstream limit to their migrations.

Method: Samples of five whitefish were collected in the upper Yukon River drainage. Otoliths were used for microchemical analysis. An electron microprobe was used to determine the strontium (Sr) distribution across core-to-margin transects of each otolith. Anadromy was assessed based on the similarity of Sr distribution to known anadromous and non-anadromous fish, and on the magnitude of difference between low and high Sr regions within an otolith.

Results: Anadromous individuals from all five species tested were found at least 1,200 km from the sea. Anadromous Bering cisco appeared to migrate farthest upstream, at almost 2,000 river km, and no non-anadromous individuals were detected. Anadromous humpback whitefish, broad whitefish, and inconnu were detected at a maximum of 1,700 river km from the sea, and individual fish from farther upstream were all non-anadromous. Anadromous least cisco's were detected at 1,200 river km from the sea, and only non-anadromous fish were found farther upstream.

Conclusions: These results establish the presence of anadromous migrations into the upper Yukon River drainage. There appear to be limits to the upstream migrations of anadromous least cisco, humpback whitefish, broad whitefish, and inconnu, with non-anadromous individuals found beyond these limits. Bering cisco may be entirely anadromous with no non-anadromous component to the population.

Life history and migration of *Oncorhynchus mykiss* on the Kamchatka Peninsula, Russia

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Background: Six life history strategies are exhibited by *Oncorhynchus mykiss* in streams on the Kamchatka Peninsula in the Russian Far East. Among these strategies, there is variation in the timing and duration of residence in streams, estuaries, lagoons, near-shore coastal seas, and the open ocean.

Purpose: This study forms part of an international research effort aimed at facilitating collaboration between Russian and U.S. scientists to examine steelhead and rainbow trout populations on the Kamchatka Peninsula. The purpose of this study was to combine scale and otolith analyses to describe migration and life history exhibited by *O. mykiss* in streams throughout Kamchatka.

Methods: Scale and otolith samples were collected from the Saichek and Sopochnaya Rivers. Age and life history type were determined based on scale growth characteristics. Otolith microchemistry (strontium to calcium ratios) was used to determine the chronology of migration between freshwater and marine habitats and identify maternal origin (anadromous v. resident).

Results: Scale and otolith analyses were complementary but differences due to temporal resolution of the techniques were evident. For example, fish classified as stream residents based on scale growth appeared to have spent short periods of time in estuary or near-shore marine habitats.

Conclusion: Study of *O. mykiss* from Kamchatka offers a unique opportunity to examine the evolution of migratory polymorphism. Comparisons among streams containing varying proportions of resident and migratory morphs with streams containing only a single morph are planned. These studies are multidisciplinary and will include study of population biology, genetics, stream ecology, and geomorphology.

The Wave Drag Hypothesis: An Explanation for Size-Based Lateral Segregation of Migration Routes During the Upstream Migration of Salmonids

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During their spawning migration large salmon like chinook, *Oncorhynchus tshawytscha*, swim upstream further offshore than smaller ones like sockeye, *O. nerka*. This pattern is counter-intuitive because natural selection should favor behavior that minimizes migration costs, yet, by traveling further offshore, large fish will have to swim against faster currents. Existing theory predicts they will expend more energy than necessary as a result. One explanation for this apparently paradoxical behavior is that large fish swim offshore to avoid wave drag, the resistance associated with the generation of surface waves when swimming close to the surface. I incorporate wave drag into existing theory and test whether the resulting model can explain size-based lateral segregation of chinook and sockeye in the Nushagak River, Alaska. The wave drag model accurately predicted the migration corridor for both species. Existing theory worked well for sockeye but not chinook. The key to these predictions is that wave drag scales according the ratio of body depth to submergence depth, so bigger fish need to swim deeper to escape its effects.

How To Destroy A World-Class Sockeye Run In 150 Years: The Columbia Basin Experience

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Columbia Basin sockeye salmon runs have declined over the past 150 years from runs exceeding 4 million fish to a low of fewer than 10,000 fish returning in 1995. During the same period that sockeye salmon run size was dropping by well over 99%, the number of lakes producing sockeye salmon dropped by 86%, lake rearing area by over 95%, and number of sockeye-producing sub-basins by 62%. The cause of this decline can be attributed to a number of factors – impassible dams, over fishing, irrigation, urban development, mortality during the migration through the Columbia Basin hydrosystem, as well as poor decisions by fish managers. Currently, only three sub-basins produce salmon: the Wenatchee, the Okanogan, and the Salmon River in the Snake Basin, the latter of which is listed under the Endangered Species Act (ESA). Seemingly little concern is given to the non-ESA listed stocks, although both face serious threats to their long-term survival. Some of these threats may arise out of efforts to save ESA listed chinook and steelhead stocks which may be inadvertently harming sockeye salmon.

Poster Session

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Application of Microsatellite Loci in Population and Mixed-Stock Analysis for Dolly Varden in the Togiak River

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Background: Dolly Varden in the Togiak River are an important subsistence resource for communities in Bristol Bay. However, population assessment and management is challenging because anadromous Dolly Varden spawn and overwinter in freshwater and subsistence harvests generally occur when populations are mixed.

Purpose: The purpose of this study was to use genetic data to test whether population subdivision exists among spawning aggregates of Dolly Varden in the Togiak River drainage and to determine if genetic methods could be used to estimate the stock composition of Dolly Varden sampled from subsistence catches and overwintering aggregates.
Method. Tissue samples were collected from prespawning Dolly Varden from three tributaries to the Togiak River: Trail Creek (n = 116), Kashaiak River (n = 51), and Ongivinuck River (n = 119). Young-of-the-year Dolly Varden from Cobblestone River north of Norton Sound (n=111) and Kivalina River in Kotzebue Sound (n=85) were used for comparison at a larger spatial scale. Samples were assayed for genetic variation at seven microsatellite loci.

Results: F_{ST}, a measure of population subdivision, was 0.01 ($P<0.01$) for the Togiak River and for all populations was 0.04 ($P<0.01$). Multidimensional scaling analysis demonstrated large spatial differences between the Togiak River, Cobblestone, and Kivalina Rivers while within the Togiak River, Trail Creek was divergent. Mean contribution estimates for 1000 artificial mixtures composed 100% from a given population were 87%, 88%, 96%, 97%, and 96% for Kashaiak River, Ongivinuck River, Trail Creek, Cobblestone River, and Kivalina River respectively.

Conclusions: Future management actions should take into account the population structure of Dolly Varden in the Togiak River drainage to maintain genetic diversity to sustain productivity. The levels of population subdivision observed in this study likely will permit estimation of population contributions to subsistence catches and overwintering mixtures in the Togiak River drainage.

Early marine ecology of juvenile salmon from Norton Sound, Alaska

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Background: Recent declines of chum salmon in Norton Sound have led to increased interest in the early marine ecology of juvenile Norton Sound salmon. The basic biology and ecology of juvenile salmon in nearshore Norton Sound, however, are not well known.

Purpose:The purpose of this study was to document migration timing, biological characteristics, diet, and distribution of juvenile salmon soon after entering marine water. Specific objectives of the preliminary field season in 2002 were to 1) determine the efficacy of fyke nets for live-capturing juvenile salmon in Norton Sound, and 2) get preliminary information on run timing and biological characteristics of Norton Sound juvenile salmon.

Method: Safety Sound, which drains four Norton Sound tributaries before emptying into Norton Sound, was surveyed in the summer of 2002 for suitable study sites. Fyke nets were installed and operated at six sampling stations between June 30 and July 21. All captured fish were identified and counted. Subsamples of salmon were retained for age and length measurements, for stomach contents analysis, and for scale preservation. Salinity, temperature, zooplankton abundance, and dissolved oxygen were also measured at sampling stations and at fixed transect.

Results: Fyke nets were operated at six stations for a total of 851 hours between June 30 and July 21. One station was fished continuously to serve as an index site. Juvenile salmon accounted for 3% of the catch; stomachs and size measurements were obtained from 164 of the 278 juvenile salmon captured. The majority of salmon were captured in the corridor linking Safety Sound to Norton Sound, and preliminary analysis indicates a strong directional pattern.

Of the 58 stomachs analyzed to date, 95% had identifiable stomach contents. Salinity averaged 33.2 ppt, with a pronounced gradient across Safety Sound. Water temperatures increased throughout the study, reaching 22°C by the end. Pending work include analyses of fish length and weight over time, additional stomach contents, change in CPUE over time, directional movement patterns, and further zooplankton, salinity, and temperature evaluation.

Conclusions: Fyke netting appears to be an effective method for capturing juvenile salmon in Safety Sound, and should be similarly effective in other Norton Sound bays with similar tidal regimes. The ability to live capture juvenile salmon and detect basic movement patterns should assist future efforts to understand the early marine ecology of Norton Sound juvenile salmon. Additional results from the preliminary 2002 will be analyzed and reported in the winter of 2002/2003.

EFFECTS OF ACETATE CARD PRESSING ON SCALE SIZE

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For over 70 years, cellulose acetate cards have been used to preserve impressions of fish scales. Recent studies have demonstrated that the lighter weight cellulose acetate used by the film industry deteriorates, and may only have a useful life of 10 years. This has generated concern regarding the use of cellulose acetate cards for the long-term preservation of fish scale impressions. Concern has also arisen as to whether repeated pressings of scales alter their size and structure. Anecdotal evidence indicates that second and third pressings of scales are less distinct, suggesting that the pressing process may alter scales. Currently, several retrospective studies using scales as an indicator of fish growth are being conducted in conjunction with our lab. Missing acetate cards require that original gummed scale cards are re-pressed, a process that requires scales and cards be placed in a heated hydraulic press at 200°F and 35,000 PSI for 2 minutes. Effects on the scale's size, by flattening of the ridges that compose the circuli, are possible through this combination of high heat and pressure. To examine whether scales change size with repeated pressings, we sampled scales from the preferred area of sockeye salmon (*Oncorhynchus nerka*) and placed them on a gum card. To create a landmark for consistent length measurement, scales were removed from the gum card and notched by removing a "V"-shaped piece from the edge of the scale. The scale was subsequently placed between two acetate cards and scanned using a ScreenScan microfiche scanner to create a digital image. To establish a reference measurement for each scale's initial length, its digital image was measured from the center of the scale to the edge using Optimas image analysis software. Scales were returned to the gum card and pressed in a hydraulic press 4 times. These acetate impressions were subsequently measured in the same manner as the original scales. The original scales were then removed from the gum cards, placed between 2 acetates, digitized, and measured once more to assess changes in actual scale length. Data were imported into Microsoft Access and differences among the data sets were analyzed using repeated measures analysis of variance. Although deterioration of the scale edge was apparent in successive pressings, preliminary results indicate that no significant change in scale size occurred. The long-term degradation of cellulose acetate, however, could ultimately require the use of alternative long-term storage methods such as high-resolution computer-based image archives.

Partners for Fisheries Management Program

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Background: Bristol Bay Native Association (BBNA), in conjunction with U.S. Fish & Wildlife Service (USFWS) Fisheries Information Service, is involved in the Partners for Fisheries Monitoring Program and has been involved in research projects in Bristol Bay for the past several years. We have built partnerships on research projects with the Alaska Department of Fish &Game (ADF&G), the Village Councils in our region, NMFS, North Slope Borough, BIA, EPA, NPS, Bristol Bay Economic Development Corporation, Alaska Beluga Whale Commission, and the Eskimo Walrus Commission.

Purpose: Our cooperative agreement under the Partners Program has three (3) main goals. The first is to address and investigate subsistence fisheries issues in the Bristol Bay region. Capacity Building is the second goal; that is, to increasing local hire and expertise and providing seasonal employment. Third, we build and sustain positive working relationships with the partnering agencies and entities.
We define “capacity building” as “acquiring or strengthening skills, processes and systems to help individuals and villages take control of their own lives.”

Method: Local issues are assessed by community meetings that focus on identifying concerns, ideas, and related elements of subsistence fisheries. These issues are judged for importance and performance ability, then potential projects are proposed to the partners. Local hire and appropriate training is built into the projects. The continual collaboration and communication between entities fosters future abilities and understanding.

Results: Current projects funded through the Federal Subsistence Fisheries Monitoring Program in Bristol Bay include:

- Kvichak Traditional Ecological Knowledge and Freshwater Species Harvest Monitoring
- Ugashik Late-run Coho Estimates
- Kametolook River Coho Carrying Capacity and Escapement Estimation
- Alagnak Sockeye Salmon Estimation
- Clark River Coho Habitat Assessment and Escapement Estimation
- Togiak River Subsistence Monitoring

Conclusions: This cooperative agreement has reduced transportation costs for project technicians, built positive local public relations, and expanded the technical abilities in the region. Reducing budget demands allows for additional investigation, which is in turn, enhanced by local support and cooperation. Decentralizing capabilities empowers communities to participate in management of local resources, charging economic growth and stability.

Whitefish of Whitefish Lake

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Background: Coregonid fish constitute a major subsistence resource in the Kuskokwim River Drainage. Traditional ecological knowledge about size and number reductions has raised concerns about this important subsistence resource. This knowledge was used to establish regulations ((5AAC 01.260 (K)) in 1992 for Whitefish Lake. This is the first study on Whitefish Lake (~6500 surface ha).

Purpose: To estimate humpback and broad whitefish abundance, age and mean length composition and determine harvest areas.

Method: A fish weir was operated at the lake outlet in September-October of 2001 and June 16 through freezeup in 2002. Scales, otoliths and lengths were collected from weir samples and subsistence catches. Floy tags were placed on both humpback and broad whitefish and least cisco to determine lake fidelity and estimate the population. A reward for tag returns will be used to determine harvest areas and movements.

Results: Winter dissolved oxygen levels were below minimums for salmonids. Fish moved into the lake in early June after ice out before weir installation. Out migration of humpback whitefish (>27,000) and least cisco (>25,000) occurred mid to late July. Subsistence fishers in September harvested primarily humpback whitefish with ages between 7 and 21 while broad whitefish ranged up to 7 years. Strontium analysis of otoliths indicates both humpback and broad whitefish spend time in brackish water.

Conclusions: Whitefish Lake is an important summer feeding lake for whitefish. Fish enter the lake after ice-out and the majority leaves in mid to late July. Fidelity to the lake as a feeding area is not currently known. Spawning locations of fish leaving in July and at freeze up is unknown.

Hetta Lake Sockeye Salmon Stock Assessment Project

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Background: Sockeye salmon continue to be an important subsistence resource to the people of Hydaburg on Prince of Wales Island in Southeast (SE) Alaska. In 2001, the Hetta Lake Sockeye Salmon Stock Assessment Project was initiated due to concerns of apparent declines of returning sockeye salmon over several decades.

Purpose: The purpose of this study was to evaluate sockeye salmon production in different life history stages in freshwater, evaluate the productivity of Hetta Lake, monitor the subsistence fishery harvest, and set a range of escapement goals after five years of data collection.

Method: Method used to assess the health of the run included a creel census to estimate the harvest in the subsistence fishery, mark-recapture methods to estimate adult returns to the spawning grounds, zooplankton sampling to estimate zooplankton biomass and densities, light attenuation measurements by depth to estimate the photogenic area of the lake, and a hydroacoustic survey to estimate the density of sockeye fry in Hetta lake in 2001.

Results: In 2001, the subsistence fishery harvest was estimated to be 4,416 fish and the adult sockeye salmon returns was estimated to be 6,000 fish, for a total of about 10,000 sockeye adults returning to the terminal area. The mean zooplankton density was 44,000 plankters per m^2 and zooplankton biomass was estimated to be 120 fry per m^2. Hetta Lake had the highest density of sockeye fry of the lakes surveyed in SE in 2001, 1.20 fry per m^2. Sockeye fry abundance was estimated to be 2.9 million fry with a range of 2.7 to 3.0 fry of the entire lake.

Conclusions: The data from the first year of this study provides a foundation for the multi-year assessment of the health of the sockeye salmon population in Hetta Lake. The long-term objective is to set a range of escapement goals to ensure sockeye salmon returns for future generations.

Preliminary Investigations into the Application of a New Sonar System for Assessing Chinook Salmon Abundance in the Kenai River

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Background: Side-looking sonar has been used to assess chinook salmon *Oncorhynchus tschwatscha* returns to the Kenai River since 1987. Hydroacoustic assessment of chinook salmon in the Kenai River is complicated by the presence of more abundant sockeye salmon *O. nerka* which migrate concurrently with chinook salmon. Most counts from sockeye salmon are censored using a combination of range and acoustic size thresholds (sockeye salmon generally migrate near the bank and are smaller than chinook salmon, which prefer the midchannel section of the river). However, some inflation of chinook estimates by sockeye salmon is known to occur.

In July 2002, we evaluated a new high definition sonar technology at the Kenai River Chinook Salmon Sonar Site. The new system, called a **D**ual frequency **ID**entification **SON**ar (DIDSON), operates at two frequencies: 1.8 MHz for close range observations less than 12 m and 1.0 MHz for detecting targets at ranges up to 30 m. At closer ranges, DIDSON provides near-video quality images.

Purpose: Our primary goals in testing the DIDSON were to determine the distances at which the it could effectively detect fish in the glacially occluded Kenai River and whether information on fish size could be derived from the high-resolution images that would aid in classifying acoustic targets as sockeye or chinook salmon.

Method: Paired data were collected on free swimming and tethered fish using the conventional split-beam sonar and the DIDSON system.

Results: The DIDSON was able to detect fish out to 25 m at the chinook sonar site. Preliminary results also indicate that reasonable measurements of fish size can be derived from the fish images, but only at close range (less than 12 m) where image quality is best.

Conclusions: The current split-beam sonar system used at the Kenai River sonar site insonifies ranges up to 60 m from the transducer. Consequently the DIDSON is not capable of detecting and measuring all the targets that we currently count with the split-beam system. However we hope to use paired data from the DIDSON and split-beam sonar system to evaluate and improve our current methods for classifying targets by size.
Our experiments in 2002 also indicated that the DIDSON could provide significant improvements in our ability to detect fish, track fish, and determine the direction of travel of acoustic targets. Valuable information on whether downstream-traveling targets should be classified as a fish or debris was also provided**.**

Growth and Movement of the Sea Cucumber *Parastichopus californicus* in Southeast Alaska

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Ginny Eckert

Background: Sea cucumbers, *Parastichopus californicus,* are an important fishery throughout Alaska, Washington, Oregon, and California, and yet little biological information is available on the species.

Purpose: Information about life history, specifically growth and movement, could improve management to ensure a sustainable fishery.

Methods: Part I – Growth. Sea cucumbers are collected by SCUBA at four sites in Sitka and Ketchikan, Alaska. They are tagged with a Floy double T-bar tag, measured for length, width and weight on the surface, and then released. This process was repeated in Spring and Fall of 2001 and 2002 and will be repeated again in Spring of 2003. Part II – Movement. Sea cucumbers are tagged with Floy tags in-situ at a site near Juneau, Alaska, and their movements are tracked at intervals of 24 hours for a total of 4-5 days. Movement from shallow to deep water is also being assessed by monthly density measurements at multiple depths.

Results: 4,478 sea cucumbers were tagged in Ketchikan and Sitka. Over a 15 month period average recapture rates were 9% for Ketchikan sites and 17% for Sitka sites. Growth data is currently being analyzed. Movement studies are underway.

Conclusion.: The growth and movement data collected from both studies will provide valuable life history information to aid in management. The studies are ongoing and analyses are in progress. Future investigations may include using sonic tags as a possible tracking method and incorporating time-lapse photography to determine speed and direction of movement of individual sea cucumbers.

Use of Multiple Gear Types and Inriver Fisheries to Estimate the Abundance of Stikine River Chinook Salmon

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The escapement of Stikine River chinook salmon *Oncorhynchus tshawytscha* above the U.S./Canada border has been estimated using a mark-recapture experiment since 1996. We have continued to improve our sampling methods by diversifying gear and lengthening sampling periods to obtain larger, more representative samples. Initially, 7¼ inch drift gillnets were fished from early May to mid-July to capture and tag returning chinook salmon, and marked fish were recovered from Canadian inriver gillnet fisheries beginning in early June. We also recovered marked fish from mid-June through August using weirs, snagging gear, dipnets, and spears, and continue to do so. In 2000, we expanded tagging efforts by adding a set gillnet site that fishes 5⅜ inch gear from mid-June through October, and moved the start-up date for the inriver fisheries to early May. These enhancements have helped us increase sample size and improve our ability to estimate the abundance of chinook salmon <660 mm MEF, which tend to be age-.2 jacks that are useful for preseason forecasting. Prior to 2000, abundance estimates for large (≥660 MEF) chinook salmon ranged from 23,716 to 31,718 at 95% relative precision (RP) levels of ±18-27%, but abundance of fish <660 mm MEF could not be estimated by mark-recapture methods. After we implemented project modifications in 2000, abundance estimates for large chinook salmon were 30,301 (95% RP = ±20%) in 2000 and 66,515 (95% RP = ±18%) in 2001. In 2000, we were also able to estimate the abundance of fish <660 mm MEF for the first time using mark-recapture methods at 13,995 (95% RP = ±34%). In 2003, we will initiate the set gillnet operation in early May, in part to increase the tagging rate of chinook salmon <660 mm MEF.

American Fisheries Society Hutton Junior Fisheries Biology Program – Summer at Ft. Richardson Hatchery

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Background: The American Fisheries Society has started a new mentorship program for high school students, the Hutton Junior Fisheries Biology Program. The program matches students with fisheries professionals who serve as mentors for the students during the summer. Students are paid a stipend and work side-by-side with the professional to experience fisheries work first-hand.

Purpose: I would like to inform other professionals about this program so that they might consider being mentors or encourage their agencies to provide funding for this program.
Methods: I applied and was accepted into the program for the summer of 2002. My mentor was Jeff Milton, manager of the Ft. Richardson Hatchery (Alaska Department of Fish and Game, Sport Fish Division).

Results: My interest in fisheries has greatly increased over the summer as a result of being able to work with fish. The Hutton Program was an excellent opportunity for me to explore careers in which I hold interest. I believe that my future career is waiting for me in the field of fisheries.

Conclusions: The most important thing that I learned during this summer's program was to find a job that you enjoy doing. Before I did this program I thought that I might be interested in fisheries, but now I know that I am. For the upcoming school year I am planning to take a high school science course in Natural Resources that includes fisheries. I plan to go to college at UAA for a year or two, and then transfer somewhere else. The Hutton Program has had a big influence on what I plan to study in college. After this summer's experience I have decided to attend a school that has a good fisheries program.

American Fisheries Society Hutton Junior Fisheries Biology Program – Working with Biologists in Sport Fish Division, Alaska Department of Fish and Game

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Background: The American Fisheries Society has started a new mentorship program for high school students, the Hutton Junior Fisheries Biology Program. The program matches students with fisheries professionals who serve as mentors for the students during the summer. Students are paid a stipend and work side-by-side with the professional to experience fisheries work first-hand.

Purpose: I would like to inform other professionals about this program so that they might consider being mentors or encourage their agencies to provide funding for this program.

Methods: I applied and was accepted into the program for the summer of 2001, and for a second summer in 2002. During 2001, my mentor was Debby Burwen, head of the sonar program for Sport Fish Division (Alaska Department of Fish and Game). The theme of my mentorship was the Serial Salmon Fishery and I worked on many different salmon projects throughout Southcentral Alaska. This allowed me to see the big picture of salmon research and management. For 2002, my mentors were Diane Loopstra and Dan Bosch, fishery biologists also with Sport Fish Division. I worked on only two projects in 2002, which gave me the opportunity to fully understand the process, goals, and expected results of each project.

Results: The Hutton Program is a great way to obtain hands on experience in the career field of fisheries. I think this program can be more beneficial to a high school student than working for ADFG, because you are assigned somebody to learn from and you do learn a lot of information about the job. It gets you focused on the education of the job or career.

Conclusions: For the upcoming school year I plan on getting prepared for college. I need to look at my options and begin looking for a college that will provide me a quality education in the field that I look into. I have fisheries in serious consideration as a career to pursue and become active in. I do want to become familiar in other areas and will keep an open mind when the time comes to declare my major.

The Alaska Fishery Research Bulletin

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The *Alaska Fishery Research Bulletin* is a professional scientific journal that publishes peer-reviewed technical and scientific information of direct or indirect pertinence to Alaskan subsistence/personal use, commercial, and sport fisheries. Submissions may examine finfish or shellfish or aspects of their environment or community from a variety of disciplines, such as aquaculture, biometrics, ecology, economics and marketing, genetics, law, life history, limnology and oceanography, management, pathology, and population dynamics. Two issues are published per year (summer and winter) and include articles, issues & perspectives, notes, and forums.

Utility of Climate Variation in Western Alaska Chum Forecast

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Background: Returns of summer chum salmon (*Oncorhynchus keta*) to the Arctic-Yukon-Kuskokwim Region (AYK) have been drastically low since 1997. Estimates of total run abundance are difficult to determine given the vast size and complexity of AYK and existing salmon stock assessment programs are limited. Forecasting is informal and based on a qualitative assessment of historical performance.

Purpose: We propose to improve the reliability of the AYK chum forecast by using multiple data sources of the Kuskokwim and Yukon management areas to produce abundance estimates. Estimates are subject to formal modeling procedures that consider influence of regional oceanographic factors and proxies of survival.

Method: We develop escapement indices that are combined with harvest and test fishery data in a maximum likelihood statistical framework to develop abundance estimates for both regions. We perform exploratory analysis on climate and survival data to determine likely variables for a series of empirical models describing chum returns. Relevant information regarding AYK summer chum life history and changes in oceanographic conditions in the North Pacific and Bering Sea is incorporated in this process.

Result: Abundance indices were completed. The use of multiple data sources required extensive evaluation of data reliability. Sensitivity analysis and bootstrapping were performed on the abundances estimates to pinpoint sources of instability and provide variance estimates. An in-depth literature review for the most appropriate environmental indices was compiled in a reference manager and available data was collected.

Conclusion: The use of fishery and environmental data for abundance estimation may increase the reliability of the AYK summer chum forecast. The most appropriate modeling techniques are currently being evaluated. A formal modeling process provides managers with a statistical analysis of current trends and allows for more informed decision making. Also the utilization of different forms of data allows for an integrated, multi-disciplinary approach to stock assessment.

Testing Archival Tags in Steelhead, Ninilchik River, Alaska

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Background: The USGS Alaska Biological Science Center is conducting a pilot study as part of the Pacific Ocean Salmon Tracking project (POST) for the Census of Marine Life. The role of ocean environment on the survival, distribution, and behavior of pacific salmon is incomplete but remains important for the understanding and management of these fishes. Steelhead (*Oncorhynchus mykiss*) kelts provide an excellent way to test the application of new electronic archival tags for describing distribution, behavior, and identifying critical habitat for Pacific Salmon.

Purpose: Steelhead kelts can be captured in freshwater after spawning and surgically fitted with archival tags. These tags will record temperature, pressure, and ambient light levels of their marine habitat. Tags from returning kelts can be retrieved and analyzed to describe critical habitat and behavior patterns for steelhead in the marine environment. This project will also test the effectiveness of using archival tags to collect marine habitat data in other Pacific Salmon.

Methods: USGS operated an Alaska Department of Fish and Game (ADF&G) weir on the Ninilchik River, Kenai Peninsula, Alaska during May and June 2002 to capture outmigrating steelhead kelts. Male and Female steelhead kelts were surgically fitted with PIT tags and either a Lotek LTD_1110 or a Lotek Beta type LTD_2410 archival tag. The LTD_1110 collects temperature and pressure and the LTD_2410 collects temperature, pressure, and ambient light levels. After recovery, kelts were released downstream to complete their out-migration. Steelhead will be recaptured and scanned for a PIT tags at the ADF&G weir through 2005 in order to recover the archival tags.

Results: A total of 21 female and 12 male steelhead were surgically implanted with PIT tags and archival tags. Of these, 25 steelhead were tagged with LTD_1110 archival tags, and 8 steelhead were tagged with Beta type LTD_2410 archival tags. Data will be retrieved from the tags pending recovery, which will begin in May 2003.

Conclusions: Tagging and tag-recovery is expected to continue through spring 2005. Archival tags provide the opportunity to examine pathways of marine migration and determination of critical habitat in salmonids. Based on the findings and experience of this study, further research concerning marine ecology and migration of salmonids in the North Pacific Ocean using archival tags will be applied throughout the Eastern North Pacific through the POST study.

Akalura Creek Remote Video Feasibility Project

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Background: Akalura Lake is one of five sockeye salmon *Oncorhynchus nerka* systems in Olga Bay supporting commercial sockeye salmon fisheries in the Alitak Bay District of the Kodiak Management Area. Weirs have been inconsistently used for escapement monitoring at Akalura Lake because of the lack of funding and the system is small compared to other Kodiak Island systems that are monitored with weirs. In years when a weir was not operated, escapement was estimated by aerial survey. Aerial surveys can bias escapement estimates if they are not conducted at the same time or in the same conditions each year.

Purpose: The purpose of this study was to compare counts obtained from time-lapse video against those obtained from a weir to determine whether time-lapse video is a viable alternative to enumerate escapement at Akalura Creek.

Method: In collaboration with the Kodiak National Wildlife Refuge, the Alaska Department of Fish and Game deployed a remote video counting tower project at Akalura Creek, Kodiak in 2002. A three-year evaluation project was designed where counts from the tower will be compared against counts obtained through a weir.

Results: A total of 5,263 sockeye, 23,171 pink *O. gorbuscha*, and 819 coho *O. kisutch* salmon were counted through the weir. Counts from the video have not been made at this time.

Conclusions: A number of technical problems were encountered throughout the season that hindered the project; for example, the power supply to the camera was prone to disconnecting, the VCR malfunctioned, and the video image was too small to identify fish. Solutions to most of the problems have been discovered. Remote video technology might be a practical solution to escapement monitoring for many small, clear streams. However, methods are still developing, system deployment is not simple, and system-specific refinements are required. Developing technologies will provide better data acquisition in the future.

An Escapement Goal Evaluation of Saltery Lake, Kodiak, Alaska

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Background: Saltery Lake is the most productive sockeye salmon *Oncorhynchus nerka* system on the eastside of Kodiak Island. The escapement goal range up until 2000 was 20,000 to 40,000 adults. This goal was based upon historical escapements and limited spawning surveys.

Purpose: The purpose of this study was to reevaluate the 20,000-40,000 escapement goal using escapement, harvest, and limnological data to determine if it was still valid.

Method: The escapement goal was reevaluated using spawner recruit, euphotic zone depth and volume, smolt biomass as a function of zooplankton biomass, smolt biomass as a function of lake rearing availability, and spawning habitat availability analyses. Spawner recruit data were available from 1976-1993 and limnological data were available from 1994-1999. Saltery Lake spawning habitat was evaluated in 1997 and 1998**.**

Results: The majority of these methods estimated an escapement goal of ~20,000 adults (mean of all methods) indicating that the original escapement goal was too high. The escapement goal estimate from the spawning habitat evaluation, compared to the other methods, was high (39,064), indicating that the system is likely rearing limited rather than spawning limited.

Conclusions: The average escapement goal from all methods excluding the spawning habitat evaluation was ~18,000 adults (ranging from ~7,500 to ~30,000). Therefore, it was recommended that the Saltery Lake sockeye salmon escapement goal be lowered to an escapement goal range of 15,000 to 30,000 adults. This goal was implemented by the Alaska Department of Fish and Game in 2001.

How to build a “fish friendly” fishwheel

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Background: Fishwheels are used by fishery scientists on large Alaskan rivers as a tool to assess salmon run strength, monitor run timing, collect biological information, and aid in the capture of fish for mark-recapture studies. Fishwheels can be very effective at capturing fish, with a potential of catching a significant proportion of the entire run. There are biological concerns over handling and holding large numbers of fish. A poorly designed fishwheel may cause added stress to captured fish, resulting in reduced fitness to the individual and possible mortality.

Purpose: The purpose of this presentation is to give examples of “fish friendly” fishwheel designs. Chute design, livebox construction, preferred materials, and operating techniques will also be discussed. Considerations as to how fish are captured and released back into the river will be presented. Video aids and digital pictures will be available to help demonstrate specific design considerations. Also a video monitoring system designed for fishwheels will be shown.

Landlocked Lampreys in Southeast Alaska

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Natural landlocked populations of salmonids are common in Southeast Alaska. However, prior to 2002 we were not aware of natural landlocked populations of other fish species in this region. In June 2002, we sighted a single, small lamprey in the watershed that drains into the North Arm of Farragut Bay, located on the mainland about 35 km north of Petersburg. This lamprey was sighted several kilometers above a large waterfall that presents a complete upstream migration barrier to all salmonids. In early July, an intensive search produced a different, dead specimen, from the same site, that has been tentatively identified as *Lampetra richardsoni*, the western brook lamprey. The only prior documented records of *L. richardsoni* from Southeast Alaska are from a lake (McDonald, on the Cleveland Peninsula), a creek (Bear Creek, on Mitkof Island) and a river (Taku), all of which are accessible to fish from saltwater. We are curious whether landlocked lamprey populations in this region are truly rare or have simply missed detection. *L. richardsoni* is a nonparasitic freshwater lamprey that spends almost its entire life buried in silt, emerging only in its last month to spawn, and it is a small, unobtrusive fish, typically only 100-150 mm long. Extensive minnow trapping in the reach where the lamprey specimen was collected has never resulted in a lamprey capture. Lampreys in silt are readily detected by electroshocking, but most shocking in this region is done over gravel streambeds, not at the silty, organic sites of the sort used by lampreys. We plan to survey further for adult *L. richardsoni* during June 2003, at the probable height of their spawning period. We request that anyone who has sighted freshwater lampreys in Southeast Alaska, especially above upstream migration barriers, contact us to discuss the details of their observations.

Pacific cod in Captivity

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Background: Discrepancies over the interpretation of otolith patterns of Pacific cod *Gadus macrocephalus* for aging have suspended production aging by National Marine Fisheries Service and the Pacific Biological Station in Canada (Roberson 2001). The importance of age for stock assessment in Gulf of Alaska and Bering Sea has prompted a need for continued aging of Pacific cod. Currently there has been little work on the validation of existing aging techniques for this species.

Purpose.: The goals of this study were to verify otolith formation in adult Pacific cod *Gadus macrocephalus* using oxytetracycline (OTC), determine optimum concentrations of OTC for Pacific cod, and successfully spawn cod in captivity for validation of daily growth increments on larval otoliths.

Method: Pacific Cod were collected and transported to the NMFS laboratory in Kodiak. The fish were held in flowing seawater tanks at ambient water temperatures, with no attempt to control light, and fed to satiation on a diet of Pacific herring. Five different concentrations of OTC, ranging from 25 to 100 mg/kg, were injected into the intraperitonieal cavity of 17 fish and the fish were held for up to one year after injection. OTC marks on the otoliths were examined under ultraviolet light and distance to the edge was measured. Fish were spawned in the lab and spawn timing, spawning behavior, and egg and larval development were visually recorded. Larval fish were retained for daily growth analysis.

Results: Pacific cod showed growth during their time in captivity. Changes in length ranged from 0-2cm. Mortalities were not associated with higher levels of OTC and fish that survived for the duration of the experiment will be sacrificed for examination in a year. Stress related mortalities allowed an initial look at the OTC marks on the otoliths. Marks were discernable for all levels of OTC injections and growth was evident. Spawning commenced on Feb 2 and was completed by March 15. Pacific cod broadcast the semi-adhesive eggs into the water column before fertilization and settling on the bottom. Two fish spawned in the tank and two were manually spawned and fertilized, eggs hatched 20 days after spawning. Hatching continued for 14 days. Three hundred larval were retained and sacrificed over a 6 week period for daily growth analysis.

Conclusions/Future Research: OTC marking has proven to be a good method for age validation in Pacific cod, with the optimum level yet determined. Spawning behavior and timing is consistent with past studies. Future analysis after a year of growth on the remaining cod in captivity and a repeat experiment under more optimal conditions for Pacific cod survival should further this research. Analysis of the daily growth increments on larval Pacific cod otoliths has yet to be completed.

Alaska Fish Habitat Inventory: An Introduction.

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Background: Knowledge of the explicit distribution of anadromous and resident fishes throughout the freshwaters of Alaska is a prerequisite for several tasks, including comprehensive fish habitat protection, landscape/watershed planning, and a variety of other research and management programs. Currently no spatial database is in use statewide to systematically record and display freshwater fish observations and characteristics of aquatic and riparian habitats. The Alaska Fish Habitat Inventory is designed to fill these needs.

Purpose: This new, multi-year program will:
1. Archive historic geo-referenced observations of fish in freshwater habitats.
2. Collect additional fish distribution and habitat information where data gaps exist and/or where management objectives require explicit field information.
3. Provide this information *via* the Internet.

Method: We will utilize a dynamic GIS-based information management system to archive both historic and project-derived information. The system integrates spatial, tabular, graphic, and textual information that will connect to attributes of the National Hydrographic Dataset (NHD) and will be spatially organized by watersheds (national standard Hydrologic Units).

Conclusion: We invite, and will actively solicit, cooperation from federal, state, and local agencies, as well as non-governmental organizations to:
1. Help us integrate this program with other on-going or proposed spatially defined Alaskan datasets.
2. Help us locate existing information.
3. Help us identify data gaps.
4. Join us on future field investigations.

You will be hearing from us!

Business Meeting Agenda October 23, 2002 Girdwood, Alaska

Determination of Quorum
Call to Order

Approval of Minutes from Alaska Chapter Business Meeting,
Sitka, November 15, 2001

Introductions
Treasurer's report

Committee reports

Aquatic Education	Laurel Devaney and Andrea Mederios
Awards	Andy Gryska
Chapter Historian	Randy Brown
Continuing Education	Joel Reynolds
Cultural Diversity	Jerry Berg and Gretchen Bishop
Electronic Communications	Allen Bingham
Finance	Bill Bechtol
Fishes of Alaska Key	Bill Wilson
Membership	Tim Joyce
Oncorhynchus Newsletter	John Thedinga
Past Presidents	Carol Ann Woody
Resolutions and By-laws	Dennis Tol
Student Sub-unit	Mia Baylor (UAF) and Ann Kaleishotwell (UAJ)
Wally Noerenberg Award	Doug Palmer

Outgoing President's Address
Installation of New Officers

New Business

Comments on the 2002 Chapter Conference

2005 Parent Society Meeting – Anchorage, Alaska

Open forum
Adjourn

Alaska Chapter, American Fisheries Society Annual Business Meeting, Sitka, Alaska November 14, 2001

Quorum was determined by head count; at least 20 Alaska Chapter members were present. Carol Ann Woody called meeting to order at 3:35 PM.

Carol Ann Woody, president, had attendees introduce themselves. Alaska Chapter Executive Committee (ExCom) members present were: president-elect David Wiswar, vice-president Carol Kerkvliet, past president Bill Bechtol, treasurer Bob Ourso, and secretary Lee Ann Gardner. Also present were past presidents Cindy Hartmann, Bill Hauser, Tom Kron, and Bill Wilson. Other AFS officers present were Western Division (WD) president Eric Knudsen, and Society Parliamentarian Joe Margraf.

Chuck Meacham's motion to approve the November 15, 2000 business meeting minutes was seconded and approved unanimously.

Eric Knudsen provided an update on WD activities. Eric said that WD presence has improved at meetings of various chapters in the Division, thereby improving communication between the WD and its chapters. Eric explained how the Alaska Chapter, WD, and Parent Society interrelate. With Chapter representation at the WD through the Chapter president and division representation on the Parent Society governing board through the WD president and president–elect. The Alaska Chapter President is encouraged to attend the annual WD ExCom meeting, as well as the WD retreat scheduled for December 3, 2001 in Portland, Oregon. An example of how a Chapter's suggestion can be implemented at the Parent Society level is reflected on the new dues statement. This past year Carol Ann Woody brought to the WD the ideas of having (1) a reduced Young Professionals dues category for persons within 3 years of graduation and (2) a program for current members to sponsor students. These Alaska Chapter proposals were taken to the WD ExCom and then brought to the Parent Society governing board. An evaluation of the proposals was done by the Membership Committee and then voted on and approved by the governing board. Eric Knudsen added that the WD is excited about the 2005 Parent Society meeting in Anchorage, Alaska and wants to participate as it did in the 2001 society meeting in Phoenix. At the Phoenix meeting, the WD combined their Division meeting with the Parent Society meeting and realized proceeds from that meeting that did not impinge on the Arizona Chapter's proceeds. Eric noted that combining the WD meeting with the Parent Society meeting in Anchorage in 2005 would attract additional meeting participants. The 2002 WD meeting is in Spokane, Washington in April and Eric Knudsen encouraged Alaska Chapter members to attend. Meeting topics include the Columbia River and a variety of other fisheries topics. Eric left copies of the agenda in the registration room and encouraged members to submit papers.

Carol Ann Woody acknowledged Bob Ourso's efforts on this year's meeting program and his efforts as Treasurer in setting up credit card access for meeting participants.

Treasurer's Report

Bob Ourso reported total current assets are $84,477.44, excluding raffle proceeds but including:

Cultural Diversity Award Fund	$11,088.94
Fishes of Alaska Checking	$ 5,487.89
Main Checking	$28,099.91
Market Rate Savings	$23,401.54
Raffle Checking	4,616.15
Wally Noerenberg Award Fund	11,783.01

The 125 meeting registrants at this year's annual meeting exceeded expectations. Registration types included:

7 one-day members, 13 one-day non-members, 27 three-day members registering early, 6 three-day non-member registering early, 4 three-day students registering early (registration fees waived for 2 of these students volunteering at the meeting), 37 three-day members, 8 three-day non-members, and 13 three-day students (registration fees waived for 9 of these students volunteering at the meeting). The Continuing Education class on data visualization had 25 participants. This was the first Chapter meeting at which credit cards were accepted and the response was very positive; for now, we will stay with VISA and Mastercard. Next year, Bob Ourso would like the option to conduct all pre-meeting administration, such as registrations, payments, and abstract submittals, on the internet.

Bill Hauser inquired about Chapter asset trends. Bob Ourso indicated that accounts are fairly elevated at this time of year because meeting expenses are pending. Bob noted that we are getting very poor returns on current Chapter accounts and that we need to explore other investment options for those accounts.

Motion: A motion to accept the Treasurer's Report was seconded and unanimously approved.

Committee Reports

Fisheries and Environmental Education – Laurel Devaney reported the committee wants to increase the skills of AFS members at educating the public about fishery resources. During the past year, the Committee continued work on the Education Resource guide, adding materials that educators or persons wanting to start an education program could use. This information will also be posted on the Chapter web site and made more of an access site with links to other useful education sites. The committee also chaired a session at this year's annual meeting and plans to host future sessions with an education theme. The plan for this year is to expand the focus of the Committee to address needs for other kinds of communication. Therefore, a committee name change will be submitted to the ExCom to reflect this change in focus.

Awards – Andy Gryska reported a 6-person subcommittee worked this past year to improve paper judging criteria. After a review that included criteria of other state AFS chapters the committee found similar criteria among chapters. One noted difference was that the best student paper often has a cash award. Also, many chapters have a Leaky Boat award as a humorous recognition of someone's infamous inability to do something. Andy expects additional comments back from committee members on the judging criteria. Carol Ann Woody suggested the committee submit amended criteria to the ExCom for comments. Laurel Devaney suggested that completed judging sheets be provided to speakers for feedback; Andy agreed that would be a good idea to implement for future meetings. David Wiswar suggested that judges could ask speakers in advance if they want to see their rating sheets; that would assist the judges in knowing ahead of time. Bill Hauser suggested a rating of session chairs be devised as session management will be crucial at the 2005 meeting.

Andy Gryska noted that one meritorious service award nomination is still current and has been submitted to the Awards Committee; it could possibly be awarded next year after approval by the ExCom. Allen Bingham noted that for several years no nominations have been made for various Chapter awards. Chapter members need to make nominations to keep the Chapter spirit alive. Eric Knudsen noted that with only one award nomination, the Chapter could improve considerably. Allen Bingham noted he has begun to put parts of the newsletter on the web and will include solicitations for award nominations. Cindy Hartmann suggested that the form for awards nominations could be included under the Awards Committee section of the Chapter website.

Chapter Historian – Carol Ann Woody reported that Jim Reynolds was unable to come to this year's annual meeting due to the recent death of his wife. Bill Hauser suggested getting a card for meeting attendees to sign to let Jim know we were thinking of him; a card was distributed prior to the end of the business meeting. Carol Ann recognized Randy Brown for serving as for this year's meeting photographer. Carol Ann noted that Jim Reynolds would like to resign from the Committee Chair position and that any member interested in this position should contactDavie Wiswar.

Continuing Education – Joel Reynolds reported there were two short courses offered at last year's annual meeting, including 25 attendees for a bootstrapping statistics course and 20 attendees for a genetics course.

Joel subsequently worked with Carol Kerkvliet to develop a survey of courses that AFS members would like to see offered. This survey will be available on the web site. Following last year's meeting, there was interest in a technical writing class by Jud Monroe. Jud taught writing courses in April 2001 at Anchorage (23 participants) and in October 2001 at Fairbanks (22 participants). Courses were very well received and net profits for the Chapter were about $3,600 for the Anchorage class and $2,700 for the Fairbanks.. Jud is also scheduled to teach the technical writing class next summer in Juneau.

For this year's annual meeting, two classes were scheduled--data visualization and telemetry. The latter course was cancelled due to a scheduling conflict for the instructor, but may be offered at a later date or meeting; Joel requested feedback for when to schedule this class in late winter. Ted Otis offered to coordinate a workshop or session on video monitoring; Joel asked members tocontactTed regarding possible participation. If you have other education ideas/suggestions, please let contact Joel. Joel announced that he will resign as Committee Chair in order to assume an office of the Alaska Statistical Chapter; please contact Joel if you are interested in chairing the committee.

Cultural Diversity – Jerry Berg reported that it has worked very well serving with Gretchen Bishop as co-chairs. They have been able to bounce ideas off each other and to also always have a backup available. They received committee records from previous chair Kate Wedemeyer. As a recent strategy, the Cultural Diversity Award is given to an Alaska Native every other year and then a general minority on alternate years. Andy Gryska established the judging criteria for the awards. The Committee then put together a contact list of Alaska Native organizations statewide and sent a letter to each organization explaining the award and requesting applicants. The solicitation generated five applications. The award decision was a difficult one and Jerry Berg thanked the award recipient, Iris O'Brien, for taking the time out of her university schedule to attend this year's annual meeting. Based on her impressions on the annual meeting, Iris will write up a report to be published in *Oncorhynchus*.

Allen Bingham reminded the Treasurer to issue a check for this year's Cultural Diversity Award winner. Cindy Hartmann then recapped the background of the Cultural Diversity Award. Previously, the award was for travel only but that it now should include AFS membership (paid out of Chapter funds) to encourage the recipient to become active in the chapter. Cindy was not certain whether this had been formally approved by the ExCom. Bill Bechtol indicated that the award should include membership dues for one year, effectively extending membership for an individual that is already an AFS member. Gretchen Bishop said that we increased the number of applications this year by offering the award to non-AFS members. Cindy pointed out that previously award criteria gave more points to AFS members.

Motion: Chuck Meacham moved that meeting fees (including the banquet) and Chapter dues be made part of the Cultural Diversity Award and be paid by Chapter funds. The motion was seconded by Tom Kron and approved unanimously. It was suggested to clarify later under New Business how awards will be set up and paid in the future.

Cindy Hartmann recalled that a separate award was to be given for Alaska Natives so that two awards occurred each year. Noting that money is now available and the issuance of two separate awards is worth considering, Carol Ann suggested that a second award be considered by the ExCom, and that additional funds could also be solicited from native corporations. Tom Kron offer support for a second award given the Chapter's financial assets. Bill Hauser suggested that now may be a good time for the Chapter to consider an annual scholarship. Andy Gryska noted that the Awards Committee could have easily awarded two Cultural Diversity Awards this year, as there were several well-qualified applicants. Cindy Hartmann suggested that future award solicitations include a pamphlet describing AFS and the Chapter. It was decided to hold any motions about new awards until later in the meeting under New Business.

Electronic Communications – Allen Bingham, Chapter Webmaster and Committee Chair, noted his report would be posted on the web. He recalled the committee was originally formed as an Ad hoc committee in 1995, and Gail Heineman continues to assist him, joined more recently by Chuck Meacham. This year, a jobs section was included on the web site that now has internet links to several fisheries-based job locations. The Chapter web site has also listed particular fisheries job openings for organizations that normally do not have web sites, such

as a recent listing for the Kuskokwim Native Corporation.

The Committee instituted an e-mail distribution list by combining information from the Chapter membership database and the Parent Society database, then filling in the gaps. As a result, e-mail addresses for approximately 300 out of 400 Chapter members are on the list. Allen will minimize e-mail traffic by sending only messages of immediate importance.

This year, the old Internet account was closed after having been maintained as an e-mail account that was uniquely the Chapter's. Now messages are sent to Allen's e-mail address. Allen wanted. Allen encouraged committee chairs to use the web site for posting information on committee activities; Chapter members were also encouraged to submit items for posting on the web site. Allen prefers that information not be sent in .pdf format because these cannot be edited; Allen can generally work with other common formats.

Environmental Concerns – No report was presented.

Fishes of Alaska – Bill Wilson reported the committee was established in 1989 to produce a fish key of Alaska; details of this history are contained in the written committee report. Three items were reviewed: 1) it has been a long project extending 12+ years; 2) it is going to generate a significant scientific contribution to North Pacific fishes and will become the scientific standard for all freshwater and marine fishes of Alaska out to the 200-m isobath; and 3) it has been paid for as we went along. The project most recently received one more infusion of funds via grants. The publication has the potential to generate $20,000 to $40,000 in funds for the Alaska Chapter.

Bill Wilson noted they did considerable work on the fish key this year. Research visits to museums/universities resulted in some changes to the key. The authors made final edits and obtained additional peer reviews and finalized the glossary, gazetteer, and key to families. They revised numerous graphics, drew more than 150 new illustrations, added or replaced photos, and have scanned 320 color plates. They revised the species' range maps as new data became available. They contracted a technical editor to draft the index. They prepared .pdf files on CDs. They have developed the cover and spine designs. Bill will visit Lyman Thorsteinson this month to complete remaining details. The authors hope to complete the book before the end of 2001. Bill continues to do more fundraising and develop agreements for publishing and marketing; printing will be through the AFS. In addition, Bill is working out a marketing arrangement with Chris Batin in Fairbanks to access clients of fish and game guides; Chris also provided some excellent color slides for the book.

The hard cover book will be 1,110 pages, have 340 color plates, and have an initial press run of 2,000 copies. The final authorship will be Mecklenburg, Mecklenburg, and Thorsteinson. Items to be finalized are cost recovery, marketing agreements, and price. A cost sharing agreement is being developed with the AFS Parent Society. The book price to AFS members will likely be $80 to $90, although a comparable book is probably worth $150 to $160. It will have a completely up to date literature review and include keys to families and all species. Bill will continue to go through the Chapter ExCom on financial issues. Bill expressed thanks to Randy Brown, Dr. Don Kramer, and several other Chapter members for their photos, and added that the Chapter would be able to take great pride in this project and its final product.

International Relations – David Wiswar and Carol Ann reported that Fred DeCicco has been trying with mixed success to forward used journals to Russian scientists. No committee member was present to provide a report.

Membership – Carol Kerkvliet presented the committee report. Carol thanked Allen Bingham for tracking the membership rolls. Membership increased by 58 since 2000, to 402 members in 2001. Carol reported she contacted people by e-mail to ask why they had let their membership lapse; their response was, "What was the chapter doing for them?" Carol and Allen Bingham designed a member survey that will be on the web. They plan to distribute the survey to inform non-members (e.g., agencies, consulting firms) about what AFS is and to also use survey responses to plan continuing education classes. Allen Bingham noted that a continuing issue is unpaid lifetime members. Allen asked members to check their newsletter label—if the last two digits on the label

are not this year's, then your Chapter dues are delinquent.

[NOTE: At this time, installation of officers occurred to allow Carol Ann Woody time to depart for the airport. David Wiswar assumed duties as President and chaired the remainder of the business meeting. The installation of officers is located at the end of these minutes, in the same placement as the original agenda.]

Oncorhynchus Newsletter – No report was presented.

Past Presidents – Cindy Hartmann reported that, at last year's Past Presidents' luncheon, it was decided that the outgoing Past President would be the committee chair. Committee members represent the Chapter's corporate wisdom. At the 2000 Fairbanks meeting, the 2005 Parent Society meeting bid for Anchorage was brought up and discussed. In the interim, the society selected Anchorage as the 2005 meeting location. This year's Past Presidents' luncheon discussed organization for the 2005 meeting. Bill Bechtol is the new Past Presidents' Committee chair. Other past presidents in attendance at this year's luncheon were Bill Hauser, Chuck Meacham, and Bill Wilson.

Resolutions and By-laws – No report was presented.

Salmon Stock Status – No report was presented.

Student Subunits – Scott MacLean, Fairbanks Student Subunit Treasurer, reported that 10 students from Juneau and seven from Fairbanks attended this year's annual meeting; two of the students had their travel funded by their professors. The Fairbanks Subunit has been active in the last year. Last spring, the Fairbanks Subunit had a barbecue and this fall they had several guest speakers come to the well-attended Subunit meetings. Students have discussed forming a raffle committee in the spring or finding another mechanism for fundraising. For future meetings, students suggested having them volunteer as timekeepers for sessions. David Wiswar thanked Scott for his report and for coordinating student activities at this year's annual meeting.

Wally Noerenberg Award – No report was presented; the committee chair remains vacant.

OTHER BUSINESS

Outgoing President's Address – Carol Ann Woody thanked everyone for the opportunity to serve as President. She was able to initiate a student mentorship program during her tenure that matches up younger biologists with experienced ones. She worked to encourage student participation in AFS and, as a result, members can now sponsor a student for one year. Theresa Tanner has provided a list of students that would like sponsorship. Carol Ann noted that Jim Beard, Bill Bechtol, and she have each sponsored students and all members are encouraged to do the same. Members can contact Joe Margraf or Milo Adkinson to sponsor a student. Carol Ann thanked Lee Ann Gardner for serving as Secretary and presented her with a plaque. In addition, Carol Ann thanked Bob Ourso for all his efforts this past year as Treasurer and for doing this year's meeting program.

Installation of New Officers – Carol Ann Woody installed new officers, Alisa Abookire as Secretary (not present), Carol Kerkvliet as President-Elect, and Tim Joyce as Vice President. Carol Ann then turned over the meeting to incoming President David Wiswar. David Wiswar presented a plaque to Carol Ann and thanked her for serving as President.

NEW BUSINESS

Comments on 2001 Chapter Meeting and Second Cultural Diversity Award – Bill Hauser suggested that a letter of thanks on letterhead and a plaque be sent to Northern Southeast Regional Aquaculture Association (NSRAA) as a thank you for hosting this year's annual meeting social. It was also suggested a letter of thanks be sent to Sheila Jacobsen, Local Arrangements Chair for this year's meeting. Thank you letters will also need to sent raffle sponsors.

Some members expressed disappointment with the quality of raffle prizes. David Wiswar indicated that issues needed to be resolved regarding the raffle and that the raffle would be a future agenda item for the ExCom. Joe Margraf said that students are not well positioned to obtain big prizes for donation. It was asked whether the money raised was enough to cover student travel. Bill Hauser suggested setting up a chair/committee to assist students on the raffle. Several members pointed out that the raffle was not originally set up to fund only student travel, but was used to fund ad hoc committee financial needs, such as establishing seed money for the cultural diversity award.

Motion: A motion was made by Eric Knudsen, seconded by Tom Kron, that the Chapter establish a raffle committee to organize the raffle and that the proceeds from the raffle be dedicated to student travel and must be used within one year. An amendment offered by Allen Bingham that student travel be to the Alaska Chapter meeting only was approved unanimously. A rousing discussion ensued raising questions such as: how would the Local Arrangements Committee (LAC) interact with the raffle committee; should the LAC handle only door prizes; Because small community businesses are approached often to donate prizes, should the raffle committee solicit prizes from around the state; is a raffle the best way to support students; and do we still need a raffle? Cindy Hartmann noted that the raffle contributes to banquet entertainment and that the ExCom had wanted students, the prime raffle beneficiaries, to get involved in the raffle and in AFS. Students could still be active in selling tickets at the meeting. Bill Wilson said the Chapter needs to review its financial accounts and develop a financial plan, including some options for membership consideration at the 2002 business meeting. Tevis Underwood called the question and a vote to close discussion was approved unanimously. The motion, as amended, to establish a Raffle Committee was approved unanimously.

Motion: Bill Wilson moved, seconded by Chuck Meacham, that the ExCom, with input from Chapter members, develop a financial plan that updates and clarifies the current financial operations of the AK Chapter, including sources of revenues, dedicated funds, disposition of revenues generated by dedicated funds, and rules or procedures for spending available funds; to develop a suite of recommended options for acquiring, managing, and spending funds in the future; and, to bring these recommendations to the Chapter for action by the membership at the next business meeting. Bill Wilson explained that the motion's intent is for the Chapter to summarize current and anticipated financial assets and operational expenses, including Oncorhynchus, annual meetings, and awards. Bill noted that his motion allows the ExCom to do this study, appoint a committee, or some combination. Chuck Meacham proposed an amendment that this be brought to the ExCom and then brought forward to the next business meeting in 2002 for action. It was suggested that the ExCom invite suggestions from the membership and Eric Knudsen suggested the ExCom appoint the Past Presidents' Committee to pursue this plan. The motion was approved unanimously.

Motion: Cindy Hartmann moved that a dedicated fund of $10,000 be established from general revenues for an annual award for an Alaska Native to attend the annual Chapter meeting. The Cultural Diversity Committee would establish criteria, with approval by the ExCom, and the Cultural Diversity Committee would administer the award. The motion was seconded. When asked if this should be part of the financial plan, Cindy didn't see why we should wait a year. She noted we have the funds and now have the criteria and a committee that supports it;. Motion approval would provide two Cultural Diversity Awards next year. Gretchen Bishop expressed concern that there could be confusion among native groups about the award if it was not awarded annually. She noted we have now initiated this effort and it may cause problems if it were not continued on an annual basis. Steve Klein felt the award should fall under financial planning; it would be good to weigh this award against a scholarship. He would like all options looked at with funds applied to the highest priorities. Tom Kron thought it appropriate to move forward now and there was support for the financial planning effort. He noted we can be proud of the Cultural Diversity Award now; we can involve Alaska Natives now in our meetings and it could complement the prior motion. Bill Wilson thought the Cultural Diversity Award decisions should be part of the financial plan and that we could dedicate next year's Cultural Diversity Award to an Alaska Native. Joe Margraf moved to amend the original motion such that the Cultural Diversity Award be funded up to $1000 for next year's award. Joe suggested the Financial Committee and the Cultural Diversity Committee could make recommendations to the ExCom to fund future Cultural Diversity Awards. The motion on the amendment was seconded and passed with 4 nay votes. The vote on the main motion, as amended, was approved unanimously.

2005 Meeting – Cindy Hartmann reported the Alaska Chapter won the bid to host the Sept. 11 to 15, 2005 Parent Society meeting. Cindy plans to begin establishing committees and will be sending out an e-mail announcement/ solicitation. A kickoff meeting is planned for early February 2002 in Anchorage and a pre-planning meeting may be scheduled for December 2001. Cindy wants to involve chapter members; people interested in assisting with the 2005 meeting should contact Cindy, the Interim Chair. ; Both Anchorage and non-Anchorage residents are needed. Cindy noted that most agencies issued letters of support for the 2005 meeting bid. To help make the meeting a success, it will be important to start fundraising now through corporations, agencies, etc., as well as getting support from native corporations. Chuck Meacham offered to seek financial support from ADF&G. She also noted that the Anchorage Convention and Visitors Bureau is behind this meeting. Cindy noted that the largest Parent Society meeting to date was 1,800, and a goal is 2,005 attendees in 2005.

Committee Issues - Joe Margraf noted that a lot of student subunit issues need to be resolved and he suggested a student affairs committee be appointed to deal with student issues. David Wiswar noted that the students are to have a conference call to discuss this.

It has been notably difficult to fill committee chairs and four committee chairs are currently being recruited: Continuing Education, Wally Noerenberg, Historian, and Salmon Stock Status Committees. Allen Bingham commented that the Wally Noerenberg Committee Chair has been vacant for a year.

2002 Annual Meeting – Carol Kerkvliet reported that she is considering Alyeska as the meeting venue. Tom Kron suggested that Carol not be totally locked into the Alyeska site because per diem may not apply for Anchorage attendees and, logistically, Anchorage residents may not want to stay there when it is that close to home. This could ultimately affect attendance. To better avoid conflicting meetings, Carol is considering Oct. 21-24, Nov. 11-14, or Nov. 18-21 as possible Chapter dates. Bill Bechtol will send Carol a list of dates of other fishery meetings. Allen Bingham noted a recent WD poll indicated members preferred a March/April WD meeting timeframe; perhaps the Alaska Chapter membership should be polled. Two sessions that have already been identified for the 2002 Chapter meeting are Research and Management (Chair Eric Knudsen) and Traditional Knowledge (Chair Dave Cannon). Carol is looking for meeting volunteers.

Meeting adjourned at 6:50 PM.

LIST OF AUTHORS

LIST OF AUTHORS (continued)

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