2007 Annual Alaska Chapter AFS Conference

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Alaska Chapter of the American Fisheries Society

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Ken Cummins, Humboldt State University
Kerry Naish, University of Washington
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Denis Wiesenburg, University of Alaska Fairbanks

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Banquet

Ray Troll and the Ratfish

Session Chairs

Hal Geiger, Saint Hubert Research Group
Bert Lewis, Alaska Department of Fish and Game
Andy Piston, Alaska Department of Fish and Game
Jeff Adams, U.S. Fish and Wildlife Service
Laurel Devaney, U.S. Fish and Wildlife Service
Cindy Hartmann, NOAA Fisheries Service
Joe Orsi, NOAA Fisheries Service
Don Martin, US Forest Service
Dirk Lang, US Forest Service

Instructors

Hal Geiger and James Hale
Andi O'Conor, Communication Consulting, Inc.
Robert Clark, Dave Bernard, and **Steve Fleishman**
Alaska Department of Fish and Game
Joseph Margraf, University of Alaska Fairbanks

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Murray Pacific, Newtown Liquor, The Green Bean Coffee Co., Tongass Trading Co., Judd's Office Supply, The Hyder General Store, Wes Loe, Safeways/Carrs, RWJ Consulting

Special thanks to Ray Troll for all his contributions to AFS

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Agenda at a Glance

Cape Fox/Ted Ferry Conference Center - Ketchikan, Alaska - November 12-16, 2007				
Day/Date	**Time Period**	**Cape Fox Conference Room 1**	**Cape Fox Conference Room 2**	
Monday, November 12	Morning	Continuing Education Course – Technical Writing Workshop (Day 1)	Continuing Education Course – Escapement Goal Workshop (Day 1)	
	Afternoon			
	Evening			
Tuesday, November 13	Morning	Continuing Education Course – Technical Writing Workshop (Day 2)	Continuing Education Course – Escapement Goal Workshop (Day 2)	Cape Fox Lobby Conference Registration
	Early Afternoon			How to Run an Effective Meeting using Robert's Rules (Room to be annc)
	Late Afternoon			Improve Scientific Speaking and Presenting Skills
	Evening	**Opening Reception**		
Day/Date	**Time Period**	**Ted Ferry Naha Room**	**Ted Ferry Alava Room**	
Wednesday, November 14	Morning	**Plenary Session**		Cape Fox Lobby Conference Registration
	Early Afternoon	Commercial Fisheries Management	Alaska's Large River Deltas: Coastal Wetlands of Diversity and Production	
	Late Afternoon	Commercial Fisheries Management	Alaska's Large River Deltas: Coastal Wetlands of Diversity and Production	Past Presidents Lunch
	Evening	**Poster Session and Welcoming Social**		Movie: Into the Deep: Glimpse of Life in Zhemchug and Pribilof Canyons
Thursday, November 15	Early Morning	Hatchery Salmon Straying Symposium: Keynote Speakers	Fisheries Habitat Restoration	Cape Fox Lobby Conference Registration
	Late Morning	Hatchery Salmon Straying Symposium: The Washington State Hatchery Review Process	Fisheries Habitat Restoration	
	Early Afternoon	Hatchery Salmon Straying Symposium: Hatchery Pink and Chum Salmon Straying	Juvenile salmon early marine ecology and biological interactions	Fisheries Habitat Restoration Field Trip
	Late Afternoon	Hatchery Salmon Straying Symposium: Round Table	Sharing your message effectively with adults and children	
	Evening	**Alaska Chapter AFS Annual Banquet**		
Friday, November 16	Early Morning	Salmon and Trout Ecology	Marine Habitat Mapping	
	Late Morning	Salmon and Trout Ecology	Marine Habitat Mapping	
	Early Afternoon	**Business Meeting Lunch Buffet**	Contributed Papers	
	Late Afternoon	**Awards and Adjournment**		Totem Park Tour

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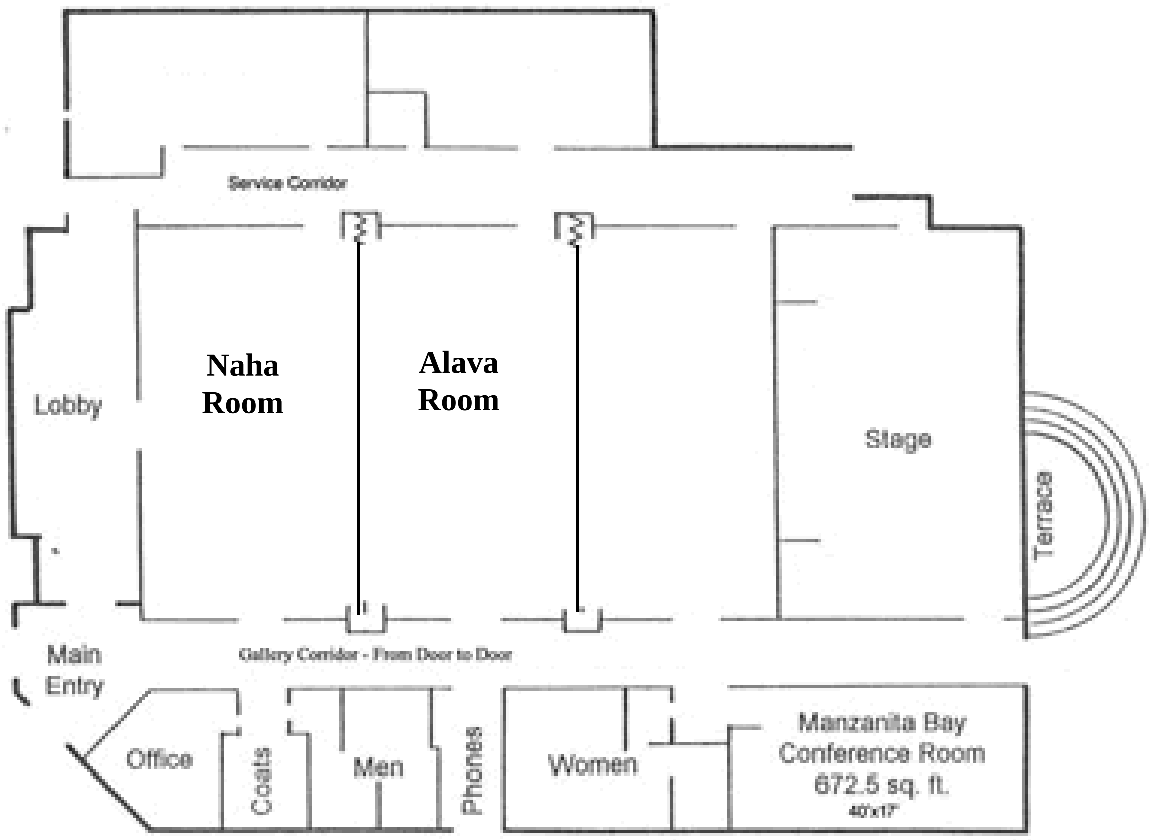

Map of the Ted Ferry Civic Center

2007 Annual Alaska Chapter AFS Conference

AGENDA

Monday, November 12 – Continuing Education

Cape Fox Conference Room 1 – Technical Writing Day 1– James Hale and Hal Geiger, instructors
9:00am – 5:00pm

Cape Fox Conference Room 2– Escapement Goal Workshop Day 1– Robert Clark, Dave Bernard, and Steve Fleishman, instructors
9:00am – 5:00pm

Cape Fox Lobby – Registration

Tuesday, November 13 – Continuing Education

Cape Fox Lodge Lobby – Registration
9:00am – 12:00pm and at the Welcoming Social 6:00pm – 8:00pm

Cape Fox Conference Room 1 – Technical Writing Day 2– James Hale and Hal Geiger, instructors
9:00am – 5:00pm

Cape Fox Conference Room 2– Escapement Goal Workshop Day 2– Robert Clark, Dave Bernard, and Steve Fleishman, instructors
9:00am – 5:00pm

Cape Fox Board Room – Improve Your Scientific Speaking and Presenting Skills – Andi O'Conor, PhD, Instructor
9:00am – 5:00pm

Ted Ferry Manzanita Conference Room – How to Run an Effective Meeting using Robert's Rules – Joseph Margraf, Instructor
1:00pm – 5:00pm

Ted Ferry Convention Center
6:00pm – 8:00pm Welcoming Social

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Wednesday, November 14

Cape Fox Lodge Lobby – Registration

8:00am – 12:00pm

Ted Ferry Naha Room – *Plenary Session*

8:45am – 9:00am
Introductions and Instructions – Jamal Moss and Bert Lewis
9:00am – 9:30am
How Can We Be Effective in the Face of Growing Demands and Pressures? Gordon Reeves, Oregon State University
9:30am – 10:00am
Invertebrate Prey Of Juvenile And Resident Salmonids. Ken Cummins, Humboldt State University
10:00 – 10:30am
Fisheries Genetics in the 21st century: the heat is on! Kerry Naish, University of Washington
10:30am – 11:00am
BREAK
11:00am – 11:30pm
Retrospectives of a State Director. Jeff Koenings, Washington State Dept. of Fish and Wildlife
11:30am – 12:00pm
The Need for a Comprehensive Alaska Fisheries Research and Education Plan. Denis A. Wiesenburg, University of Alaska Fairbanks

12:00pm – 1:20pm BUFFET LUNCH

Ted Ferry Naha Room – *Concurrent Session # 1*

SESSION: Commercial Fisheries Management – Bert Lewis, Chair
1:20pm – 1:40pm
Optimal Harvesting Considering Biological And Economic Objectives. Brian G. Bue, Ray Hilborn, and Michael R. Link
1:40pm – 2:00pm
Models Of Effects Of Marine-Derived Nutrients On Salmon Population Dynamics. Milo Adkison
2:00pm – 2:20pm
The Controversial Use of Windows in Upper Cook Inlet Commercial Fisheries: Analysis of Benefits and Risks Based on a Fishery Model. Ray Beamesderfer
2:20pm – 2:40pm
Video Gaming at the Kook Sockeye Weir, 2007. Ben VanAlen, Pete Schneider, and Chad Hood

2:40pm – 3:00pm
Kuskokwim River Sockeye Salmon: Spawning Distribution, Relative Abundance, And Stock-Specific Run Timing. Sara E. Gilk, Toshihide Hamazaki, Douglas B. Molyneaux, David Orabutt, Eva Patton, Greg Ruggerone, Dan Young

3:00pm – 3:20pm BREAK

Ted Ferry Naha Room – *Concurrent Session # 1*

SESSION: Commercial Fisheries Management – Bert Lewis, Chair

3:20pm – 3:40pm
Through A Cod's Eye: Exploring The Social Context Of Alaska's Bering Sea Groundfish Industry. Emilie Springer

3:40pm – 4:00pm
Commercial Salmon Management in Ketchikan, Alaska. Bo Meredith and Scott Walker

4:00pm – 4:20pm
Pink Salmon Stock Status in Southeast Alaska. Steven C. Heinl

4:20pm – 4:40pm
Harvest Management Of Large Hatchery And Wild Pink Salmon Returns In Prince William Sound. Bert Lewis

Ted Ferry Alava Room – *Concurrent Session # 2*

SESSION: Alaska's Large River Deltas: Coastal Wetlands of Diversity and Production – Dirk Lang, Chair

1:20pm – 1:40pm
The USDA Forest Service Alaska Region's Key Coastal Wetlands. Deyna Kuntzsch

1:40pm – 2:00pm
The Stikine River: New Challenges and New Opportunities
for the Great River and its fisheries. Tom Cady

2:00pm – 2:20pm
Cutthroat Trout in the Copper River Delta and Prince William Sound: A Summary of Recent Research. Gordon Reeves

2:20pm – 2:40pm
Invertebrate Communities Associated with Aquatic Vegetation in Ponds of the Copper River Delta, Alaska. Kenneth W. Cummins

2:40pm – 3:00pm
Contribution Of Benthic And Riparian Macroinvertebrates To The Diet Of Juvenile Coho Salmon And Dolly Varden On The Copper River Delta, Alaska. Todd C. White.

3:00pm – 3:20pm BREAK

3:20pm – 3:40pm
Fish Species Composition and Distribution in the Yukon River Delta. Douglas J. Martin
3:40pm – 4:00pm
Timing Of Emigration, Distribution, And Duration Of Residence Of Chum And Coho Salmon In Estuaries And Deltas Of Western Alaska. Christian E. Zimmerman and Nicola Hillgruber
4:00pm – 4:20pm
Juvenile Steelhead Habitat Characterization And Utilization: A Precursor To A Habitat Carrying Capacity Model For Southeast Alaska. Anthony Crupi, Brian Frenette, and Jeff Nichols

Ted Ferry Convention Center
Poster Session/Welcoming Social– Bert Lewis, Chair

5:30pm – 8:00pm-Posters

8:00pm-Special Movie Presentation – Into the Deep: Submarine Exploration of Zhemchug and Pribilof Canyons

<u>Thursday, November 15</u>
Cape Fox Lodge Lobby – *Registration*
8:00am – 12:00pm

Ted Ferry Naha Room – *Concurrent Session # 1*
SESSION: Hatchery Salmon Straying Symposium: Introduction – Hal Geiger, Chair
8:00am – 8:10am
Welcome and reason for the symposium. Hal Geiger
8:10am – 8:40am
Potential Impacts Of Hatchery Releases On Salmon Population Structure, And A Case Study In Coho Salmon In Puget Sound, Washington. Kerry Naish
8:40am – 9:10am
Straying Hatchery Salmon: Why Are The Problems That Hard To Solve? W.W. Smoker

SESSION: Hatchery Salmon Straying Symposium: The Washington State Hatchery Review Process – Bert Lewis, Chair
9:10am – 9:30am
Perspectives Of A State Director: Selective Fisheries As A Tool In Fisheries Management And Salmon Recovery. Jeff Koenings
9:30am – 10:00am

Genetic Principles Supporting Hatchery Reform. Paul Seidel

Break 10:00am – 10:20am

10:20am – 10:40am
Hatchery Reform as a Catalyst For Increased Coordination
with Harvest Plans and Habitat Restoration. Heather Bartlett
10:40am – 11:10am
The Practical Application Of Hatchery Reform In Washington State. Andrew Appleby
11:10am – 11:30am
The Alaska Department of Fish and Game Genetic Policy: an enduring example of the precautionary principal. Christopher Habicht
11:30am – 11:500am
The Alaska Salmon Hatchery Program: Plans, Permits, And Policies To Protect Wild Stocks. Craig Farrington

12:00pm – 1:20pm BUFFET LUNCH

SESSION: Hatchery Salmon Straying Symposium: What Do We Know About Straying in Alaska? – Hal Geiger, Chair

1:20pm – 1:40pm
Hatchery Evaluation at SSRAA. Susan Doherty
1:40pm – 2:00pm
Estimated Straying Rates of Pink Salmon From Three Southeastern Alaska Streams. Alex Wertheimer
2:00pm – 2:20pm
Hatchery Chum Salmon Straying into Southern Southeast Alaska Streams. Andrew W. Piston and Steven C. Heinl
2:20pm – 2:40pm
Summary Of Hatchery Chum Salmon Straying In Southeast Alaska Based On Coded Wire Tags And Thermal Marks. Ron Josephson
2:40pm – 3:00pm
Do Southeast Alaska Hatchery Coho Salmon Stray into Natural Populations? Leon Shaul

3:00pm – 3:20pm BREAK

3:20pm – 3:40pm
Straying Of Hatchery-Derived Chum Salmon (*Oncorhynchus keta*) In Prince William Sound, Alaska. Rick Merizon, Steve Moffitt, Rich Brenner, Scott Raborn, and Dayna Norris

3:40pm – 4:00pm

Hatchery Releases In Prince William Sound And Published Threshold Straying Rates: How Do They Match Up? Steve Moffitt, Scott Raborn

4:00pm – 4:15pm BREAK

4:15pm – 5:00pm Roundtable Discussion and Session Summary

Ted Ferry Alava Room – *Concurrent Session # 2*

SESSION: Fisheries Habitat Restoration – Don Martin, Chair

8:20am – 8:40am

A Process For Setting Watershed-Scale Priorities For Restoration On Prince Of Wales Island. David Albert, Laura Baker, Rob Bosworth, K. Koski, and Susan Howell

8:40am – 9:00am

Fubar Creek Rehabilitation: Lessons Learned Working in Disturbed large Wood Dominated Channels. Robert Gubernick

9:00am – 9:20am

The Sal Creek Watershed Restoration Project, Southeast Alaska. Aaron Prussian

9:20am – 9:40am

Fish Passage Restoration for Resident Fish through Road Storage on Prince of Wales Island, Alaska. Jim Beard

9:40am – 10:00am

Fish Habitat and Fish Passage Restoration using Explosives. Robert Miller, Perry Edwards, Marty Becker, and Kristen Dunlap

10:00am – 10:20am BREAK

Ted Ferry Alava Room – *Concurrent Session # 2*

SESSION: Fisheries Habitat Restoration – Don Martin, Chair

10:20am – 10:45am

The “Resurrection” of Resurrection Creek near Hope, Alaska. Dave Blanchet, Brian Bair, Bill MacFarlane, Robert Spangler, and Aaron Martin

10:45am – 11:10am

Restoration Of Instream Flows And Temperatures To A Tributary Of The Kenai River, Alaska Affected By Hydropower Development. James M. Ferguson

11:10am – 12:00pm

Government Creek Relocation and Habitat Mitigation. Shane Cherry, Lance Mearig, Jon Houghton, and Derek Ormerod

12:00pm – 1:20pm BUFFET LUNCH (Past Presidents Lunch – Boardroom)

Field Trip **SESSION: Fisheries Habitat Restoration** – Don Martin, Chair

1:20pm-4:30pm Visit stream restoration project at Ketchikan Airport

Ted Ferry Alava Room – *Concurrent Session # 2*

SESSION: Juvenile salmon early marine ecology and biological interactions - Joe Orsi, Chair

1:20pm- 1:40pm
The Influence of Physical and Biological Factors
on Coho Salmon Marine Survival in Southeast Alaska, Michael J. Malick, Milo D. Adkison, and Alex C.Wertheimer

1:40pm- 2:00pm
Variables Related to Juvenile Coho Salmon Abundance
in Marine Habitats of Southeast Alaska,Jacob J. LaCroix, Joseph A. Orsi, Alex C. Wertheimer, Emily A. Fergusson, and Molly V. Sturdevant

2:00pm- 2:20pm
Sablefish Predation On Juvenile Salmon In The Coastal Marine Waters Of Southeast Alaska. Molly V. Sturdevant, Michael F. Sigler, and Joseph A. Orsi

2:20pm – 2:40pm
Diet and Energy Density of Juvenile Chum Salmon in Kuskokwim Bay: Is Kuskokwim Bay a Suitable Nursery Habitat? Sean E. Burril Nicola Hillgruber, and Christian E. Zimmerman

2:40pm – 3:00pm
Insights Into Juvenile Salmon Ecology On The Eastern Bering Sea Shelf From U.S. BASIS Surveys 2002-2007. James M. Murphy, Edward V. Farley Jr., Jamal H. Moss, Lisa B. Eisner, Angela F. Feldmann, Kristin D. Cieciel, and Erik F. Husoe

3:00pm – 3:20pm BREAK

Ted Ferry Alava Room – *Concurrent Session # 2*

SESSION: **Sharing your message effectively with adults and children** – Laurel Devaney, Chair

3:20pm - 3:40pm
Charting a New Course for Fisheries Undergraduates in Alaska. Trent M. Sutton, William W. Smoker, and Denis A. Wiesenburg

3:40pm – 4:00pm
Techniques For Designing Captivating, Age-Appropriate Classroom Presentations. Erik Anderson

4:00pm – 4:20pm
Creating Effective Traditional Knowledge Science Camps In Rural Alaska. Brandy Berkbigler

4:20pm – 5:00pm

Holding Effective Public meetings in Rural Alaska – A Recipe for Success. Laurel Devaney

6:30pm – 9:30 pm **Banquet - Guest Ray Troll and the Ratfish**

<u>Friday, November 16</u>

Cape Fox Lodge Lobby – *Registration*

8:00am – 12:00pm

Cape Fox Conference Room 1

SESSION: Salmon and Trout Ecology – Jeff Adams, Chair

8:20am – 8:45am
Securing Our Borders Canadian-origin Yukon River Chinook Salmon Rearing in U.S. Streams. David Daum and Blair Flannery
8:45am – 9:10am
Historical Timber Harvest And Its Lingering Influence On The Utilization Of Salmon-Derived Nutrients In Stream Ecosystems. Scott D. Tiegs, Dominic T. Chaloner, Peter Levi, Janine Rüegg, Alex Reisinger, Jennifer L. Tank, and Gary A. Lamberti
9:10am – 9:35am
What Four Years Of Saron Work Has Taught Us About The Kwethluk River In Southwestern Alaska. Daniel D. Gillikin, Jack A. Stanford and Bonnie K. Ellis
9:35am – 10:00am
Evidence For Anadromy In Arctic Char From Becharof Lake, Alaska. Brendan Scanlon

10:00am – 10:20am **BREAK**

10:20am – 10:45am
Physiological Stress Responses Of Brown Trout To Stormwater Runoff Events In An Urbanized Stream. Jack W. Erickson
10:45am – 11:10am
Assessment Of Chinook Salmon Abundance In The Kuskokwim River Drainage Using Radio Telemetry Techniques. Lisa Stuby
11:10am – 11:20am
Thermal Limitations On Chinook Salmon Spawning Habitat On The Chena River. Sam Decker

Cape Fox Conference Room 2 – *Concurrent Session # 1*

SESSION: Marine Habitat Mapping – Cindy Hartman, Chair

8:20am – 8:45am
ShoreZone Mapping Dependent on Multiple Partners for Success - K Koski and Cindy Hartmann, Presenters

8:40am – 9:00am:
The ShoreZone Coastal Habitat Mapping System: Inventory and Application - Jodi Harney, Presenter
9:00am – 9:20am:
Describing Coastal Habitats With Shorezone Biological Attributes. Mary Morris, Presenter
9:20am – 9:40am:
ShoreZone Applications in Oil Spill Response - Susan Saupe, Presenter
9:40am – 10:00am:
Integration of a Nearshore Fish Atlas in Alaska with ShoreZone Coastal Mapping: an Interactive Website - Steve Lewis

10:00am – 10:20am: Break

10:20am – 12:00am:
Demo of ShoreZone Data in GIS and Access; Question and Answer Discussion Opportunity - Participants are invited to bring their lap tops with wireless internet connections to the ShoreZone demonstration.

12:00pm – 1:20pm BUFFET LUNCH (Past Presidents Lunch – Boardroom)

Cape Fox Conference Room 1 – *Concurrent Session # 1*

SESSION: Contributed Papers – Andy Pistion, Chair
1:20pm – 1:40pm
Buffer Strips and Tree Windthrow: Problem or Habitat Enhancement? Douglas J. Martin
1:40pm – 2:00pm
Global Biodiversity Decline Of Marine And Freshwater Fish: A Cross-National Analysis Of Social And Ecological Influences. Rebecca Clausen and Richard York
2:00pm – 2:20pm
Inter-Decadal Change In Sablefish Growth And Age At Maturity In The Northeast Pacific Ocean. Katy B. Howard and Dana Hanselman
2:20pm – 2:40pm
Large Recruitment Event of Selawik River Inconnu *Stenodus leucichthys* Identified with Population Estimate, Length Frequency, and Sex Ratio Data. Ray Hander and Randy J. Brown
2:40pm – 3:00pm
Assumptions And Real Life In Salmon Mark-Recapture Experiments. Jan Conitz and Xinxian Zhang

3:30pm Totem Park and Museum Tour

<u>Saturday, November 17</u>

Rain Forest Zip Line Tour (weather permitting) 10:00am

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ABSTRACTS

SESSION: Plenary

How Can We Be Effective in the Face of Growing Demands and Pressures?

Gordon Reeves

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The growing demand to manage fish populations, and other natural resources, for multiple purposes has created tremendous pressure on managers and researchers. And, the pressure is only likely to grow as human populations increase and potential changes from climate change appear. As managers and researchers, we are being thrust into arenas that we do not fully understand, and for which we have not been prepared by training and education. Effective management, which I define as the continued persistence and viability of populations for which we are responsible, places demands on us as individuals and professionals. We need to know how to operate in political and legal arenas and to be able to make points effectively and convincingly to decision and policy makers. As a practical matter, this will require that we teach ourselves about the legal and political systems, how they work, and how we can be effective in them. We must be able to explain what science can tell us and, perhaps more importantly, what it cannot tell us. We must understand how science fits into the decision making process. We must keep ourselves updated on recent advances in our technical field, and understand what they mean and how they can be applied. We must be able to speak in terms that non-technical people, from the general public to legislators, can understand. We must be able to listen. Finally, we need to recognize that change does not happen quickly or in large steps. Rather it generally comes about as a result of the cumulative effect of small steps. Our failure to recognize this will likely lead to frustration, professionally and personally, and make our efforts less successful.

SESSION: Plenary

Invertebrate Prey Of Juvenile And Resident Salmonids

Ken Cummins

California Cooperative Fisheries Research Unit,
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The center piece of most salmonid fisheries management strategies focuses on physical habitat, usually considered the only critical parameter determining the distribution, abundance, and condition of the fish. However, the highest growth rates measured for juvenile salmonids are in places where there are no habitat features – we call these hatcheries. In hatcheries it's all about food, but in natural streams, food availability is seldom considered a major driver of juvenile salmonid well being. Further, favorable habitat for anadromous juvenile and resident salmonids does not insure favorable habitat for invertebrate prey organisms. For example, many juvenile salmonids rear in pools while many of their invertebrate prey taxa inhabit riffles, very shallow depositional areas, or terrestrial riparian areas. Therefore, successful stream and riparian management to foster healthy, sustainable salmonid populations should not ignore the habitat requirements of invertebrate prey that are often different from those of the fish. Furthermore, if hatchery supplementation is ever appropriate to enhance salmonid populations, "stocking" of invertebrate food organisms also should be a viable strategy. Alaska, and higher latitudes in general, appear to involve different types of food webs than those of lower latitudes and will likely require different management strategies than previously envisioned.

SESSION: Plenary

Fisheries Genetics In The 21st Century: The Heat Is On!

Kerry Naish

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Genetic approaches have played an important role in fisheries management and have addressed several key questions; namely, identification of population structure and delineation of management units, studying the success of restoration and enhancement programs, performing mixed-stock fishery analysis, and examination of the evolutionary ecology and mating systems of populations. As an understanding of the complexity of biological interactions improves, and as science is increasingly directed towards conservation and restoration approaches, there is now an increasing role for genetic approaches in predicting evolutionary responses in fish populations to changes in the environment. In general, any changes to marine ecosystems alter the selective regimes that component species experience and hence can be expected to produce an evolutionary response. Three general topics are particularly important in this regard: the effects of harvest, artificial propagation, and climate change. One key challenge in this area is to disentangle the effects of genetic versus environmental variation in determining observed patterns of phenotypic change. Quantitative genetic and molecular genetic approaches can accomplish this goal, and our capabilities for examining functional parts of the genome are rapidly expanding. Here, I will show how these approaches are being integrated in order to improve our ability to predict evolutionary responses in fish populations, and to improve decisions in fisheries management.

SESSION: Plenary

The Need For A Comprehensive Alaska Fisheries Research And Education Plan

Denis A. Wiesenburg

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Alaska's fisheries – subsistence, commercial and sport – are considered to be among the healthiest and best managed in the world. Fishery managers, incorporating the best available science in conjunction with a public participation process, have seen nearly uniform success in sustaining the biological stocks that underpin the fisheries and in supporting the economic value of our fisheries. However, the value of some fisheries, in particular salmon, has declined and has caused social and economic distress to many of the state's fishing communities. Management decisions that have altered access to fish resources, or have restricted fishing to alleviate possible competition with threatened and endangered populations of marine mammals and to avoid damages to unique benthic communities, have had serious impacts on many communities. Fisheries and economic research to address Alaska management issues is conducted by university researchers, non-profit organizations, state agencies and the federal government. A comprehensive Alaska fisheries research and development plan needs to be prepared to provide a complete view of the fisheries-related research that is underway, planned and needed. The plan should consider fisheries undertaken in both state and federally managed waters, seafood processing, oceanography and ecosystems. The plans for preparing such a plan will be presented along with a companion effort underway at the University of Alaska to train the professionals necessary to guarantee the sustainability of Alaska's vast and healthy marine and freshwater resources.

SESSION: Commercial Fisheries Management

Kuskokwim River Sockeye Salmon: Spawning Distribution, Relative Abundance, And Stock-Specific Run Timing

Sara E. Gilk[1], Toshihide Hamazaki[1], Douglas B. Molyneaux[1], David Orabutt[2], Eva Patton[3], Greg Ruggerone[4], Dan Young[5]

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[2]Kuskokwim Native Association; P.O. Box 127, Aniak, Alaska 99557; (907)675-4384
[3]Association of Village Council Presidents; P.O. Box 219, Bethel, Alaska 99559; (907)543-7342

[4]Natural Resource Consultants, Inc; 1900 West Nickerson St, Suite 207, Seattle, WA 98119; (206)285-3480

[5]National Park Service, Lake Clark National Park; 1 Park Place, Port Alsworth, Alaska 99653; (907)781-2113

The role of sockeye salmon in the environment and their importance to the culture and economy of the Kuskokwim River area is changing. There is growing interest in directed commercial harvest of this species as demonstrated by recent actions by the Alaska Board of Fisheries; however, some fundamental knowledge about distribution, abundance, and basic biology and ecology of sockeye salmon in the Kuskokwim River is lacking. Our aim was to begin addressing these data gaps by describing the spawning distribution and relative abundance of spawning aggregates. We also sought to describe differences in run-timing out of the commercial fishing district for discreet spawning stocks as might be of importance to fishery management. We achieved these objectives by conducting tagging and radio telemetry studies in 2006 and 2007. Results indicate that river-type sockeye salmon are far more important to the overall Kuskokwim River sockeye run than previously believed, particularly those spawning in the Holitna River basin which accounted for about 70 percent of the final destination of tagged fish. Other major contributors included the Stony River (lake-type), and Aniak River (river-type). Stock-specific run timing out of the commercial fishing district for these three major stocks overlapped broadly. Several smaller stocks had markedly later run timings. Future measures should include establishing an escapement monitoring program representative of the diversity found within Kuskokwim River sockeye salmon. Establishing such a platform would also provide the means to develop total abundance estimate as will be needed to address issues of harvestable surplus and exploitation rate.

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SESSION: Commercial Fisheries Management

Optimal Harvesting Considering Biological And Economic Objectives

Brian G. Bue[1], Ray Hilborn[2], and Michael R. Link[3]

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Most examinations of optimal harvesting policies have considered only biological objectives, yet it is increasingly recognized that a primary objective of many fisheries is economic profitability. Using Bayesian risk analysis, we compare policies that combine fish harvesting, the revenue brought in by fish sales, the cost of harvesting and processing, and processing and fishing capacity to find policies that maximize biological yield and economic profit to the processing and harvesting sectors, for a major Pacific salmon (*Oncorhynchus* spp.) fishery in Bristol Bay, Alaska. We show that while average catch is maximized by a fixed escapement policy, total revenue is maximized by a policy that includes some harvesting at stock sizes below that required to produce maximum average catch. In addition, there is a wide range of policies that provide 90% of the maximum for any of the biological and economic objectives considered. Economic profitability is enhanced by limitations on processing and harvesting capacity.

SESSION: Commercial Fisheries Management

The Controversial Use Of Windows In Upper Cook Inlet Commercial Fisheries: Analysis Of Benefits And Risks Based On A Fishery Model

Ray Beamesderfer

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Commercial fishery windows were adopted by the Alaska Board of Fisheries into Upper Cook Inlet fishery management plans in 2005. Windows are mandatory closure periods designed to distribute sockeye escapement over the duration of the run and to provide predictable opportunity for in-river fisheries. Windows have been lauded by sport and personal use anglers but panned by commercial fishers. Commercial fishery managers have been particularly concerned about the constraints of windows on management flexibility to respond in-season to unpredictable daily and annual variation in fish numbers. We review the first two years of implementation of windows and use a simple model of commercial, sport, and personal-use fisheries to evaluate the benefits and risks of different management alternatives based on total and daily harvest and escapement of sockeye and chinook. The model is calibrated with recent harvest and sonar data and also considers the effects of seasonal and daily variation in run timing and fishing rates. Our analysis highlights the cliché that all models are wrong but some are useful. We found the modeling approach particularly useful for systematic and transparent analysis of fishery alternatives and tradeoffs in the Cook Inlet fishery where seemingly simple management plan measures can have complex biological and allocation effects. The analysis highlights the difficulty of balancing the often competing escapement and allocation objectives of this mixed species, stock and user fishery. Modeling suggests that windows are an effective strategy for providing regular, predictable escapements and in-river fishing opportunities with small marginal risks of exceeding escapement goals as long as fish runs and fishery management are not subject to excessive uncertainty or error.

SESSION: Commercial Fisheries Management

Video Gaming At The Kook Sockeye Weir, 2007

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Management of salmon fisheries always boils down to assessing if enough fish escape to spawn. In Southeast Alaska, sockeye escapements are counted as fish pass through weirs/traps and the counts are validated with mark-recapture methods. These projects often involve handling a fair proportion of the run and passing fish during the day when many naturally migrate at night. These weir/mark-recapture projects yield reliable estimates but fish handling, migration delays, and project costs are a concern. Counting fish with video equipment works well when the water is clear enough to see the fish, and they pass close enough to the camera(s), but power demands, system complexity, and costs have compromised the practicality and reliability of past systems. However, in conjunction with the 2007 Kook sockeye weir project, we tested a micro digital video recorder-based system that proved easy to use, reliable, and inexpensive. The off-the-shelf units are solid state, fit in a pocket, run on only 5 volts, and cost less than $200. They are easy to setup and only need to be powered-up to work. Motion detection features allow saving date/time-stamped video only when fish pass. The MPEG4-SF compressed Windows Media .ASF files are saved on Secure Digital cards up to 8GB and video is easily reviewed using the unit's full-featured playback controls. With two independent battery/camera/recorder units counting fish through a picket weir, two independent battery/camera/recorder units counting fish again through a "net" weir, and a known number passing each location, we had the redundant system needed to reliably get and validate the fish counts. The CCD cameras had built-in LED lights and the units operated non-stop off AGM batteries charged by hydro generator or solar panel. These high capacity and portable "surveillance" recorders have much potential for true remote counting applications and other fish and wildlife monitoring uses.

SESSION: Commercial Fisheries Management

Through A Cod's Eye: Exploring The Social Context Of Alaska's Bering Sea Groundfish Industry

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As fisheries management agencies in the North Pacific consider the notion of eco-system based management; it is essential to investigate how fishermen might be influenced by foreseeable transitions in the industry. The Bering Sea Pacific cod industry exemplifies a particularly complex social system because it consists of participants from geographically diverse regions (i.e. Seattle, Washington or Dutch Harbor, Alaska) and from an array of gear categories including trawl, hook-and-line, pot and jig in both catcher-processor and catcher-vessel status. This diversity of individuals convenes in the Bering Sea with differing expectations, intentions and needs. An effort to identify and understand the goals, motivations and variable dependency on fisheries resources through the process of interviews with fishermen and qualitative analysis techniques can contribute clarity towards the assorted socio-economic circumstances evident in the Bering Sea. It can also serve as an example for future collaborative studies with fishermen.

SESSION: Commercial Fisheries Management

Models Of Effects Of Marine-Derived Nutrients On Salmon Population Dynamics

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Pacific salmon populations transfer large quantities of nutrients from their marine to freshwater habitats. I develop and explore mathematical models of the effects of these nutrients on stock-recruitment relationships, and use these models to investigate the management implications of marine-derived nutrients. If nutrients affect the stock-recruitment relationship, lower harvest rates and larger escapement goals may increase yield.

SESSION: Commercial Fisheries Management

Commercial Salmon Management In Ketchikan, Alaska

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Pacific salmon management in southern southeast Alaska consists of a mixture of management strategies that vary by management area. The Ketchikan management area is broken down into four districts that encompass both purse seine and gillnet fisheries. Key factors for management in these districts include ensuring wild stock escapements of five species of pacific salmon, exploitation of enhanced chum and coho salmon in both common property and terminal harvest areas, and fulfilling Pacific Salmon Treaty obligations. The District 1 gillnet fishery targets wild stock chum and coho salmon, enhanced chum and coho salmon, and both U.S. and Canadian sockeye salmon. The gillnet fishery begins on the third Sunday of June and continues through mid to late September. Initial purse seine openings which begin in mid-June target early enhanced chum salmon returns. The traditional purse seine fishery opens the first Sunday in July and is primarily managed for wild stock pink salmon in District 1 and Canadian sockeye salmon in District 4. The fisheries continue through August in all four districts and is managed based on abundance of returning pink salmon. Daily catch rates are assessed and compared to historical averages and developing escapements are monitored throughout the summer through extensive aerial surveys. A limited fall fishery occurs that is directed at wild stock chum salmon in District 2 and portions of District 3.

SESSION: Commercial Fisheries Management

Pink Salmon Stock Status In Southeast Alaska

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Wild pink salmon spawn in approximately 2,500 short, coastal streams in Southeast Alaska and support a large and valuable commercial fishing industry. Recent pink salmon harvests in Southeast Alaska have been at the highest levels since record keeping began in the 20th century. The total pink salmon harvest in Southeast Alaska averaged 48 million fish a year from 1989 to 2007. Recent pink salmon escapements have also been at the highest levels since monitoring began in 1960. The Alaska Department of Fish and Game annually monitors escapements to 718 pink salmon spawning streams via aerial surveys. These streams are further grouped into 45 stock groups and three sub-regions (Southern Southeast, Northern Southeast Inside, and Northern Southeast Outside). Escapement goals for pink salmon were established for each sub-region, based on annual peak aerial survey estimates to the index streams. Escapement goals were met, or exceeded, for the two largest sub-regions since the late 1980s, and for all three sub-regions since 1994. Just five of the 45 pink salmon stock groups showed declines in escapement survey measures, and those declines were so small that these stocks were considered functionally stable. Although odd- and even-year lines of pink salmon are genetically isolated and biologically separate populations, data from both lines were pooled for analysis of escapement trends because they have been managed as if they were a single population, and escapement goals are the same for both brood lines. Recently, the harvest series has exhibited an odd-even-year cycle, and a poor return of pink salmon in 2006 may increase the magnitude of this cycle in the future. At this time, there are no stocks of pink salmon in Southeast Alaska or the Yakutat area that can be considered “stocks of concern” under the definition of the state’s Sustainable Salmon Fisheries Policy.

SESSION: Commercial Fisheries Management

Managing The Harvest Of Record Pink Salmon Returns In Prince William Sound

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The mission of the Alaska Department of Fish and Game, Division of Commercial Fisheries, is to manage, protect, and develop fisheries consistent with the sustained yield principle. To achieve that mission the department has a strategy that employs adaptive in-season management with escapement goals and harvest monitoring. This basic management strategy is used in Prince William Sound (PWS) where the department has developed a pink salmon Sustainable Escapement Goal of 2 million fish. The primary management objective is to achieve that escapement goal while allowing for the orderly harvest of all fish surplus to spawning requirements. In addition, the department follows regulatory plans to manage fisheries to allow hatcheries to achieve cost recovery and broodstock objectives. Recently PWS has developed a strong odd-year pink salmon escapement cycle. The 2007 pink salmon harvest forecast for PWS was 40.6 million fish. This estimate included 12.9 million wild stock fish and 29.8 million hatchery fish. In 2003 and 2005 large returns outpaced processor capacity and resulted in a build up of poor quality fish and ultimately large scale roe stripping. After experiencing returns that far exceeded the forecasts in 2003 and 2005, the industry anticipated the potential for a large return and had increased capacity this year. The 2007 pink salmon harvest turned out to be the largest on record for Prince William Sound with 63.5 million pink salmon. The previous record was set in 2005 with a harvest of 59.9 million pink salmon. In 2007 approximately 11.9 million fish were harvested for hatchery cost recovery leaving 51.5 million fish in the commercial harvest. The increased processor capacity and an aggressive fishing schedule were able to keep pace with run entry to avoid roe stripping despite the record numbers of fish. The daily harvest rate during the peak of the run was more than 2.0 million fish per day.

SESSION: Alaska's Large River Deltas: Coastal Wetlands of Diversity and Production

The USDA Forest Service Alaska Region's Key Coastal Wetlands

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The USDA Forest Service Alaska Region (R10) contains over a million acres of coastal wetlands, largely contained in the Copper River Delta, Yakutat Forelands, and Lower Stikine River. The ecosystem services, natural capital, and fish and wildlife resources that these wetlands provide is recognized by the Forest Service and by national and international agencies. Wetlands of this size in far northern latitudes are rare and of extreme value. Alaska's key coastal wetlands are large, intact natural ecosystems that cover habitats from estuaries, wetlands, freshwater/riparian habitats, uplands to glaciers. In these wetlands, we can gain understanding of naturally functioning ecosystems and use them as reference ecosystems to assess the health of habitats and populations that range world-wide. This is unique in North America; however, these systems are not static and the resources are not without threats, both human caused and due to natural processes. Understanding how these wetlands are changing and the affects of these changes to the ecosystem services they provide is critical to land managers to maintain natural assets of reference ecosystems that are linked throughout the Western Hemisphere.

SESSION: Alaska's Large River Deltas: Coastal Wetlands of Diversity and Production

The Stikine River: New Challenges And New Opportunities For The Great River And Its Fisheries

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The Stikine River is arguably the most important freshwater resource in Southeast Alaska. It is strongly tied to present and ancient cultures, has significant physical and biological resources including a managed trans-boundary fishery, and is gaining wider recognition as a recreation destination. Ecologically, the Stikine helps sustain vast numbers of migratory birds and other locally important wildlife species including marine mammals, eagles, moose, and bear. Local/regional wildlife resources and human subsistence and commercial users are dynamically linked to the rivers' fisheries for ecological and economic sustainability. These fisheries include hooligan that are a largely untapped and unknown resource, highly sought-after king salmon, and sockeye salmon. Recent re-implementation of commercial gill net fisheries at the river mouth, implementation of upstream subsistence fisheries, increased human use, inland resource extraction, and possible climate change effects will present managers with many challenges but will also open the door to new possibilities to maintain this amazing resource.

SESSION: Alaska's Large River Deltas: Coastal Wetlands of Diversity and Production

Cutthroat Trout In The Copper River Delta And Prince William Sound: A Summary Of Recent Research

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In the last 20 years, the PNW Research Station and the Cordova Ranger District of the USDA Forest Service have conducted four major studies involving coastal cutthroat trout on the Copper River Delta (CRD) and in Prince William Sound (PWS). Purposes of these studies included: (1) inclusion of fish from a tributary of the Copper River and from a site on Hitchenbrook Island in a genetic study over the distributional range of coastal cutthroat trout; (2) an examination of the genetic relation among populations in PWS, which included sites on the CRD; (3) determination of the extent of naturally occurring hybridization between coastal cutthroat trout and rainbow trout/steelhead on the CRD; and (4) determination of life-history and movement patterns on the CRD. Results from these studies will be summarized. Cutthroat trout populations on the CRD and in PWS are genetically diverse and exhibit a range of movement patterns and life-histories. This is most likely a result to a large extent because of the complexity and diversity of habitat and environments in these locations.

SESSION: Alaska's Large River Deltas: Coastal Wetlands of Diversity and Production

Invertebrate Communities Associated With Aquatic Vegetation In Ponds Of The Copper River Delta, Alaska

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Ponds on the Copper River Delta are important habitat for fish and summer habitats for a variety of waterfowl, including Dusky Canada geese. There is growing concern about the persistence of these ponds on the Delta, particularly the western portion that was uplifted by the 1964 earthquake. This shifted the West Delta from a tidally influenced marsh to a perched freshwater system. Since that time, the ponds appear to have undergone changes with regards to vegetative composition and many are shrinking in size. There are concerns about potential changes in the ecological quality of the ponds related to this ongoing vegetative succession. Of particular concern is the future of waterfowl production on the Delta. A portion of the study of the Delta ponds is focused on the invertebrate communities associated with the major vascular aquatic plant bed types as an important component of the food base for fish and waterfowl rearing in the ponds. Specific associations between invertebrates and each of the major plant bed types understudy. Because the plant beds are largely mono-specific and the invertebrate community associations appear to be reliably predictable, it should be possible to develop a pond-specific conceptual model relating plan bed cover, associated invertebrates, and potential food for fish and waterfowl.

SESSION: Alaska's Large River Deltas: Coastal Wetlands of Diversity and Production

Contribution Of Benthic And Riparian Macroinvertebrates To The Diet Of Juvenile Coho Salmon And Dolly Varden On The Copper River Delta, Alaska

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During the summers of 2005 and 2006, 7 stream segments within the Copper River Delta, South-Central Alaska, USA were sampled via trapping and gastric lavage for juvenile coho salmon and Dolly Varden stomach contents. This was done in order to investigate the role of benthic and riparian macroinvertebrates in juvenile salmonid diets prior to habitat enrichment by returning adult spawners. A total of 926 juvenile salmonids were sampled for stomach contents over the two summers. Results of sample enumeration and identification revealed that winged adult riparian insects and winged adult aquatic insects comprised the majority of the stomach contents of juvenile coho salmon (50 – 90%) within these habitats. Of the dominant fauna, the dipteran families, Rhagionidae and Cecidomyiidae, as well as the Aphididae and Hymenoptera comprised the major riparian fauna, while the Chironomidae comprised the aquatic fauna among the dominant taxa. Juvenile Dolly Varden stomach contents were dominated by benthic organisms (50-80%), specifically larvae of Chironomidae, Simuliidae, Limnephilidae, and adult planorbid snails. Results of this study suggest that riparian macroinvertebrate inputs into freshwater habitats within the Copper River Delta comprised a significant and important portion of the diet of juvenile coho salmon during the summer period, and that juvenile coho salmon and Dolly Varden may alleviate interspecies food resource competition during the summer via adaptive feeding strategies.

SESSION: Alaska's Large River Deltas: Coastal Wetlands of Diversity and Production

Fish Species Composition And Distribution In The Yukon River Delta

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In 1984-85, the Outer Continental Shelf Environmental Assessment Program initiated a field investigation of physical processes, fish distribution, and habitat utilization in the Yukon River Delta (YRD). The area supports a large subsistence and commercial fishery, therefore information was needed to assess the potential impacts of future oil and gas development on fisheries resources. The YRD contains a wide range of aquatic habitats including riverine channels, distributary channels, lakes, sloughs, tidal channels, and estuarine habitats. These habitats support a large and diverse fish assemblage that includes freshwater resident, anadromous, and estuarine species (32 species). Habitat utilization varied by species and was strongly influenced by seasonal changes in stream flow, temperature, and turbidity. For example, juvenile chinook and chum salmon utilized the outer delta front and delta platform habitats to a greater extent than the nearshore intertidal environment. Juvenile coregonid fishes (e.g., cisco, sheefish, whitefish) tended to utilize the intertidal mudflats and tidal sloughs. These patterns are thought to be influenced by the timing of outmigration and the unique physiographic conditions in the YRD. Other findings including temporal patterns of abundance, fish diet, and growth will be presented.

SESSION: Alaska's Large River Deltas: Coastal Wetlands of Diversity and Production

Timing Of Emigration, Distribution, And Duration Of Residence Of Chum And Coho Salmon In Estuaries And Deltas Of Western Alaska

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Little is known about the residence and migration of juvenile Pacific salmon in delta and estuarine habitats of western Alaska. Alaska's two largest rivers, the Yukon and Kuskokwim drain over 37% of the state through the adjacent Yukon Delta and Kuskokwim Bay. Here we present results on the timing of emigration, age, and duration of residence in saltwater habitats of juvenile chum salmon (*Oncorhynchus keta*) and coho salmon (O. *kisutch*) captured in Kuskokwim Bay, Alaska and compare these results to studies conducted by others in the Yukon River delta in the 1980s. In 2003 and 2004, surface trawling throughout Kuskokwim Bay and across a salinity gradient ranging from 0 to 26 was conducted to determine the timing of migration and patterns of distribution during estuarine residence. Chum salmon juveniles, ranging in size from 31-66 mm FL, were captured from the middle of May until late July and no chum salmon were captured in August. Post-emergence ages for juvenile chum salmon ranged from 12 to 44 d. Using Otolith strontium-to-calcium ratios (Sr/Ca) we determined the timing of saltwater entry and duration of saltwater residence. Duration of residence in estuarine salinity levels ranged from 8 to 18 d for juvenile chum salmon. In comparison, coho salmon ranging in size from 70-170 mm FL, were primarily captured in late May and declined substantially in June. Coho salmon ranged in age from 1 to 2 years old. The overlap in distributional patterns of chum and coho salmon in Kuskokwim Bay and the large size advantage of coho salmon over emigrating chum salmon may indicate the potential for coho salmon predation pressure on chum salmon. Further work is needed to assess the interactions between chum and coho salmon and highlights the need for information concerning salmon migrating through bays and deltas of western Alaska.

SESSION: Hatchery Straying Symposium

Potential Impacts Of Hatchery Releases On Salmon Population Structure, And A Case Study In Coho Salmon In Puget Sound, Washington

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Management actions associated with hatcheries, such as translocations, reintroductions and supportive breeding, can have both negative and positive effects on population recovery. Several studies have examined the incidence of introgression following such actions, but few studies have explored the effect of release numbers on gene flow between closely related recipient populations. We examined population structure in historical and modern samples of coho salmon in Puget Sound, Washington, to evaluate the effects of the number of individuals transferred between rivers, and the number released within rivers, on population divergence. Eleven microsatellite loci were surveyed in 23 hatchery and wild samples collected from 11 rivers within and one hatchery outside Puget Sound. Pairwise genetic divergences between most populations were significant. However, the population structure in historical samples could be explained by a geographical isolation-by-distance model, whereas the modern samples did not fit this model. In contrast, we detected significant hatchery influence on population structure in the modern samples. The numbers of fish transferred among rivers between 1952 and 2004 was negatively correlated with differentiation between rivers. Number of fish released from hatcheries that collect broodstock locally was negatively correlated with population structure within rivers, and between nearby rivers. Our results indicate that the population structure can, to some degree, be altered by the number of individuals transferred and by local release number of individuals in ongoing artificial propagation programs. The findings presented here emphasize the need to control the number of individuals that are either inadvertently introduced, or are deliberately released under conservation and fishery enhancement scenarios.

SESSION: Hatchery Straying Symposium

Genetic Principles Supporting Hatchery Reform

Paul Seidel

Washington Department of Fish and Wildlife

The *Hatchery Scientific Review Group* was formed in 2000 to propose solutions whereby hatcheries could support fisheries *and* contribute to conservation of natural populations. Three scientific principles emerged: (1) the need for well-defined goals, (2) scientific defensibility, and (3) flexibility to respond to new information. This *paradigm shift* emphasizes genetic management of broodstocks and monitoring/control of hatchery-origin fish in natural spawning areas. Under this shift, each broodstock must be managed genetically as either a *segregated* “hatchery population” or as an *integrated* hatchery component of a natural population. The two strategies yield different operational guidelines intended to minimize genetic risks to natural populations. Both strategies restrict natural spawning of hatchery fish relative to demographic benefits.

SESSION: Hatchery Straying Symposium

Hatchery Reform As A Catalyst For Increased Coordination With Harvest Plans And Habitat Restoration

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Washington's hatchery system represents a tremendous investment by its citizens. Washington State hatcheries provide 75 percent of salmon caught in Puget Sound and 90 percent of the salmon caught in the Columbia River. Recreational fisheries are estimated to bring in nearly a billion dollars annually to the state economy, while commercial fisheries provide another $250 million. Although important from an economic perspective, information indicates hatchery fish can also pose a risk to natural populations of salmon and steelhead, and the federal Endangered Species Act listings for several of the salmon and steelhead populations within the state have identified hatcheries as contributors to the natural population declines. To address these risks, the Washington Department of Fish and Wildlife has supported a fundamental paradigm shift in how hatcheries are viewed; hatcheries are not an isolated replacement for habitat, but an integral component of the watershed—they must be designed, operated, and evaluated in the context of the ecosystem in which they reside. Decisions about harvest rates, hatchery production, and habitat restoration have traditionally been made according to discipline, occurring in isolation from one another. To support successful implementation of hatchery reform, these disciplines need to be well linked and decisions coordinated. This presentation is the first of two parts; 1) describe the context for a more comprehensive and integrated natural resource management decision making approach, and 2) the basic tenets of hatchery reform, both operational and facility considerations for successful implementation.

SESSION: Hatchery Straying Symposium

The Practical Application Of Hatchery Reform In Washington State

Andrew Appleby

Washington Department of Fish and Wildlife

Hatchery Reform, as proposed by the Hatchery Scientific Review Group (HSRG), has become an increasing important concept in the operation of Washington State hatcheries. The basic tenets of Hatchery Reform are reviewed and both operational and facility considerations needed for successful implementation are discussed. An example of an integrated broodstock plan that has been implemented for summer Chinook (Wallace River Hatchery) is presented in detail.

SESSION: Hatchery Straying Symposium

The Alaska Department Of Fish And Game Genetic Policy: An Enduring Example Of The Precautionary Principal

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The Alaska Department of Fish and Game's Genetic Policy was written over 20 years ago, during a period aquaculture growth, primarily as a guide to protect wild stocks. Since then, revolutionary advances in the technical field of genomics have increased the visibility of genetics in everything from murder trials to mixture analyses, yet the fundamental basis of the policy still hold. Here, I will provide an overview of the policy and the theoretical basis for the guidelines. I will review recent literature that empirically tests some of the tenants of the theoretical basis. Finally, I will discuss how this policy is applied to steer Alaska's aquaculture efforts to protect the genetic integrity of important wild stocks.

SESSION: Hatchery Straying Symposium

The Alaska Salmon Hatchery Program: Plans, Permits, And Policies To Protect Wild Stocks

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The Alaska Department of Fish and Game's salmon hatchery program was designed to augment the common property fisheries of the state without adversely affecting Alaska's abundant wild salmon resource. Plans, permits, and policies on salmon hatcheries were developed and instituted over the years, which kept a priority for healthy wild salmon stocks. The hatchery program is also well-scrutinized by others outside the state. Because the regulatory framework and process for the Alaska salmon hatchery program is successful, today the population of Alaska wild salmon remains healthy and robust, and harvests of wild salmon in the state remain high.

SESSION: Hatchery Straying Symposium

Hatchery Evaluation At SSRAA

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Southern Southeast Regional Aquaculture Association (SSRAA) used Coded Wire Tag (CWT) technology from 1980 through 2002 to estimate chum catch in the common property fisheries from its release sites. In 2002 SSRAA began otolith marking 100% of the chum released. The 2002 brood had both types of marks. The 2006 commercial harvest was estimated independently by The Alaska Department of Fish and Game (ADF&G) using historic CWT methodology, and by SSRAA using otolith sampling techniques. Twenty discrete landings from the District 101 Gillnet fishery were independently sampled using both methods and their data compared. Estimated contribution numbers compared most poorly in cases where the number of fish observed for CWT's was either less than 1000 or more than 2000. When the enhanced component was 30% or less using otolith data, no contribution was identified using CWT recoveries. Harvest estimates from all Southern Southeast net fishery districts (101–108) were compared using the two mark and recovery techniques. Otolith contribution estimates were double that of the CWT contribution estimates.

SESSION: Hatchery Straying Symposium

Estimated Straying Rates Of Pink Salmon From Three Southeastern Alaska Streams

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This presentation reviews two studies estimating the effects of stock, coded-wire tags (CWTs), and transplant on straying of pink salmon (*Oncorhynchus gorbuscha*) in southeastern Alaska. In one study, pink salmon fry from Auke Creek were marked with CWTs and thermally-induced otolith marks to estimate local straying rates and to investigate the effects of CWTs on survival and straying. Pink salmon from Gastineau Hatchery that had been thermally marked provided a point of comparison. Straying was also estimated for pink salmon from two other wild stocks by marking emigrating fry with CWTs. One stock, Sashin Creek, is characterized as an upstream spawning population, and the second stock, Lovers Cove Creek, is characterized as an intertidal spawning population. Secondary factors evaluated for their effect on straying in this study were CWTs (compared with pelvic-fin clips) and transplanting of the intertidal stock. Estimated straying rates for pink salmon from the three streams ranged from 2-9%. The CWTs reduced survival of pink salmon fry in both studies and increased straying in one of the studies, but did not affect observed straying of Auke Creek pink salmon. Incubation and initial estuarine environment were major determinants of straying rates. Observed straying and run composition estimates indicated a large-scale interchange of adult pink salmon among local streams, which may promote rapid colonization and recovery of reduced populations.

SESSION: Hatchery Straying Symposium

Hatchery Chum Salmon Straying Into Southern Southeast Alaska Streams

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Hatchery production of chum salmon in Southeast Alaska increased dramatically over the last two decades, from 8.7 million fry released at eight locations in 1980, to 367 million fry released at 16 locations in 2006. Hatchery fish accounted for an average of 75% of the commercial harvest of chum salmon—94 million fish—over the 10 years, 1995–2004. Alaska's Sustainable Salmon Policy states that "wild salmon stocks and fisheries on those stocks should be protected from adverse impacts from artificial propagation and enhancement efforts (5 AAC 39.222)." High rates of straying would make it difficult for fisheries managers to monitor chum salmon populations through standard survey techniques, and greatly reduce the department's ability to formulate meaningful escapement goals and test whether those goals are being met for wild chum populations as required by the Sustainable Salmon Fisheries Policy. In 2006, we collected otolith samples from chum salmon carcasses at Traitors Creek, located in the next bay south of Neets Bay hatchery. Traitors Creek was historically an important producer of wild chum salmon (e.g., chum escapement of 32,000 in 1962). We collected 192 otolith samples on three separate sampling events from early to late August; 87% of the samples had hatchery marks, primarily from Neets Bay hatchery. In 2007, we collected otolith samples from chum salmon carcasses at Fish Creek, near Hyder, Alaska. The nearest hatchery release site to Fish Creek is located approximately 180 km south in Nakat Inlet. We collected 148 otolith samples on two sampling events conducted 13 and 27 August 2007; no otolith marked fish were found in our Fish Creek sample. These results indicate that a region-wide sampling program is necessary for determining the overall extent of hatchery chum salmon straying in Southeast Alaska.

SESSION: Hatchery Straying Symposium

Do Southeast Alaska Hatchery Coho Salmon Stray Into Natural Populations?

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Evidence of straying by hatchery coho salmon in Southeast Alaska is consistent with findings from other areas that indicate low straying rates (>1%) in most wild systems from central incubation facility releases but potentially higher rates for fish outplanted to marine and estuarine areas. There is little evidence of straying into Auke Creek near Juneau from releases of up to 1 million smolts per year from the nearby Macaulay and Sheep Creek Hatcheries. However, far smaller releases outplanted in marine and estuarine waters have resulted in straying rate estimates at the Auke Creek Weir as high as 32%. During 2004-2006, an average of 16.1 million hatchery coho salmon were released annually in Southeast Alaska, of which 81% were released from central incubation facility releases with the lowest likelihood of straying, 14% were outplanted in remote freshwater habitats, and 5% were marine outplants with a higher probability of straying. To date, studies to assess straying rates have been cursory or very limited in scope. However, a new project in Sitka Sound that could more than triple the number of marine outplanted coho salmon in the region, has been permitted expand incrementally contingent upon results of monitoring of strays in two wild-stock systems, with an acceptable straying rate of 2%. Estimated terminal returns from some outplanted releases have averaged substantially lower than expected based on a comparison of mixed-stock fishery contributions and exploitation rates with nearby streams and hatcheries, suggesting that in some years these projects produced many potential strays. Imprinting concerns and an absence of evolutionary incentive for improved homing back to remote release sites suggest that montoring of straying rates should be focused primarily around remote release projects.

SESSION: Hatchery Straying Symposium

Straying Of Hatchery-Derived Chum Salmon (*Oncorhynchus keta*) In Prince William Sound, Alaska

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The Alaska Department of Fish and Game became concerned about hatchery chum salmon *Oncorhynchus keta* straying in Prince William Sound (PWS) in 2002 and 2003 when a high percentage of chum salmon collected at Eshamy Creek were of hatchery origin and aerial surveys indicated an unusually large escapement of chum salmon in streams surrounding a release site. The PWS/CR Comprehensive Salmon Plan, the guiding document for hatchery operations in PWS, states that “The proportion of hatchery salmon straying into wild-stock streams must remain below 2% of the wild-stock escapement…” and “A monitoring program should be implemented to periodically estimate the rate of hatchery-salmon straying into wild-stock streams…” We initiated a pilot study in 2004 to quantify chum salmon straying in PWS. This study was expanded in subsequent years to include a greater geographic distribution of significant chum salmon spawning streams. In general, streams were selected for sampling if they had an historical average escapement of 1,000 chum salmon. In this study, otoliths were extracted from chum salmon carcasses collected within streams and analyzed for hatchery thermal marks. During the 2004-2006 field seasons, 42-71% of the sampled streams had hatchery chum salmon straying proportions >2%. The estimated total instream abundance of chum salmon explained more variation of straying rates than did distance from the release facility or sexual differences. There was no significant difference in egg retention estimates between hatchery and wild stock chum salmon. Our findings reveal concerns with the primary assumptions regarding estimated wild stock escapement, existing biological and sustainable escapement goals and inseason management in PWS.

SESSION: Hatchery Straying Symposium

Hatchery Releases In Prince William Sound And Published Threshold Straying Rates: How Do They Match Up?

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Hatcheries in Prince William Sound (PWS) released an average of ~ 585 million pink, 108 million chum, 6.6 million sockeye, and 0.68 million coho salmon from 1997–2006. Hatchery salmon straying into wild streams has been well documented. If hatchery strays successfully interbreed with wild salmon, the genetic variability of wild fish could be reduced. Subsequently, the resilience of salmon to change, e.g., climate change or disease, may also be reduced. Several threshold levels of hatchery straying have been suggested to minimize the possible genetic impacts to wild salmon (Copper River/PWS Phase 3 plan—2%; Washington Hatchery Reform group—5%). We examined the PWS hatchery releases of pink salmon over the recent (1997–2006) range of estimated marine survivals and calculated the number of returning adults. The number of strays over a range of straying rates was calculated and compared to PWS midpoint Sustainable Escapement Goal (SEG) adjusted to approximate the total escapement. The "best case" scenario would minimize the number of strays; therefore, this scenario would be that with the lowest marine survival. The lowest estimated marine survival for the 1997–2006 pink salmon returns was 3.24%. Given the lowest recent estimate of marine survival and the current average number of pink salmon fry released, less than 1% of the returning adults could stray into wild streams or the number of strays would exceed 2% of the adjusted midpoint escapement goal for pink salmon. Straying rates probably vary in relation to distance from release site and examination of this will be presented.

SESSION: Fisheries Habitat Restoration

A Process For Setting Watershed-Scale Priorities For Restoration On Prince Of Wales Island

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Prince of Wales Island ranks among the most biologically diverse and productive provinces in southern southeast Alaska, and has supported some of the most intensive timber harvest in the region. This management legacy has left some important watershed values in an impaired condition. On Prince of Wales Island, the juxtaposition of ecological richness, need for restoration, and the proximity of several small, economically impacted communities provides a unique opportunity to build a landscape level restoration program that enjoys broad support from a myriad of users and investors. An important, but frequently overlooked element of watershed restoration is a mechanism to evaluate projects for further development and investment. The Nature Conservancy and the U.S. Forest Service formed a local stakeholder group to help develop a systematic process for guiding watershed assessment and restoration efforts on Prince of Wales Island. We used existing data to evaluate the spatial distribution of biological and social values, ecological conditions, and other opportunities that might lead to restoration success (partnerships, research sites, and commercial opportunities). The prioritization process allows us to systematically characterize groups of watersheds on a gradient from high value and high need for restoration, to mostly intact. The prioritization process has identified where to focus restoration efforts, created a local awareness of watershed health, and spurred interest in the biological as well as social benefits of a well-designed restoration program. We feel our approach offers a relatively quick and accurate method for allocating future investments that could be easily adapted to other locations.

SESSION: Fisheries Habitat Restoration

Fubar Creek Rehabilitation: Lessons Learned Working In Disturbed Large Wood Dominated Channels

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From 2005 to 2007 the Tongass NF, Craig ranger district under took a large scale channel rehabilitation project on FUBAR Creek a tributary to the Harris River. The project involved many complexities and liabilities that had to be considered in the planning and design of the project including but not limited to obtaining materials, logistics, dealing with changing subsurface conditions, and protecting highway structures. Fubar Creek, located on Prince of Wales Island, Southeast Alaska is federally owned and managed by the U.S. Forest Service. The watershed area covers approximately 4 mi^2 from the headwaters to the junction with Harris River. Since the early 1960's approximately 520 acres, or 20 percent of the watershed has been harvested and about 4.2 miles of road have been constructed. In 1993 eleven landslides occurred in the headwaters of Fubar Creek. These landslides, a result of natural forces accelerated by past timber harvest activities, resulted in excessive sedimentation in Fubar Creek. This coupled with diverted flow thru a road culvert from landslides, a highway and bridge forming a causeway across the floodplain restricting flood flow that impacts sediment transport in the stream, and changes in channel form and condition required different levels and types of design solutions for different reaches.

This presentation will discuss the design complexities, challenges encountered, and lessons learned during the course of this project.

SESSION: Fisheries Habitat Restoration

The Sal Creek Watershed Restoration Project, Southeast Alaska.

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The Sal Creek watershed restoration project was the result of a multiyear undertaking to restore declining watershed processes and fisheries populations resulting from intensive large-scale timber harvest. Located on Prince of Wales Island, 33% of the 1,942 ha (7.5 mi^2) watershed was harvested from 1967-1971, including 100% of its lowland floodplain and riparian area, and 7 miles of forest road were constructed within the floodplain. In 2004, the US Forest Service initiated the development of a watershed restoration plan for Sal Creek that included restoring fish passage and hydrologic connections across forest roads, improving riparian plant compositions and growth rates, and improving anadromous salmonid habitats in Sal Creek and its tributaries. As a result, the comprehensive restoration plan gained the attention of conservation groups The Nature Conservancy and Trout Unlimited and lead to the accomplishment of many restoration projects. To date, over 30 road/stream crossings have been removed or replaced improve fish passage or to restore hillslope hydrology, over 300 acres of riparian forest have been thinned to promote conifer growth, and nearly 400 whole logs were added to over 3 miles of stream to improve declining fisheries habitat and ecosystem function. Preliminary results from pre and post monitoring efforts will also be presented.

SESSION: Fisheries Habitat Restoration

Fish Passage Restoration For Resident Fish Through Road Storage On Prince Of Wales Island, Alaska

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A baseline provision of the Clean Water Act is that "road crossings shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body," Culverts at road crossings can impede upstream fish passage if they have been improperly placed. The average cost for replacing fish stream culverts and restoring upstream fish passage has been running about $70,000 per culvert on the Tongass N.F.

Road storage typically involves removing culverts. The average cost for removing culverts is $325-$500. Removing culverts is a cheaper alternative to culvert design and replacement on fish bearing streams. Limited funding for restoration tends to give priority to anadromous fish projects because of their economic value and importance. Road storage is a way to allow resident fish to get equitable restoration effort with anadromous fish. Resident fish passage remediation through road storage efforts in the North Thorne project area on Prince of Wales Island will be discussed.

SESSION: Fisheries Habitat Restoration

Fish Habitat And Fish Passage Restoration Using Explosives

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During 2005, 2006 and 2007, we used explosives at 30 sites to remove log stringer bridges and culverts from the Duffield Creek drainage, located on the north side of Baranof Island approximately 30 air miles from Sitka, AK. Roads and associated log culverts and bridges were left after harvest activities were completed in the1960s and 1970s. Constructed from 3 foot diameter logs and covered by 1-3 feet of rock and soil, these culverts and bridges have decayed and failed, or will soon fail, becoming chronic sediment contributors to Duffield Creek and tributaries. When structures fail and fall into streams they often block and divert the stream, reducing fish habitat quantity and quality. Average cost per site was just over $2,000 (1/2 the cost estimated for heavy equipment). Techniques were refined each year to maximize benefits of the project while minimizing amounts of explosives needed and short term impacts to the sites. Monitoring equipment was set up within 100 feet of blasting to monitor water pressure and vibrations caused by blasting. Juvenile coho salmon and Dolly Varden were observed within 10 feet of blasting sites shortly after detonation at several sites. Vegetation and bank disturbance was limited to a 40 foot blast radius. A thin layer of sediment typically was spread over the riparian area. Riparian vegetation was not typically destroyed by blasting. Pieces of logs from demolished log bridges and culverts, placed by directional blasting, functioned as large woody debris immediately after the blast and are expected to function in the long term. Using explosives at stream/road crossing sites minimized disturbance to the landscape compared to using heavy equipment which would have required reconstructing portions of the road to access culvert and bridges sites.

SESSION: Fisheries Habitat Restoration

The "Resurrection" Of Resurrection Creek Near Hope, Alaska

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In 2005 and 2006 the U.S. Forest Service initiated a large-scale watershed restoration project on Resurrection Creek, near Hope, Alaska. Beginning at the turn of the past century, placer mining operations had adversely affected stream function and fish habitat. Prior to restoration, the channel was deeply entrenched creating poor fish habitat, had little sinuosity or large woody debris, few pools and side channels, and was artificially straightened and confined limiting its interaction with the riparian and flood plain areas. To design the new channel, a previously undisturbed reach upstream of the recovery area was surveyed and used as a template. Using heavy construction equipment, the U. S. Forest Service constructed a new channel that approximated the reference reach morphology. The results were an increase in the overall channel length from 1097 m to 1392 m, channel sinuosity from 1.1 to 1.3, average slope from 1.7% to 1.4%, the amount of pool habitat from 1% to 17%, run type habitat from 0% to 26%, and riffle area from 99% to 57%. The results in fish use were seen immediately with adult Chinook salmon (*Oncorhynchus tshawytscha*) increasing from a pre-project mean of 15 adult spawning in the old channel to 260 adults spawning in the post project stream channel. Large in creases in fish use were also observed for adult pink (*O. gorbuscha*, 1100 vs. 3000), chum (*O. keta*,19 vs.40), and coho salmon (*O. kisutch*, 34 vs. 242).

SESSION: Fisheries Habitat Restoration

Restoration Of Instream Flows And Temperatures To A Tributary Of The Kenai River, Alaska Affected By Hydropower Development

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The Kenai River supports large populations of salmonids and is the most popular sport fishing destination in Alaska. Cooper Creek historically flowed from Cooper Lake to the main stem of the Kenai River. Flows and temperatures in Cooper Creek were affected by the building of the Cooper Lake hydroelectric project in 1957. The dam prevented flows from entering Cooper Creek from Cooper Lake. The only major tributary to Cooper Creek, Stetson Creek, provides relatively cold water to the lower 2/3 of Cooper Creek. Therefore, the upper part of the creek is nearly dewatered and the lower section of the creek has abnormally low temperatures. These conditions have negatively affected both spawning and egg incubation of several species of salmonids, which utilized Cooper Creek prior to the project. During the relicensing process for the project, stream habitat and temperature under a variety of levels of release of water from the dam were modeled. A settlement agreement with the project operator was negotiated which includes restoration of flows from Cooper Lake to Cooper Creek. Restoring the stream temperature regime to near pre-project levels should result in increased utilization of the creek by salmonids. Temperature, stream and dam release flows, adult and juvenile fish, and stream bed composition will be monitored. Results of the monitoring studies will be used by an interagency committee of federal and state agency scientists to adjust the quantity and timing of flow releases, including periodic channel maintenance flow releases.

SESSION: Fisheries Habitat Restoration

Government Creek Relocation And Habitat Mitigation

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Government Creek flows through bedrock along the south end of the Ketchikan International Airport. The stream supports multiple anadromous and resident salmonid species. In 2007 the Alaska Department of Transportation and Public Facilities (ADOT&PF) initiated the construction of safety upgrades at the airport including extending the runway safety area (RSA) at the south end of the runway. A new channel was constructed to the south and the historic channel was filled to accommodate the extension. The channel design was developed by characterizing the geomorphology of a reference reach selected to represent the natural channel located upstream. This innovative design approach integrated the morphology characterization with analysis of geomorphic processes to initiate the formation of a naturally functioning channel. The design minimized the use of artificial material and anchors allowing the channel to adjust itself and evolve over time by distributing sediment and large woody debris throughout the constructed channel. Stream flow was diverted into the new channel on August 15, 2007. Early monitoring data demonstrate that both juveniles and adults occupied and utilized the new habitat within 2 weeks of the diversion. Future work includes establishing riparian vegetation, conducting ongoing monitoring, and adaptively managing the system in response to observations of performance.

SESSION: Juvenile salmon early marine ecology and biological interactions

The Influence Of Physical And Biological Factors On Coho Salmon Marine Survival In Southeast Alaska

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Correlation analyses, stepwise regression models, and model averaging were performed to better understand the influences of a number of biological and physical covariates on coho salmon (*Oncorhynchus kisutch*) marine survival across 14 Southeast Alaska (SEAK) stocks. The covariates included discharge, summer sea surface temperature, the Pacific decadal oscillation, the North Pacific index (NPI), SEAK commercial pink salmon (*O. gorbuscha*) harvest, a localized pink salmon fry abundance index, and a localized pink and chum salmon (*O. keta*) fry abundance index. The results of the correlation analyses within the coho stocks showed that on average the coho stocks were positively correlated with each other. This indicates that similar factors are influencing marine survival throughout SEAK. The correlation analyses between marine survival and the covariates produced mixed positive and negative correlations for all the covariates except the NPI and SEAK commercial pink salmon harvest which both correlated positively will all the coho stocks. The correlation analyses produced no consistent significant correlation, but the SEAK pink and chum salmon fry abundance index produced the highest number of significant correlations followed by the NPI. The model averaging results showed that the pink and chum fry abundance index was the most important variable in explaining coho marine survival followed by the NPI and discharge. Taken together, these results indicate that coho marine survival in SEAK is influenced by both localized biological covariates and regional scale physical covariates, but no specific mechanisms have been identified.

SESSION: Juvenile salmon early marine ecology and biological interactions

Variables Related To Juvenile Coho Salmon Abundance In Marine Habitats Of Southeast Alaska

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We examined the relationships among juvenile coho salmon (*Oncorhynchus kisutch*) abundance and nine biophysical habitat variables. The data set used in this analysis was obtained from monthly surface trawl surveys conducted in the vicinity of Icy Strait in the northern region of Southeast Alaska, May-September, 1997-2006. The biophysical variables examined included: sea surface temperature and salinity (3-m and 20-m integrated), mixed layer depth, juvenile pink salmon (*O. gorbuscha*) abundance, zooplankton (upper 20-m and $\leq$ 200-m), and chlorophyll. In our analysis we used: 1) bivariate correlation, 2) forward-backward stepwise regression with standardized coho salmon CPUE, and 3) binary logistic regression with presence or absence of juvenile coho salmon. We found the best habitat predictors of juvenile coho abundance changed over the course of the summer months and in general explained low amounts of the variation in juvenile coho salmon abundance. Low predictive power of biophysical variables at certain times is probably confounded by a high frequency of occurrence of juvenile coho salmon in the study area and suggests a continuous summer migration of juveniles through this corridor to the Gulf of Alaska.

SESSION: Juvenile salmon early marine ecology and biological interactions

Sablefish Predation On Juvenile Salmon In The Coastal Marine Waters Of Southeast Alaska

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Sablefish (*Anoplopoma fimbria*) predation on juvenile salmon (*Oncorhynchus* spp.) was observed at sea in the summer of 1999, prompting laboratory studies to determine qualitative digestion indices and quantitative gastric evacuation rates for the purpose of estimating predation impact. Nearly half (43%) of 56 trawl-caught, age-1+ sablefish examined from the northern region of Southeast Alaska consumed from one to four juvenile pink (*O. gorbuscha*), chum (*O. keta*), or sockeye (*O. nerka*) salmon in straits habitat in June and July. In two laboratory experiments, individual sablefish were acclimated without food in compartmentalized flow-through tanks with conditions manipulated to reflect the photoperiod and temperature regimes of summer. Each sablefish was offered a whole, pre-weighed juvenile chum salmon, consumption events were observed, and then individuals were sacrificed at predetermined time intervals (0.5-96 hr). Prey biomass remaining in the gut of each predator was weighed, and an exponential model of the decline in percent biomass over time yielded instantaneous evacuation rates of $r = -0.049$ at 12°C and $r = -0.027$ at 7°C, respectively. Field meal frequency was projected from experimental times to 75% evacuation of the prior meal, which required 29 and 51 hrs at the two temperatures. We then estimated from combined field and laboratory data that 1.13-2.77 million juvenile salmon were consumed by age-1+ sablefish in the 500 km^2 area of Icy Strait from June-July, 1999. Examination of catches over a nine-year time series indicated that 1999 was an anomalously high year of age-1+ sablefish abundance and lower than average juvenile salmon abundance, which was followed by an extremely low harvest of adult pink salmon in the region for the year 2000. These results suggest that sablefish predation on juvenile salmon is an important ecological interaction, and strong sablefish year classes may impact salmon survival.

SESSION: Juvenile salmon early marine ecology and biological interactions

Diet And Energy Density Of Juvenile Chum Salmon In Kuskokwim Bay: Is Kuskokwim Bay A Suitable Nursery Habitat?

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Minimal information exists on the ecology of chum salmon juveniles (*Oncorhynchus keta*) during their estuarine residence in Kuskokwim bay, western Alaska. We sampled chum salmon juveniles from Kuskokwim Bay in 2003 and 2004 to describe spatial and temporal patterns in their dietary habits and energy density. Combined, small calanoid copepods and insects made up > 50% of all prey items consumed and > 80% of the overall prey biomass for all size classes, salinity ranges, and seasons. Numerically and gravimetrically measured feeding intensity increased with size and season, and was highest in waters with moderate salinity (5 - 19). The percentage of empty stomachs was particularly high for the smallest size class of juvenile chum salmon, early in the season and in water with low salinity (0 - 4). In 2004, energy density decreased significantly from 5,371 cal g^{-1} in mid-May to 4,932 cal g^{-1} in mid-June. As juvenile chum salmon increased in size, their energy density significantly decreased. In addition, a seasonal decrease in energy densities from May to June was apparent in all size classes, except in the largest (≥60 mm). The decrease in fish energy content with season and size suggests that juvenile chum salmon were allocating the majority of their energy towards growth and smoltification, rather than lipid storage. However, the significantly lower energy content of similar sized chum salmon migrating into the bay in June versus in May might be the result of higher metabolic costs, related to higher sea surface temperatures later in the season. If seasonally increasing energy demands are not balanced by an increasing food supply, the implications could include declines in growth rates and overall survival probability of chum salmon juveniles in Kuskokwim Bay.

SESSION: Juvenile salmon early marine ecology and biological interactions

Insights Into Juvenile Salmon Ecology On The Eastern Bering Sea Shelf From U.S. BASIS Surveys 2002-2007

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BASIS (Bering-Aleutian Salmon International Survey) is a coordinated research program by NPAFC (North Pacific Anadromous Fish Commission) member nations designed to improve our understanding of salmon ecology and climate change impacts on salmon in the Bering Sea. Temperature plays a key role in the ecology of western Alaska salmon stocks and is known to be a limiting factor in their production. Impacts of cold spring temperatures during 2006 was evident in the size and abundance of juvenile salmon within the survey area; however, the response of juvenile salmon was not consistent across all regions of the shelf. In the northern region (locations north of 60°N), average size of juvenile salmon was significantly lower in 2006, but average catch rate was not. In the southern region, average catch rate of juvenile salmon was significantly lower in 2006, but average size was not. Interactions between marine growth, survival, ocean entry, and migration rates of juvenile salmon all contribute to the observed patterns in size and abundance of juvenile salmon in the survey area. Marine migration rates play a key role in the distribution of juvenile salmon within the survey area. Juvenile pink salmon are consistently distributed the greatest distance from shore, reflecting high dispersal rates and minimal utilization of near-shore estuarine habitats of the Bering Sea. In contrast, Chinook and coho salmon are distributed closest to shore, reflecting low dispersal rates and high utilization of near-shore estuarine habitats. Juvenile pink and chum salmon were found in significant numbers throughout the Chukchi Sea, Kotzebue Sound, and Bering Strait regions during 2007, reflecting significant utilization of these arctic marine habitats by juvenile salmon. Based on coded-wire tag recoveries, a northward migration pattern by juvenile Yukon Chinook salmon was observed in 2007. Northward migration of Yukon salmon and relatively high abundance levels of juvenile salmon in Arctic marine habitats may be in response to warm surface temperature observed in 2007.

SESSION: Juvenile salmon early marine ecology and biological interactions

Juvenile Steelhead Habitat Characterization And Utilization: A Precursor To A Habitat Carrying Capacity Model For Southeast Alaska

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The overall goal of this project is to develop a habitat-based carrying capacity model for steelhead *Oncorhynchus mykiss*, which integrates stream habitat information with estimates of juvenile and adult production parameters from an ongoing steelhead production study. This project was initiated in the Sitkoh Creek watershed on Chichagof Island with an assessment of the available habitat and documented use by juvenile and adult steelhead. We conducted stream habitat surveys throughout the watershed in 2005 to classify individual stream reaches into distinct process groups and channel types as well as to obtain associated measures of linear extent (km) and area (ha). We investigated the landscape forming processes that propagate fish habitat through an assessment of stream reach characteristics (e.g., channel bed-width, gradient, and incision) and the associated contribution to accumulations of large woody debris (large and key wood) and the formations of macro-pools. In conjunction with these surveys we obtained high-resolution imagery of the watershed, and employed image classification techniques to identify macro-habitats. To evaluate the temporal use of stream reaches by steelhead, we snorkel-surveyed the mainstem and predominate tributaries seasonally from 2005 to 2007. The results of the habitat and fish use surveys provided the data necessary to calculate the amount of usable habitat. This parameter of the model will be integrated with productivity data to produce an estimate of habitat carrying capacity potential for other steelhead bearing systems in southeast Alaska.

SESSION: Sharing your message effectively with adults and children

Charting A New Course For Fisheries Undergraduates In Alaska

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Alaska's fisheries resources are entering a time of rapid change, and the fisheries program offered by the University of Alaska Fairbanks (UAF) through the School of Fisheries and Ocean Sciences (SFOS) must respond to meet this challenge. To meet this need, the UAF SFOS will educate and train students who can support the sustainability of Alaska's marine and freshwater resources and who can fill positions needed to maintain the state's vital fishing and seafood industries. The undergraduate program in SFOS will be revitalized to meet this goal through the revision of the current Bachelor of Science in Fisheries degree program and the creation of a Bachelor of Arts in Fisheries and Minor in Fisheries degree program. Ongoing steps in this process include: (1) review, planning, and development of curricula; (2) expansion and engagement of tenure-track faculty; (3) undergraduate student recruitment and retention, with an emphasis on Alaska Native and rural Alaskan students; and (4) development and renovation of physical facilities and infrastructure. Further, the revitalized undergraduate program will: (1) have an experiential learning requirement; (2) offer a broad range of interdisciplinary classes; (3) be widely geographically available to students throughout Alaska; and (4) develop partnerships with government agencies, the fishing and seafood industry, and other fisheries groups. This new focus will not only better prepare students for traditional agency research and management positions, but will also train students for fisheries careers in the areas of business administration, policy and social sciences, or rural development.

2007 Annual Alaska Chapter AFS Conference

SESSION: Sharing your message effectively with adults and children

Techniques For Designing Captivating, Age-Appropriate Classroom Presentations

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In this session, Erik Anderson, an education specialist for the Alaska Department of Fish & Game, will share specific techniques for working with school children of different ages and grade levels. Erik works with kindergarten through college-level classes, and so must adapt his presentations and activities accordingly. In particular, Erik will share strategies he has found useful in order to teach biological and ecological concepts to young children. This session may be of use to individuals who are asked to give presentations at schools but are unsure of how to design an age-appropriate lesson.

SESSION: Sharing your message effectively with adults and children

Creating Effective Traditional Knowledge Science Camps In Rural Alaska

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Effective communication about fisheries in Alaska is complex. Alaska is a large state with multiple animal resources, habitats, hunting and fishing regulations, resource management agencies, and user groups. However, cooperative management requires the effective dissemination of information. Because management of fisheries in Alaska requires knowledge of both the fish and the people who use them, one of the effective ways of communicating in rural Alaska has been to bring youth, elders, fisheries scientists, social scientists, managers, and teachers together to learn from each other and share their unique perspectives. The blending of Traditional Knowledge (TK) and western science in a camp setting has been very successful at encouraging students and others to think critically about how different kinds of information, perspectives, and approaches can contribute to a better and more comprehensive understanding of the fisheries and management in their region. However, developing a successful camp in rural Alaska requires a significant amount of advance planning, organization, and building of local partnerships. This talk will focus on some of the conceptual and logistical challenges of running TK camps as a means of building effective communication between managers and users.

SESSION: Sharing your message effectively with adults and children

Holding Effective Public Meetings In Rural Alaska – A Recipe For Success

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As managers and biologists, we often choose to hold a public meeting when our work requires us to share research results, management decisions, and priority messages with residents of rural Alaskan communities. These meetings are often poorly attended, and we can be left feeling that local residents don't care about their resources, or have no interest in participating in fisheries management. The reality is more likely that the local audience is very interested in your issue, but some aspect of your communication tool used, your methods of gaining local interest, or advertising the meeting somehow missed the mark. This session will share some strategies for advertising meetings, advance planning, and developing relationships with local communities that will result in a larger, more receptive audience at your next public meeting.

SESSION: Salmon and Trout Ecology

Securing Our Borders
Canadian-Origin Yukon River Chinook Salmon Rearing In U.S. Streams

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Yukon River Chinook salmon are described as having “stream-type” life histories. After emergence from river gravels, juveniles Chinook salmon feed and grow in tributary streams of the Yukon River throughout their first summer, over-winter in freshwater, and usually leave rearing areas for marine waters during the second spring/summer. The importance of freshwater rearing areas to juvenile Chinook salmon, including non-natal streams, is well documented in the upper Canadian portion of the Yukon River drainage. Data from mainstem and tributary trapping studies suggest that many subyearlings leave their natal streams after emergence, drift downstream for several days in the main-stem current, and then seek out clear freshwater habitats to feed and possibly over-winter. The extent to which natal fry leave their home streams is little understood. Possible explanations for the dispersal from natal streams are individual behavioral responses, avoidance of high sediment loads, competition, and random downstream displacement from strong current. In the summer of 2006 and 2007, a study was conducted by USFWS to document rearing of Canadian-origin Chinook salmon in downstream U.S. waters. Seven streams were selected for study in a 260-km segment between the U.S./Canada border and Circle, AK. Subyearling Chinook salmon were found in all seven tributaries. Genetic samples from all captured juveniles were collected (over 700 samples) and preliminary mixed-stock genetic analysis suggested that the captured fish were from Canadian source populations. The majority of the samples (93%) were from source populations over 500 km upstream of the study area. Future work will focus on detailed genetic population structure analysis to more clearly define the geographic distribution among different source populations. This study provided an initial assessment of the extent to which Canadian-origin juvenile Chinook salmon rear in U.S. streams and will help direct further research into quantifying the importance of U.S. habitat to Canadian-origin Chinook salmon.

SESSION: Salmon and Trout Ecology

Historical Timber Harvest And Its Lingering Influence On The Utilization Of Salmon-Derived Nutrients In Stream Ecosystems

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Anadromous Pacific salmon can provide important nutrients to the stream ecosystems in which they spawn and die, thereby having a positive influence on the productivity of stream biota. Recently, salmon have also been shown to negatively influence biota by causing physical disturbance to stream sediments during migration and spawning. The factors that govern which of these contrasting effects predominate are not known, nor has research investigated how human activities, such as timber harvest, could alter the influence of salmon as sources of nutrients and disturbance to stream ecosystems. On Prince of Wales Island, southeastern Alaska, we identified seven streams draining watersheds which have been subjected to varying degrees of timber harvest. We measured two response variables before and during the salmon run: the abundance of benthic algae (estimated as chlorophyll a), and the isotopic composition (^{15}N) of juvenile coho salmon (*Onchorhynchus kisutch*). In streams within heavily harvested watersheds, sediment disturbance via salmon reduced the overall abundance of benthic algae, while at pristine sites, algal abundance increased. During the salmon run, mean sediment size explained 96% of the variability in algal abundance among streams, with finer, more readily disturbed sediments typifying sites with more timber harvest. Relative to the juvenile coho from harvested sites, coho from pristine streams were more enriched with ^{15}N, the heavy isotope of nitrogen associated with marine ecosystems, suggesting that these fish have incorporated more nutrients derived from the marine phase of the salmon life-cycle. Collectively these results suggest that past timber harvest limits the utilization of salmon-derived nutrients by both algae and juvenile coho, with potential consequences for the productivity of stream ecosystems. We propose that a broader appreciation of both the physical context of the stream environment and the complex ecological roles of salmon will improve understanding of how these unique fish affect stream ecosystems and contribute to better management of salmon and the watersheds in which they spawn.

SESSION: Salmon and Trout Ecology

What Four Years Of SaRON Work Has Taught Us About The Kwethluk River In Southwestern Alaska

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The Flathead Lake Biological Station (FLBS) of The University of Montana (www.umt.edu/flbs) along with the U.S. Fish and Wildlife Service, the Wild Salmon Center and Moscow State University have been collaboratively documenting salmonid biodiversity and productivity and how it is controlled by natural and cultural processes. A suite of pristine Pacific salmon river ecosystems called Observatory Rivers are collectively being monitored under the Salmonid Rivers Observatory Network project - SaRON, (www.umt.edu/flbs/Research/SaRON.htm). In 2004, the SaRON group selected the Kwethluk River located in Southwestern Alaska as an Observatory River and initiated data collection. We will present the preliminary results of the SaRON work that has been completed to date from the Kwethluk River, a 5th order tributary of the Kuskokwim River. The SaRON research group has been collecting data to quantify biophysical processes influencing salmonid productivity and biodiversity in the Observatory Rivers for contrast and comparison purposes. The information collected is spatially explicit focusing on the river-floodplain linkages in the context of marine-derived carbon, nitrogen and phosphorus subsidies. Using this information FLBS has also pioneered the use of remote sensing techniques to classify and quantify various riverine habitats using satellite and low altitude digital imagery, allowing for detailed habitat classification and biologically meaningful landscape scale assessments.

SESSION: Salmon and Trout Ecology

Evidence For Anadromy In Arctic Char From Becharof Lake, Alaska

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The Arctic char (*Salvelinus alpinus*) is the northernmost freshwater fish in the world, is circumpolar in distribution, and can exhibit both anadromous and strictly freshwater life history patterns, although anadromy in Arctic char in Alaska has so far not been confirmed. In Becharof Lake, a large oligotrophic lake on the Alaska Peninsula with large runs sockeye salmon (*Oncorhynchus nerka*) and a short (50 km) connection to Bristol Bay, both the Arctic char and the closely-related (and often anadromous) Dolly Varden (*S. malma*) are found. Using otolith microchemistry, evidence for anadromous behavior in Arctic char was investigated by looking for patterns of high strontium deposition. Otoliths from 27 Arctic char were examined from fish aged from 3-13 years. Twelve fish exhibited what appear to be strictly freshwater signals (250-500 ppm Sr). Five fish exhibited what appear to be full anadromy signals (1,500-2,000 ppm) in addition to freshwater signals. Anadromous movement appeared to begin between ages 2-8, and did not always occur in consecutive years. Ten fish exhibited signals that were difficult to interpret as strict freshwater residence or anadromous movement. These fish appeared to show movement to and from water of higher and lower salinity (Sr up to 1,500 ppm, but generally 1,200 ppm or less), but without movement to full-strength saltwater as witnessed in the anadromous fish. These results suggest that Arctic char in Becharof Lake can exhibit a wide range of life history strategies.

SESSION: Salmon and Trout Ecology

Physiological Stress Responses Of Brown Trout To Stormwater Runoff Events In An Urbanized Stream.

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Urban streams typically have increased flows, high suspended sediment concentrations and reduced water quality during rainstorms as a result of changes within the watershed related to human activity. The objective of this study was to determine if violations in suspended sediment concentrations during stormwater runoff events could be linked to the decline of a feral brown trout *Salmo trutta* population. Water quality was monitored continuously at five sites along Rapid Creek within Rapid City, South Dakota between May and October for two years. Water quality samples were collected for eight base flows (non events) and eight storm events. Blood samples were collected from wild brown trout during base flow conditions and six of eight storm events to determine if storm events could elicit physiological stress responses. Plasma concentrations of cortisol and lactate, during and after storm events were not significantly different from those measured during base flow conditions. Plasma glucose values were lower during storm events than during nonevent periods. These observations were compared to those predicted by a suspended sediment dose-response model developed for adult salmonids. The dose-response model over- predicted the severity of the effects of increased total suspended sediment on the brown trout during stormwater runoff events.

SESSION: Salmon and Trout Ecology

Assessment Of Chinook Salmon Abundance In The Kuskokwim River Drainage Using Radio Telemetry Techniques

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The Kuskokwim River drainage is the second largest watershed in Alaska and supports the largest subsistence fishery for Chinook salmon Oncorhynchus tshawytscha in the state. This study, conducted from 2002-2006, used two sample mark-recapture and radio telemetry techniques to estimate inriver abundance and gave insight to the distribution of Chinook salmon in the middle-upper drainage. This project came about due to the need for drainage-wide escapement information, especially as a result of low escapements during 1998-2001. Prior to 2002, assessments of spawning escapements were limited to aerial survey index and weir counts of some tributaries. However, estimates of total run size and the relative contribution of the monitored streams to total drainage escapement were lacking. Better understanding the degree to which aerial and weir projects act as indices for the Chinook salmon run in the Kuskokwim River can help managers better interpret the data.

Each season, approximately 500 Chinook salmon were fitted with esophageal implant radio transmitters. An attempt was made to distribute the tags in proportion to run strength. Those fish that successfully migrated upstream constituted the first sample and fish counted at the four to five weirs upstream of the capture site constituted the second sample. Those that migrated past the weirs became recaptures. Final destinations were assessed with ground-based receiving stations and aerial surveys. Chinook salmon distributions remained similar over the five seasons with the majority entering the Holitna and Aniak rivers. Estimates of inriver abundance for the middle-upper portion of the Kuskokwim River ranged from 100,733 in 2002 to 145,373 in 2005. These estimates along with escapement monitoring projects in the lower river and harvest estimates are currently being used to estimate total returns to the Kuskokwim River in order to evaluate annual exploitation rates and assess the fraction of the return enumerated by the weir projects.

SESSION: Salmon and Trout Ecology

Thermal Limitations On Chinook Salmon Spawning Habitat

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Models of carrying capacity (e.g. Ricker's stock and recruit model) are important and widely used management tools for Chinook salmon. However, simplifications inherent in many of these models overlook regional habitat influences and are limited in application to river systems with a history of run enumeration. In addition, most current research is centered in the middle of the species range in systems with a history of human influence; transferability may be limited at the edge of their distribution in Alaska, which still has healthy runs of wild salmon with commercial, sport and cultural value. At the northern edge of their habitat, water temperature is likely to have an important influence on recruitment. The objective of this study is to investigate the importance of temperature on the spatial and temporal limits of Chinook salmon spawning habitat. Temperature loggers were installed along the mainstem of the Chena River in 2006 and 2007. Sampling locations were selected systematically within and clustered around the boundaries of the main spawning habitat. We tracked use of thermal habitat through the arrival timing of the run in 2007. We expect results to show that habitat suitable to Chinook salmon spawning is spatially limited by the availability of Accumulated Thermal Units and shifts temporally based on adult arrival timing to the spawning grounds. This project will broaden the geographical range of Chinook salmon habitat research and contribute to the bank of knowledge on a typical interior Alaskan freshwater river that faces urban development pressure as well as changing climate regimes. Understanding the processes that limit spawning habitat will aid in the future development of habitat models.

SESSION: Marine Habitat Mapping

Shorezone Mapping Dependent On Multiple Partners For Success

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The ShoreZone mapping system has been used since the early 1980s and has been applied to more than 40,000 km of shoreline in Washington and British Columbia. Partners plan to use ShoreZone to map the entire 55,000 km of Alaska coastline. Since 2001, about 28,000 km of the coastline have been inventoried. The system catalogs both geomorphic and biological shore-zone resources at effective mapping scales of better than 1:10:000. The Nature Conservancy, as global, non-profit organization, has served as the coordinating organization for the ShoreZone project. Partnerships among 12 organizations and agencies across Alaska and British Columbia have invested funding and in-kind services into the data collection, website implementation, public outreach and applied research for ShoreZone in Alaska. ShoreZone has proven useful for a variety of applications including oil spill contingency planning, conservation planning, habitat research, development evaluation, mariculture site review, and recreation opportunities. The continuity of the ShoreZone system used to map the coastlines of Alaska, BC, and Washington makes it an especially important coastal resources management tool.

SESSION: Marine Habitat Mapping

The Shorezone Coastal Habitat Mapping System: Inventory And Application

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The land-sea interface is a crucial realm for terrestrial and marine organisms, human activities, and dynamic processes. ShoreZone is a mapping and classification system that specializes in the collection and interpretation of aerial imagery of the intertidal zone and nearshore environment. Its objective is to produce an integrated, searchable inventory of geological and biological features which can be used as a tool for science, education, management, and environmental hazard mitigation.

Oblique aerial video and digital still imagery of the coastal zone is collected during summer low tides, usually from a helicopter flying at <100 m altitude. The flight trackline is recorded at 1-second intervals using electronic navigation software, and time-synchronization provides images with latitude and longitude position. Video imagery is accompanied by continuous commentary by a geologist and a biologist aboard the aircraft. Imagery exists for nearly 40,000 km of shoreline in Alaska, and much of it can be viewed online at CoastAlaska.net and www.fakr.noaa.gov/maps/szintro.htm.

Image interpretation and mapping is accomplished by a team of physical and biological scientists. The mapping system (housed in ArcGIS and MS Access databases) provides a spatial framework for coastal habitat assessment on local and regional scales. Mapped regions include more than 21,000 km of coastline in the Gulf of Alaska and 45,000 km of coastline in British Columbia and Washington state.

Current research applications involve habitat capability modeling, in which physical and biological attributes mapped in the ShoreZone coastal database are used to predict the distribution of habitats that would support a particular group or species of interest. Such a model developed for the invasive European green crab appraises the sensitivity of shorelines in Washington, BC, and southeast Alaska to colonization and identifies potential habitat “hot spots” that could provide a spatial basis for monitoring and species detection.

Directions of future research include examining relationships between coastal attributes mapped in ShoreZone and habitat use by nearshore fish.

SESSION: Marine Habitat Mapping

Describing Coastal Habitats With Shorezone Biological Attributes

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The ShoreZone coastal habitat program maps biophysical attributes of the shoreline. Aerial imagery collected during low tides is reviewed and interpreted to construct a spatial dataset that includes both geomorphic and biotic descriptors of coastal habitat. The shoreline is segmented into alongshore units, usually a few hundred meters long. Observations of biota in each unit are recorded as species assemblages called *biobands*. Examples of biobands are: Eelgrass, Dark Brown Kelps and Red Algae. The combinations of biobands observed are further classified for each shore unit, into categories of wave exposure and habitat classes. Six different wave exposure categories and more than 35 habitat classes are mapped, each with a characteristic 'signature' of biobands.

Regional patterns in the distribution of the biota have been observed throughout the Gulf of Alaska, in particular in the lower intertidal zone, and further regional-scale *bioareas* have been delineated. For example, in Icy Strait, the dominant canopy kelp biobands are different than the canopy kelp biobands in the Sitka Sound bioarea. Examples of combinations of biobands and associated distribution of wave exposures and habitat classes, by bioarea in Southeast Alaska where ShoreZone mapping has been completed, will be presented; along with a demonstration of how ShoreZone nearshore habitats are potentially useful to extrapolate site-specific samples to regional modelling.

2007 Annual Alaska Chapter AFS Conference

SESSION: Marine Habitat Mapping

Shorezone Applications In Oil Spill Response

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SESSION: Marine Habitat Mapping

Integration Of A Nearshore Fish Atlas In Alaska With Shorezone Coastal Mapping: An Interactive Website

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Nearshore waters of Alaska support a diverse and abundant community of fishes, many of commercial importance. Determining the distribution and fish use of coastal habitats is needed to target which habitats are essential and should be protected. To meet this objective, we have integrated a Nearshore Fishes of Alaska database with an existing Arc IMS *ShoreZone* coastal imagery and mapping website.

About 28,000 km or nearly half of Alaska's coastline has been mapped using the *ShoreZone* classification system–the shoreline is photographed continuously on a minus tide, and the visual images are later analyzed for physical geomorphology and biological resource characteristics (e.g., eelgrass beds).

The Fish Atlas database contains beach seine catch information on fish assemblages from 68 locations in southeastern Alaska, Prince William Sound, the Aleutian Islands, and the Arctic. At each location, up to four habitat types were sampled including sand or gravel beaches with no rooted vegetation, cobble beaches with understory kelps, soft bottom (sand, silt, mud) beaches with eelgrass, and steep bedrock outcrops. Nearly 600,000 fish representing 98 species have been captured in 841 beach seine hauls.

The Fish Atlas/*ShoreZone* website is dynamic and will be updated as fish sampling and coastal mapping continues throughout the state. The integrated website provides valuable information on the distribution and habitat of nearshore fishes, and allows scientists and resource managers to query species, habitat, and site data over wide spatial scales in Alaska. Please visit our web sites at: www.fakr.noaa.gov/habitat/fishatlas/ and www.fakr.noaa.gov/maps.

SESSION: Contributed Papers

Buffer Strips And Tree Windthrow: Problem Or Habitat Enhancement?

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Our research in Southeast Alaska indicated that windthrow after logging caused a significant increase in stand mortality in buffer strips compared to unlogged reference units. We found there is a pulse in LWD recruitment within several years after timber harvest that is followed by a decade long decline in recruitment rate. This increase in LWD supply correlates with an increase in pool frequency shortly after timber harvest that continues on an increasing trend more than a decade after logging. The common perception that logging induced windthrow is environmentally harmful neglects a broader ecological context. For example, in windthrow protected areas and where wood recruitment to streams is limited by the low frequency of disturbance processes we find that LWD loading and fish habitat are low. In these wood-starved streams the increased inputs of LWD following logging can have a positive benefit to fish habitat. It is conceivable that spatial patterns of spawning and rearing habitat may be associated with natural patterns of wind damage in regions like Southeast Alaska where wind is a dominant disturbance process. It is possible that streams in storm-prone areas may actually have more habitat for a given channel morphology than streams in storm protected areas. Clearly, the ecological relationship of windthrow to aquatic habitat needs more investigation to understand how the spatial and temporal patterns of logging-related windthrow may influence patterns of fish habitat. Integrating this knowledge with modern windthrow prediction modeling offers strategic options to resource managers to protect and potentially enhancing aquatic habitat over the long-term.

SESSION: Contributed Papers

Global Biodiversity Decline Of Marine And Freshwater Fish: A Cross-National Analysis Of Social And Ecological Influences

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We test competing hypotheses from political-economic and modernization theories about the effects of economic development and urbanization on a neglected, but important, indicator of environmental health: aquatic biodiversity. We analyze cross-national data on the number of threatened fish species within national territorial waters using negative binomial regression. We find that, counter to the expectations of neo-liberal theories, economic development increases the likelihood of fish species becoming threatened within nations. Urbanization, however, appears to have no additional effect. The "environmental Kuznets curve" does not hold for aquatic biodiversity, suggesting that further economic growth in nations is likely to escalate the biodiversity crisis.

SESSION: Contributed Papers

Inter-Decadal Change In Sablefish Growth And Age At Maturity In The Northeast Pacific Ocean

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Errors in the estimation of growth estimates, as well as an accurate age at maturity, can drastically affect the spawner-per-recruit threshold used to recommend sablefish catch quotas. Growth and maturity parameters for Alaskan sablefish, *Anoplopoma fimbria*, have not been updated for stock assessment purposes since Sasaki (1985). Since that time, many more sablefish have been aged with better geographic coverage. In this study, older length-stratified data (1981 – 1993) were updated and corrected for bias, newer randomly collected samples (1996 – 2004) were analyzed, and new length-at-age, weight-at-age, and percent mature at length and age parameters were estimated and examined for temporal trends. The analysis showed that both male and female sablefish growth in all Alaskan waters has changed significantly. Recently, sablefish are growing to a moderately larger maximum size, as well as becoming mature at a larger size and older age. Sablefish mean length at age data fit to a nonlinear mixed effects model revealed that sex, time period, and area were all confounding factors influencing sablefish growth. Hotelling T^2 multiparameter tests were carried out to compare von Bertalannfy growth curves between the older data (1981 – 1993) and newer data (1996 – 2004) of all comparable regions: Aleutian Slope, Bering Slope, Chirikof Slope, Kodiak Slope, Shumagin Slope, and Southeast Slope. It was found that male sablefish on the Bering and Shumagin Slopes, and female sablefish on the Aleutian, Bering, Kodiak, Shumagin, and Southeast Slopes, are reaching larger maximum sizes during the more recent time period. Growth compared among individual years in all Alaskan waters showed no temporal pattern. Applying updated growth data divided between the two time periods to the current stock assessment model provides the best fit to the data, as well as results that are biologically reasonable.

SESSION: Contributed Papers

Large Recruitment Event Of Selawik River Inconnu *Stenodus leucichthys* Identified With Population Estimate, Length Frequency, And Sex Ratio Data

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Inconnu *Stenodus leucichthys* are long-lived, iteroparous, coregonid fishes with fecundities as high as 500,000 per spawning female. They mature late (8 to 12 years) and make upstream spawning migrations on annual or less frequent intervals. On average, females mature later than males, females are larger than males, and older fish are larger than younger fish. Their population dynamics are poorly understood and the relationship between spawning population and future recruitment is unclear. Inconnu are intensively sought in commercial, sport, and subsistence fisheries in northwest Alaska, with annual harvests in the region thought to be as high as 20,000 or more. This has inspired population research in the region. Mark and recapture population estimates of the Selawik River spawning population, one of three known in the region, were conducted in 1995, and again in 2004 and 2005. The spawning population increased significantly during the 10-year interval from approximately 6,000 (95% CI = 4,055 – 7,796) in 1995 to 23,500 (95% CI = 13,383 – 33,920) in 2004 and 46,500 (95% CI = 25,069 – 67,580) in 2005. During the same interval, the length distribution shifted to the smaller length categories. Sex ratio data was not collected in 1995, but males comprised over 75% of the spawning population in 2004 and 2005. These data suggest that a large recruitment event was occurring during 2004 and 2005, perhaps initiated by favorable environmental conditions during the mid 1990's, leading to significantly greater survival of early life stages. Early maturing, small males were apparently recruiting to the spawning population before the later maturing, large females. The female cohort of this event is expected to mature and fully recruit to the spawning population during the next few years, shifting the length distribution to the larger length categories again and reducing the skew in the sex ratio.

SESSION: Contributed Papers

Assumptions And Real Life In Salmon Mark-Recapture Experiments

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The use of mark-recapture to provide validation of a salmon weir count has become standard procedure for many studies, but how do we know if the mark-recapture estimate is really better than the weir count? A stratified Petersen-type mark-recapture model depends on uniform sampling conditions, which are never strictly met in real salmon runs. Simple diagnostic tests may identify a failure to meet assumptions without pinpointing the problem. Hence, consequences of not meeting assumptions cannot be determined and are frequently ignored. We wanted to rigorously test assumptions of equal capture probability in our mark-recapture experiments, and whether failure to meet these assumptions would make a consequential difference in the estimates. We started with a maximum-likelihood (ML) Jolly-Seber model, which avoided the unrealistic assumption of closure, i.e. no immigration or death, but the larger number of parameters reduced precision. Furthermore, we lacked diagnostic tests for this model. We then applied a Bayesian approach to the Jolly-Seber model. Unlike the ML approach, the Bayesian approach explicitly incorporated entry probabilities and capture probabilities of unmarked fish into the model. We implemented the model using WinBUGS, which provides a DIC (deviance information criterion), allowing us to compare models and trade-offs between complexity and variation. Application of this model to sockeye spawning populations in Falls Lake and Klawock Lake in Southeast Alaska generally confirmed problems we suspected with stratified Petersen models. We could see exactly where high variation and imprecision in parameter estimates contributed to poor model fit. In general, high variation in parameters reflected realities observed in the field, such as extreme variation in water levels or fish densities. On the other hand, more uniform capture probability estimates reflected more uniform field conditions, and in these cases a simpler model was justified.

SESSION: Poster

Alaska Clean Water Actions...Protecting Our Waters

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Alaska Clean Water Actions (ACWA) brings State agencies (Departments of Environmental Conservation, Fish and Game, and Natural Resources) together to deal with water issues in a coordinated process, assuring State resources are directed at specific issues identified on the highest priority waters. The ACWA database is a product of this collaboration and contains a prioritized and categorized list of waterbodies, determines appropriate next steps, provides a consolidated collection of information, and tracks the progress and current status of “nominated” waterbodies. ACWA provides ways for local governments, tribes, citizen groups, and education facilities to get involved through “nominating” waterbodies of concern and by receiving funding for projects. The three resource agencies conduct an annual joint matched-solicitation for water quality projects using funds that are passed through from federal monies. Projects to restore, protect, or conserve water quality, quantity, or aquatic habitats on identified waters are considered. In FY08 ACWA funded 20 projects with a total of approximately $650,000.

SESSION: Poster

Monitoring And Conserving The Subsistence Fisheries Of South-Central And Southwestern Alaska

Derek Hildreth[1], Jeff Anderson[1], and Mike Edwards[2]

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This poster presents an historical background to the Federal governments' responsibility for subsistence fisheries management on Federal public lands in Alaska, and describes three escapement projects that have developed from this responsibility: the Perryville aerial observations, the McLees Lake picket weir, and the proposed Big Creek floating weir on Kodiak Island.

Kametolook, Three Star/Long Beach Rivers, Perryville: Aerial counts of coho salmon are used to determine escapement and run timing. These data indicate dwindling returns and provided the basis to limit coho harvest.

McLees Lake, Reese Bay, Dutch Harbor: Assessment of this subsistence fishery was previously limited to aerial surveys and harvest data. Aerial surveys can be negatively affected by a number of factors and management of this fishery required more accurate and timely escapement data. In 2001 the Subsistence Regional Advisory Council recommended collection of data to develop an escapement goal. A fixed picket weir was placed at the McLees Lake outlet. Data suggests highly variable escapements, but higher numbers than those documented during the aerial surveys of 1995 through 2000.

Big Creek, Old Harbor, Kodiak Island: Big Creek is thought to support coho salmon returns that number in the tens of thousands. The sport fishery on Big Creek has become a concern for the subsistence fishers. The lack of reliable estimates of escapement precludes development of escapement goals or management strategies. Operation of a floating weir on Big Creek is in the planning stages, to begin in summer 2008.

SESSION: Poster

Electronic Collection Of Aerial Survey Data

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Aerial surveys of streams in the Copper River drainage has been used as a method of assessing sockeye salmon spawning escapement since prior to 1960. Historically, observations were recorded in-flight using pencil and paper. Recent advances in GIS technology and handheld computer hardware have provided biologists with the opportunity to record this data in-flight and pair aerial observations with accurate geographic coordinates. While software is currently available that can accomplish this, (ArcPad, CyberTracker, etc) these applications are written primarily for collecting generic field data and rely heavily on visual cues to change fields and record observations. This application, gpsDataLogger was written specifically for use while conducting aerial surveys and addresses these shortfalls. It allows the observer to document observations with minimal visual contact with the computer. This allows for a more productive use of flying time as the observer focuses entirely on the stream being flown and significantly minimizes the possibility of untimely kinetosis. This application was written using the Superwaba Java development environment with source code available at “http://sourceforge.net/projects/gps-datalogger/”.

SESSION: Poster

Movement Of Humpback Whitefish *Coregonus pidschian* Within The Lake Clark/Sixmile Lake Drainages, Alaska

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Next to sockeye salmon *Oncorhynchus nerka*, humpback whitefish *Coregonus pidschian* have historically been the most important subsistence fish in the Kvichak River watershed. Reports of declining subsistence harvests and a lack of information for humpback whitefish in the Lake Clark and Iliamna watershed initiated this study. To monitor the seasonal movement patterns of humpback whitefish in the Lake Clark/Sixmile Lake watershed, 169 adult whitefish were captured and radiotagged from three sites during May-August 2006 (n=94) and 2007 (n=75). Radiotagged fish were tracked by boat and aircraft every 1-14 days and monitored 24 hrs/day by remote tracking stations at the outlets of Lake Clark, Sixmile Lake, and several inlet tributaries of Lake Clark. Site fidelity to feeding areas was observed with fish generally remaining near tagging locations. Several fish made directed migrations to subsistence salmon camps where tagged fish were observed feeding on salmon carcasses and eggs. Fish from all tagging sites migrated to spawning habitats in the Chulitna River between late August and early October; fish migrated out of the river between mid October and early November. Three fish were tracked into the Chulitna River in both 2006 and 2007 despite a projected tag life of approximately 11 months. These results suggest subsistence salmon camps are an important feeding area for humpback whitefish and that the Chulitna River is the primary spawning location for humpback whitefish in the Lake Clark/Sixmile Lake drainage.

SESSION: Poster

Variation In Age At Maturity Among Sockeye Salmon (*Oncorhynchus nerka)* Spawning Populations From Lake Clark, AK

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Age at maturity is a key life history trait in sockeye salmon (*Oncorhynchus nerka*) and varies within and among populations. Variation in age at maturity may be influenced by genetics, spawning habitat, rearing habitat, or by a number of environmental factors generally associated with growth, including water temperature, food availability, or fish density. This study compared the age at maturity of sockeye salmon collected during 2002-2006 from nine Lake Clark, AK spawning locations that differed by habitat type. Using samples from brood years 1998 and 1999, marine age (2 or 3 years in the ocean) was calculated for each sex and spawning location and arranged by brood year. Binary logistic regression models were used to determine the influence of spawning location and brood year on marine age using a major tributary as a reference spawning location. Spawning location had a significant effect on marine age for both female and male sockeye salmon. Among females, most (6 of 8) spawning locations were more likely to be comprised of younger fish (marine age 2) as compared to the major tributary. Among males, only 1 spawning location was more likely to be comprised of younger fish, while 2 spawning locations were more likely to be comprised of older fish (marine age 3) as compared to the major tributary. Brood year had a significant effect on marine age for females, but did not have a significant effect on marine age for male sockeye salmon. These patterns of variation in marine age may be related to spawning conditions, however further studies combining these data with other life history information including length at age, fecundity, and egg size are necessary to develop accurate population models of Lake Clark sockeye salmon.

SESSION: Poster

Will Silt From A Permafrost Thaw Slump Negatively Influence Inconnu Spawning Habitat In The Selawik River?

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A large retrogressive thaw slump (slump) occurred in the upper Selawik River drainage within the Selawik National Wildlife Refuge (Refuge) in spring 2004 and continues to erode and deposit large quantities of silt into the Selawik River. One of the most conspicuous effects of the slump is the transformation of the once clear-running river into an opaque and turbid river. Inconnu *Stenodus leucichthys*, a Refuge trust species, and other whitefish species are major local subsistence resources in the Selawik River. Inconnu spawn in a limited portion of the Selawik River approximately 42 km downstream of the slump. We do not know how suspended sediments and silt accretion affects water quality or if it will jeopardize inconnu and other whitefish species spawning habitats in the Selawik River; however, there is potential that silt could fill interstitial spaces between the gravel and cobble substrate where fertilized eggs must settle, overwinter, and mature. Little is know about the physical spawning habitat requirements for inconnu, especially sensitivity to the accretion of sediments. Preliminary analysis from the 2007 melting season estimated that about 25,000,000 to 60,000,000 kg of sediments eroded from the slump. The slump was discharging 267 g/L of suspended sediments and discharging more than 100 L/s from thawing permafrost. In August 2007, at least 375 mg/L of suspended sediment was observed at the spawning area resulting in roughly 8,600,000 kg of deposited silt. Scientists are monitoring the slump using photographic imagery. Future research on the geologic processes that caused the slump could provide predictive capabilities to assess the likelihood of similar events in the Selawik River drainage. Future fisheries research could help the Refuge manager assess how the slump may affect the critical aquatic habitats of inconnu and other whitefish species in the Selawik River.

SESSION: Poster

Temporal and ontogenetic trophic level variability of walleye pollock (*Theragra chalcogramma*) in the Gulf of Alaska

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Trophic level (TL) estimates of commercial fishery catches are used as an ecosystem-based indicator for sustainability. Often these estimates do not incorporate seasonal feeding dynamics and average length of catch for each species. The purpose of this study is to provide a finer scale of trophic level variability for walleye pollock (*Theragra chalcogramma*), a commercially and ecologically valuable fish in the Gulf of Alaska (GOA). For walleye pollock, TL is hypothesized to increase with size class (ontogenetically) because of a larger gape size, swimming speed, and energetic requirements, and to vary by season resulting from seasonally changing prey availability and pollock behavior. Walleye pollock were sampled from 2000 to 2004 over four seasons on the northeast side of Kodiak Island. Based on nitrogen stable isotope analysis, we estimated TL variation for walleye pollock by size class, season and year. Preliminary results suggest that TL of pollock does not differ significantly for fish with total lengths of 15-40 cm but increases in lengths of 40-70 cm. In future analyses these data will be used to estimate a GOA-wide weighted average of trophic level for walleye pollock for 2000-2004 based on catch length frequency in the commercial fishery and NOAA bottom trawl survey lengths. In addition, future analyses will increase in scope to include Pacific cod (*Gadus macrocephalus*), Pacific halibut (*Hippoglossus stenolepis*) and arrowtooth flounder (*Atheresthes stomias*).

SESSION: Poster

Comparing Vertical And Oblique Aerial Photography: Applications For Classifying Coastal Habitats Of Southeast Alaska

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The acquisition of high resolution imagery with aerial photography has become more commonplace in recent years providing a diversity of applications. While satellite imagery is commercially available, it may be cost prohibitive or temporally unavailable under special situations. We compare two types of imagery (nadir, oblique) captured from low-elevation platforms (e.g., fixed-wing, helicopter) which have been used for delineating the coastal shoreline of Southeast Alaska in two separate case studies: 1) The Nearshore Marine and Estuarine Habitat Project: Taku River and Inlet, conducted by the Sport Fish Division of Alaska Department of Fish & Game, and 2) The ShoreZone Coastal Mapping Data Summary (2004-2005) conducted by John Harper and Mary Morris of Coastal & Ocean Resources Inc. and Archipelago Marine Research Ltd.. While both types of imagery provide a means to identify and evaluate shoreline features, each platform individually, has limitations. Oblique imagery represents vertical features well, since these patterns are observed parallel or in cross section to the camera and thus the user. However, objects further away from the camera/user are often distorted in scale and thus impossible to delineate. In comparison, nadir (or vertical) imagery tends to represent habitat features best delineated as polygons or areas better, since these features are observed parallel or in cross section to the camera. In terms applied to the mapping of shoreline features, nadir imagery provides more accurate delineation of estuaries as well as base layer imagery for GIS. In contrast, oblique imagery delivers a product capable of capturing the vertical complexity of shoreline features, such as the biobands on cliffs and/or bluffs. Integration of the output from the two image platforms may provide complimentary processing and evaluation tools in a GIS environment capable of delineating nearshore marine habitats known to be important for a diversity of vertebrate and invertebrate populations. We conclude that numerous studies could benefit from the additional information provided by incorporating both methods, creating a vertical and horizontal landscape fusion, consequently avoiding the exclusion of certain respective valuable data.

SESSION: Poster

The Partners For Fisheries Monitoring Program

Beth Spangler, Steve Klein, Kay Larson-Blair

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The Partners for Fisheries Monitoring Program, Intern Program. The U.S. Fish and Wildlife Service initiated the program in 2002 to strengthen Alaska Native and rural involvement in subsistence fisheries management and research while mentoring local students. Collectively, eight Partner scientists hire approximately 25 college interns and 20 high school interns each year to work on research projects. Students are from rural Alaska, are pursuing degrees in fisheries science, biology, or anthropology, and will become future fishery professionals in Alaska. The intern program has matching funds from the National Science Foundation and interns have the opportunity to earn science credit through the School of Fisheries and Ocean Sciences at the University of Alaska or through the State of Alaska rural high school program. As a former Partner intern from the Bristol Bay Native Association and a current STEP student with the Office of Subsistence Management, Ms. Blair will be an advocate for other students at the conference.

SESSION: Poster

Embryonic Development Of Atka Mackerel And The Effect Of Temperature

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Atka mackerel (*Pleurogrammus monopterygius*) range from Asia to North America in the southern Bering Sea and northern Pacific Ocean. In Alaska, a better ecological understanding of this integral species that supports a multimillion dollar commercial trawl fishery is critical for reliable management programs. Currently available data on the embryonic development of Atka mackerel are not suitable for accurate age determination of eggs due to lack of information, detail, and standardized methods. Our primary objective was to generate a complete embryonic developmental series for Atka mackerel at different temperature regimes. Fertilized eggs collected from captive Atka mackerel were transferred into closed-system incubation tanks, incubated at seven temperatures (2, 4, 5, 7, 10, 12 and 15 °C) until hatching, sampled at regular intervals and preserved in Stockard's solution. Spawning events were video recorded to determine time zero. Calendar days until first hatch decreased logarithmically ($y = -65.096\mathrm{Ln}(x) + 192.64$, $R^2 = 0.9768$) with the increase of temperature. Eggs incubated at 2 °C hatched at 169 ± 4 days while eggs incubated at 12 °C hatched at 39 ±1 days. Hatch did not occur in any of the 15 °C treatments. Development was divided in 22 stages. Preserved eggs of each stage were described and photographed. Data from a complete embryonic developmental series will allow the assessment of age of eggs found *in situ* when the prevailing water temperature is known. As a consequence it will be possible to estimate spawning and hatching dates, thus providing critical information for better stock assessment and management of Atka mackerel in Alaskan waters.

SESSION: Poster

Do Drifting Invertebrates Originating From Fishless Headwater Streams Benefit Downstream Fish?

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Headwater streams, typically comprising up to 80% of drainage networks, carry nutrients, detritus, and invertebrates to downstream habitats, but the importance of these subsidies to fish downstream is not known. The objectives of this study were to 1) determine whether the quantity of drifting invertebrates originating from fishless headwaters affects fish downstream, and 2) demonstrate whether prey transport from headwaters, and the use of these prey by fish, varies across timber harvest regimes and climatic conditions. This study took place in the Wenatchee River sub-basin, Washington, in 2006 and 2007. We examined 16 streams whose catchments differed in climate (wet v. dry) and land use (high- v. low-intensity timber harvest). We measured the density and biomass of drifting invertebrates entering fish-bearing reaches from fishless headwaters, and fish standing stock and growth in response to variability in prey derived from headwaters. We then manipulated invertebrate drift (blocked, supplemented, or control) from fishless headwaters and measured downstream fish responses (movement, growth, and standing stock). Initial results show that standing stock of fish varied significantly with differences in climate and logging intensity. There was no correlation between invertebrate drift density and fish biomass or growth in 2006. Results of drift manipulations showed higher fish growth in habitats receiving more headwater prey in 2006, but not in 2007. Clarifying whether there are strong trophic linkages between fishless headwaters and fish downstream will increase our understanding of whether variation in prey delivery from headwater reaches can affect productivity of fish populations downstream, and provide insight into how management of headwater habitats affects broader riverine ecosystem productivity.

SESSION: Poster

Environmental Factors Associated With The Migration Of Adult And Downstream Drift Of Larval Eulachon (*Thaleichthys pacificus*) In A Glacial River

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The importance of eulachon (*Thaleichthys pacificus*) and its apparent decline in Alaska has necessitated the development of population monitoring programs. In the past, both the migration of adult eulachon and downstream drift of larvae have been used to aid in the monitoring of local populations. However, questions remained on how key environmental variables were associated with the migration of adult and downstream drift of larval eulachon, especially in Alaska where little work has been conducted. We investigated the spawning run timing and intensity of migration of adults and downstream drift of larval eulachon in Twentymile River and compared them with environmental factors including: water temperature, tide height, water discharge, light intensity, water conductivity, and the density of a predator, bald eagles (*Haliaeetus leucocephalus*). The catch per unit effort of adults was significantly related to water temperature ($p<0.0001$), tide height ($p<0.0001$), freshwater discharge ($p<0.0001$), light intensity ($p<0.0001$), and the number of bald eagles ($p<0.0001$). The downstream drift of larval eulachon was significantly related to mean daily water temperature ($p<0.0137$), freshwater discharge ($p<0.0001$), and light intensity ($p<0.0198$). The results of this study indicate key environmental variables need to be considered when conducting monitoring program studies on adult and larval eulachon.

SESSION: Special Feature Movie

Into the Deep: Submarine Exploration of Zhemchug and Pribilof Canyons – Features Bering Sea Shelf Break

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The Continental shelf edge "greenbelt" is a key feature in generating fisheries production in the Bering Sea large marine ecosystem. Spanning across the central Bering Sea, the shelf edge is incised by six massive submarine canyons. These canyons serve as conduits for advecting deep, nutrient rich waters from the Aleutian Basin into the northwestern flow of the Bering Slope Current, which fuels secondary production across the shelf and into the Chukchi Sea.

We examined pelagic and benthic communities in the upper 1,100 meters of Pribilof and Zhemchug Canyons using manned submersibles and a remotely operated vehicle. During 25 submarine dives and 10 ROV dives, we documented benthic megafauna and macrozooplankton communities along transects using scaled high definition video imagery.

This first in situ investigation of Bering Sea shelf break canyons provides insights on habitats, species assemblages and trophic characteristics. Sponge, coral, anemone, hydroids and other biotic features that provide secondary habitat for myriad invertebrates and fish dominated highly patchy hard substrata likely deposited by sea ice. Unique on the sedimentary plains in the canyons, these "dropstone" communities were havens for motile species including red and golden kingcrab, rockfish and other groundfish. Pelagic water column observations confirm that both canyons support dense macrozooplankton communities, including squid, euphausiids and chaetognaths. Rather than occupying only upper water layers, zooplankton were distributed in thin and mixed layers extending to all depths examined.

Analysis of data and specimens during the coming months will yield stable carbon isotope indices for trophic foodweb interactions, and information on new, endemic and range extensions for some known benthic megafaunal taxa. Fine scale macrozooplankton spatial distribution will also be examined to ascertain density and bioavailablity of secondary production in the canyons.

2007 Annual Alaska Chapter AFS Conference

Business Meeting Agenda

November 16, 2007
12:00 p.m., Ketchikan, Alaska

Business Meeting Agenda

1. Call to order

2. Determination of a Quorum

3. Approval of Agenda

4. Approval of Minutes from Alaska Chapter Business Meeting 2006

5. Reports

    a. Treasurer's report — Lee Ann Gardner
    b. Committee reports
        i. Awards — Cheryl Dion
        ii. Wally Noerenberg Award — Cheryl Dion
        iii. Cultural Diversity — Lisa Stuby
        iv. Electronic Communication — Allen Bingham
        v. Environmental Concerns — Cecil Rich
        vi. Fisheries Communication and Education — Laurel Devaney
        vii. International Relations — Fred DeCicco
        viii. Membership — Hamachan Hamazaki
        ix. Resolutions and Bylaws — Bill Bechtol

6. Outgoing President's Address
7. New Business - Should the provision that the Cultural Diversity Travel Award recipient "must reside greater than 50 mils from the meeting location" be removed as a criterion for the award

8. Old Business - Selection of a new Alaska Chapter logo

9. Open forum

10. Adjourn

2007 Annual Alaska Chapter AFS Conference

American Fisheries Society, Alaska Chapter
The 33rd Meeting of the Alaska Chapter
Business Meeting Minutes

November 15, 2006
3:20 p.m., Fairbanks, Alaska

1. Meeting called to order at 3:27 by President Scott Maclean

2. Quorum established - Members of Executive Committee present were President Scott Maclean, President Elect Jamal Moss, Vice President Bert Lewis, Treasurer Lee Ann Gardner, Secretary Steve Zemke, and Student Chapter President Scott Ayers. Approximately 30 members were present.

3. Approval of the Agenda - The membership approved the agenda as presented.

4. Approve minutes from September 14, 2005 business meeting - Minutes of the September 14, 2005 were approved as presented on pages 98 through 101 of the 2006 Program.

5. Reports:
    a. Treasurer's - Lee Ann Gardner presented the report of 2005-2006. Lee Ann provided a hard copy of her report for the membership prior to the meeting. In summary she indicated that the primary treasurer efforts have been related to incorporating the Chapter's financial plan into day to day operations of the financial accounts. The federal tax year filings were completed for Tax Year 12/1/04 through 11/30/05. Considerable effort was made to consolidate the Chapters financial accounts.

       The Chapters Financial account balances are robust, with total assets of $219,299.98. Approximately one half, are within the UBS checking accounts. Assets have increased approximately $50,000 since 2004, primarily due to the Alaska Chapter's share of the 2005 National Annual Meeting profits ($30,000) and the establishment of the Molly Ahlgren Scholarship Fund. Most of the expenses for this annual meeting are still outstanding.

       Meeting attendance is 187. The highest percentage of the attendees at the meeting are either regular members (85) or student members (48).

    b. Committee Reports (full reports can be viewed at (http://www.fisheries.org/units/afs-ak/)
        i. Aquatic Education- no report.
        ii. Awards - Cheryl Dion presented that the Award Committee received two nominations for the Meritorious Service Award and two for the Alaska Chapter Service Award. The five committee

members selected Mason Bryant for the Meritorious Service Award and Cindy Hartmann for the Alaska Chapter Service Award. The new Almost Darwin Award only had one nomination. The winners/perpetrators were Togiak Refuge, Bethel ADF&G commercial fisheries, and the Native Village of Quinhagak.

iii. Chapter Historian - Discussion about how much of the archival data should be digitized and stored on the Chapter web site. Also, the considerable hard copy data that are not digitized need to either be eliminated or saved for permanent files that would be stored with the Secretary.

iv. Continuing Education – no report.

v. Cultural Diversity – no report.

vi. Electronic Communications – no report.

vii. International Relations – no report.

viii. Membership – Bert Lewis presented membership statistics from 1999 to 2006. 2006 membership numbers are slightly lower than in 2005, 498 versus 478. Fewer numbers of students and non members were the primary difference.

ix. Molly Ahlgren Scholarship Committee – Hal Geiger discussed the status of the Molly Ahlgren award.

x. Student Sub-units - Scott Ayers summarized the activities of the different sub units.

xi. Wally Noerenberg Award - The committee is comprised of three Chapter past-presidents and a committee chair that cannot be a past president. Committee members during 2006 were David Wiswar, Carol Kerkvliet, Tim Joyce and Doug Palmer as chair. The award was created in 1981, and now has 13 recipients. The Wally Noerenberg Award for Fishery Excellence was presented this year to Bill Wilson during the banquet by Doug Palmer. Doug stated that Bill's life-long achievements include numerous scientific contributions that have improved our understanding of Arctic and sub-Arctic fish assemblages – particularly the responses of North Slope fish communities to human perturbations and development. Bill played an integral role in developing the Bering Sea and Aleutian groundfish management plan for the North Pacific Fishery Management Council. Most Alaska Chapter members understand the outstanding and continuous contributions that Bill has made to our organization. He has held numerous positions on Chapter committees and played a significant role in bringing two very successful annual meetings of the AFS Parent Society to Alaska. He was a key driving force in the realization of the milestone book "Fishes of Alaska" which probably would have never come to pass without his efforts. Bill has demonstrated a career of fisheries excellence, be it on-the-ground research studies, policy negotiations, or bringing top-flight science to the fisheries community in Alaska and beyond. His career in Alaska fisheries truly embodies what the Wally Noerenberg Award is all about.

xii. Environmental Concerns – no report and looking for a chair.

xiii. Newsletter – Gretchen Bishop, Committee Chair, reported on the *Oncorhynchus* which serves as a medium to distribute information to Alaska Chapter members and other interested individuals. The newsletter is produced by the editor, currently Gretchen Bishop. Gretchen edits and compiles articles submitted by Chapter members then sends the articles to Connie Taylor of Fathom Publishing who designs, lays out, and mails the newsletter. During the past fiscal year, four regular issues were printed, one at the beginning of each calendar quarter. At the 2006 meeting, the possibility of changing to electronic newsletter distribution is being considered. This has the potential of saving the Chapter $1,000 annually in printing and mailing costs.

xiv. Resolutions and Bylaws – no report.

6. Outgoing President's Address - Scott Maclean gave a short address to the membership. He indicated that the Alaska Chapter was in a robust financial situation and that continuation of the established programs will keep the Chapter in good order. The meeting, being in Fairbanks helped provide for student participation (which was a primary goal) with over 45 students attending the meeting.

7. New Business
   a. Student Travel Fund Criteria - Scott Maclean presented the Student Fund Criteria as found on page 96-97 of the program. It was moved and seconded that the Criteria as presented should be adopted. Unanimous vote by the membership was to approve as written.
   b. Electronic Newsletter - There was discussion about whether to go to an electronic newsletter, or to stay with the hard copy newsletter, or to go to some sort of hybrid. It was moved and seconded that the Chapter should go to electronic newsletter format, with the opportunity to receive a hard copy if requested. The membership voted unanimously to support the motion to go to an electronic newsletter, with a hard copy option.
   c. Chapter Logo – Scott led discussion about establishing a formal logo for the Chapter. The various logos that were considered were located throughout the program. The Executive Committee previously voted to recommend the Chinook salmon logo as printed on the cover as the official logo. Considerable discussion ensued, most centering around the fact that the Chinook logo was not inclusive of the wide range of fisheries represented by our membership throughout Alaska. Many people preferred the ring concept logo showing a variety of fish as found on page 10 of the program. Others felt that there might be a logo that could combine the best attributes of many of the logos presented. Generally, the

membership felt that decision on the selection of a logo was not appropriate at the time of the meeting. A motion was made and seconded to table the decision. Vote was unanimous to affirm tabling the decision.

8. Installation of Officers – Officers for this year were introduced. For 2007 the executive committee are:
   President, Jamal Moss
   Vice President, Bert Lewis
   Past President, Scott Maclean
   President Elect, Hamachan Hamazaki
   Treasurer, Lee Ann Gardner
   Secretary, Steve Zemke
   Scott Ayers, Student Sub-Unit Representative.

9. Announcements – no announcements were made.

10. Next meeting – The next meeting will be located in southeast Alaska. Juneau, Sitka, and Ketchikan were discussed as possible locations. Sitka was ruled out as it hosted the meeting last round in Southeast Alaska.

11. Adjourn - A motion to adjourn was made and seconded. Motion was passed by unanimous consent.