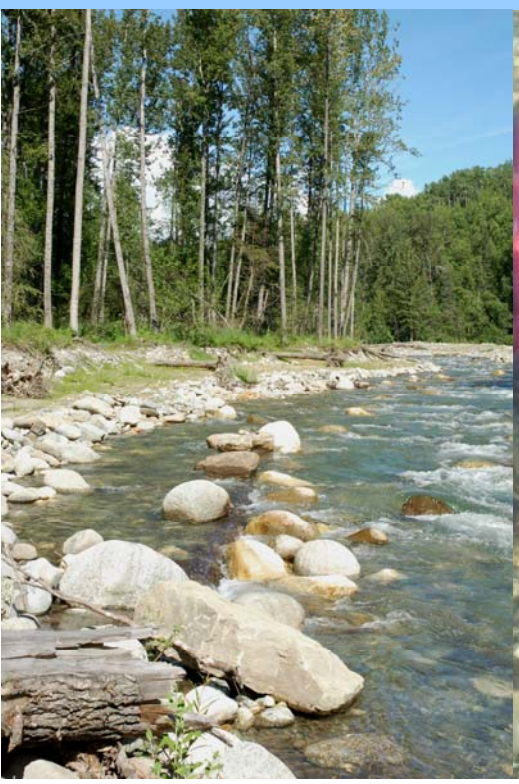
Conserving Salmon Habitat in the Mat-Su Basin



Appendices

The Strategic Action Plan

of the

Mat-Su Basin Salmon Habitat Partnership

2008

Appendix 1: Participants in Planning Process

Steering Committee:

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The Steering Committee and Science Working Group also participated as part of the Implementation Working Group.

Additional Planning Support:

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Appendix 2: Strategic Action Planning Workshops

Phase	Tasks Accomplished	Participants
Workshop #1 (9 Jan 07)	Identify Stakeholders & Work Groups Define Scope of Action Plan	Steering Committee (SC)
Workshop #2 Science (28 Feb – 2 Mar)	Define Species & Systems of Concern ("targets") Assess Viability of Targets Identify Critical Threats to Targets Establish Status Measures to Monitor Targets	Science Working Group
Workshops Round #3 Science Review & Implementation (24 – 25 April)	Science: Review workbook – targets, viability, threats Implementation: Introduction to CAP & Science WG work Develop trial set of strategies to address one or more issues for MatSu salmon	Science WG Steering Committee, Science WG & Implementation WG
Workshop #4 Science Review (16 May)	Review workbook – targets, viability, threats Refine draft recommendations for focal issues	Science Working Group
Workshop #5 Steering Committee Review (12 June)	Review work of Science Working Group – targets, viability, stresses, sources, and recommended focal issues and places Address partnership and plan development	Steering Committee Science WG
Workshop #6 Implementation (24 – 25 July)	Presentation of Science WG work and recommendations for focal issues Conduct Situation Analysis Develop Strategies, Objectives, & Actions	Steering Committee, Science WG & Implementation WG
Workshop #7 Partnership Review (30 Oct)	Partnership reviews Action Plan – presentation of major points of plan and facilitated review discussion	Partnership
Workshop #8 Steering Committee Review (Dec 07 – Jan 08)	Review of revised Action Plan post partner and working group reviews Determine Process & Frequency of Plan Review	Steering Committee
Implementation (2008)	Distribute Report through website, newsletter, etc. Publicize Partnership and Action Plan Highlight Action Plan at Salmon Celebration Develop workplans	Steering Committee & Partnership

Appendix 3: Other Planning Documents with Provisions for Fish Habitat in the Mat-Su Basin

Many agencies and organizations have undertaken planning efforts in the Mat-Su Basin that directly or indirectly include fish habitat issues. These plans addressed land management, large-scale development, population growth, fish conservation, fisheries enhancement, overall conservation goals, and ecosystem-based management. Many of the people involved in these other planning efforts are Mat-Su Salmon Partners. They brought their experience and knowledge to address salmon habitat in the Mat-Su Basin.

This appendix is intended to give a broad view of the range of other planning documents that have included salmon and fish habitat in the Mat-Su Basin in their scope and recommendations. Those interested in learning more about these efforts should contact the agencies and organizations who prepared the plans. Websites have been listed when available.

1. Matanuska-Susitna Borough

The Matanuska-Susitna Borough adopted a borough-wide comprehensive plan in 1970. Since the 1980's, the planning department has prepared comprehensive plans on a community by communtiy basis. Lake management plans and special use district plans are also developed for communities. Most community-based plans include provisions for maintaining access to fish and wildlife and for preserving open space around communities. The Transportation and Environmental Division also prepared transportation plans and other regional plans.

- ***Cook Inlet Ferry NEPA Supplemental Environmental Assessment (2006)***
- ***Matanuksa-Susitna Borough-wide Comprehensive Plan (1970) and Draft Matanuksa-Susitna Borough-wide Comprehensive Plan Update (2005)***
- ***South Denali Implementation Plan and Environmental Impact Statement (2006)***
  http://www.matsugov.us/denali/
- ***Matanuska-Susitna Borough: Parks, Recreation, and Open Space Plan (2000)***
- ***Adopted Lake Management Plans***
  http://www.matsugov.us/Planning/AdoptedLakeMgmtPlans.cfm
- ***Community Comprehensive Plans***
  http://www.matsugov.us/Planning/ComprehensivePlans.cfm

2. Alaska Department of Fish and Game (ADFG), State of Alaska

The Alaska Department of Fish and Game oversees refuges, critical habitat areas, and sanctuaries, which are classified as being essential to the protection of fish and wildlife habitat. A refuge typically contains a rich habitat that attracts diverse and abundant wildlife species. A

critical habitat area may be a complete biotic system or well-defined area needed by a group of species for certain functions such as nesting or spawning. The founding legislation establishes the specific purpose for each unit. The Mat-Su Basin contains one critical habitat area (Willow Mountain Critical Habitat Area), three game refuges (Palmer Hay Flats, Goose Bay, and Susitna Flats), and the Matanuska Valley Moose Range. ADFG coordinates an interagency planning team, including state, federal, and municipal agencies, to prepare unit management plans. ADFG has also prepared statewide conservation plans for fish and wildlife and a management plan to address the problem of invasive northern pike. In the 1970s and early 1980s, biological, water quality, and water quantity investigations were conducted to obtain baseline data on indigenous fish populations and the existing aquatic habitat to assess the potential impacts of the proposed Watana/Devil Canyon hydroelectric project upon the aquatic ecosystem of the Susitna River drainage.

- ***Management Plan for Invasive Northern Pike in Alaska (2007)***

- ***Aquatic Resources Implementation Plan for Alaska's Comprehensive Wildlife Conservation Strategy, ADFG Sept. 2006-2011 (2006)***
  http://www.sf.adfg.state.ak.us/statewide/ngplan/files/CWCSPlan.pdf

- ***Alaska's Comprehensive Wildlife Conservation Strategy (2005)***
  http://www.sf.adfg.state.ak.us/statewide/ngplan/NG_outline.cfm

- ***Susitna Flats State Game Refuge Management Plan (1988)***
  http://www.wildlife.alaska.gov/refuge/pdfs/susitna.pdf

- ***Palmer Hay Flats State Game Refuge Management Plan (1999)***
  http://www.wildlife.alaska.gov/refuge/pdfs/palmer_hf.pdf

- ***Susitna Studies ADFG Reports, (1980-1981)***

3. Alaska Department of Natural Resources (ADNR), State of Alaska

Various divisions of the Alaska Department of Natural Resources prepare management plans for state lands. The Division of Outdoor Recreation manages state parks largely with the intent to preserve natural resources. Park unit management plans are prepared primarily as in-house documents. The Division of Mining, Land, and Water prepares regional plans for managing state lands and the Division of Foresty prepares plans for managing forests on state lands.

- ***Susitna Basin Recreation Rivers Management Plan (1991)***
  http://www.dnr.state.ak.us/mlw/planning/mgtplans/susitna/index.htm

- ***Susitna Regional Forest Plan (1990)***
  http://www.dnr.state.ak.us/mlw/planning/mgtplans/susitna_forestry_guidelines/index.htm

- ***Denali State Park Master Plan (1989)***
  http://www.dnr.state.ak.us/parks/plans/denali/denali.htm

- ***Hatcher Pass Management Plan (1986), Amendments (1989 & 2006)***
  http://www.dnr.state.ak.us/mlw/planning/mgtplans/hpmp/index.htm

- ***Willow Creek State Recreation Area River Access Study (2006)***
  http://www.dnr.state.ak.us/parks/plans/willowcrkhdr9_06.pdf

- ***Kashwitna Management Plan (1990)*** currently under revision
  http://www.dnr.state.ak.us/mlw/planning/mgtplans/kashwitna/index.htm

- ***Deception Creek Land Use Plan (1989)*** currently under revision
  http://www.dnr.state.ak.us/mlw/planning/mgtplans/deception/index.htm

- ***Fish Creek Management Plan (1984, Amendment 1987)*** currently under revision
  http://www.dnr.state.ak.us/mlw/planning/mgtplans/fish_ck/index.htm

- ***Matanuska Valley Moose Range Management Plan (1986)***
  http://www.dnr.state.ak.us/mlw/planning/mgtplans/mat_valley/index.htm

- ***Susitna Area Plan (ADNR, ADFG, and MSB 1985)***
  http://www.dnr.state.ak.us/mlw/planning/areaplans/susitna/index.cfm

- ***Willow Sub-Basin Area Plan (1982)*** currently under revision
  http://www.dnr.state.ak.us/mlw/planning/areaplans/willow/index.cfm

- ***Southeast Susitna Area Plan (2008)*** superceded Willow Sub-basin Area Plan
  http://www.dnr.state.ak.us/mlw/planning/

4. Alaska Department of Environmental Conservation (ADEC), State of Alaska

The Alaska Clean Water Actions (ACWA) program brings three state resource agencies -- ADEC, ADFG, and ADNR -- together to deal with state waters in a coordinated and cooperative method, assuring state resources are used on the highest priorities. ACWA's database of priority waters and identified stewardship actions is a product of this collaboration. The three agencies also 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 and aquatic habitat on identified waters are considered. Local governments, citizen groups, tribes and education facilities are often the recipients of these awards.
http://www.dec.state.ak.us/water/acwa/acwa_index.htm

5. Coastal Zone Management Program

The U.S. Congress enacted the Coastal Zone Management Act in 1972 to create a "partnership between, state, and local governments in the planning and management of coastal resources". Five years later, the Alaska Coastal Management Act established the state's requirements and

guidelines for coastal planning. The Alaska Coastal Management Program is implemented through coastal districts, which include boroughs, municipalities, cities, and Coastal Resource Service Areas (CRSAs). CRSAs perform planning functions in areas where no borough was organized. The district program can include special area plans that focus on a particular area, resource, or use issue within the coastal zone and provide possible management solutions. Point McKenzie is designated as an Area which Merits Special Attention within the plan.

- ***Matanuksa-Susitna Borough Coastal Management Plan (2005)***
  http://www.alaskacoast.state.ak.us/District/DistrictPlans_Final/MatSu.htm

6. Bureau of Land Management (BLM)

The BLM prepared the Ring of Fire plan to provide management guidance for 1.3 million acres of BLM-administered public land in southeast and southcentral Alaska, Kodiak Island and the Aleutian Islands. The Ring of Fire Proposed Resource Management Plan (RMP)/Final Environmental Impact Statement (EIS) proposes one Area of Critical Environmental Concern in the Neacola Mountains of Western Cook Inlet and two Special Recreation Management Areas in the Haines Block of southeast Alaska and the Knik River area of southcentral Alaska.

- ***Ring of Fire Proposed Resource Management Plan and Final Environmental Impact Statement (2006)***
  http://www.blm.gov/ak/st/en/prog/planning/ring_of_fire_propos.html

7. National Park Service

The General Management Plan addresses resource management, visitor use, park operations, and development. Action plans provide specific guidelines for land protection, resource management, and wilderness suitability. Land Protection Plans review non-federal lands within the unit and strategies to ensure compatibility of use. Resource Management Plans identify actions to preserve resources (cultural and/or natural), including fire, river, or historic management plans. Denali National Park is on the northern edge of the Susitna valley.

- ***Backcountry Management Plan and EIS (2006)***
  http://parkplanning.nps.gov/document.cfm?parkId=9&projectId=10016&documentID=13580

- ***South Denali Implementation Plan (2006)***
  www.southdenaliplanning.com

8. National Oceanic and Atmospheric Administration

The National Marine Fisheries Service and the North Pacific Fishery Management Council have completed the Final Environmental Impact Statement (EIS) for Essential Fish Habitat (EFH) in Alaska. The EIS evaluates alternatives and environmental consequences for three actions: (1) describing and identifying EFH for fisheries managed by the Council; (2) adopting an approach

for the Council to identify Habitat Areas of Particular Concern within EFH; and (3) minimizing to the extent practicable the adverse effects of Council-managed fishing on EFH.

- ***Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska (2005)***
  http://www.fakr.noaa.gov/habitat/seis/efheis.htm

9. Cook Inlet Aquaculture Association

The Cook Inlet Aquaculture Association helps to protect salmon stocks and the rehabilitation of salmon stocks and habitat by maximizing the value of Cook Inlet's common property salmon resource through the use of science, education, and technology. The Association is involved in hatchery management, lake fertilization, flow control structure operation, fishway management and construction, habitat surveying, and education. The Cook Inlet Regional Salmon Enhancement Plan is identified in Alaska Statutes and Regulations as the regional plan for the Cook Inlet drainage and has been approved by the commissioner of ADFG. This is the plan to rehabilitate natural stocks and supplement natural production of salmon and it identifies wild stock sanctuaries and preserves.

- ***Cook Inlet Regional Salmon Enhancement Plan (2007)***
  http://www.ciaanet.org

10. The Nature Conservancy (TNC)

The mission of TNC is to is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. TNC sets broad priorities for conservation with ecoregional assessments. These assessments identify areas of biological significance where, if managed correctly, an ecoregion's biodiversity can be sustained for the long-term.

- ***Cook Inlet Basin Ecoregional Assessment (2003)***
  http://www.nature.org/wherewework/northamerica/states/alaska/preserves/art12944.html

11. Chickaloon Village Traditional Council

The Chickaloon Village Traditional Council engages the community in a land use planning effort that uses ecosystem based planning to ensure the integrity of local ecosystems. Other goals of the plan are protecting cultural activities; maintaining and building healthy and unified communities; and developing diverse, community based economies.

- ***Matanuska Watershed Ecosystem Based Plan (2007)***
  http://www.chickaloon.org/Environmental/EBP/EBP.html

Appendix 4: Nested targets

Conservation Targets are chosen to represent and encompass the full array of biodiversity found in a project area. They are the basis for setting goals, carrying out conservation actions, and measuring conservation effectiveness. In theory – and hopefully in practice – conservation of the focal targets will ensure the conservation of all native biodiversity within functional landscapes. Nested Targets are the species, ecological communities, or ecological system targets whose conservation needs are subsumed by one or more focal conservation targets. Below are the nested targets that are assumed to be associated with the conservation targets (bolded) for the Mat-Su Basin.

Terrestrial System Targets:

Upland Complex	**Lowland Complex – West**	**Lowland Complex - East**	**Lake Complex**
Spawning and rearing habitat for anadromous salmonids	Spawning, rearing, & migration habitat for anadromous salmonids	Spawning, rearing, & migration habitat for anadromous salmonids	Spawning, rearing, & migration habitat for anadromous salmonids
Resident salmonids	Resident salmonids	Resident salmonids	
Prey fishes (e.g., juvenile Dolly Varden, sculpin)	Prey fishes (e.g., sticklebacks, juvenile resident fishes)	Prey fishes (e.g., sticklebacks, juvenile resident fishes)	Prey fishes (e.g., sticklebacks, sculpins)
	Whitefish Pacific lamprey Eulachon	Whitefish Pacific lamprey Eulachon	
Macroinvertebrates - terrestrial and aquatic	Macroinvertebrates - terrestrial and aquatic	Macroinvertebrates - terrestrial and aquatic	Macroinvertebrates - terrestrial and aquatic
Aquatic habitats (e.g., riffle/pool complex, logjams, alluvial fans)	Aquatic habitats (e.g., run-of-river lakes, side channels, backwater sloughs)	Aquatic habitats (e.g., run-of-river lakes, side channels, backwater sloughs)	Aquatic Habitats
Upland plant communities (e.g., willow and alder, scrub-shrub, tundra, grasslands, spruce/birch mixed forest)	Terrestrial plant communities (e.g., mixed forest, dwarf scrub, grassland)	Terrestrial plant communities (e.g., mixed forest, dwarf scrub, grassland)	Terrestrial plant communities
	Aquatic vegetation types (e.g., wetlands)	Aquatic vegetation types (e.g., wetlands)	Aquatic vegetation types (e.g., wetlands)
Lake Louise fish assemblage*	Freshwater mollusk assemblage	Freshwater mollusk assemblage	

Marine System Target:

Upper Cook Inlet Marine:

- Salmon marine/estuarine life stages - adult & juvenile migration and juvenile rearing
- Beluga whales and harbor seals
- Food sources for salmon - forage fish, planktonic assemblages, & invertebrates

Salmon Species Targets:

Sockeye Salmon	Pink & Chum Salmon	Chinook & Coho Salmon
Rainbow trout	Rainbow trout	Rainbow trout
Dolly Varden	Dolly Varden	Dolly Varden
Whitefish	Whitefish	Whitefish
Arctic grayling	Arctic grayling	Arctic grayling
	Pacific lamprey	Pacific lamprey
	Eulachon	Eulachon

*The Lake Louise area and its unique freshwater fish assemblage are included in the Upland complex system target. The Lake Louise area differs from the rest of the Upland complex primarily because of the high density of lakes in the area and the fish species assemblage. Fish species present in Lake Louise that are not present in most other areas of the Mat-Su Basin include lake trout, burbot, and pond smelt. Primary human impacts around Lake Louise are related to recreational development and activities. The Science Working Group considered splitting out this area as a separate focal conservation target, but decided to consider the area and the fish species assemblage as a nested target under the Upland complex. Since salmon are the focus of the partnership and because the Lake Louise area is upstream from occupied salmon habitat, the Science Working Group felt that measures taken to conserve habitat in the Upland complex target would also benefit the Lake Louise area.

Appendix 5: Viability of Salmon and their Habitats

Each conservation target has certain characteristics or key ecological attributes that can be used to help define and assess its current health and viability. For Mat-Su Basin salmon, these key ecological attributes are critical components of salmon life history, including physical and biological processes, which if degraded or missing would seriously jeopardize the ability for healthy salmon runs to persist over time. Identifying and assessing these attributes provides a basis for determining current health, identifying stresses, and setting conservation goals. For salmon, three basic components are critical for long-term viability:

1. good habitat for spawning and rearing;
2. ability to move between habitats of different lifestages; and
3. sufficient fish to sustain healthy populations through time.

With the conservation targets selected for the Mat-Su Basin, key ecological attributes of population size and migration are assessed for each of the salmon group targets. Key ecological attributes of habitat are assessed for each of the ecosystem targets.

Key ecological attributes fall into one of three categories. While these categories are useful to consider for each target, each should be applied only where relevant.

- SIZE - This is a measure of the area or abundance of the conservation target or element's occurrence. For ecological systems and communities, size is simply a measure of the area of occurrence's geographic coverage. For species, size takes into account the area of occupancy and number of individuals. Minimum area needed to ensure survival or re-establishment of an element after natural disturbance is another aspect of size.

- CONDITION – An integrated measure of the composition, structure and biotic interactions that characterize the occurrence is used. This includes factors such as reproduction, age structure, biological composition (e.g., presence of native versus exotic species; presence of characteristic patch types for ecological systems), structure (e.g., canopy, under story, and groundcover in a forested community) and biotic interactions (e.g., levels of competition, predation, and disease).

- LANDSCAPE CONTEXT - This is an integrated measure of two factors: the dominant environmental regimes and processes that establish and maintain the element occurrence, and connectivity. Dominant environmental regimes and processes include hydrologic and water chemistry regimes (surface and groundwater), geomorphic processes, climatic regimes (temperature and precipitation), fire regimes and many kinds of natural disturbance. Connectivity includes such factors as species elements having access to habitats and resources needed for life cycle completion, fragmentation of ecological communities and system, and the ability of any element to respond to environmental change through dispersal, migration, or re-colonization.

Each key ecological attribute can either be measured directly or will have one or more associated indicators that can be measured to represent the attribute's status. Indicators should be biologically and socially relevant, sensitive to changes caused by human activity, measurable, and cost-effective to assess. For example, to measure the key attribute of connectivity between habitats for salmon, the percent of spawning and rearing habitat that is accessible to salmon can be used as an indicator. The percent of accessible habitat is a good indicator to measure connectivity because it is:

1) biologically relevant – if available habitat is blocked, salmon runs may be affected;
2) socially relevant – the public can understand the effect of migration barriers on salmon populations;
3) sensitive to changes caused by humans – human-caused barriers can be identified and inventoried;
4) measurable – the technology necessary to measure accessible habitat is available; and
5) cost effective – the analyses involve the use of existing data layers using GIS technology.

The viability of each indicator is assigned a rank using a four-level scale. Rankings may be based on qualitative or quantitative criteria and may only be defined to the extent possible with available information. The viability ranking system uses simple categorical ranks, as follows:

***Very Good*:** The indicator is functioning within an ecologically desirable status, requiring little human intervention for maintenance within the natural range of variation (i.e., is as close to "natural" as possible and has little chance of being degraded by some random event).

***Good*:** The indicator is functioning within its range of acceptable variation, although it may require some human intervention for maintenance.

***Fair*:** The indicator lies outside of its range of acceptable variation and requires human intervention for maintenance. If unchecked, the target will be vulnerable to serious degradation.

***Poor*:** Allowing the indicator to remain in this condition for an extended period will make restoration or prevention of extirpation of the target practically impossible (e.g., too complicated, costly, and/or uncertain to reverse the alteration).

Overall Target Viability Summary:

Conservation Targets		Landscape Context	Condition	Size	Viability Rank
1	Sockeye salmon	Good	-	Fair	**Good**
2	Pink and chum salmon	Good	-	Fair	**Good**
3	Coho and Chinook salmon	Good	-	Good	**Good**
4	Upland complex	Good	Very Good	Very Good	**Very Good**
5	Lowland complex - West of Susitna River	Good	Very Good	Very Good	**Very Good**
6	Lowland complex - East of Susitna River	Fair	Fair	Good	**Fair**
7	Lake complex	Fair	Fair	Good	**Fair**
8	Upper Cook Inlet Marine	Good	Fair	Good	**Good**
Project Biodiversity Health Rank					**Good**

Viability Assessment for Conservation Targets

Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status*	Current Rating	Desired Rating
1	Sockeye salmon	Landscape Context	Connectivity between habitats for different life stages	% documented rearing habitat accessible (not blocked by human-caused barriers)	Human-caused barriers in lower watershed block access to all rearing habitat for one stock	Human-caused barriers in lower watershed may block access to most rearing habitat for one stock	All mainstem rearing habitat accessible across Mat-Su Basin; tributaries may or may not be fully accessible due to human-caused barriers	All documented rearing habitat accessible across Mat-Su Basin	Fair-to-good (SWG[i]); 80% (+/-) of culverts are in the core area but these streams are not the high producers (SWG 5/24).	Good	Very Good
1	Sockeye salmon	Landscape Context	Connectivity between habitats for different life stages	% documented spawning habitat accessible (not blocked by human-caused barriers)	Human-caused barriers in lower watershed block access to all spawning habitat for one stock	Human-caused barriers in lower watershed may block access to most spawning habitat for one stock	All mainstem spawning habitat accessible across Mat-Su Basin; tributaries may or may not be fully accessible due to human-caused barriers	All documented spawning habitat accessible across Mat-Su Basin	Good (SWG); 80% (+/-) of culverts are in the core area but these streams are not the high producers (SWG 5/24).	Good	Very Good
1	Sockeye salmon	Size	Population size & dynamics	Maintenance of ADFG escapement goals and sustainable yield of wild salmon	Loss of 1 or more stocks in 2 or more watersheds within Mat-Su Basin OR Stock of Conservation Concern exists	Stocks of Management or Yield Concern exist OR public and/or fish biologists have expressed concern about sustainability of some stocks	Most fisheries intact and most escapement goals achieved	Healthy stocks exist so all fisheries (sport, subsistence, & commercial) are intact	Public & biologists concerned about sockeye in the Susitna drainage. Sport fishery in Yentna & subsistence fishery in Fish Cr (Big Lk) closed. Susitna sportfishery closed by EOs[ii] in last 3 yrs. Have lost minor stocks in Alexander Cr due to pike (Ivey).	Fair	Very Good

[i] SWG: Science Working Group (SWG indicates the current indicator status was based on their knowledge, experience, and judgment. Other references in this column were participants in the Science Working Group or literature citations.)

[ii] EO: Executive Order

Viability Assessment for Conservation Targets

Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status*	Current Rating	Desired Rating
2	Pink and chum salmon	Landscape Context	Connectivity between habitats for different life stages	% documented spawning habitat accessible (not blocked by human-caused barriers)	Human-caused barriers in lower watershed block access to all spawning habitat for one stock	Human-caused barriers in lower watershed may block access to most spawning habitat for one stock	All mainstem spawning habitat accessible across Mat-Su Basin; tributaries may or may not be fully accessible due to human-caused barriers	All documented spawning habitat accessible across Mat-Su Basin	Good (SWG); 80% (+/-) of culverts are in the core area but these streams are not the high producers (SWG 5/24). Can verify w/ GIS analysis.	Good	Very Good
2	Pink and chum salmon	Size	Population size & dynamics	Maintenance of ADFG escapement goals and sustainable yield of wild salmon	Loss of 1 or more stocks in 2 or more watersheds within Mat-Su Basin OR Stock of Conservation Concern exists	Stocks of Management or Yield Concern exist OR public and/or fish biologists have expressed concern about sustainability of some stocks	Most fisheries intact and most escapement goals achieved	Healthy stocks exist so all fisheries (sport, subsistence, & commercial) are intact	Pink and chum salmon harvest numbers have drastically declined. No defined escapement goals or monitoring.	Fair	Very Good
3	Coho and Chinook salmon	Landscape Context	Connectivity between habitats for different life stages	% documented rearing habitat accessible (not blocked by human-caused barriers)	Human-caused barriers in lower watershed block access to all rearing habitat for one stock	Human-caused barriers in lower watershed may block access to most rearing habitat for one stock	All mainstem rearing habitat accessible across Mat-Su Basin; tributaries may or may not be fully accessible due to human-caused barriers	All documented rearing habitat accessible across Mat-Su Basin	Fair-to-good (SWG); 80% (+/-) of culverts are in the core area which does support more documented spawning and rearing for coho than for other species. Cottonwood Cr has multiple blockages in lower mainstem, but overall Good status.	Good	Very Good
3	Coho and Chinook salmon	Landscape Context	Connectivity between habitats for different life stages	% documented spawning habitat accessible (not blocked by	Human-caused barriers in lower watershed	Human-caused barriers in lower watershed may block access	All mainstem spawning habitat accessible across Mat-Su	All documented spawning habitat accessible	Good (SWG); 80% (+/-) of culverts are in the core areas which support	Good	Very Good

Viability Assessment for Conservation Targets

Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status*	Current Rating	Desired Rating
				human-caused barriers)	block access to all spawning habitat for one stock	to most spawning habitat for one stock	Basin; tributaries may or may not be fully accessible due to human-caused barriers	across Mat-Su Basin	more documented spawning and rearing for coho than for other species.		
3	Coho and Chinook salmon	Size	Population size & dynamics	Maintenance of ADFG escapement goals and sustainable yield of wild salmon	Loss of 1 or more stocks in 2 or more watersheds within Mat-Su Basin OR Stock of Conservation Concern exists	Stocks of Management or Yield Concern exist OR public and/or fish biologists have expressed concern about sustainability of some stocks	Most fisheries intact and most escapement goals achieved	Healthy stocks exist so all fisheries (sport, subsistence, & commercial) are intact	Cottonwood Cr coho may not be doing well (SWG).	Good	Very Good
4	Upland complex	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Magnitude and timing of annual peak flows in index watersheds	Magnitude and timing outside acceptable range of variation on persistent basis	Magnitude and timing outside acceptable range of variation on occasional basis	Magnitude and timing within acceptable range of variation		Estimate based on professional judgement (SWG)	Good	
4	Upland complex	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Stream flow at low flow stage in index watersheds	Creek is over allocated and no availability for instream flow reservation	All allocations do not take up rest of flow, but no instream reservation allocated	In stream flow reseravation allocated with no other allocations on creek that do not take up the rest of the flow	In stream flow reservation allocated with no other allocations on creek	Few alterations to flow	Good	
4	Upland complex	Landscape Context	Water quality	DEC water quality standards for freshwater aquatic life (18 AAC 70.020(1)(C))	Many waterbodies do not meet DEC WQS[iii] criteria on persistent basis	Many waterbodies do not meet DEC WQS criteria on occasional basis OR impaired waterbodies	Most waterbodies meet DEC WQS criteria except under certain flow conditions	All waterbodies meet or exceed WQS criteria on a consistent basis	based on Laura Eldred's best professional judgment & actual QA/QC[iv] WQ data; Lk Louise is a priority	Good	Very Good

[iii] DEC WQS: Department of Environmental Conservation Water Quality Standards
[iv] QA/QC: Quality Assurance/Quality Control

Viability Assessment for Conservation Targets

Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status*	Current Rating	Desired Rating
						designated			waterbody		
4	Upland complex	Condition	Riparian zone vegetation (streams & lakes)	% native vegetation remaining along stream and lake shorelines	(undefined)	>10% native vegetation converted within 100' of OHW[v] of waterbody	5 - 10% native vegetation converted within 100' of OHW of waterbody	0 - 5% native vegetation converted within 100' of OHW of waterbody	Assume clearing on lakes and streams similar to Little Susitna (1% typical; 3% max). Assume Very Good (SWG).	Very Good	Very Good
4	Upland complex	Size	Size / extent of characteristic native vegetation	% lands converted from natural state across the target	>30% converted	20 - 30% converted	10 - 20% converted	0 - 10% converted	GIS analysis of landcover data shows conversion (development + agriculture) less than 1% in all subwatersheds.	Very Good	Very Good
5	Lowland complex - West of Susitna River	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Magnitude and timing of annual peak flows in index watersheds	Magnitude and timing outside acceptable range of variation on persistent basis	Magnitude and timing outside acceptable range of variation on occasional basis	Magnitude and timing within acceptable range of variation		Estimate based on professional judgement (SWG).	Good	Very Good
5	Lowland complex - West of Susitna River	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Stream flow at low flow stage in index watersheds	Creek is over allocated and no availability for in steam flow reservation	All alloations do not take up rest of flow but no in stream reservation allocated	In stream flow reservation allocated with other allocations on creek that do not take up the rest of the flow	In stream flow reservation allocated with no other allocations on creek	Vast majority of the Mat-Su Basin is very good.	Good	Very Good
5	Lowland complex - West of Susitna River	Landscape Context	Water quality	DEC water quality standards for freshwater aquatic life (18 AAC 70.020(1)(C))	Many waterbodies do not meet DEC WQS criteria on persistent basis	Many waterbodies do not meet DEC WQS criteria on occasional basis OR Impaired	Most waterbodies meet DEC WQS criteria except under certain flow conditions	All waterbodies meet or exceed WQS criteria on a consistent basis	based on Laura Eldred's best professional judgment & actual QA/QC WQ data	Very Good	Very Good

[v] OHW: Ordinary High Water

Viability Assessment for Conservation Targets

Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status*	Current Rating	Desired Rating
						Waterbodies designated					
5	Lowland complex - West of Susitna River	Condition	Riparian zone vegetation (streams & lakes)	% native vegetation remaining along stream and lake shorelines	(undefined)	>10% native vegetation converted within 100' of OHW of waterbody	5 - 10% native vegetation converted within 100' of OHW of waterbody	0 - 5% native vegetation converted within 100' of OHW of waterbody	Assume clearing on lakes and streams similar to Little Susitna (1% typical; 3% max). Assume Good (SWG).	Very Good	Very Good
5	Lowland complex - West of Susitna River	Size	Size / extent of characteristic native vegetation	% lands converted from natural state across the target	>30% converted	20 - 30% converted	10 - 20% converted	0 - 10% converted	GIS analysis of landcover data shows conversion (development + agriculture) less than 2% in all subwatersheds.	Very Good	Very Good
5	Lowland complex - West of Susitna River	Size	Size / extent of characteristic wetlands	diversity & distribution of wetlands types	Near loss of at least one of 6 wetlands types	Rates of change in 6 wetlands types and distribution vary significantly	Rates of change in 6 wetlands types and distribution not significantly different	Historic diversity and distribution of 6 wetland types maintained	GIS analysis of landcover data shows conversion (development + agriculture) less than 1% in all subwatersheds; assume wetlands not significantly changed	Very Good	Very Good
6	Lowland complex - East of Susitna River	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Magnitude and timing of annual peak flows in index watersheds	Magnitude and timing outside acceptable range of variation on persistent basis	Magnitude and timing outside acceptable range of variation on occasional basis	Magnitude and timing within acceptable range of variation		Estimate based on professional judgement (SWG)	Fair	Good
6	Lowland complex - East of Susitna River	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Stream flow at low flow stage in index watersheds	Creek is over allocated and no availability for instream flow reservation	All allocations do not take up rest of flow but no instream reservation allocated	In stream flow reservation allocated with no other allocations on creek that do not take up the rest of the flow	In stream flow reservation allocated with no other allocations on creek	Vast majority of the Mat-Su Basin is very good. BUT core area has water withdrawals and modified runoff due to	Fair	

Viability Assessment for Conservation Targets

Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status*	Current Rating	Desired Rating
									impervious surfaces. Fair to good in core area.		
6	Lowland complex - East of Susitna River	Landscape Context	Water quality	DEC water quality standards for freshwater aquatic life (18 AAC 70.020(1)(C))	Many waterbodies do not meet DEC WQS criteria on persistent basis	Many waterbodies do not meet DEC WQS criteria on occasional basis OR Impaired Waterbodies designated	Most waterbodies meet DEC WQS criteria except under certain flow conditions	All waterbodies meet or exceed WQS criteria on a consistent basis	based on Laura Eldred's best professional judgment & actual QA/QC WQ data; 4 impaired waters: Lk Lucille, Cottonwood Cr, Big Lake, Matanuska R + 6 priority waters	Fair	Very Good
6	Lowland complex - East of Susitna River	Condition	Riparian zone vegetation (streams & lakes)	% native vegetation remaining along stream and lake shorelines	(undefined)	>10% native vegetation converted within 100' of OHW of waterbody	5 - 10% native vegetation converted within 100' of OHW of waterbody	0 - 5% native vegetation converted within 100' of OHW of waterbody	Assume core area and Big Lake area have greater levels of clearing on lakes and streams than Little Susitna (3% max). Assume Fair (SWG).	Fair	Good
6	Lowland complex - East of Susitna River	Size	Size / extent of characteristic native vegetation	% impervious surfaces within subwatersheds	>10% impervious	6 - 10% impervious	2 - 5% impervious	0 - 1% impervious	GIS analysis of landcover data shows impervious surfaces for subwatersheds ranges from1% for Upper Little Su to 11% for Wasilla Creek and lower Mat R-Knik R. Most subwatersheds in target area less than 5%, so rated Good.	Good	Poor
6	Lowland complex - East of Susitna	Size	Size / extent of characteristic native vegetation	% lands converted from natural state across the	>30% converted	20 - 30% converted	10 - 20% converted	0 - 10% converted	GIS analysis of landcover data shows conversion	Good	Good

Viability Assessment for Conservation Targets

Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status*	Current Rating	Desired Rating
	River			target					(development + agriculture) ranges from Little Su 4%, Fish Creek 4%, to Wasilla Creek 14% and Mat R-Knik River 16%. Assuming that most subwatersheds are less developed than Wasilla Creek, rated Good.		
7	Lake complex	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Magnitude and timing of annual peak flows in index watersheds	Magnitude and timing outside acceptable range of variation on persistent basis	Magnitude and timing outside acceptable range of variation on occasional basis	Magnitude and timing within acceptable range of variation		Estimate based on professional judgement (Janet Curran)	Good	
7	Lake complex	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Stability of lake level	Shallow lakes dry up & large lakes drop without rebound		Level fluctuates within normal range of variability		Fair-to-Good; borough concerned about some lake levels dropping without explanation.	Good	
7	Lake complex	Landscape Context	Hydrologic regime - (timing, duration, frequency, extent)	Stream flow at low flow stage in index watersheds	Creek is over allocated and no availability for instream flow reservation	All alocations do not take up rest of flow but no instream reservation allocated	In stream flow reservation allocated with other allocations on creek that do not take up the rest of the flow	In stream flow reservation llocated with other allocations on creek	Based on Tom Cappiello's best judgment.	Good	
7	Lake complex	Landscape Context	Water quality	DEC water quality standards for freshwater aquatic life (18 AAC 70.020(1)(C))	Many waterbodies do not meet DEC WQS criteria on persistent basis	Many waterbodies do not meet DEC WQS criteria on occasional basis OR Impaired Waterbodies	Most waterbodies meet DEC WQS criteria except under certain flow conditions	All waterbodies meet or exceed WQS criteria on a consistent basis	Bsed on Laura Eldred's best professional judgment & actual QA/QC WQ data; waters of high priority are Fish Creek,	Fair	

Viability Assessment for Conservation Targets

Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status*	Current Rating	Desired Rating
						designated			Meadow Creek, and Nancy Lake.		
7	Lake complex	Condition	Riparian zone vegetation (streams & lakes)	% native vegetation remaining along stream and lake shorelines	(undefined)	>10% native vegetation converted within 100' of OHW of waterbody	5 - 10% native vegetation converted within 100' of OHW of waterbody	0 - 5% native vegetation converted within 100' of OHW of waterbody	Assume greater levels of clearing on lakes and streams than Little Susitna (3% max). Assume Fair (SWG).	Fair	
7	Lake complex	Size	Size / extent of characteristic native vegetation	% impervious surfaces within subwatersheds	>10% impervious	6 - 10% impervious	2 - 5% impervious	0 - 1% impervious	GIS analysis of landcover data shows impervious surfaces for subwatersheds ranges from <1% in Susitna subwatershed to 12% for Meadow Creek. Most subwatersheds in target area greater than 5%, so rated Fair.	Fair	Good
7	Lake complex	Size	Size / extent of characteristic native vegetation	% lands converted from natural state across the target	>30% converted	20 - 30% converted	10 - 20% converted	0 - 10% converted	GIS analysis of landcover data shows conversion (development + agriculture) ranges from <1% in Susitna R subwatershed to Meadow Creek16%. Assuming that most subwatersheds are less developed than Meadow Creek, rated Good.	Good	Good

Viability Assessment for Conservation Targets

Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status*	Current Rating	Desired Rating
7	Lake complex	Size	Size / extent of characteristic wetlands	diversity & distribution of wetlands types	Near loss of at least one of 6 wetlands types	Rtes of change in 6 wetlands types and distribution vary significantly	Rtes of change in 6 wetlands types and distribution not significantly different	Hstoric diversity and distribution of 6 wetland types maintained	GIS analysis of landcover data shows conversion (development + agriculture) ranges from <1% in Susitna River subwatershed to Meadow Creek16%. Assume most development outside of wetlands and that wetland changes continue as previous decade (Hall 2001).	Good	
8	Upper Cook Inlet Marine	Landscape Context	Freshwater inflow (timing, quantity, quality)	Salinity and turbidity in estuaries and river deltas			Salinity and turbidity of nearshore maintained		Estimate of Marine subgroup (Engel, LaCroix, Koski).	Very Good	
8	Upper Cook Inlet Marine	Landscape Context	Soil / sediment stability & movement	tidal flow to distribute sediments	Nearshore development blocks tidal flow		Nearshore development changes some tidal flow	Tidal flows unimpeded	Estimate of Marine subgroup (Engel, LaCroix, Koski).	Good	
8	Upper Cook Inlet Marine	Landscape Context	Water quality	DEC water quality standards for marine aquatic life (18 AAC 70.020(2)(C))	Some parts of inlet do not meet DEC WQS criteria on persistent basis	Some parts of inlet do not meet DEC WQS criteria on occasional basis	most of inlet meets DEC WQS criteria except under certain flow conditions	All of inlet meets or exceeds WQS criteria on a consistent basis	Based on Laura Eldred's best professional judgment & actual QA/QC WQ data.	Good	
8	Upper Cook Inlet Marine	Condition	Abundance of food resources	Status of marine insects, forage fish, and plankton	Significant decline in one or more resource types	Declines in one or more resource types in some parts of inlet	Minor changes in status	No change in statuses from historic numbers	Estimate of marine subgroup (Engel, LaCroix, Koski):	Good	
8	Upper Cook Inlet Marine	Condition	Presence / abundance of key functional guilds	Status of predator populations (e.g. beluga, harbor seals)	Complete loss of 1 species	1 or more species ESA or State Concern listed	1 or more species with noted declines	All species present at historic levels	NMFS designated belugas as 'Depleted'; harbor seals	Fair	

Viability Assessment for Conservation Targets

Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status*	Current Rating	Desired Rating
									declining in other parts of Gulf of Alaska (Angliss & Outlaw 2006).		
8	Upper Cook Inlet Marine	Size	Size / extent of characteristic nearshore habitats	Diversity & distribution of nearshore habitat types	Near loss of at least one of 5 nearshore habitat types	Rates of change in 5 nearshore habitat types and distribution vary significantly	Rates of change in 5 nearshore habitat types and distribution not significantly different	Historic diversity and distribution of 5 nearshore habitat types maintained	Marine subgroup (Engel, LaCroix, Koski) estimated Good – Very Good w/ changes concentrated around Anchorage; can verify & set baseline w/GIS using ESI[vi] or Shorezone data	Good	Very Good

[vi] ESI: Environmental Sensitivity Index

Appendix 6: Stresses to Salmon and their Habitats

Many human activities are potential threats to salmon and their habitats. Human activities can affect salmon by degrading or eliminating habitat, removing vegetation from wetlands and the banks of streams and lakes, degrading water quality, changing river flows, disconnecting streams, lakes, and wetlands, or blocking fish passage. These stresses are altered Key Ecological Attributes (see Appendix 5) that are essential for the survival of the conservation target. This plan focuses on human activities that are currently major sources of stress to salmon and their habitat or are likely to be in the next 10 years.

The severity and scope of impact of particular stresses to each conservation target are analyzed in combination to define the stress to the target. For each stress, the severity and geographic scope of impact are ranked as follows:

Severity of Impact:

Very High:	Likely to destroy or eliminate the conservation target over some portion of the target's occurrence at the site.
High:	Likely to seriously degrade the conservation target over some portion of the target's occurrence at the site.
Medium:	Likely to moderately degrade the conservation target over some portion of the target's occurrence at the site.
Low:	Likely to only slightly impair the conservation target over some portion of the target's occurrence at the site.

Scope of Impact:

Very High:	Likely to be very widespread or pervasive in its scope, and affect the conservation target throughout the target's occurrences at the site.
High:	Likely to be widespread in its scope, and affect the conservation target at many of its locations at the site.
Medium:	Likely to be localized in its scope, and affect the conservation target at some of the target's locations at the site.
Low:	Likely to be very localized in its scope, and affect the conservation target at a limited portion of the target's location at the site.

The scope and severity are then analyzed in combination with the relative contribution and irreversibility of various sources to those stresses. The ratings established for the severity and scope of each stress drive the process to some extent when categorizing levels of potential threats. If a stress was rated Medium for both severity and geographic scope, the highest rating for any potential threat on that key attribute is capped at Medium. Although a potential threat might be severe for salmon or their habitat at a specific site, the overall threat rating was capped at Medium because the impact is likely to be localized in geographic scope and only moderately degrade the target over some portion of its range.

As an example, impeded connectivity and barriers to passage was rated as Medium for both severity and scope for sockeye salmon and the Chinook and coho salmon group targets, while these were both rated as Low for the pink and chum salmon group target since neither species requires upstream passage for juveniles to complete their freshwater life history. Therefore, the maximum rating for impacts to connectivity was capped at Medium for sockeye, Chinook, and coho salmon and at Low for pink and chum salmon, regardless of the severity of a potential threat.

The Stress Matrix (Table 1, Appendix 6) summarizes stresses for each conservation target, based on severity and scope rankings.

Stresses (Altered Key Ecological Attributes) Across Targets		Sockeye salmon	Pink and chum salmon	Coho and Chinook salmon	Upland Complex	Lowland Complex - West of Susitna River	Lowland Complex - East of Susitna River	Lake Complex	Upper Cook Inlet Marine
		1	2	3	4	5	6	7	8
1	Degraded water quality	-	-	-	Medium	Medium	High	Medium	Medium
2	Loss of native vegetation across the ecosystem	-	-	-	Low	Medium	High	Medium	-
3	Loss of riparian vegetation	-	-	-	Medium	Low	High	Medium	-
4	Decreased population size and/or altered age structure	High	Medium	Medium	-	-	-	-	-
5	Loss of diversity of nearshore habitats	-	-	-	-	-	-	-	High
6	Altered hydrologic regime	-	-	-	Low	Medium	Medium	Medium	-
7	Impeded connectivity and barriers to passage	Medium	Low	Medium	-	-	-	-	-
8	Loss of wetlands diversity	-	-	-	-	Medium	-	Medium	-
9	Decreased abundance of predators	-	-	-	-	-	-	-	Low
10	Decreased abundance of food resources	-	-	-	-	-	-	-	Low
11	Alteration of freshwater inflow	-	-	-	-	-	-	-	Low
12	Alteration of sediment transport	-	-	-	-	-	-	-	Low

Appendix 7: Threats to Salmon and Their Habitat

Many human activities are potential threats to salmon and their habitats. Human activities can affect salmon by degrading or eliminating habitat, removing vegetation from wetlands and the banks of streams and lakes, degrading water quality, changing river flows, disconnecting streams, lakes, and wetlands, or blocking fish passage. Lack of data to make management decisions can also be an impediment to conserving salmon and their habitats. Most of these activities are vital to human communities and can be mitigated to reduce or eliminate negative impacts to salmon and salmon habitat.

The Strategic Action Plan focuses on human activities that are currently major sources of stress to salmon and their habitat or are likely to be potential threats in the next 10 years. The severity and scope of particular stresses to each conservation target (Appendix 6) were analyzed in combination with the relative contribution and irreversibility of various sources to those stresses. Each source was rated as follows:

Contribution of Source:

Very High:	The source is a very large contributor of the particular stress.
High:	The source is a large contributor of the particular stress.
Medium:	The source is a moderate contributor of the particular stress.
Low:	The source is a low contributor of the particular stress.

Irreversibility of Source:

Very High:	Not reversible (e.g., wetlands converted to a shopping center).
High:	Reversible, but not practically affordable (e.g., wetland converted to agriculture).
Medium:	Reversible with a reasonable commitment of resources (e.g., ditching and draining of wetland)
Low:	Easily reversible at relatively low cost (e.g., off-road vehicle use in wetland).

This combined analysis of stress and source produced a ranked list of 22 potential threats to Mat-Su salmon and their habitats (Table 1, Appendix 7). This ranked list provided an overall picture for Mat-Su Basin salmon and a starting point for selecting potential threats that the Partnership could address. The ranking system tends to emphasize existing threats that require restoration so the working groups tried to find a balance with prevention and protection opportunities when selecting threats for the Strategic Action Plan. The working groups examined the High and Medium ranked potential threats with the following considerations in mind:

- How many targets are impacted?
- How urgent is it?
- Is there a clear role for a habitat-focused partnership?
- Is there available information for addressing it?
- Is there opportunity to prevent, mitigate, or restore impacts?
- How easily reversed are the impacts?

The working groups and steering committee agreed on seven potential threats to address in this plan:

1. Housing and Urban Areas
2. Roads and Railroads
3. Stormwater and Urban Runoff
4. Household Septics and Urban Wastewater
5. Ground and Surface Water Withdrawals
6. Development in Estuaries
7. Invasive Northern Pike

This appendix contains more information about the potential threats not selected. The Partnership plans to revisit the Strategic Action Plan on a regular basis with an eye for identifying potential threats that could or should be addressed by the Partnership.

Climate Change

Evidence is growing that climate in Alaska is undergoing an unusual degree of change. When compared to the rest of the U.S., Alaska is thought to have experienced the largest regional warming of all states (ARAG 1999). Using predictive models, USGS (2001) reported that 15 non-glacial streams in the Cook Inlet Basin are expected to have a water temperature change of $3^{o}C$ or more, which is considered significant for the incidence of disease in fish populations. In addition to warming temperatures, climate change will likely alter watersheds by affecting flooding frequencies, snow pack depths, precipitation levels, surface and ground water volumes and other hydrologic characteristics. For salmon, this means that flows may be too low at critical times of migration or too great, resulting in erosion and flushing of spawning gravels.

Although warming stream temperatures was not among the top threats identified by the Science Working group, many of the factors that can maintain or reduce the resiliency of salmon to a changing climate (e.g., loss of riparian cover, wetlands, connectivity, and instream flow) were high priorities. The water quality monitoring program will include stream temperature so that the thermal regimes of Mat-Su Basin waterbodies can be tracked and understood as climate and land uses change.

Coal Power Plant

The Matanuska Electric Association (MEA) provides energy for most Mat-Su residents and there is an increased need for more power as population size and commercial development in the Mat-Su Basin increases. Several options for new power plants are currently being considered, including construction of a new coal-fired power plant. A coal-fired power plant in the Mat-Su Basin could affect both terrestrial and aquatic ecosystems, and could directly affect water quality.

This potential threat was not analyzed further because MEA has stated that they do not intend to pursue the coal power plant option in the immediate future.

Dams and Hydroelectric Power

Dams and hydroelectric power development are potential threats that can block fish passage and affect the hydrology of streams and watersheds. The Susitna River has been identified in the past as a potential site for a hydroelectric project, although construction does not appear feasible at this time. Small projects to supply power to remote cabins and homes are likely to occur in some tributary streams, and larger projects may be proposed again in the future.

This potential threat was not moved forward for further analysis at this time. Although the effects of small dams are practically irreversible once constructed, their impact would be limited in scope to specific watersheds. Larger projects would follow a regulatory process in which members of the Partnership would be able to participate.

Mining & Gravel Quarrying (on land and in river)

The Mat-Su Basin is rich in mineral resources, and a history of mining has helped shaped development of the area. Major coal deposits include areas of the Lowlands West and Uplands Complexes near Petersville, and the Little Susitna and Matanuska watersheds in the Lowlands East, Lake, and Upland Complexes. Numerous active and abandoned hardrock mining claims are scattered among the terrestrial Complex targets. Gravel quarries to support construction activities are also common in the Lowlands East and Lake Complex targets, and the potential threat exists for in-river extraction of gravel from the Matanuska River. Mining can directly impact fish populations by alteration or destruction of instream, riparian, and terrestrial habitat, affecting water budgets and hydrologic regimes, and impacting water quality. These impacts can be irreversible in many cases.

The potential threat of mining was not elevated for inclusion in conservation strategy development because most mining activities are limited in scope to specific locations or watersheds and because there is no clear role or opportunities for the Partnership as a whole to affect future projects. Larger projects would follow a regulatory process in which individual Partnership members would be able to participate.

Recreational Activities (e.g. boating, ATVs, accessing fishing & hunting)

Most of the Mat-Su Basin is remote and not accessible via the road system. Therefore, the use of airplanes, boats, and off-road vehicles to access recreational areas in the Mat-Su Basin is common. However, the use of boats and off-road vehicles can affect salmon habitat. Boat wakes can contribute to streambank instability and increased sedimentation. Off-road vehicle trails can damage wetland, riparian, and instream habitat. Angler access along river banks can also damage riparian vegetation and lead to streambank instability. However, most of these activities are limited in scope and are reversible given an adequate level of funding and commitment. Therefore, the Partnership did not elevate this potential threat to the conservation strategy development stage.

Oil, Gas, and Coalbed Methane Drilling

The potential threat of oil, gas, and coalbed methane drilling could affect salmon habitat, primarily by potential negative effects on water quality. This potential threat is greatest in the Lowlands East and Lake Complex terrestrial targets, and in the Upper Cook Inlet Marine target.

This potential threat was not elevated by the Partnership because most activities would be limited in geographic scope barring a catastrophic event. Larger projects would follow a regulatory process in which individual Partnership members would be able to participate.

Utility & Service Lines

Utility and service lines are necessary infrastructure for communities. Although they can affect salmon by altering upland and riparian vegetation, these effects are usually limited in scope and do not affect large areas of any terrestrial target. Therefore, the Partnership did not elevate this potential threat.

Developed Recreational Areas (e.g. lodges, campgrounds, & cabins)

Developed recreational areas can have similar effects on salmon habitat as urban and residential development. However, these impacts are much more limited in scope. Several Objectives and Strategies developed for urban and residential development are applicable to developed recreational areas, but at a much smaller scale. Compared to the severity of other potential threats, the Partnership did not choose to elevate the potential threat of developed recreational areas at this time.

Invasive Alien Plant Species (terrestrial & aquatic)

Although the Mat-Su Basin and the rest of Alaska are relatively unaffected by invasive species compared to other areas in North America, the pathways for aquatic and terrestrial invasives exist and a large-scale invasion is probably imminent. Once established, invasive species are nearly impossible to eradicate. Increasing air and water temperatures could make Alaska even more vulnerable to invasives. The Partnership did not advance this potential threat for conservation strategy development because individual partners (USFWS, ADFG) have established invasive species programs to address the threat.

Logging & Wood Harvesting

Although timber resources in the Mat-Su Basin are not prized species for commercial timber harvest, trees in the Lowland East and West Complexes could support small commercial operations. Improper timber harvest can affect fish populations by damaging riparian and instream habitat and degrading water quality. However, timber harvest in Alaska is regulated by the Alaska Forest Resources and Practices Act (AS 41.17) which provides protections for riparian areas and fish habitat. The Partnership did not advance this threat for conservation strategy development because most timber harvest in the Mat-Su Basin will be limited in geographic scope, and larger projects would follow a regulatory process in which individual Partnership members would be able to participate.

Agriculture (crops & ranching)

Agriculture has played an important role in the development of the Mat-Su Valley, and the Palmer-Wasilla area is widely considered to be the agricultural center of Alaska. Improperly implemented agricultural practices can affect fish habitat and water quality. The Partnership did not elevate this potential threat because individual partners, such as Natural Resource Conservation Service (NRCS), have programs already available to promote environmentally sustainable agricultural practices.

Fishing (commercial, sport and subsistence)

Although overfishing has the potential to affect salmon populations in the Mat-Su Basin, the Partnership decided not to address fishery management issues in Upper Cook Inlet. Within Alaska, ADFG has the responsibility to manage all fisheries according to the sustained yield principal.

Invasive Alien Marine Species

The Upper Cook Inlet Marine target is vulnerable to invasive marine species transported on ship hulls and in ballast water, and also through oceanic currents that bring invasives to Alaskan coastal waters. Several species of crab and other marine invertebrates are potential invaders, and as sea temperatures increase, Alaska could become even more vulnerable to this threat. As with terrestrial and aquatic invasives, the Partnership did not advance this potential threat for conservation strategy development because individual partners (USFWS, ADFG) have established invasive species programs.

Tidal Energy Development

Tidal energy development is currently being planned for Cook Inlet, with a demonstration project in Knik Arm scheduled for 2008. Underwater turbine generators would use the currents produced by incoming and outgoing tides to produce electricity. These turbines could kill fish in Cook Inlet, but overall affects are unknown at this time. The Partnership did not elevate this potential threat for conservation strategy development because individual partners will be able to participate in the regulatory process to license any project through Federal Energy Regulatory Commission (FERC).

Marine Shipping Lanes & Platforms

The Port of Anchorage accounts for delivery of more than 90 percent of the consumer goods arriving in Alaska. Shipping traffic in Upper Cook Inlet associated with this volume of goods has the potential to affect salmon habitat. However, the Partnership did not advance this potential threat because the impacts are limited in geographic scope and somewhat variable over the landscape.

Table 1, Appendix 7. Summary of Threats Across Targets and the Mat-Su Basin, based on severity and scope of particular stresses to each conservation target (Appendix 4) in combination with the relative contribution and irreversibility of various sources to those stresses.

Threats Across Targets		Sockeye salmon	Pink and chum salmon	Coho and Chinook salmon	Upland Complex	Lowland Complex - West of Susitna River	Lowland Complex - East of Susitna River	Lake Complex	Upper Cook Inlet Marine	Overall Threat Rank
Project-specific threats		1	2	3	4	5	6	7	8	
1	Housing & Urban Areas (development & uses of these areas)	Low	Low	Low	Low	Low	Very High	High	Note 2	High
2	Roads & Railroads for housing, urban, & industry	Low	Low	Low	Medium	Medium	Very High	Medium	Note 2	High
3	Climate Change	Note 1	Note 1	Note 1	Low	Medium	High	Medium	Medium	Medium
4	Stormwater & Urban Runoff	Note 1	Note 1	Note 1	Low	Low	High	Medium	Low	Medium
5	Invasive northern pike	High	Low	Medium	Note 2	Note 2	Note 2	Note 2	Note 2	Medium
6	Marine Transportation Infrastructure (e.g. ports, ferries, bridges)	Note 1	Note 1	Note 1	Note 2	Note 2	Note 2	Note 2	High	Medium
7	Dams and Hydroelectric Power	Low	Low	Low	Low	Medium	Medium	Medium	Low	Medium
8	Mining & Gravel Quarrying (on land and in river)	Low	Low	Low	Medium	Medium	Medium	Low	Note 2	Medium
9	Oil, Gas, and Coalbed Methane Drilling	Note 1	Note 1	Note 1	Low	Low	Medium	Medium	Medium	Medium
10	Ground & Surface Water Withdrawals	Note 1	Note 1	Note 1	Low	Medium	Medium	Medium	Note 2	Medium
11	Household Septics & Urban Waste Water	Note 1	Note 1	Note 1	Low	Low	Medium	Medium	Low	Medium
12	Utility & Service Lines	Note 1	Note 1	Note 1	Low	Low	Medium	Low	Medium	Medium
13	Developed Recreational Areas (e.g. lodges, campgrounds, & cabins)	Note 1	Note 1	Note 1	Low	Low	Medium	Medium	Note 2	Medium

Threats Across Targets		Sockeye salmon	Pink and chum salmon	Coho and Chinook salmon	Upland Complex	Lowland Complex - West of Susitna River	Lowland Complex - East of Susitna River	Lake Complex	Upper Cook Inlet Marine	Overall Threat Rank
Project-specific threats		1	2	3	4	5	6	7	8	
14	Logging & Wood Harvesting	Note 1	Note 1	Note 1	Low	Medium	Medium	Low	Note 2	Medium
15	Recreational Activities (e.g. boating, ATVs, accessing fishing & hunting)	Low	Low	Low	Low	Low	Medium	Low	Note 2	Low
16	Agriculture (crops & ranching)	Note 1	Note 1	Note 1	Low	Low	Medium	Low	Note 2	Low
17	Coal Power Plant	Note 1	Note 1	Note 1	Low	Low	Medium	Low	Note 2	Low
18	Fishing (commercial, sport, subsistence)	Medium	Low	Low	Note 2	Note 2	Note 2	Note 2	Low	Low
19	Invasive Alien Plant Species (Terrestrial & Aquatic)	Note 1	Note 1	Note 1	Low	Low	Medium	Low	Note 2	Low
20	Invasive Alien Marine Species	Note 1	Note 1	Note 1	Note 2	Note 2	Note 2	Note 2	Medium	Low
21	Tidal Energy Development	Note 1	Note 1	Note 1	Note 2	Note 2	Note 2	Note 2	Medium	Low
22	Marine Shipping Lanes & Platforms	Note 1	Note 1	Note 1	Note 2	Note 2	Note 2	Note 2	Low	Low
Threat Status for Targets and Project		Medium	Low	Low	Medium	Medium	Very High	High	High	High

Note 1: This potential threat impacts salmon habitat so is assessed for the broader ecosystem/habitat targets; potential threats to population and fish passage are assessed for salmon targets.
Note 2: This potential threat does not occur in this ecosystem target or does not affect its key ecological attributes (Appendix 5).

Appendix 8: Research Needs for Mat-Su Basin Salmon and Habitat

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 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 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.

Loss of Estuaries & Nearshore Habitats:

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.

Septic Systems:

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

Loss of Water Flow or Volume:

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.

Appendix 9: Steps in Conservation Action Planning

The Conservation Action Planning (CAP) process guides project teams to identify effective conservation strategies. It provides an objective, consistent and transparent accounting of conservation actions and the intended and actual outcomes of conservation projects. It enables project staff to responsively adapt their actions to improve strategy effectiveness and achieve greater conservation impact.

TNC has developed a robust array of tools to support this process, including a sophisticated Excel workbook that documents decisions and discussions and synthesizes information by species and habitats of concern and by threat. The summary tables in the Appendices were generated from information in the Excel workbook.

Figure 1. Steps in TNC's Conservation Action Planning process

The 10 steps of CAP address the 5-S Framework:

- **Systems:** the species and natural communities that are the ***conservation targets*** for the area. The current health, or **viability**, of the targets is evaluated.
- **Stresses:** the types of degradation and impairment that can affect the viability of conservation targets
- **Sources**: the sources of stress for each target. The analysis of stresses and sources together identify potential threats.
- **Strategies:** practical cooperative ways to mitigate or eliminate potential threats, enhance biodiversity and achieve conservation **objectives**
- **Success:** ***measures*** of biodiversity health and threat abatement to gage effectiveness of strategies
- **Situation:** an understanding of the cultural, political and economic situation behind potential threats. This human context is often referred to as the sixth "S".

Additional information about Conservation Action Planning is available at conserveonline.org/workspaces/cbdgateway/cap.

Summary of the Conservation Action Planning Process

A. Defining Your Project

1. Identify People Involved in Your Project

- ☐ Selection of core project team members and assignment of roles
- ☐ Identification of other planning team members and advisors as needed
- ☐ Identification of a process leader

2. Define Project Scope & Focal Conservation Targets *(5S = Systems)*

- ☐ A brief text description and basic map of your project area or scope
- ☐ A statement of the overall vision of your project
- ☐ Selection of no more than 8 focal conservation targets and explanation of why they were chosen

B. Developing Your Conservation Strategies and Measures

3. Assess Viability of Focal Conservation Targets *(5S = Systems)*

- ☐ Selection of at least one key ecological attribute and measurable indicator for each focal target
- ☐ Your assumption as to what constitutes an acceptable range of variation for each attribute
- ☐ Determination of current and desired status of each attribute
- ☐ Brief documentation of viability assessments and any potential research needs

4. Identify Critical Threats *(5S = Stresses & Sources)*

- ☐ Identification and rating of stresses affecting each focal target
- ☐ Identification and rating of sources of stress for each focal target
- ☐ Determination of critical threats

5. Complete Situation Analysis *(5S = Strategies)*

- ☐ A situation analysis that includes indirect threats/opportunities and associated stakeholders behind all critical threats and degraded attributes
- ☐ A "picture" – either in narrative form or a simple diagram – of your hypothesized linkages between indirect threats and opportunities, critical threats, and focal targets

6. Develop Strategies: Objectives & Actions *(5S = Strategies)*

- ☐ At a minimum, good objectives for all critical threats and degraded key ecological attributes that your project is taking action to address and if useful, for other factors related to project success
- ☐ One or more strategic actions for each conservation objective

7. Establish Measures *(5S = Success)*

- ☐ A realistic list of indicators and methods to track the effectiveness of each conservation action
- ☐ A realistic list of indicators and methods to assess status of selected targets and threats you are not currently working on

C. Implementing Your Conservation Strategies and Measures

8. Develop Work Plans

- ☐ Lists of major action steps and monitoring tasks
- ☐ Assignments of steps and tasks to specific individual(s) and rough timeline
- ☐ Brief summary of project capacity and a rough project budget
- ☐ If necessary, objectives and strategic actions for obtaining sufficient project resources

9. Implement

- ☐ Action.
- ☐ Measures.

D. Using Your Results to Adapt and Improve

10. Analyze, Learn, Adapt, & Share

- ☐ Appropriate and scheduled analyses of your data
- ☐ Updated viability and threat assessments
- ☐ Modifications to objectives, strategic actions, and work plans, as warranted
- ☐ Regular updates of project documents
- ☐ Identification of key audiences and appropriate communication products for each

Appendix 10: Summary and Response to Comments on the Strategic Action Plan of the Mat-Su Salmon Partnership

Overview of the Planning Process

The Mat-Su Salmon Partnership developed this 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 planning team, composed of three working groups (Appendix 1), met in a series of workshops in 2007 to go through the CAP process to develop the plan (Appendix 2). The Steering Committee determined the scope of the plan, set parameters for the plan, and monitored the planning process. The Steering Committee decided that the plan would focus exclusively on habitat-related issues and that the scope would include freshwater fish habitat in the Mat-Su Basin and nearshore, estuarine, and marine habitat in upper Cook Inlet.

With guidance from the Steering Committee, two working groups determined priorities for the Partnership and developed the plan. The Science Working Group was composed of people with knowledge about salmon and their habitat in the Mat-Su Basin, including hydrologists, biologists, ecologists, and naturalists. They defined conservation targets for salmon and salmon ecosystems in the Mat-Su Basin, identified the factors that describe the health of salmon and their habitat, and assessed the current state of those factors. They then identified stresses and their sources that affect salmon and their habitats and ranked these potential threats. The Science Working Group recommended which potential threats and stresses to salmon that the Partnership should concentrate conservation effort on and participated in developing strategies for those potential threats.

The Implementation Working Group included people who will carry out conservation strategies in the Mat-Su Basin. The range of strategies is broad, thus requiring a broad range of skilled partners, so this group included parties that are expected to help carry out conservation work for salmon and salmon ecosystems in the Mat-Su. The Implementation Working Group analyzed the situation for each potential threat to look for the root causes and leverage points for successful implementation of conservation strategies. They defined objectives for salmon conservation activities by the partnership and identified the actions required to achieve those objectives.

A draft Strategic Action Plan was presented to the entire Mat-Su Salmon Partnership on October 30, 2007, and was made available for Partner and public review through November 30, 2007. State and federal agencies reviewed the plan for policy implications in April 2008. The Steering Committee reviewed all comments and revised the plan accordingly. Following is a summary of the comments on the plan and how the Steering Committee incorporated the suggestions and information in those comments.

Specific Issues and Topics Receiving Comments

Alteration of Riparian Areas

Summary: Comments submitted concerning riparian areas proposed protection of riparian vegetation and identification of the most valuable riparian areas to buffer streams from rising air temperatures. Also one comment suggested that the goals and timeframe for the amount of riparian areas to be protected were too low and that more acres need to be protected sooner.

Response: The Steering Committee added a new objective to identify salmon riparian areas and prioritize those with the greatest importance for salmon. The objective that previously combined protection and restoration was broken into separate objectives. A new strategic action was added to the protection objective to protect riparian habitat through conservation easements and acquisition. Since Mat-Su riparian areas are not yet mapped or prioritized, the steering committee did not change the timeline or acreage goals. Under the new restoration objective, a new strategic action was added to conduct riparian restoration projects. Protection and restoration efforts should be on-going and not wait for all the mapping and prioritization to be completed.

Best Management Practices

Summary: Several commenters noted that Best Management Practices (BMPs) have been written for many of the focal issues identified in the plan. Some of the strategic actions included development of BMPs. Existing BMPs may have been drafted for the Mat-Su Basin, Alaska, or U.S. in general.

Response: The plan has been revised to "promote" BMPs. The Partnership and its partners will use BMPs already written as a starting point for promoting development practices that minimize impacts to salmon and their habitat.

Climate Change

Summary: Several commenters requested that the plan acknowledge climate change and warming stream temperatures among the top threats to salmon and include objectives to address the risks to salmon from rising water temperatures and changing hydrological patterns.

Response: Although warming stream temperatures was not among the top threats identified by the Science Working Group, many of the factors that can maintain or reduce the resiliency of salmon to a changing climate (e.g., loss of riparian cover, wetlands, connectivity, and instream flow) were high priorities. We recognize the value of understanding changes to the thermal regimes of water bodies in prioritizing and directing protection and restoration efforts and will be developing a monitoring program that will include measures of water quality, including water temperature.

Culverts

Summary: Comments received on this section included clarifications, what standards and information exist now for fish passage, and what kind of strategic actions should be taken.

Alaska Department of Fish and Game's (ADFG) fish passage website was noted to be included, grey culverts and what constitutes a barrier further defined, and the level of streamlining between agencies laid out. Some comments expressed concern over the number of culverts to be replaced in such a short time. Some comments noted that "no new barriers" was already guaranteed within existing laws and that enforcement might be a better focus for that objective. To achieve that, a revamp of the MOA between DOT and ADFG would be less effective than development of local standards and update of existing standards. Commenters saw the need for further refinement in state and local coordination actions as more annual coordination meetings, gathering of more hydrologic data, and subsequent analysis for basin-specific flow regimes.

Response: Most clarification comments were incorporated including: defining legacy culverts, how culverts are barriers, and existing streamlining efforts. The number of culvert replacements was decreased to 20 by 2012 from 50. The No New Barriers objective was refined to emphasize enforcement of current state statutes and fostering effective fish passage practices. Strategic Actions to achieve No New Barriers were changed to reflect promotion of developing local design standards and updating and exploring options used by the Municipality of Anchorage with road infrastructure agencies. State-Local coordination was revised to include annual meetings to discuss the year's infrastructure projects. Workshops and education were included.

Development in Estuaries

Summary: Comments received on this section reflected a wide range of opinion. Some comments promoted expanding this section to be more comprehensive, as limiting this section restricts collaborative efforts for protection and restoration in the larger Cook Inlet watershed. Other comments expressed concern that the inclusion of this section under potential threats could be counter to development interests and reaches beyond the original scope.

Response: The Steering Committee retained this issue in the plan at the recommendation of the Science Committee and Implementation Team. The Plan recognizes the need for maintaining water quality and quantity and the integrity and connectivity of wetlands, riparian and hyporheic processes in the fresh water tributary system. In order to maintain healthy fish populations, cumulative effects from all potential threats need to be recognized.

Proposed port expansions, a ferry terminal, and the construction of a bridge to span Knik Arm could influence salmon migration to and from Knik Arm tributaries. Dredging operations needed to maintain shipping access to the port terminals would significantly alter sediment loads, natural channel course and water quality. Other activities such as the construction of shear wall piling to support docks, and filling hundreds of acres of intertidal zones and wetlands decreases usable refuge for migrating salmon and creates potential velocity barriers particularly to juvenile salmon. It also decreases potential refuge for migrating smolt and increases susceptibility to predation. In addition, the impacts of these actions on forage fish and invertebrates should also be considered. Lastly, it is inconsistent with the intent of the purposes identified in the Strategic Action Plan to ignore the potential cumulative effects from projects that hinder the ability of salmon to access Knik Arm and its tributaries, impact rearing and refuge habitat, and compromise migratory corridors.

Fisheries Management and Allocation

Summary: Several commenters suggested that fisheries management and allocation between Cook Inlet fisheries is a large issue concerning salmon in the Mat-Su Basin that should be included in the plan.

Response: While fishery allocation is a large issue facing the Mat-Su and other areas near Cook Inlet, the plan purposefully excluded this issue. The Steering Committee initiated the plan under the guidance of the National Fish Habitat Action Plan specifically to identify important habitats for salmon and other fish, identify and prioritize fish habitat conservation actions, and identify and engage potential collaborators and funding for those actions.

The Mat-Su Salmon Partnership formed and now operates under guidance of the National Fish Habitat Action Plan, approved by the National Fish Habitat Board in 2007. The mission of NFHAP 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." NFHAP further identifies four goals: (1) Protect and maintain intact healthy aquatic systems; (2) Prevent further degradation of fish habitats that have been adversely affected; (3) Reverse declines in the quality and quantity of aquatic habitats to improve the overall health of fish and other aquatic organisms, and; (4) Increase the quality and quantity of fish habitats that support a broad natural diversity of fish and other aquatic species.

Guidance under NFHAP clearly identifies habitat as the scope under which partnerships, including the Mat-Su Salmon Partnership, are to operate. The Steering Committee designed the planning process to address habitat-related issues to remain consistent with the intent of the NFHAP and the Mat-Su Partnership. Including fishery allocation issues would substantially change the nature of the plan and would likely shift the focus away from the purpose for which the Mat-Su Partnership formed.

While the plan does not address fishery allocation, Alaska is uniquely equipped to deal with fishery allocation issues through the Alaska Board of Fisheries process. The Board process is open and available to the public. Any member of the public – individual or group – can submit a proposal to change fishing regulations on a 3-year cycle. The Alaska Department of Fish and Game provides technical support to the Board, and other affected agencies participate as needed. More information on the Board process is available at: http://www.boards.adfg.state.ak.us/.

The introduction section of the plan was modified to better explain its scope, including the rationale for excluding fishery allocation issues.

Filling of Wetlands

Summary: Several commenters requested strengthening the agency permitting review process and preventing wetlands loss while protection strategies are being developed. One suggestion was to develop a public education and outreach plan with incentives and information about wetland and water quality protection.

Response: Strategic actions were added for permitting process and educational outreach. One strategic action was added to strengthen agency review, including COE 404 permit reviews.

Another added strategic action is to develop and support wetlands educational efforts. The wording used in this section is "wetlands that are important for salmon;" this does not preclude protecting wetlands for other values. For the purposes of this Strategic Action Plan, conservation efforts are focused on the most important wetlands for salmon, which will be determined through implementation of these strategies.

Impervious Surfaces and Stormwater Runoff

Summary: Comments about these two focal issues (Impervious Surfaces and Stormwater Runoff Management) largely provided additional and clarifying information about current programs to manage stormwater runoff. Some comments focused on the interconnected nature – stormwater becomes a problem when increasing imperviousness within a watershed directs increasing amounts of storm and melt-water directly into surface waters. One commenter also suggested addressing Stormwater Runoff with Alteration of Riparian Areas.

Response: These two focal issues were combined in the revised Strategic Action Plan. Several similar or identical strategic actions had been included under both issues. In the revisions, the objectives were condensed and simplified to focus on 1) assessing the current impacts of impervious surfaces and stormwater runoff and 2) preventing and mitigating additional impacts. The Water Quality Improvement objective and strategic actions under Stormwater Runoff was largely duplicative of other objectives and actions in other parts of the plan so was removed; the action for Encouraging Drainage Districts was included under the revised Impact Prevention objective. The Baseline Water Studies objective under Impervious Surfaces was duplicative with objectives for two other focal issues (Culverts and Instream Flow); all water studies have been combined under the Overarching Science Strategies section. Additional and clarifying information about current programs to manage stormwater runoff was included in the revisions.

Northern Pike

Summary: The majority of comments about northern pike were in support of inclusion of this issue for Mat-Su Basin salmon. One commenter thought the partnership's objective should be eradication, and another questioned if introductions could be prevented or just reduced. One commenter said there is anecdotal evidence that northern pike were in the Susitna Valley prior to 1940.

Response: The Steering Committee retained this issue in the plan based on recommendations from the Science and Implementation Working Groups and local biologists at the Alaska Department of Fish and Game. We revised the objective regarding new pike introductions to "Reduce introductions of northern pike to additional Mat-Su Basin waterbodies by 2012 through education and outreach."

Protection strategies

Summary: Several commenters suggested strengthening the role of conservation easements and land acquisition in the plan's strategies.

Response: Strategic actions for protecting private lands have been expanded or added to two focal issues (Alteration of Riparian Areas, Filling of Wetlands). Similarly, instream flow reservations can protect water quantity in Mat-Su waterbodies.

Recreation

Summary: All comments about Recreation noted this issue as an important one in the Mat-Su Basin and several commenters said that it should be included. Comments put specific recreational impacts into two categories – motorized recreation and access for sportfishing. Motorized recreation can impact vegetation, water flow, and fish spawning areas when ATV trails cross wetlands and streams; and boats can pollute streams and lakes with hydrocarbons. A lack of sportfishing access concentrates use, which can result in damage to spawning habitat and streambanks. Commercial traffic, including outboard motor boats, airboats, and floatplanes, can contribute to bank erosion to a greater extent that anglers and disturb spawning fish and redds in shallow water.

Response: During development of the plan, recreation was included in the analysis of threats to salmon and salmon habitat. The Science Working Group recommended that the Partnership focus on other issues at this time because recreational impacts are localized and more easily reversed than other threats. The Steering Committee decided not to add this issue to the plan at this time for two reasons. First, the recommendations from the Science Working Group and discussions among the Implementation Working Group led to agreement that while recreational activities are having significant impacts in some locations, other threats to salmon have broader implications that the Partnership should address. For example, a culvert that blocks access to a productive system will likely have a greater long-term impact than sedimentation from trampled banks at the mouth of a creek. Second, irresponsible use of ORVs in the Mat-Su Basin may be best addressed through enforcement of existing laws, and the Steering Committee does not see a role for the Partnership with that strategy. The plan was revised to better explain why issues that are currently impacting salmon habitat, like Recreation, were not included in this first Strategic Action Plan.

While recreational impacts may not be one of the issues addressed by the Mat-Su Salmon Partnership, that does not mean they should not be a focus for others. Partners or other community groups should work on issues that affect their local salmon streams and that they have the skills and resources to remedy. As discussed in the plan, the issues facing Mat-Su salmon are multiple; diverse and collaborative efforts by many are required to ensure that salmon fill our streams for generations to come.

Septic Systems

Summary: The comments received about Septic Systems ranged from support for the inclusion of this issue due to its impact on water quality to questioning the significance of septic systems to salmon. The majority of comments supported the inclusion of this issue. One comment suggested adding a strategy or action to improve existing septic systems. Another comment suggested an alternative preventative strategy to ensure that new septic systems are appropriately sited. Several commenters had additional information or corrections about regulation of septic systems.

Response: Despite one comment questioning the inclusion of this issue, the Steering Committee retained it in the plan based on discussions with the Science and Implementation Working Groups. Septic systems present an increasing water quality problem because new development tends to be concentrated around lakes and streams and few community wastewater systems are

installed. Fecal coliform bacteria may not be a direct pollutant to salmon, but it is an indicator of degraded water quality that has negative impacts to other elements of the aquatic environment that may indirectly affect salmon. Because septic systems are a developing issue, the Partnership approach will be preventative. Objectives were revised to encourage the installation of appropriate septic systems in new development and the construction of a wastewater facility in the Mat-Su. Some background information in the plan was revised based on comments from partners.

Water Withdrawals and Instream Flow

Summary: Many comments were received specifically listing "water quantity" as one of the biggest issues for salmon habitat in the Mat-Su Basin. Specific edits and suggestions for this section were limited to a few commenters and included additions of data from US Geological Survey and Alaska Department of Fish and Game, state policies and procedures, current status, reports for reference, and expansion of general hydrologic processes.

Response: Most of the comments were included this section of the Plan, either in their entirety or abbreviated. There remains a high need for reservations of water for the protection of fish and wildlife habitat, migration and propagation. Multiple objectives for Baseline Water Studies existed in the plan (Impervious Surfaces, Culverts and Instream Flow); all water studies have been combined into one objective under the Overarching Science Strategies section.

Voluntary, Non-regulatory Nature of Plan and Partnership

Summary: During the policy review, state and federal agencies asked for clarification that the strategic action plan is non-regulatory and voluntary in nature.

Response: The Introduction and Strategies sections were revised to emphasize the voluntary, non-regulatory nature of the partnership and to clarify that the plan is non-binding on any partners. Achievement of some objectives may be best through with policy changes at the local, state, or federal level. These changes are recommended in the plan. All resource agencies, however, who are members of the Mat-Su Salmon Partnership Steering Committee maintain all statutory authorities and do not relinquish any of their responsibilities for managing fish and wildlife resources or budgetary responsibilities per their agency missions through Mat-Su Salmon Partnership participation. Similarly, no non-governmental organization that is a member of the Partnership has ceded its right to determine its own actions in the Mat-Su Basin.