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Sport Fish
Division - ADF&G

Economic Significance of Sport Fishing in Alaska

Sport fishing contributes money and jobs to the Alaskan economy.

The economic contribution of sportfishing in Alaska is an important consideration for natural resource managers who must evaluate fishery projects, assist in planning for land and water resource management, and provide input to regulatory or policy decision-makers regarding management or allocation of aquatic resources. Recognizing that there is a need for detailed economic information on sportfishing in Alaska, ADF&G has periodically contracted both economic impact and valuation studies to estimate the economic effects of sportfishing in Alaska at the statewide, regional, and fishery levels.

The most recent statewide assessment of the economic contribution of sportfishing in Alaska was conducted for ADF&G by Southwick Associates, Inc. in 2007. This study estimated that 475,534 resident and nonresident licensed anglers fished 2.5 million days in Alaska and spent nearly \$1.4 billion on licenses and stamps, trip related expenditures, pre purchased packages, and equipment and real estate used for fishing. The \$1.4 billion of angler spending in Alaska in 2007 resulted in economic activity that supported 15,879 jobs in Alaska, provided \$545 million of income, and resulted in \$123 million in state/local tax revenues. Nonresident angler spending in Alaska in 2007 (economic impact) was \$653 million, and this supported 9,437 jobs and \$67 million in state/local tax revenues.

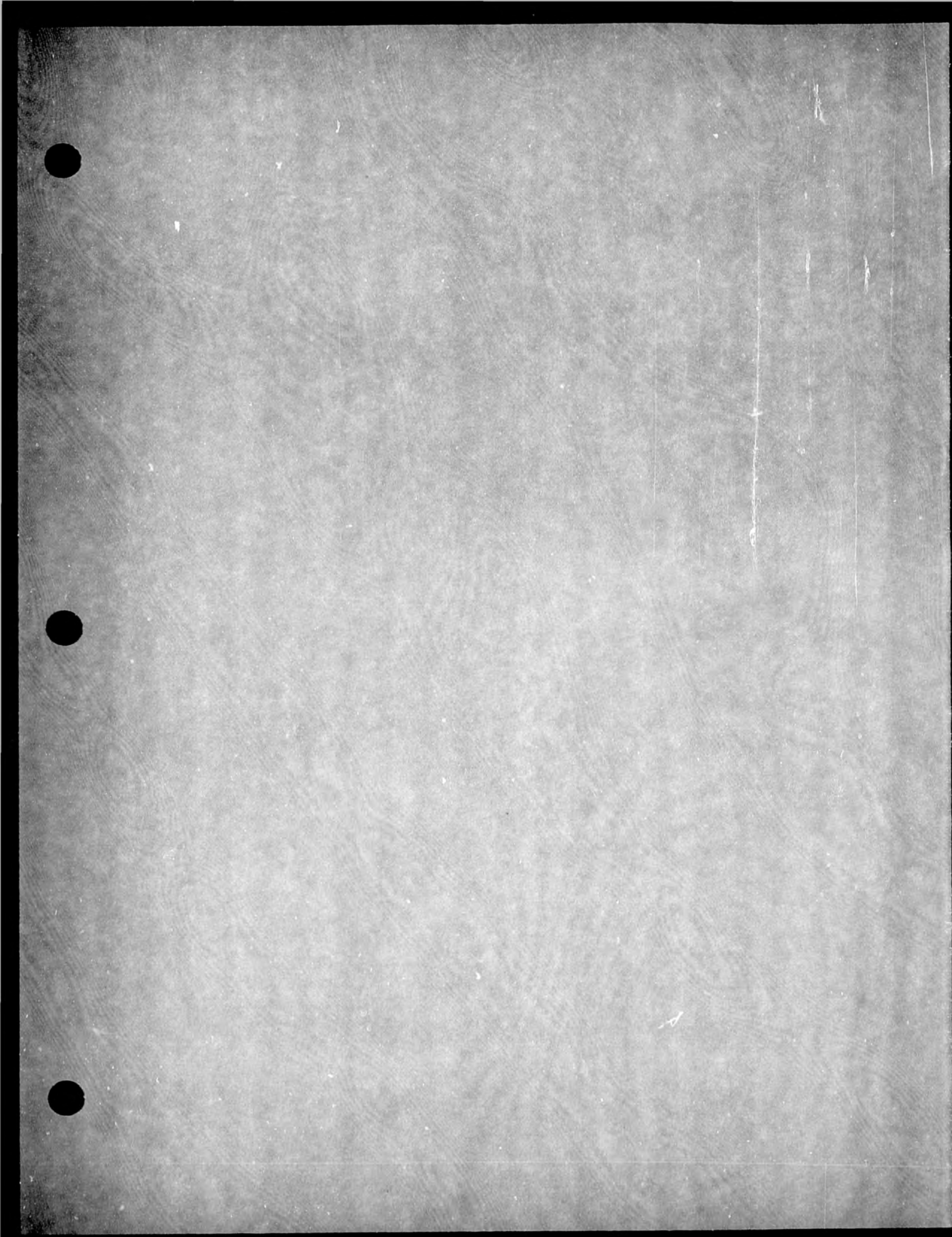


The regional distribution of spending by anglers generally follows the distribution of total days fished in Alaska, with most angler spending occurring in the Southcentral region (72%), followed by the Southeast and the Interior regions with 20% and 7% of total angler spending respectively. Total expenditures on guided sportfishing activities in 2007 totaled \$416 million, which resulted in \$641 million in total economic activity and supported 7,183 jobs. Resident anglers spent an average of \$150 per day of sportfishing activity on trip-related expenses in 2007, while nonresident anglers spent an average of \$448 per day in Alaska on trip-related expenses in 2007.

Previous statewide economic assessments of sportfishing in Alaska were conducted in 1993 by the Institute of Social and Economic Research at the University of Alaska Anchorage, and in 1986-87 by Jones & Stokes, Inc. Although the methodologies of these studies differ in some respects, collectively the results suggest that during the past fifteen years, the economic significance of sport fishing in Alaska has increased considerably, in terms of the number of job, wages and salaries, and total economic contribution to the Alaska economy. Those who participate in sport fishing are likely to point out that the opportunity to go fishing in Alaska has a value that is often difficult to measure in dollars. However, sportfishing is also an important part of the Alaska economy and a vital source of income to many in small towns and cities throughout the state.

2007 Study Reports and background

- [2007 Summary Report](#) (PDF 2.9 Mb)
- [2007 Technical Report](#) (PDF 5.4 Mb)
- [Project Background](#)



2008 Mat-Su Basin Salmon Science & Restoration Symposium



October 15-16, 2008



The Nature
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Agenda

OCTOBER 15, 2008 - DAY ONE

- 8:30 - 9:00 a.m. Registration & Continental Breakfast
- 9:00 a.m. Welcome
Frankie Barker, Matanuska-Susitna Borough
John Duffy, Matanuska-Susitna Borough
Corinne Smith, The Nature Conservancy
Valerie Hansen, U.S. Corps of Army Engineers
Sarah Barton, RISE Alaska
- 9:40 a.m. One Fish, Two Fish – Why are we here?
- 10:00 a.m. Presentations
Kris Abshire, Alaskans for Palmer Hay Flats
Catherine Inman, Wasilla Soil & Water Conservation District
Gino Graziano, Alaska Soil and Water Conservation District
Theresa Tanner, U.S. Fish & Wildlife Service
- 10:45 a.m. Hot Questions
- 10:50 a.m. Morning Break
- 11:00 a.m. Presentations
Bill Rice, U.S. Fish & Wildlife Service
Chuck Kaucic, Mat-Su Borough
Corinne Smith, The Nature Conservancy
Brian Winnestaffer, Chickaloon Village Traditional Council
- 11:55 a.m. Hot Questions
- 12:00 p.m. Lunch
- 12:30 p.m. Afternoon Break & Mapping Exercise
- 1:00 p.m. Presentations
Jeff Davis, Aquatic Restoration & Research Institute
Tom Cappiello, Alaska Department of Fish & Game
Janet Curran, U.S. Geological Survey
Doug McBride, U.S. Fish & Wildlife Service
Sue Mauger, Cook Inletkeeper
- 1:55 p.m. Hot Questions
- 2:00 p.m. Embrace Your Inner Fish – Going Deeper (Snack)
- 3:15 p.m. Announcements/Close
Sarah Barton, RISE Alaska
- 4:00 p.m. Adjourn
- 4:15 p.m. **Mat-Su Basin Salmon Habitat Partnership Meeting**
- 5:15 p.m. Adjourn



Agenda

OCTOBER 16, 2008 - DAY TWO

- 8:30 - 9:00 a.m. Registration & Continental Breakfast
- 9:00 a.m. Welcome
Sarah Barton, RISE Alaska
- 9:15 a.m. Presentations
Chris Zimmerman, U.S. Geological Survey
Ruth Hulbert, AlaskChem Engineering
Dan Bogan, University of Alaska Anchorage
Jessica Dryden, Chickaloon Village Traditional Council
- 10:00 a.m. Hot Questions
- 10:05 a.m. Presentations
Jeff Davis, Aquatic Restoration & Research Institute
Monica McTeague, U.S. Geological Survey
Paul Blanche, Cook Inlet Aquaculture Association
- 10:40 a.m. Hot Questions
- 10:45 p.m. Twist & Trout – Lots to Talk About
- 12:00 p.m. Lunch
- 12:30 p.m. Afternoon Break & Mapping Exercise
- 1:00 p.m. Presentations
Karen Nelson, U.S. Army Corps of Engineers
Serena Sweet, U.S. Army Corps of Engineers
Ralph Hulbert, AlaskChem Engineering
Jack Hewitt, U.S. Army Corps of Engineers
Valerie Hansen, U.S. Army Corps of Engineers
Frankie Barker, Matanuska-Susitna Borough
Angie Wade, Chickaloon Village Tribal Council
- 2:20 p.m. Hot Questions
- 2:30 p.m. Break & Snack
- 2:40 p.m. Da Vinci Cod – What does it all mean?
- 3:45 p.m. Thank You/Close
Valerie Hansen, U.S. Army Corps of Engineers
Corinne Smith, The Nature Conservancy
Sarah Barton, RISE Alaska
- 4:00 p.m. Adjourn



Agenda

Mat-Su Basin Salmon Habitat Partnership Annual Meeting

Update on National Fish Habitat happenings (John DeLapp)

- Update on October National Fish Habitat Board meeting
- National Fish Habitat Action Plan FY09 projects funding

Port of Anchorage mitigation funds (Corinne Smith and Frankie Barker)

Conserving Salmon Habitat in the Mat-Su Basin, the Strategic Action Plan (Tom Brookover and Corinne Smith)

- Completed and available at <http://conserveonline.org/workspaces/MatSuSalmon>
- Prioritization of objectives and strategies

Steering Committee updates (Corinne Smith)

- Meeting monthly 3rd Tuesday, alternating Palmer and Anchorage
- Two At-large seats on the Steering Committee open in January

Cooperative Conservation Award from Department of Interior (John DeLapp)

- distribution of award certificates to all partners

Q & A about the Partnership

5:15 Adjourn



Abstracts

Palmer Hay Flats: Refuge Jewel in Our Midst

Kris Abshire, Alaskans for Palmer Hay Flats

From Cottonwood Creek at the head of Knik Arm, north, east and southeast along the Talkeetna and Chugach watersheds, fresh water drainages flow through Palmer Hay Flats State Game Refuge. Continued assurance of clean water, undisturbed by human use in these salmon migration rivers and streams is crucial to the long term viability of salmon populations. For the past 3-1/2 years, after decades of neglect, human abuse and pollution, this gem of Alaska's public lands is being healed and restored. On-the-ground partnership efforts in clean-up, repair and restoration projects carried out by ADF&G, Wasilla Soil & Water Conservation District, Mat-Su Borough and Alaskans for Palmer Hay Flats have made tremendous progress. Among these efforts and accomplishments, perhaps the most important element has been the concerted effort to involve our local youth population. Working field trip days have students brushing trail, cleaning up trash along stream beds and revegetation projects; annual on-site grade school education days teach children about healthy water and healthy habitat. All these efforts are at the core of our future plans, which is to teach awareness of the delicate balance of our natural world and the role of humans as an integral part of it. Toward this end, Alaskans for Palmer Hay Flats with support from ADF&G, Mat-Su Borough, other state and federal agencies as well as community partners, proposes to build a Natural Science Education/Community Center. It is anticipated that youth and adult programs provided through partners in this endeavor will serve as the underlying foundation for an intrinsic conservation ethos and widespread community stewardship for generations to come.

Green Infrastructure

Frankie Barker, Matanuska-Susitna Borough

The Mat-Su Borough is implementing green infrastructure concepts through several community initiatives. One is the inclusion of green infrastructure goals as a plan element in all new community comprehensive plans. A second project is a grass-roots effort to recruit a planning team for the Palmer-Wasilla core area to develop a green infrastructure design and map for the central valley. MSB is also working with natural resource agencies, particularly USFWS, to identify and digitally map wildlife resource areas. This fall, we will introduce new interactive technology for converting local and technical knowledge to GIS maps to more accurately inform our green infrastructure initiatives.

Investigation and Evaluation of Sockeye Salmon Production from Lakes in the Susitna River System

Paul Blanche, Cook Inlet Aquaculture Association

Recent sockeye salmon returns to the Northern District of Cook Inlet have been significantly less than expected. There could be a number of causes for this recent trend. There are two broad questions to be asked. The first is whether or not the system is producing juvenile salmon that succeed in migrating to sea. The second question is whether or not a sufficient number of adult fish are failing to reach the spawning grounds. CIAA is investigating the freshwater rearing environment of this system. Understanding the entire salmon life cycle will



help to identify if rehabilitation is warranted and which strategies seem to offer the most promise. The investigation involves studies on seven lakes. Four of the lakes are along the mainstem Susitna River and Talkeetna River (Larson, Stephan, Swan, and Byers Lakes); and three are on tributaries of the Yentna River (Judd, Shell, and Chelatna Lakes). The studies include: the enumeration of adult salmon escapement and smolt emigrations at each lake. Adult sockeye salmon and smolts are sampled for age, weight, and length throughout the enumeration. Further investigations include limnological sampling (water chemistry and zooplankton) and the collection of dissolved oxygen, light, and temperature profiles within each lake.

Biological Assessment Indices for Streams in the Cook Inlet Basin

Dan Bogan, University of Alaska Anchorage

Biological monitoring and assessment index development for Wadeable streams in the Cook Inlet Basin has been on-going for over 10 years. I will discuss our latest research in this area and present the results of the recalibration of the Alaska Stream Condition Index for Cook Inlet using the benthic macroinvertebrate assemblage and the newly calibrated diatom assemblage index. I will also mention other projects we have on-going in the area, including an assessment project on Montana Creek.

Instream Flow Protection in the Mat-Su Basin

Tom Cappiello, Alaska Department of Fish and Game

The goal of this project is to collect the hydrological data necessary to protect instream flows in waters important to the production of salmon in the Mat-Su Basin. The streams identified for the purposes of this project are Meadow Creek, Fish Creek, Moose Creek, and Wasilla Creek. The Mat-Su Basin Salmon Habitat Partnership developed a strategy and planning process aimed at conserving salmon habitat. One of the priority actions identified in this Partnership's strategic plan is instream flow protection. Continuous flow data are also essential for scientists and natural resource managers to make well-informed decisions regarding water developments and land-use practices that have the potential to impact water quantity and quality, salmon populations and their habitat. The Alaska legislature amended the Water Use Act (AS 46.15) in 1980 in recognition of the economic, social, and other benefits of retaining water in rivers and lakes. This amendment or "instream flow law" provides the opportunity for the private sector and government agencies to legally acquire water rights to maintain instream flow rates in rivers or water levels in lakes for a variety of purposes, including the protection of fish and wildlife habitat, migration, and propagation. Continuous recording gaging stations in combination with periodic discharge measurements will be used to obtain the stream flow data necessary for quantifying instream flow needs of salmon and their habitat. These hydrologic data will be used to file new or update existing applications for a reservation of water pursuant to the Alaska Water Use Act. Basic water quality information will also be collected at these sites to determine baseline seasonal water quality variability.

Matanuska River Geology, Geomorphology and Erosional Processes

Janet Curran, U.S. Geological Survey

Many of the erosional processes present along the Matanuska River can be related to the geology and glacial history of the Matanuska Valley. The river flows through a confined valley consisting of sedimentary and volcanic rocks above Palmer and an unconfined area filled with



glacial and riverine sediments downstream from Palmer. The confined valley includes a broad glacial valley floor at about 1000 ft in elevation and other evidence of the pre-historic glacier that was hundreds of feet thick, but the valley and river owe their orientation and location to regional geology. The valley and river parallel northeast-southwest trending faults, and the modern river is incised into the broad glacial valley floor. Narrow, non-braided reaches are generally governed by the presence of resistant bedrock. The valley bottom contains mostly fluvial terraces, fans, and the river's braid plain, or the area over which the braided river moves frequently. In the unconfined valley downstream from Palmer, geologic controls are less obvious, although the river is locally constrained by bedrock outcrops. Historical photo analysis shows active braiding that leaves vegetated bars in the braid plain in the confined and unconfined valleys stable for only years to decades.

Assessment of Juvenile Salmon Habitat -- Stream Water Temperatures & Fish Distribution

Gay and Jeff Davis, Aquatic Restoration & Research Institute

Water temperatures have a large influence on most biotic processes occurring within stream systems. Water temperatures influence rates of primary production, decomposition, invertebrate growth and development, and the behavior and metabolism of fish. However, we have limited water temperature data for streams within Southcentral Alaska. Stream water temperatures vary with regional climate, elevation, vegetation cover, channel shape, ground water input, and other physical features, which differ widely among streams within the ecoregion. We collected stream water temperature data within the Matanuska-Susitna Borough from multiple stream types and evaluated the range of stream temperatures, the factors influencing that variability, and the relationship to State Water Quality Standards. Three groups of streams were identified based upon this evaluation: cold water streams which included small and moderate sized streams draining forested regions of the Talkeetna Mountains; temperate streams which included the lower portions of larger clear water and semi-glacial streams, and both large and small lowland wetland streams; and warm water streams, which included streams draining small and large lakes. In 2008 we compared the capture rate and fitness of juvenile salmon between small wetland and small upland streams. Fish were captured in mid to late May, mid July, and September.

Biotic Evaluation of Road Crossing Structures

Gay and Jeff Davis, Aquatic Restoration & Research Institute

Roads, railroads, and other transportation structures often cause barriers to fish migration at stream crossing locations. Stream crossing structures affect the movement of fish and other aquatic life by altering the stream physical characteristics. The construction of migration barriers can have significant effects to fish production as access to large areas of spawning or rearing habitat can be eliminated or reduced. For this reason, considerable work has been done to assess fish passage and restore migration barriers. Fish passage assessment has focused on comparisons between laboratory measures of fish swimming ability and the physical conditions at crossing locations, primarily water velocity and depth. Fish swimming ability, both prolonged and burst, has been assessed under varying conditions of velocity, buoyant forces, and water temperature (summaries and equations within the FishXing V3 2006) which affect physical water properties and fish physiology. While considerable work has been done modeling fish passage based upon stream physical characteristics and fish swimming ability, we are not aware of any work comparing the fish community composition above and below crossing



structures as a method for evaluating fish passage or augmenting model derived results. The life history of Pacific salmon provides a biological method of fish passage assessment. In 2006 and 2007 we evaluated fish passage at multiple sites using physical culvert and stream measures, direct measures of water velocity, fish passage models, and upstream to downstream fish abundance. Fish passage models did not accurately predict water velocities within culverts and so were determined to be poor predictors of migration barriers. Water velocity measures derived from the flow time of dissolved solutes coupled with direct measures of water velocity at the inlet and outlet was determined to be the best indicator of juvenile salmon barriers. We found greater numbers of salmon below crossings that were barriers if upstream spawning habitat was limiting; however, there were no differences at sites that were obvious juvenile barriers but with extensive upstream spawning and rearing habitat. In 2008, we expanded biotic measures to additional locations. Initial results of spring sampling showed distinct differences in catch rates of salmon above and below crossings on wetland streams with limited upstream spawning habitat. However, the catch rates of coho salmon were higher upstream of crossings that were juvenile fish migration barriers.

Invasive Plants That Threaten Salmon Habitat in Alaska

Gino Graziano, Alaska Department of Natural Resources, Division of Agriculture

Many invasive plants have the ability to impact habitats related to salmon. Reed canary grass (*Phalaris arundinaceae*) and purple loosestrife (*Lythrum salicaria*) are two invaders known to affect aquatic systems that are present in Alaska. White sweetclover (*Melilotus alba*), European bird cherry (*Prunus padus*) are currently invading rivers and riparian areas in Alaska and their impacts to salmon are under investigation. A host of other weeds such as Eurasian watermilfoil (*Myriophyllum spicatum*) and Himalayan blackberry (*Rubus discolor*) are not known in salmon habitat in Alaska, however, could have profound impacts if they become widespread.

The Commercial Mitigation Banks

Jack Hewitt, US Army Corps of Engineers, Alaska District

We will provide information on the newly formed commercial mitigation banks located in the Mat-Su Valley. What are the mitigation banks, how will they be operated, how will credits and debits be calculated, what are there service areas, and other regulatory-related information will be provided.

Palmer's Wastewater

Ralph Hulbert, AlaskaChem Engineering

Treated wastewater has been discharged to a small Matanuska side channel since the 1940s. The discharge permit was recently amended by EPA to severely reduce ammonia, due to presumed toxicity to salmon. The salmon in this creek are apparently thriving in relation to other streams, perhaps enhanced by the discharge. There are no affordable means to reduce the ammonia enough to meet future discharge limits for this creek. Research status and options for upgrading Palmer's wastewater treatment plant to meet new regulations will be presented.

Spawning Counts in Four Matanuska Side Streams

Ruth Hulbert, AlaskaChem Engineering

Spawning salmon were counted in September 2008 in four small streams flowing into the lower Matanuska River. These streams are unnamed, mostly uncataloged by ADFG, and have no



previously recorded spawning counts. Each streambed has been either created or significantly altered in the past twenty years. Carcasses and live salmon were counted while walking the streams, and species roughly estimated. A section 1.2 miles long of one creek had over 5,500 spawners, and the late Coho had not yet arrived.

Restoration and Education

Catherine Inman, Wasilla Soil and Water Conservation District

Wasilla Soil & Water Conservation District combines community education with salmon habitat restoration work. Providing area students, adult volunteers, and youth groups with hands-on stewardship projects helps citizens develop a strong conservation ethic. Natural resource science education is worked in through classroom lessons and on-site watershed health studies. We work with a wide range of agency and community partners. This presentation shows examples of habitat assessment and revegetation work on Mat-Su's streams, trails, and wetlands, and the ways education can be an important part of restoration projects.

Replacing Mat-Su Culverts at Colter Creek, Government Creek, & Kime Lane

Chuck Kaucic, Matanuska-Susitna Borough

The Matanuska-Susitna Borough Public Works Department has replaced culverts on the Borough road system to improve fish passage on prioritized road crossings. These projects are based on U.S. Fish and Wildlife prioritization in collaboration with Public Works priorities. Thirty sites with significant fish barrier characteristics were identified and prioritized for initial funding out of 130 Borough sites assessed. Project viability, value of positive impact on natural resources, watershed analysis, potential partners and dedicated MSB funding are considered in determining the crossings to be addressed. In 2008, MSB Public Works oversaw the replacement of culverts on Colter Creek and Government Creek, both tributaries to the Little Susitna River, and at Kime Lane at Nancy Lake.

Stream Temperature Monitoring Network for Mat-Su Basin Salmon Streams

Sue Mauger, Cook Inletkeeper

In the summer of 2008, Cook Inletkeeper and its Partners began implementing a Stream Temperature Monitoring Network to collect consistent, comparable temperature data for Mat-Su Basin salmon streams. Water and air temperature data loggers will be retrieved from 20 sites in October and GIS maps will be produced to illustrate temperature patterns, temperature exceedances and potential thermal refugia. The Stream Temperature Monitoring Network will allow fisheries managers and land-use planners to identify watershed characteristics with the greatest potential to buffer stream temperatures from climate and land-use change, and provide the knowledge and data needed to prioritize sites for future research, protection and restoration actions.

Spawning Distribution of Salmon in the Matanuska River Watershed

Doug McBride, U.S. Fish and Wildlife Service

As the human population in the Mat-Su Borough continues to grow, residential and urban development threatens salmon habitat in the Matanuska River watershed. The U.S. Fish and



Wildlife Service and our partners, the Chickaloon Native Village and the Alaska Department of Fish and Game, initiated a project to describe baseline run timing and spawning distribution of sockeye, chum, and coho salmon in the Matanuska River watershed. We used a fishwheel to capture migrating salmon from late July through September. Radio transmitters ($n = 300$) were deployed and tagged fish were tracked through the watershed with active searches and remote data loggers. As of 4 September, 355 sockeye, 191 chum, and 442 coho salmon were captured at the fishwheel with a mean catch per effort for salmon of 3.5 fish/hr. Other species captured included Chinook and pink salmon, Dolly Varden, rainbow trout, round whitefish, and longnose sucker. Telemetry searches are still being conducted. Results of the project will identify habitat important for sockeye, chum, and coho salmon, which will allow local land managers and planners to better protect and conserve important salmon habitat from current and future development activities in the Matanuska River watershed.

Clearwater Side Channels of the Matanuska River as Salmon Habitat

Monica McTeague, U.S. Geological Survey

The United States Geological Survey Alaska Science Center and Chickaloon Village have partnered to study the extent and conditions of clearwater side channel systems of the mainstem Matanuska River as potential salmon spawning habitat. Rapid movement of the braided Matanuska River results in abandoned channels that fill with clearwater from tributary or ground water sources. We traced these clearwater channels using aerial photography from 1949, 1960, 2004, and 2006 to understand persistence and quantity of side channels. Initial results of temporal analyses suggest that side channels persist for years to decades in a single location. This decadal scale formation of side channels suggests that although side channels may only persist at a particular site for several years, the quantity of side channels at a reach level appears to be fairly stable and this long-term stability of side channels at the reach level may provide suitable habitat for salmon spawning sites of coho, chum, and sockeye salmon.

Introduction of the Mat-Su Regulatory Field Office

Karen Nelson, US Army Corps of Engineers, Alaska District

The U.S. Army Corps of Engineers (Corps) has regulatory responsibilities for work in waters of the United States. Corps will discuss regulated activities, Corps jurisdictional boundaries, and permitting processes. In addition, Corps will introduce the new Mat-Su Field Office located in Wasilla.

Overview of Fish Passage and Projects in the MatSu

Bill Rice, U.S. Fish and Wildlife Service

Providing fish passage at road crossings is an integral part of maintaining sustainable salmon populations. Over 300 culverts have been assessed over the past 5 years in MatSu and more than half of them need improvements for fish passage. Over the past 10 years about 24 culverts have been replaced by partnership between US Fish and Wildlife Service, Mat-Su Operations and Maintenance Department (O&M), and private landowners. O&M has also replaced a number of other culverts during this time period while performing road improvement projects. Alaska Department of Transportation also has an active program of replacing culverts when replacing or improving roads in coordination with ADFG. In 2008, efforts were placed in two focus areas – the Little Susitna and Wasilla Creek drainages. The Nature Conservancy and the Chickaloon Traditional Village Council were active in replacing six culverts, and M&O



replaced six culverts, only one of which was outside these two focus areas. Future projects will be based on prioritization efforts and opportunities to create an even more comprehensive approach to habitat access across the Borough.

The Mat-Su Watershed Study – Status Update

Valerie (Hansen) Ringold, US Army Corps of Engineers, Alaska District

This study is unique in that it encompasses an area relatively pristine, but the Matanuska-Susitna watershed is also the fastest growing area of Alaska and among the fastest in the US. As population continues to grow, this area will have more development pressure and more impact on water resources. The watershed is part of the Cook Inlet Salmon Fishery and contains 5 species of native salmon commercially important and economically vital on a regional, national, and international scale. The Matanuska-Susitna Borough and other agencies identified the need for good science-based planning tools to assist in making better decisions regarding future development while preserving the health of natural resources. Begin underway with the study for just about 1 year now, we'll be giving an update on the project.

Wetland Mapping

Valerie (Hansen) Ringold, US Army Corps of Engineers, Alaska District

As part of the Mat-Su Watershed Study efforts and a follow-on to grant work completed by the MSB in 2007, wetland mapping was completed on close to 190,000 acres this summer. A total of 272,000 acres was mapped in 2007 and 2008. We'll tell you what areas have been mapped so far, give some general information on the mapping process and where we plan to head in the future.

Mat-Su Salmon Partnership & Conserving Salmon Habitat

Corinne Smith, The Nature Conservancy

The Matanuska-Susitna Basin Salmon Habitat Partnership formed to address increasing impacts on salmon from human use and development in the Mat-Su Basin with a collaborative, cooperative, and non-regulatory approach that brings together diverse stakeholders. The Partnership developed *Conserving Salmon Habitat in the Mat-Su Basin*, a Strategic Action Plan, to identify long-term goals and strategies and to provide a tool the Partnership can use to prioritize projects related to fish habitat goals in the Mat-Su Basin. The intent of the Strategic Action Plan is to identify long-term goals, strategies, and voluntary actions that the Partnership and others can undertake to conserve salmon habitat. The Mat-Su Salmon Partnership's broad goals are to protect salmon and their habitats in the Mat-Su Basin and Upper Cook Inlet, mitigate potential threats to salmon and their habitats, restore connectivity between salmon habitats, and increase knowledge about salmon and their use of freshwater and marine habitats. Better understanding of salmon's needs throughout the Mat-Su Basin and Cook Inlet would improve management of salmon habitat and implementation of the recommendations in this plan. Three science strategies were highlighted in the plan because the information they will gather will inform multiple focal issues. Additional research and information needs were identified in the plan. This 1st Mat-Su Basin Salmon Science and Restoration Symposium provides a forum to share information on restoration and research projects related to Mat-Su watersheds and salmon habitat conservation and to promote an exchange of ideas about salmon science and restoration in the Mat-Su Basin.



Colter Creek Fish Passage Restoration Project

Corinne Smith, The Nature Conservancy

The Colter Creek Fish Passage Restoration Project will restore juvenile fish passage, improve stream function, and enhance fish habitat on Colter Creek, the second largest tributary along the southern flank of the Talkeetna Mountains to the Little Susitna River, near Wasilla, Alaska. Only four culverts occur on Colter Creek; by the end of this project, all will pass migratory fish and adequately provide for stream flow and process. A perched culvert crossing at Sitze Road constricts the creek and blocks juvenile fish passage. The Matanuska-Susitna Borough (MSB), with technical assistance from the U.S. Fish and Wildlife Service (USFWS) and financial support from The Nature Conservancy (TNC), replaced this culvert with an arched pipe in September 2008. Three culvert crossings upstream on private driveways severely constrict the creek and present velocity barriers to juvenile salmon. TNC worked with the landowners to replace the driveway culverts in June 2008, thus allowing unrestricted migration of both adult and juvenile salmonids within the Colter Creek watershed. The sites were incorporated into an existing environmental education program conducted by the Wasilla Soil and Water Conservation District (WSWCD) for local elementary school children. The Upper Susitna Youth Conservation Corps revegetated the site with willow cuttings and transplanted shrubs, trees, and ferns.

Upcoming Major Projects in the Mat-Su, Including ARRC, ANGDA, and KABATA

Serena Sweet, US Army Corps of Engineers, Alaska District

What is going on in your backyard? This presentation will include briefings on current big projects, including Alaska Railroad Port Mackenzie Rail Spur Project, Alaska Natural Gas Spur Line, KATABA: Knik Arm Bridge, and others. Information will include current status of the projects and plans and research being conducted for each project.

Inventory of Fish Distribution in Mat-Su Basin Streams, Southcentral Alaska, 2008

Theresa Tanner, U.S. Fish and Wildlife Service

Residential and commercial development in the Matanuska-Susitna (Mat-Su) Borough in southcentral Alaska is a threat to fish habitat. Fish habitat protection authorities and planning processes in Alaska are constrained by the extent of current knowledge of fish distributions and their habitats. Some protections provided under AS 41.14.870 only apply to waters specified in the *Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes* (AWC). The Anchorage Fish and Wildlife Field Office initiated this project to increase coverage of the AWC for Mat-Su Basin water bodies. We sampled 79 reaches in 29 different streams in 2008, resulting in 18 total nominations for addition to the AWC. Additionally, we reported 10 previously unpublished, unmapped streams, of which four were nominations for addition to the AWC. Coho salmon (*Oncorhynchus kisutch*) and Dolly Varden (*Salvelinus malma*) were the most common species sampled in 2008. Other species captured in 2008 included Chinook salmon (*O. tshawytscha*), Alaska blackfish (*Dallia pectoralis*), threespine stickleback (*Gasterosteus aculeatus*), and sculpin (*Cottus* spp). Most streams sampled in 2008 were small (< 5 m width) 1st and 2nd order streams. This project continues to support the goals and objectives of the Mat-Su Basin Salmon Habitat Partnership and the National Fish Habitat Action Plan.



Matanuska Watershed Ecosystem Based Plan

Angie Wade, Chickaloon Village Traditional Council

The boundaries of the Matanuska River valley range from the Talkeetna Mountains to the north, the Matanuska Glacier to the east, the Chugach National Forest to the south, and the Cook Inlet/Gulf of Alaska to the west. It is extremely rugged and diverse terrain, spanning 10,000 foot mountains and impassable glaciers, numerous rivers, streams, lakes and wetlands, and coastal habitats at sea level. The northern boreal forest, primarily a spruce-birch-aspen mix, covers much of our mid-altitude lands and provides much of our sustenance. Historically harvested resources include salmon, moose, caribou, beluga whale, grizzly, and black bear, Dall sheep, beaver, hare, birch bark, berries, spruce roots, and numerous other animals and plants for food, medicine, tools, and fiber. As one of the few Alaska Native villages on the road system, we live in a culturally integrated community. It is essential that Chickaloon Native Village acts as a steward of its own land, and advocates for appropriate, non-damaging activities on adjacent lands. The Ecosystem Based Plan focuses on lands currently owned by Chickaloon Native Village, but encompasses the entire Matanuska Valley, which are ecologically inseparable. *We recognize that ecosystems don't follow land ownership boundaries.* As a result, this project is designed to help bridge the gap between Native and non-Native communities by serving both the Tribal community of Chickaloon Village and the larger community of the Matanuska Valley.

Wasilla Creek Fish Passage Restoration

Brian Winnestaffer, Chickaloon Village Traditional Council

The Wasilla Creek watershed contains some of the most spectacular wetlands in Southcentral Alaska with productive salmon streams, diverse wildlife habitats and wild, dynamic biotic systems. Within the watershed are residential communities that are the fastest developing areas of the state and some of the fastest growing in the country. This project built upon efforts from the previous Chickaloon Native Village Upper Wasilla Creek Project in 2007, which analyzed the three main impacted culverts on Upper Wasilla Creek, and replaced the culvert furthest downstream with a culvert which passes both adult and juvenile salmon. This NFHAP 2008 project focused on replacing the remaining two impaired culverts within the upper Wasilla Creek drainage area associated with Murphy Road.

Thermal Variability and Incubation of Salmon in the Matanuska River, Alaska

Chris Zimmerman, U.S. Geological Survey

Water temperature and dissolved oxygen play an important role in determining the developmental timing and survival of salmonid eggs and alevins. Due to variation in the source of inter-gravel water (e.g., down-welling surface water, up-welling ground water) inter-gravel water temperature can vary greatly over small spatial scales. In some locations, salmon select for a suite of inter-gravel conditions that maximize developmental timing and survival. We are examining the variability in inter-gravel temperatures in side-channels used by spawning salmon in the Matanuska River. We are mapping inter-gravel water temperatures across spawning areas by taking point measurements. Recording thermistors will be deployed to measure water temperature during the incubation period. Accumulated thermal units will be calculated to determine potential developmental timing in spawning areas. These data will be useful in determining habitat selection and survival of salmon.



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SCIENCE NEEDS from *Conserving Salmon Habitat in the Mat-Su, the Strategic Action Plan of the Mat-Su Salmon Partnership*

The Mat-Su Salmon Partnership's broad goals are to protect salmon and their habitats in the Mat-Su Basin and Upper Cook Inlet, mitigate potential threats to salmon and their habitats, restore connectivity between salmon habitats, and increase knowledge about salmon and their use of freshwater and marine habitats. Better understanding of salmon's needs throughout the Mat-Su Basin and Cook Inlet would improve management of salmon habitat and implementation of the recommendations in the strategic action plan. Three science strategies are highlighted in the plan because the information they will gather will inform multiple focal issues for salmon and salmon habitat in the Mat-Su Basin.

The full plan is available at <http://conserveonline.org/workspaces/MatSuSalmon>.

Overarching Science Strategies

Objective 1.1: Anadromous Waters Catalog

By 2020, all anadromous fish habitat in the Mat-Su Basin will be included in the Anadromous Waters Catalog and thus given basic protections afforded under state law. Efforts to catalog anadromous fish should also document non-anadromous fish.

Strategic Action 1.1.1: Complete Anadromous Waters Catalog

Develop a cooperative, long term implementation and funding plan that accomplishes inventories of all anadromous fish habitat for inclusion in the Catalog and identifies fish species present.

Objective 1.2: Comprehensive Surface & Groundwater Studies

By 2012, a comprehensive water quantity program will increase understanding of surface and groundwater, including quantities, flows, and variability in the Mat-Su Basin, and provide information for implementing and monitoring strategies for instream flow needs, stormwater management, fish passage, and climate change.

Strategic Action 1.2.1: Implement Study Plan and Water Data Clearinghouse

Develop a cooperative baseline & monitoring plan by winter 2008. Seek funding sources to implement and sustain plan. Develop clearinghouse to oversee funding efforts & identify lead entity to manage data by winter 2008.

Strategic Action 1.2.2: Support USGS Groundwater Program

Work with USGS groundwater modeling and monitoring program to ensure consistency with Partnership goals. Support and help secure funding for USGS program.

Strategic Action 1.2.3: Monitor Groundwater Use

Implement comprehensive well log database by 2009 and house information in a central location with public access. ADNR, Mat-Su Borough (MSB), or USGS may house this.

Strategic Action 1.2.4: Collect Hydrologic Data

Continuously gather hydrologic data with stream gages in three to five index watersheds. These index watersheds will be important to salmon and representative of Mat-Su Basin streams, and/or vulnerable to human activities and change in the Mat-Su Basin. USGS and other partners will collaborate on operating and securing funding for this stream gage network.



Objective 1.3: Water Quality Monitoring

By 2010 a comprehensive baseline and monitoring program for water quality exists to track and manage changes in Mat-Su Basin waterbodies.

Strategic Action 1.3.1: Develop Comprehensive Water Quality Monitoring Program

Work with Alaska Clean Water Actions program and other partners to develop a comprehensive water quality monitoring program for the Mat-Su Basin.

Strategic Action 1.3.2: Strengthen and Expand Water Quality Monitoring

Support and help secure funding for existing water quality programs. Seek long-term funding for a comprehensive program in the Mat-Su Basin.

Strategic Action 1.3.3: Support Baseline Data for Stream Temperatures

Support monitoring of temperatures in Mat-Su Basin waterbodies.

Additional Research Needs

Information on salmon and salmon habitats, as well as assessment of development, restoration, and mitigation measures, are essential components to effective salmon conservation. Development of accurate and predictive models is critical for effective conservation actions. Research priorities specific to watersheds will likely require a gap analysis for the watershed in question. During development of the Strategic Action Plan, the Science Working Group identified general and specific research needs. Many of those needs appear as objectives and strategic actions in the plan. This appendix (8 in the full plan) presents the full list for use by partners to development research programs.

General Research Needs:

- Assess the effects of passage barriers on fish populations.
- Assess the probable impacts of climate change for each focal conservation target.
- Assess impacts to salmon habitat from changes in hydrography.
- Develop and assess water quality and quantity baselines.
- Identify and classify critical salmon habitats, and monitor physical and biotic characteristics.
- Estimate salmon distribution and abundance; and assess stock status and limiting factors.
- Assess the likely effects of a coal-fired power plant on the focal conservation targets.
- Assess the cumulative impacts of development in riparian areas.
- Identify representative streams and stream reaches to conduct baseline and long-term monitoring.
- Conduct process studies to better understand systems.
- Document value of undeveloped riparian areas for acquisitions and conservation easements.
- Monitor dissolved oxygen in lakes classified as oligotrophic to confirm that the low dissolved oxygen status has a physical origin (e.g. long period of ice cover and subsequent quick stratification of the lakes does not allow adequate time for mixing and oxygenation), not a nutrient origin, and better understand the cause and implication of the low values.



To achieve objectives for focal issues identified in the Strategic Action Plan, the following research and monitoring needs were identified as action items:

Alteration of Riparian Areas:

1. Map and prioritize riparian habitats.
2. Prioritize subwatersheds based on a high importance for salmon, an expected high return on investment, and priorities already identified by partner programs.
3. Develop standards for riparian buffer protection on all lands sold by the state.

Filling of Wetlands:

1. Identify priority salmon watersheds within the Mat-Su Basin according to vulnerability and importance to salmon.
2. Map wetlands within priority watersheds.
3. Develop functional assessment methodology for all Mat-Su wetlands to aid in prioritization for protection.

Impervious Surfaces:

1. Develop Best Management Practices for new developments on municipal, state and private lands.
2. Assess current level and extent of imperviousness.
3. Institute a comprehensive baseline and monitoring program for water quality and quantity for surface and ground water in the Mat-Su Basin by 2010.
4. Develop baseline & monitoring plan by winter 2008.

Culverts that Block Fish Passage:

1. Inventory all anadromous fish habitat for inclusion in the Anadromous Waters Catalog.
2. Develop and implement culvert monitoring plan to ensure fish passage maintained or improved.
3. Assess fish passage status on all culverts on state and borough roads by Fall 2009; Inventory and assess all culverts on private roads and the railroad by 2012.
4. Prioritize culverts based on an analysis of benefit to fish versus cost of replacement.
5. Develop a fish passage educational and outreach program.
6. Identify index watersheds and start gathering hydrologic data.

Invasive Northern Pike:

1. Develop and implement a collaborative research plan on Northern pike invasion pathways.
2. Develop and implement a collaborative control program.
3. Develop a collaborative outreach program.

Stormwater & Urban Runoff:

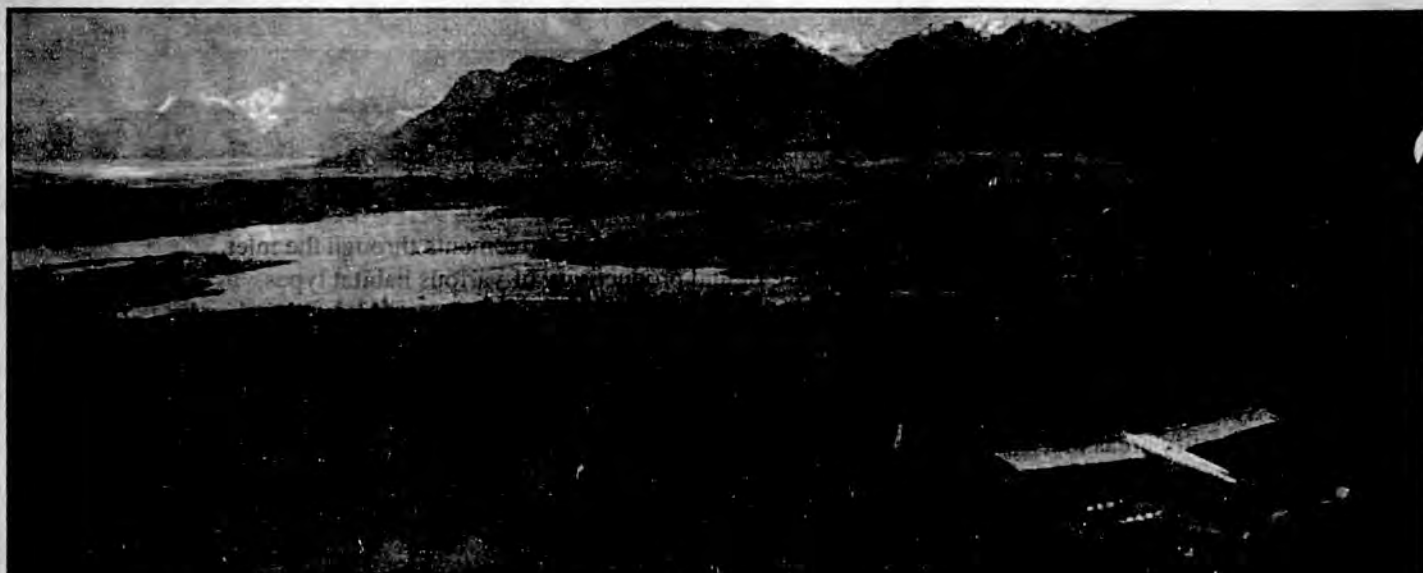
1. Assess adequacy of National Pollutant Discharge Elimination System (NPDES) permitting and adequacy of Alaska Department of Environmental Conservation (ADEC) monitoring.
2. Map and identify stormwater drainage network that includes pipes and ditches.
3. Map accumulations of stormwater runoff in streams.
4. Determine current impact of runoff to water quality and hydrograph of streams and lakes.
5. Maintain adequate water volume in anadromous streams through instream water reservations.
6. Develop Best Management Practices for new developments on municipal, state and private lands.



1. Identify and map habitat types in Cook Inlet.
2. Use sampling telemetry to map salmon distribution and movements through the inlet.
3. Use this information to determine use of and productivity of various habitat types.
4. Study processes in the inlet and interactions with salmon, similar to studies undertaken by Exxon Valdez Oil Spill (EVOS) Trustee Council in Prince William Sound.

1. Identify areas that are poorly-suited to onsite systems and/or that are subject to existing ADEC regulations.

1. Prioritize anadromous streams and lakes for water reservations based on importance to salmon and vulnerability.
2. File for water reservations on the highest priority anadromous lakes and stream reaches.
3. Prioritize watersheds for gaging network based on importance to salmon and vulnerability.
4. USGS and other Partners will collaborate on operating a stream gage network.
5. Identify current and future water needs based on population trends and assess capacity of groundwater supply.



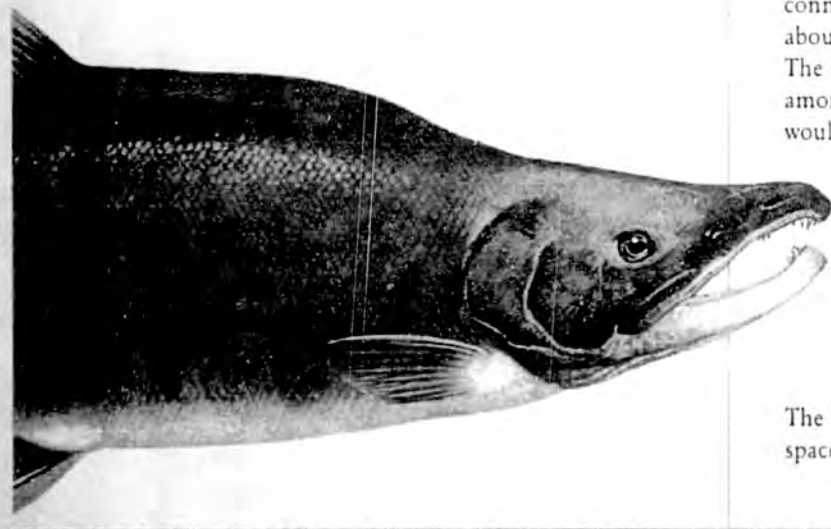
Clark James Mueller

The Matanuska Susitna Basin Salmon Habitat Partnership

Thriving fish, healthy habitats, and vital communities in the Mat-Su Basin

In Alaska, nature runs on salmon. Hundreds of thousands of wild salmon return to spawn in the Matanuska-Susitna Basin, where lakes and rivers serve as a nursery for salmon and other fish, including world-class rainbow trout, char and grayling. The five species of wild salmon that share these living waters help define life for people in the Mat-Su Basin.

Though the Mat-Su Basin's rivers, lakes, wetlands, tundra, boreal forest, glaciers and mountain ranges include some of the wildest terrain on earth, communities in the lower reaches of the basin comprise the fastest growing region in Alaska. To help ensure that wild salmon survive in a place where development pressures are growing, the Matanuska-Susitna Basin Salmon Habitat Partnership was formed.



A partnership

The Mat-Su Salmon Partnership believes that thriving fish, healthy habitats, and vital communities can co-exist in the Mat-Su Basin.

The Partnership is addressing the growing list of impacts to wild salmon habitat with an approach that is collaborative, cooperative, and non-regulatory. It brings together a diverse group of people from business and government and the non-profit community who are concerned with the health of wild salmon.

The Mat-Su Salmon Partnership developed a Strategic Action Plan to identify collaborative projects and other actions that will protect and restore important habitat for wild salmon in the Mat-Su Basin. The broad goals are to protect salmon and their habitats in the Mat-Su Basin and Upper Cook Inlet, mitigate potential threats to salmon and their habitats, restore connectivity between salmon habitats, and increase knowledge about salmon and their use of freshwater and marine habitats. The plan's conservation strategies encourage collaboration among multiple partners to achieve common objectives that would be difficult for any one partner to accomplish alone.

The history of salmon in other parts of the world indicates that wild salmon cannot persist in their full abundance unless stakeholders work together to protect salmon habitat. Only in working together, can all the key components for salmon habitat be protected to ensure healthy, abundant salmon runs in the Mat-Su Basin into the future.

The Plan is available at <http://conserveonline.org/work-spaces/MatSuSalmon>

National Fish Habitat Action Plan

The Mat-Su Salmon Partnership's focus on a bottom-up, locally driven, voluntary and non-regulatory effort was inspired by the approach outlined in the National Fish Habitat Action Plan. Its mission is to protect, restore, and enhance the nation's fish and aquatic communities through partnerships that foster fish habitat conservation and improve the quality of life for the American people.

National Fish Habitat Action Plan is available at www.fishhabitat.org



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Mat-Su
salmon
PARTNERSHIP



Partners as of September, 2008

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Alaska Dept. of Environmental Conservation
Alaska Dept. of Fish & Game
Alaska Dept. of Natural Resources
Alaska Dept. of Transportation & Public Facilities
Alaska Center for the Environment
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Cook Inletkeeper
Environmental Protection Agency
Friends of Mat-Su
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Knik River Watershed Group
Matanuska River Watershed Coalition
Matanuska-Susitna Borough
National Marine Fisheries Service
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Palmer Soil & Water Conservation District
Sierra Club
The Conservation Fund
The Nature Conservancy
Upper Susitna Soil & Water Conservation District
US Army Corps of Engineers
US Fish & Wildlife Service
US Geological Survey
USDA Forest Service
Wasilla Soil & Water Conservation District



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Matanuska-Susitna Rivers Watershed Study

Local Sponsor: Mat-Su Borough



Location & Description: The project location includes the entire watershed area of the Matanuska and Susitna Rivers in addition to the Knik River with its confluence to Upper Cook Inlet. The Matanuska-Susitna Valley area commonly known as the Mat-Su valley is approximately 24,000 square miles in size. The Matanuska River is a significant natural resource. It rises in the glacier fields of the Chugach Mountains and flows westerly for about 75 miles to empty into the Knik River and ultimately into Knik Arm at the head of Cook Inlet. The Susitna River, highly valued for its salmon fisheries, originates with the Susitna Glacier located on Mount Hayes in the Alaska Range. This 300 mile river flows in a winding course generally southwest to Curry, then south along the west side of the Talkeetna Mountains, past the villages of Talkeetna, Chulitna and Susitna and drains into Cook Inlet about 25 miles west of Anchorage.

Problem & Need: The overall purpose of this study is to produce a comprehensive watershed assessment for the Matanuska-Susitna watershed. The watershed assessment will provide several planning tools and products that will serve as a decision-making framework for local, state, and federal agencies, and other interested stakeholders including private property owners. An important component of this process will be a concentrated effort on the wetlands resources. In scoping this study effort, wetlands resources were brought up at almost every meeting with every stakeholder as a resource of concern. We will be working on a coordinated multi-agency effort to map, delineate jurisdictional wetlands, as well as perform a qualitative functional assessment of the wetland resources in currently developed, developing, and areas recognized for future development within the watershed.

These tasks will support the activities and research of on-going efforts in the Matanuska-Susitna Rivers watershed. The process will not duplicate existing or on-going research and data collection but will provide a vehicle for using the existing information in a watershed context. The intent of this study and the watershed assessment is to work as an umbrella to bring together in a collaborative manner all of the groups currently working in the watershed.

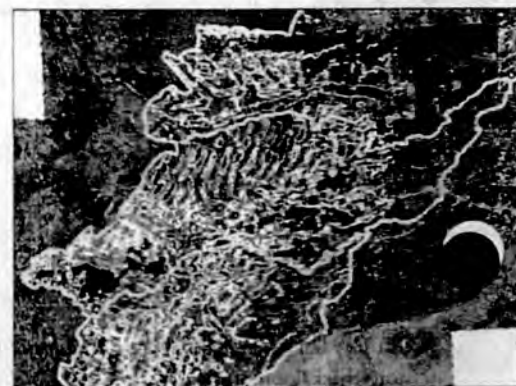
Activities for 2008/2009: In 2008, three sub-watershed areas were selected for wetland mapping: the Big Lake, Knik-Fairview and Little Susitna. In 2007 the area commonly known as the Core Area was mapped. A total of 271,764 acres have now been mapped in 2007 and 2008. Overall, 55,501 acres of wetlands cover the three watersheds mapped in 2008; making up about 29% of the land surface. In addition, a technical committee consisting of members from Federal, State, Local governments and private organizations are developing a wetlands functional assessment methodology to help better understand and predict how a wetlands functions on the landscape and what is the associated values of those functions. Both the mapping and the methodology work will continue in 2009 and 2010 fiscal years.

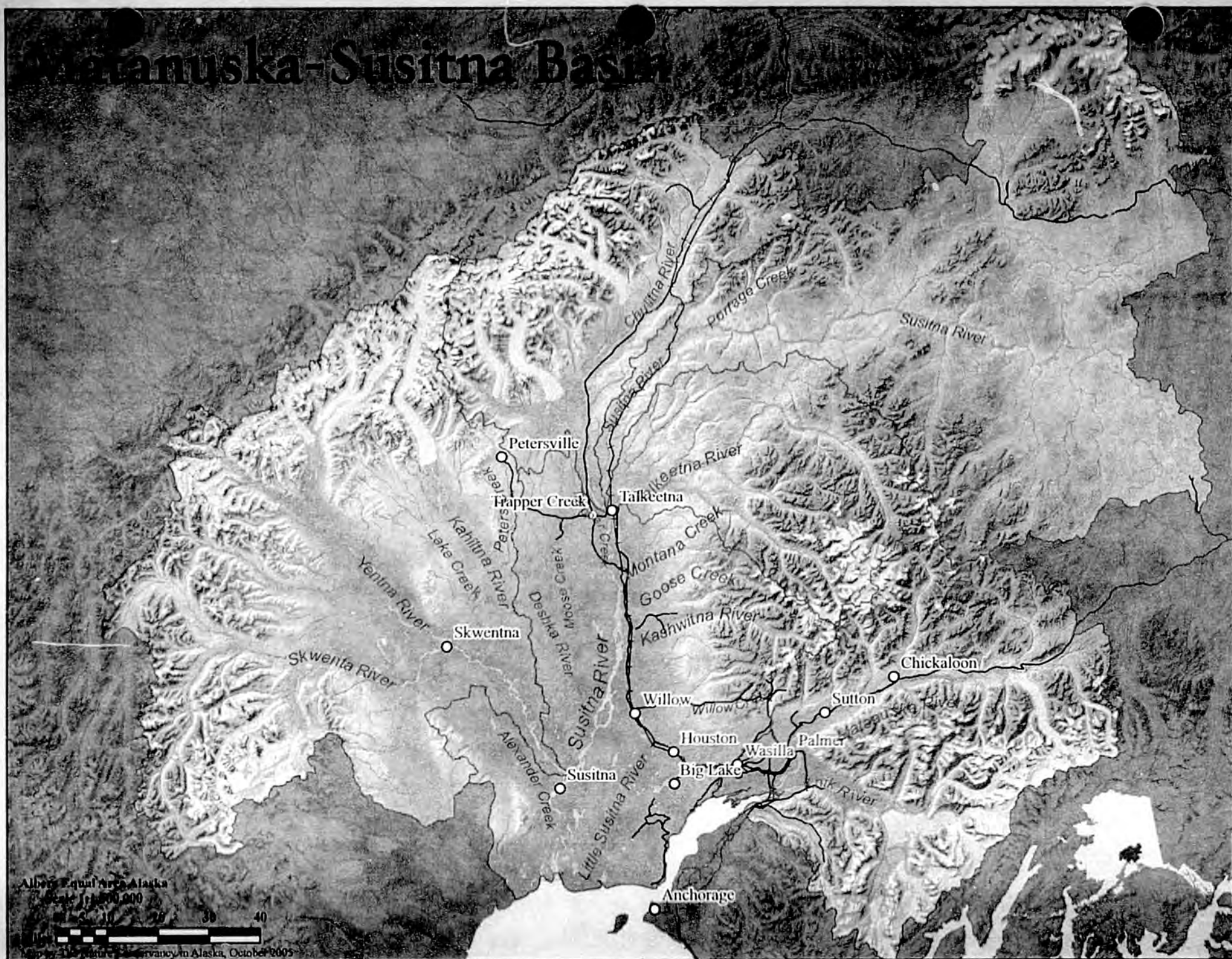
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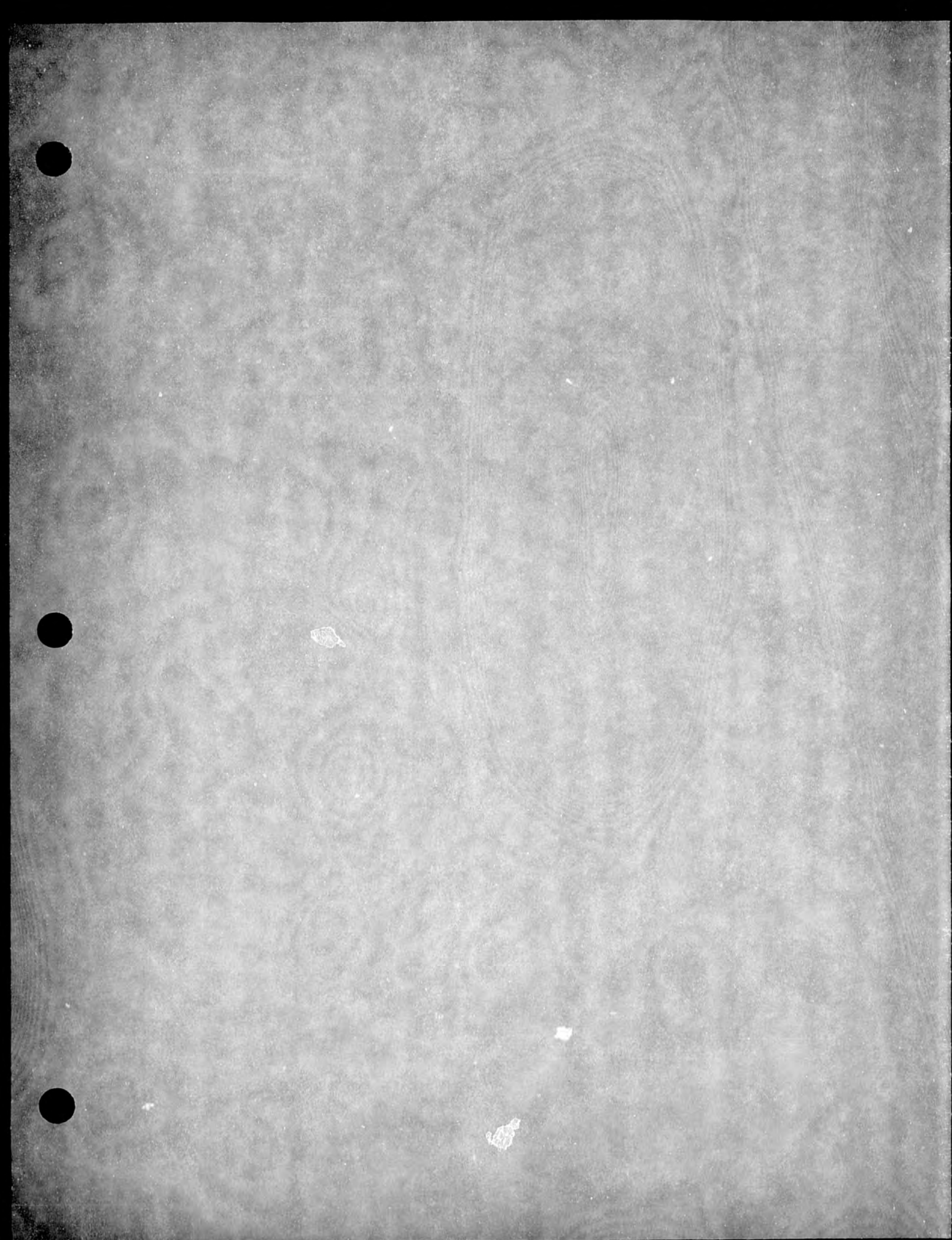
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david.a.martinson@usace.army.mil







Title 5. Fish and Game.

Chapter 21. Cook Inlet Area.

Article 3. Salmon Fishery.

5 AAC 21.333(a) is amended to read:

(a) Except as specified in (e-g) of this section, two Cook Inlet drift gillnet CFEC permit holders may concurrently fish from the same vessel and jointly operate up to 200 fathoms of drift gillnet gear under this section.

5 AAC 21.333(c) is amended to read:

(c) When two Cook Inlet drift gillnet CFEC permit holders fish from the same vessel and jointly operate **additional** drift gillnet gear under this section, the vessel must display its ADF&G permanent license plate number followed by the letter "D" to identify the vessel as a dual permit vessel. The letter "D" must be removed or covered when the vessel is operating with only one **registered** drift gillnet CFEC permit holder on board the. The **permanent license plate** [IDENTIFICATION] number and letters must be displayed

...

5 AAC 21.333(e) is repealed and readopted to read:

(e) The joint operation of additional drift gillnet gear under this section is not allowed when drift gillnet gear is restricted to any of the following areas:

...

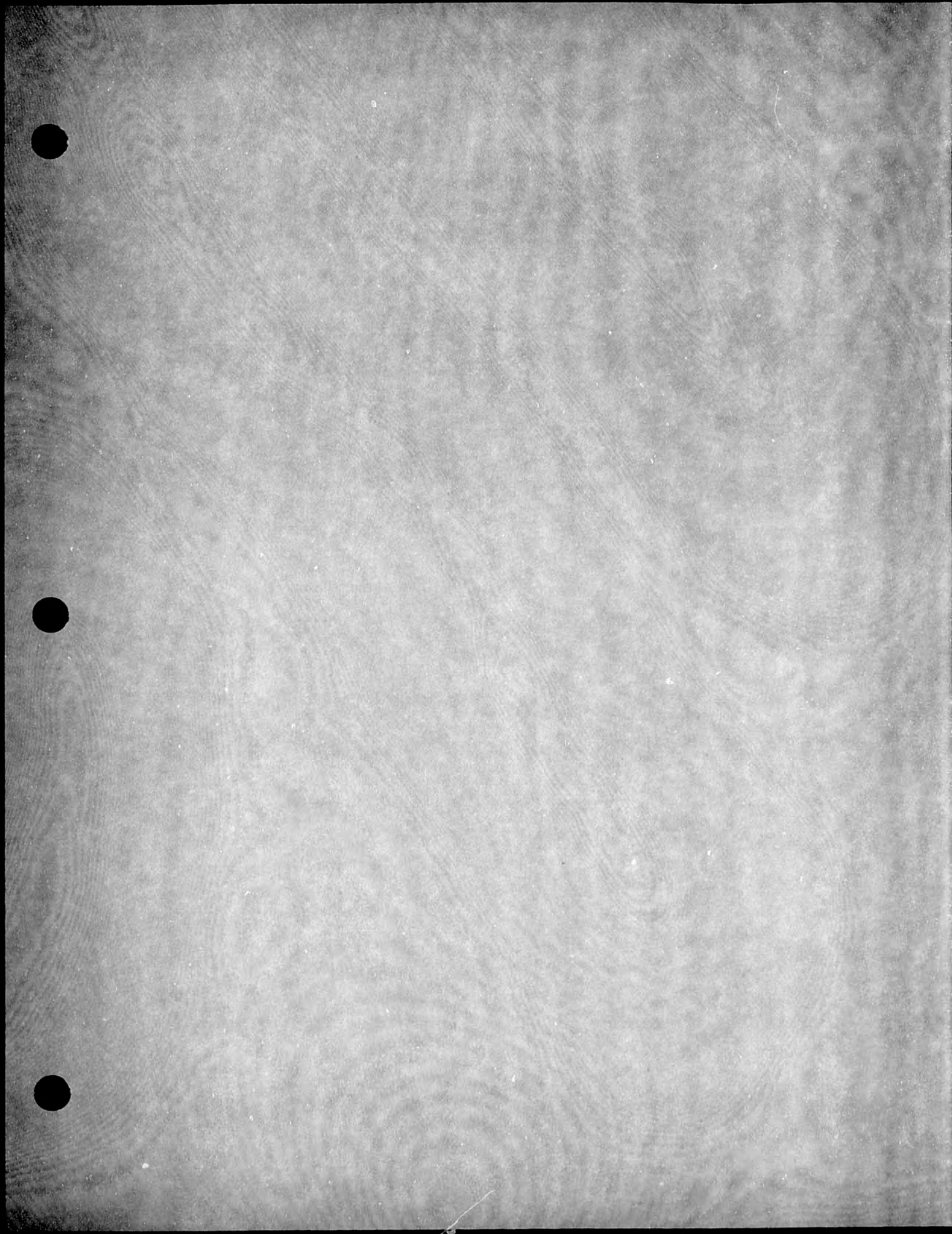
5 AAC 21.333 is amended by adding new subsections to read:

(f) A vessel with two registered CFEC permit holders on board, when transitting through any area where the legal limit of gillnet gear is less than 200 fathoms, may have on board up to 200 fathoms of gillnet gear as long as no portion of the gear is deployed into the water;

(g) When fishing on a vessel with two registered CFEC permit holders on board in areas where the operation of gear is restricted to less than 200 fathoms of gillnet as specified in subsection (e) of this section, the gillnet in excess of the legal limit must be removed from the reel and securely bagged or sacked. (Eff. 6/4/2008, Register 186; am

_____/_____/2008, Register _____)

Authority: AS 16.05.251





Salmon

Herring

Groundfish

Shellfish



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Fax: 907-465-2604
TTY: 800-478-3648 or
907-465-3646

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- † [Press Release: ADF&G Unveils New Publication Today at Board Of Fisheries: "Sustaining Alaska's Fisheries: Fifty Years of Statehood"](#)
- † [2009 Bristol Bay Sockeye Salmon Processing Capacity Survey - \(PDF 46KB\)](#)
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- † [2009 Bristol Bay Sockeye Salmon Forecast - \(PDF 92KB\)](#)



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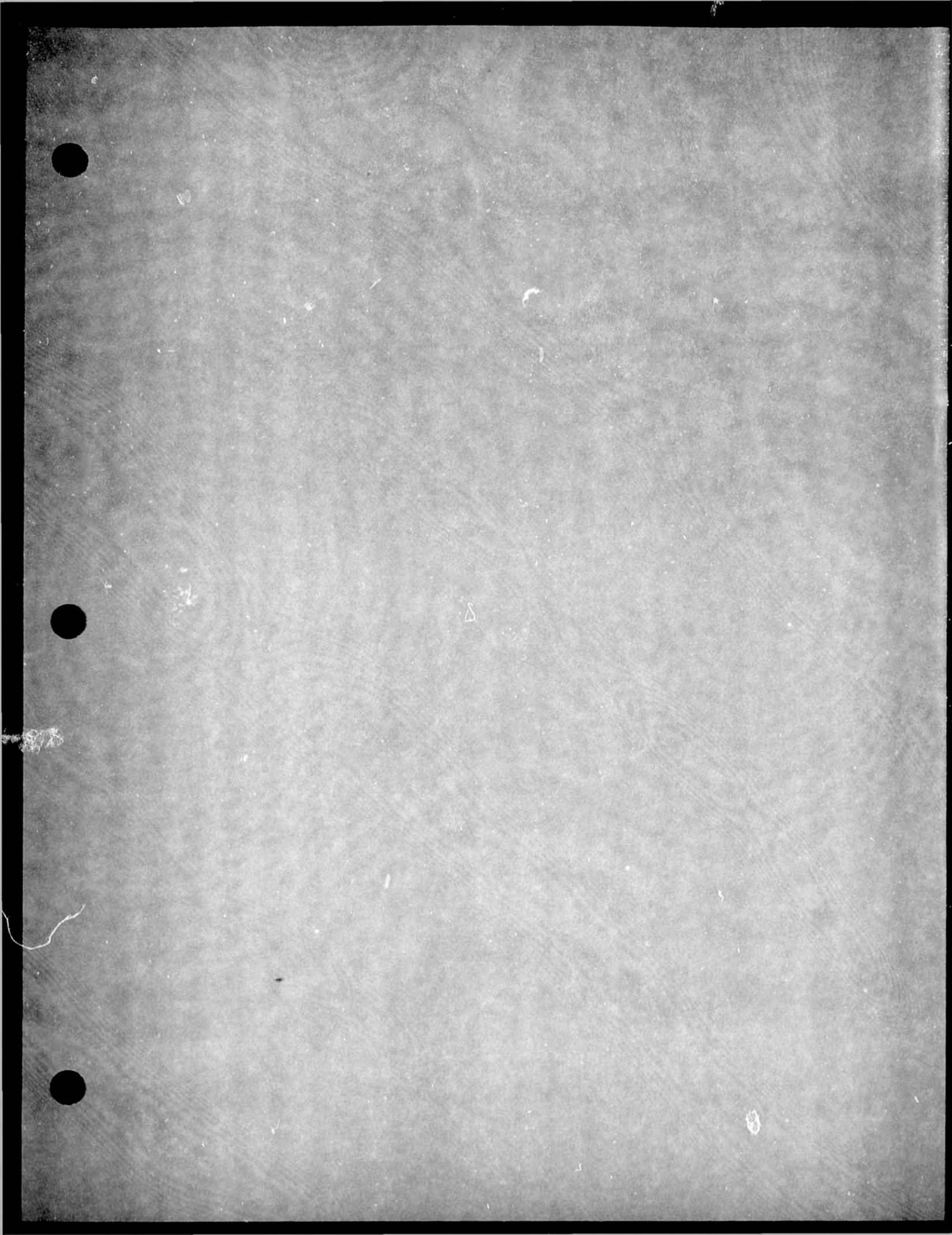
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(Upper Cook Inlet Salmon and Herring)

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Cook Inlet Fisheries

(Sport, Commercial, Personal Use, and Subsistence Fisheries)

Detailed river system information is available through clickable links in the map, through the tables below, or by using the following text links: [Kenai River](#), [Russian River](#), [Kasilof River](#), [Northern Cook Inlet \(Yentna and Susitna Rivers\)](#). See also [Commercial Fisheries: Upper Cook Inlet / Lower Cook Inlet](#), and [Sport Fisheries Lower Cook Inlet](#).

Salmon Run Timing:

Kenai River	May	Jun	Jul	Aug	Sep
-------------	-----	-----	-----	-----	-----

King Salmon

Early Run

Late Run

Red Salmon

Silver Salmon

Pink Salmon

[Text Version](#)

Russian River	May	Jun	Jul	Aug	Sep
---------------	-----	-----	-----	-----	-----

Red Salmon

Early Run

Late Run

[Text Version](#)

Kasilof River	May	Jun	Jul	Aug	Sep
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King Salmon

Red Salmon

Silver Salmon

[Text Version](#)

Susitna River	May	Jun	Jul	Aug	Sep
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King Salmon

Red Salmon

Silver Salmon

Pink Salmon

Chum Salmon

[Text Version](#)

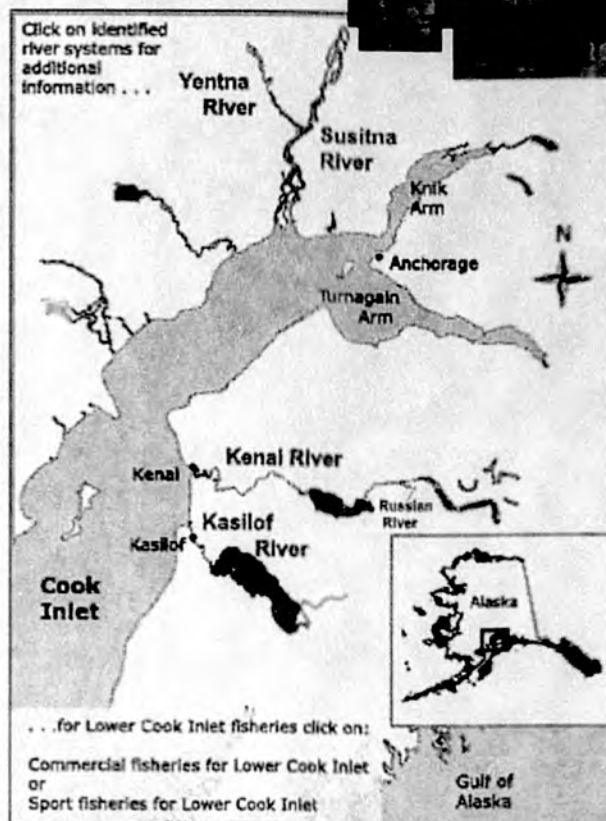
Yentna River	May	Jun	Jul	Aug	Sep
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King Salmon

Red Salmon

Silver Salmon

[Text Version](#)



Upper Cook Inlet Commercial Fisheries Information

For Lower Cook Inlet Information please go to the following links: [Commercial Fisheries for Lower Cook Inlet](#) | [Sport Fisheries for Lower Cook Inlet](#).

Contact Information:

Commercial Fishing

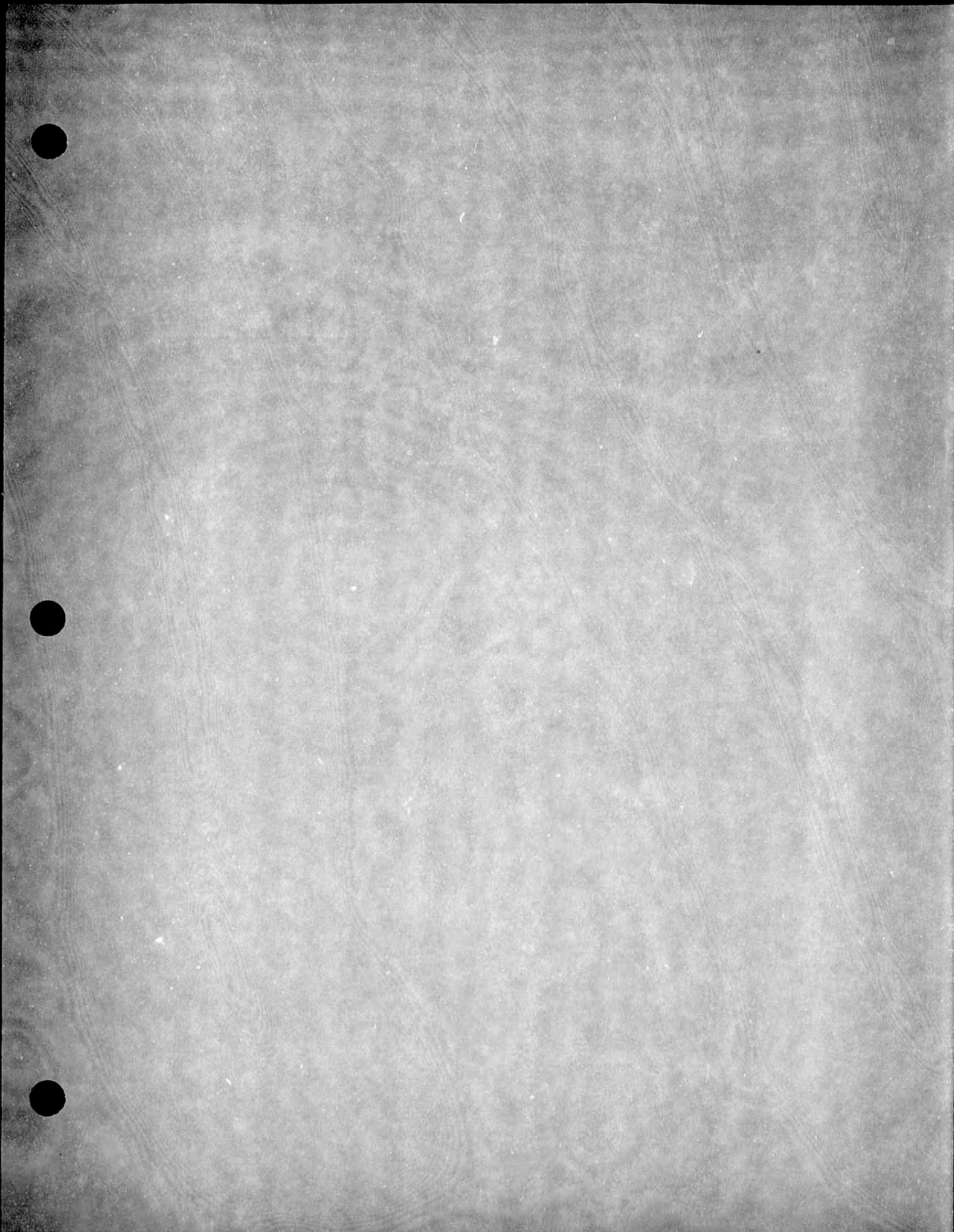
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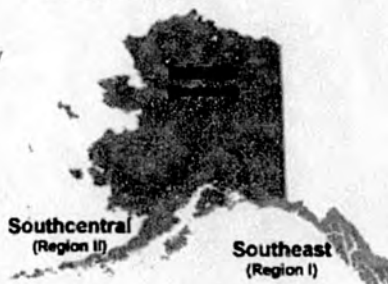
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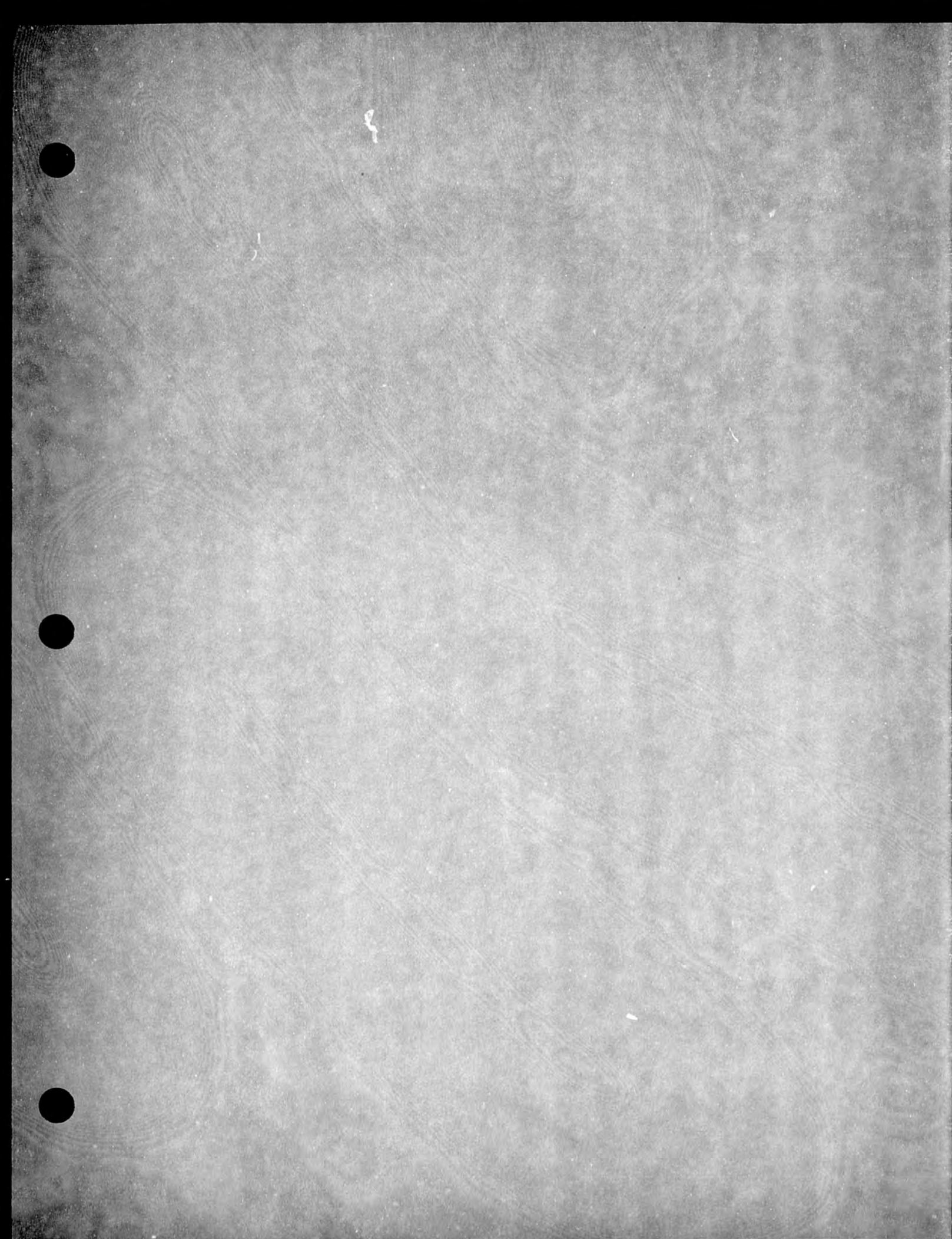
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December 1-7, 2008 [7 days]	Prince William Sound	Agenda/Roadmap Legal Notice Board of Fisheries Dept. of Law Findings/Policies Subsistence Materials Proposals Supplemental Proposals Index of Comments AC Comments Public Comments RC Index & Staff Comments RCs 5-38 RCs 38-123	32KB 76KB 112KB 1.41MB 2.35MB 795KB 405KB 35KB 160KB 2.10MB 12.8MB 13.8MB 11.1MB
January 21-27, 2009 [7 days]	Southeast and Yakutat Shellfish	Agenda/Roadmap Legal Notice Board of Fisheries Findings/Policies Dept. of Law Miscellaneous Proposals Subsistence Materials Index of Comments AC Comments Public Comments RC Index & Staff Reports RCs	73KB 35KB 52KB 496KB 3.02MB 1.61MB 329KB 795KB 75KB 2.06 MB 9.25 MB 214 KB 6.48 MB
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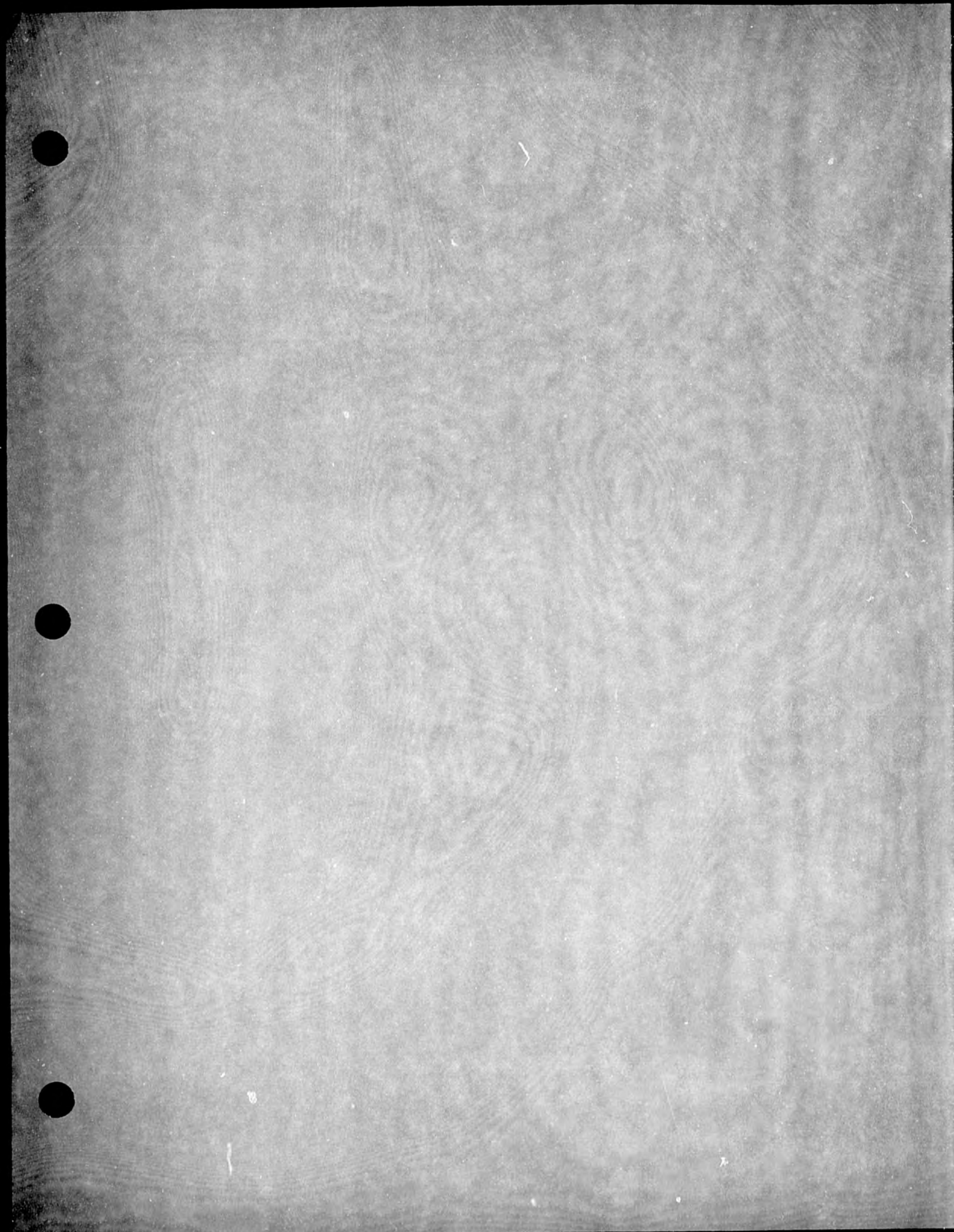
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Last updated: February 13, 2009



Review of Salmon Escapement Goals in Upper Cook Inlet, Alaska, 2007

by
Lowell F. Fair,
Robert A. Clark,
 and
James J. Hasbrouck

November 2007

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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FISHERY MANUSCRIPT NO. 07-06

REVIEW OF SALMON ESCAPEMENT GOALS IN UPPER COOK INLET, ALASKA, 2007

by

Lowell F. Fair,
Division of Commercial Fisheries, Anchorage
and
Robert A. Clark, and James J. Hasbrouck
Division of Sport Fish, Anchorage

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REVIEW OF SALMON ESCAPEMENT GOALS
IN UPPER COOK INLET, ALASKA, 2007

Lowell F. Fair,
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and

Robert A. Clark, and James J. Hasbrouck
Alaska Department of Fish and Game, Division of Sport Fish,
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This document should be cited as:

L. F. Fair, R. A. Clark, and J. J. Hasbrouck. 2007. Review of salmon escapement goals in Upper Cook Inlet, Alaska, 2007. Alaska Department of Fish and Game, Fishery Manuscript No. 07-06, Anchorage.

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ABSTRACT

In January 2007, a salmon escapement goal review committee, composed of Alaska Department of Fish and Game staff from the Division of Commercial Fisheries and Division of Sport Fish, was formed to review Pacific salmon *Oncorhynchus* spp. escapement goals for the major river systems in Upper Cook Inlet, Alaska. Escapement goals were evaluated for 22 Chinook salmon, 1 chum salmon, 3 coho salmon, and 8 sockeye salmon stocks. The committee did not recommend a change to any existing goals, however, the committee recommended re-instating the sustainable escapement goals (SEG) of 50–700 for Campbell Creek Chinook salmon and 15,000–30,000 for Packers Creek sockeye salmon. In addition, the committee recommended removing the SEG for South Fork Eagle River Chinook salmon and Campbell Creek coho salmon.

Key words: Upper Cook Inlet, escapement goal, biological escapement goal, BEG, sustainable escapement goal, SEG, sockeye salmon, *Oncorhynchus nerka*, Chinook salmon, *O. tshawytscha*, coho salmon, *O. kisutch*, chum salmon, *O. keta*, Alaska Board of Fisheries.

INTRODUCTION

Upper Cook Inlet (UCI), Alaska, supports all five species of Pacific salmon *Oncorhynchus*. The Alaska Department of Fish and Game (ADF&G; department) reviews the escapement goals for UCI salmon stocks on a schedule that corresponds to the Alaska Board of Fisheries (BOF) 3-year cycle for considering area regulatory proposals. This report describes the UCI salmon escapement goals that were reviewed in 2007 and presents information from the subsequent 3 years in the context of these goals. UCI escapement goals were thoroughly reviewed during the previous 2004–2005 BOF cycle (Clark et al. 2007; Hasbrouck and Edmundson 2007). Due to the thoroughness of the previous analyses, this review re-analyzed only those goals with recent (2004–2006) data that substantially changed findings from the 2004 review.

Escapement goals were reviewed based on the Policy for the Management of Sustainable Salmon Fisheries (SSFP; 5 AAC 39.222) and the Policy for Statewide Salmon Escapement Goals (EGP; 5 AAC 39.223). The Alaska Board of Fisheries adopted these policies into regulation during winter 2000–2001 to ensure that the state's salmon stocks are conserved, managed, and developed using the sustained yield principle. Two important terms defined in the SSFP were:

“Biological Escapement Goal” or “(BEG)” means the escapement that provides the greatest potential for maximum sustained yield; BEG will be the primary management objective for the escapement unless an optimal escapement or inriver run goal has been adopted; BEG will be developed from the best available biological information, and should be scientifically defensible on the basis of available biological information; BEG will be determined by the department and will be expressed as a range based on factors such as salmon stock productivity and data uncertainty; the department will seek to maintain evenly distributed salmon escapements within the bounds of a BEG;” and

“Sustainable Escapement Goal” or “(SEG)” means a level of escapement, indicated by an index or an escapement estimate, that is known to provide for sustained yield over a 5 to 10 year period, used in situations where a BEG cannot be estimated due to the absence of a stock specific catch estimate; the SEG is the primary management objective for the escapement, unless an optimal escapement or inriver run goal has been adopted by the board, and will be developed from the best available biological information; the SEG will be determined by the department and will be stated as a range that takes into account data uncertainty; the department will seek to maintain escapements within the bounds of the SEG.

During the 2007 review process, escapement goals for the following stocks were evaluated:

- Sockeye salmon *O. nerka*: Fish and Packers creeks, and Crescent, Kasilof, Kenai, Russian (early and late run), and Yentna rivers;
- Chinook salmon *O. tshawytscha*: Alexander, Campbell, Clear, Crooked, Goose, Lake, Little Willow, Montana, Peters, Prairie, Sheep, and Willow creeks, and Chuitna, Chulitna, Dëshka, Eagle River South Fork, Kenai (early and late run), Lewis, Little Susitna, Talachulitna, and Theodore rivers;
- Chum salmon *O. keta*: Clearwater Creek;
- Coho salmon *O. kisutch*: Campbell and Jim creeks, and Little Susitna River.

During the winter of 2006–2007, the department established an escapement goal review committee (hereafter referred to as the committee). The committee consisted of 4 Division of Commercial Fisheries and 7 Division of Sport Fish personnel (Table 1). The committee was formed to recommend the appropriate type of escapement goal (BEG or SEG) and provide an analysis for recommending an escapement goal for each stock.

The committee formally met 16 January, 2007 to review escapement goals and develop recommendations. The committee also communicated by email. All committee recommendations were reviewed by ADF&G regional and headquarters staff prior to being adopted by ADF&G as escapement goals per the SSFP and EGP.

METHODS

Available escapement, catch, and age data for each stock were compiled from research reports, management reports, and unpublished historical databases. Escapement refers to the annual estimated size of the spawning salmon stock. Escapement is affected by a variety of factors including exploitation, predation, diseases, and physical and biological changes in the environment. The committee evaluated the type, quality, and quantity of data for each stock. This evaluation was used to determine the appropriate type of escapement goal as defined in regulation. Generally speaking, an escapement goal for a stock should provide escapement that produces sustainable yields. Escapement goals for salmon have typically been based on spawner-recruit relations (e.g., Beverton and Holt 1957; Ricker 1954), which represent the productivity of the stock and estimated carrying capacity. However, specific methods to determine escapement goals vary in their technical complexity. Thus, escapement goals should be evaluated and revised over time as improved methods of assessment and goal setting are developed, and when new and better information become available. An escapement goal for a stock was defined as a BEG if a sufficiently long time series of escapement, catch, and age estimates were available; the estimates were sufficiently accurate and precise; and the data were considered sufficient to provide a scientifically defensible estimate of MSY (as per rules and methods in Hilborn and Walters 1992; CTC 1999; Quinn and Deriso 1999). A BEG is used when the reference points can be estimated and there is sufficient fishing power and inseason management capability to harvest annual runs to achieve the BEG. An escapement goal for a stock was defined as an SEG if a sufficiently long time series of escapement estimates were available, but there was concern about the spawner-return data (lack of age composition

estimates and/or concern with stock-specific catch allocation) or there was a lack of information on stock productivity.

STUDY AREA

The UCI management unit consists of that portion of Cook Inlet north of Anchor Point and is divided into the Central and Northern districts (Figure 1). The Central District is approximately 120 km (75 miles) long, averages 50 km (32 miles) in width, and is further subdivided into 6 subdistricts. The Northern District is 80 km (50 miles) long, averages 32 km (20 miles) in width, and is divided into 2 subdistricts. Commercial salmon fisheries target mainly sockeye salmon with secondary catches of Chinook, coho, chum and pink salmon. Sport fish management is divided into the Northern Kenai Peninsula, Northern Cook Inlet, and the Anchorage management areas. These areas offer diverse personal use and recreational fishing opportunities for all 5 species of Pacific salmon.

ESCAPEMENT AND HARVEST DATA COLLECTION

Estimates or indices of salmon escapement are obtained with a variety of methods such as foot and aerial surveys, capture-recapture experiments, weir counts, and hydroacoustics (sonar). Differences in methods among years can affect the comparability and reliability of data. In the practical arena of salmon management, fishery biologists try to determine the amount of harvestable surplus and the number of spawners necessary to perpetuate the stock or run, known as the escapement goal.

Escapements of most Chinook salmon stocks in UCI have been monitored by single foot and aerial surveys. Such surveys provide only an index of escapement because we lack supporting data (i.e., accurate estimates of stream life and observer variability) to estimate number of fish in the escapement. The indices are a measurement on a numeric scale that provides information only about the relative level of the escapement. These measurements provide a ranking of escapement magnitude across years, but alone these measurements provide no information on the total number of fish in the escapement or of their age composition.

Hydroacoustics (sonar) have been used to assess early- and late-run Chinook salmon in river runs to the Kenai River (Miller et al. 2005). An associated gillnetting program has been used to sample Chinook salmon to estimate age, sex, and size composition (Reimer 2004). Since 1995, the Deshka River Chinook salmon escapement has been counted and sampled at a weir, but in prior years escapement was indexed annually by single aerial surveys (Yanusz *In prep*). Chinook salmon escapement into the Deshka River prior to 1995 was estimated by expanding the aerial surveys in those years using the relationship between weir counts and survey indices observed since 1995. A weir project has also been in place to count and sample Chinook salmon in Crooked Creek (Gambelin et al. 2004). Sonar and weir data provides a count or an estimate of the total number of fish in the escapement.

For coho salmon stocks, escapements have been monitored with a combination of single foot surveys and weir counts (Bue and Hasbrouck *Unpublished*). Peak aerial surveys have been used to index escapement of chum salmon in Clearwater Creek, the only chum salmon stock in UCI that is monitored by ADF&G (Tobias and Willette 2007).

Sonar has been deployed to count or estimate sockeye salmon passing specific locations in the Crescent, Kasilof, Kenai, and Yentna rivers. Fish wheel catches were used to apportion sonar counts to species in these systems and to sample fish for age, sex, and size information.

(Westerman and Willette 2006). Weirs have been installed to count and sample adult sockeye salmon escapements in the Russian River (Gamblin et al. 2004), Fish Creek (Sweet et al. 2004), and Packers Creek (Fandrei 1996).

Commercial catch statistics were compiled from ADF&G fish ticket information. The majority of sockeye salmon returning to UCI are caught in mixed stock fisheries (Shields 2007). A weighted age-composition apportionment method has been used to estimate stock-specific harvests of sockeye salmon in commercial gillnet fisheries in UCI (Tobias and Willette 2007). This method is based upon the assumption that age-specific exploitation rates were equal among stocks in the gillnet fishery (Bernard 1983) and is dependent upon accurate and precise escapement measures for all contributing stocks to the fishery. The age-composition catch apportionment method utilizes four data sources: (1) commercial harvests, (2) escapements into major UCI drainages, (3) age composition of harvests, and (4) age composition of escapements. Harvest allocation for each stock was estimated by harvest location and age composition. Estimates of sport harvest were derived from the postal survey (Statewide Harvest Survey) conducted annually by the Division of Sport Fish (Jennings et al. 2007).

ESCAPEMENT GOAL RECOMMENDATION

Escapement goals were evaluated for UCI stocks using the following methods: (1) Spawner-Return data; (2) Yield Analysis; (3) Smolt/Fry Information; and (4) Percentile Approach. Spawner-Return data was used to estimate escapement goals when the committee determined it had "good" estimates of total return (escapement and stock-specific harvest) for a stock. When "good" spawner-return data was available, escapement goals were estimated based on: (1) escapements producing average yields that were 90–100% of MSY (S_{MSY}) from a stock-recruitment model, and (2) the Yield Analysis, explained below, which also estimates MSY with corresponding 90–100% yield range. Smolt and/or fry information, when available, was used to aid in the estimation of escapement goals for stocks by examining the stability of freshwater productivity (average weight through time) and to better understand the effects of process error in marine versus freshwater environments. If marine survival is assumed to be largely density independent, a smolt stock-recruit production model provides improved estimates of yield related to spawners by eliminating marine environmental influences on survival.

Spawner-Return Data

Salmon spawner-return data were analyzed for all available brood years. Annual runs, the sum of escapements and harvests, were estimated as described in Bernard (1983). Where quantifiable, sport and subsistence harvests were included in total return estimates.

Spawner-return data were analyzed using a Ricker (1954) stock-recruitment model to estimate MSY and the escapement goal range. Results were not used if the model fit the data poorly ($p \geq 0.20$) or model assumptions were violated. Hilborn and Walters (1992), Quinn and Deriso (1999), and the CTC (1999) provide good descriptions of the Ricker model and diagnostics to assess model fit. All stock-recruitment models were tested and corrected for serial correlation of residuals when necessary. Additionally, the Ricker alpha parameter was corrected for the logarithm transformation bias induced into the model as described in Hilborn and Walters (1992) from fitting a regression line to $\ln(\text{recruits/spawners})$ versus spawners.

Additional spawner-return analyses were conducted to examine stock productivity and the escapement goal for Kenai River sockeye salmon. Details about the various methods are provided in Clark et al. (2007). These analyses included:

- (1) examination of a hierarchy of mathematical models that related number of spawners and adult recruitment of sockeye salmon;
- (2) simulations using brood-interaction model parameters (Carlson et al. 1999) using the 1969–1999 spawner-recruit data and for the recent brood years 1979–1999 because the latter data set was obtained using more consistent methods for stock composition; and
- (3) simulations testing the effects of alternating spawner abundances on yields in the brood-interaction model.

Yield Analysis

For the Kenai River sockeye salmon stock, Clark et al. (2007) conducted a Markov yield analysis (Hilborn and Walters 1992) to further evaluate the escapement goal range using three data sets: (1) the original spawner-recruit data set used in 1999, (2) an updated data set, and (3) a reduced data set. As in the original 1999 analysis, the yield table was constructed by partitioning the data into overlapping intervals of 200,000 spawners. The mean number of spawners, mean return, mean return per spawner, mean yield, and the range of yields was calculated for each interval of spawner abundance.

Percentile Approach

Most salmon stocks in UCI with an escapement goal have an SEG. In 2001, the SEG of these stocks was developed using percentiles of observed escapements, whether estimates or indices, that incorporated contrast in the escapement data and exploitation of the stock (Bue and Hasbrouck *Unpublished*). Percentile ranking is the percent of all escapement values that fall below a particular value. To calculate percentiles, escapement data are ranked from smallest to the largest value, with the smallest value the 0th percentile (i.e., none of the escapement values are less than the smallest). The percentile of all remaining escapement values is a cumulative, or summation, of $1/(n-1)$, where n is the number of escapement values. Contrast in the escapement data is simply the maximum value divided by the minimum value. As contrast increased, the percentiles used to estimate the SEG were narrowed, primarily from the upper range, to allow the SEG to include a wide range of escapements. For exploited stocks with high contrast, the lower end of the SEG range was increased to the 25th percentile as a precautionary measure for stock protection. The percentiles used at different levels of contrast were as follows (Bue and Hasbrouck *Unpublished*):

Escapement Contrast and Exploitation	SEG Range
Low Contrast (<4)	15 th Percentile to maximum observation
Medium Contrast (4 to 8)	15 th to 85 th Percentile
High Contrast (>8); Low Exploitation	15 th to 75 th Percentile
High Contrast (>8); Exploited Population	25 th to 75 th Percentile

For this review, the SEG ranges of all stocks were reevaluated using the percentile approach with updated or revised escapement data. If the estimated SEG range was consistent with the current goal (i.e., a high degree of overlap), the committee recommended no change to the goal.

RESULTS

There were 34 escapement goals evaluated for 32 stocks in UCI (Table 2). There were 32 existing escapement goals and 2 new goals for stocks that previously had goals. The recommendation for each escapement goal follows by species and river. The detailed information for each escapement goal can be found in the previous review reports (Clark et al. 2007; Hasbrouck and Edmundson 2007).

CHINOOK SALMON

Eagle River South Fork

The committee recommended that the Eagle River South Fork escapement goal for Chinook salmon be dropped. The sport harvest on this stock is very small (averaging less than 100 fish per year) and 5 of the past 6 surveys were poor quality, providing little information about escapements.

Campbell Creek

The committee recommended that the Campbell Creek Chinook salmon goal be re-instated to its previous level of 50 to 700 fish. During the 2004 review the goal was dropped because no fishery on this stock existed. In January of 2005 however, the BOF created a small youth-only fishery, which now warrants an escapement goal for this stock. The annual harvest for this fishery is approximately 100 fish (D. Bosch, Fishery Biologist, ADF&G, Division of Sport Fish, Region II; personal communication).

CHUM SALMON

The committee did not recommend any changes to the Clearwater Creek goal, the only chum salmon goal in UCI.

COHO SALMON

Campbell Creek

The committee recommended that the Campbell Creek escapement goal for coho salmon be dropped. Coho salmon runs to Campbell Creek are predominantly hatchery-stocked fish, with brood stock from Ship Creek.

SOCKEYE SALMON

Packers Creek

The committee recommended that the Packers Creek sockeye salmon goal be re-instated to its previous level of 15,000 to 30,000 before the 2004 review when it was dropped. In 2004, the committee dropped this goal because the weir had not operated since 2001. In 2005 however, a video counting system was installed for an annual assessment of escapement.