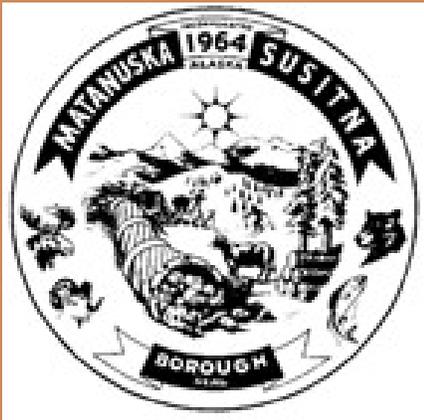


MATANUSKA-SUSITNA SALMON

RESEARCH, MONITORING & EVALUATION PLAN

FOR UPPER COOK INLET



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SUMMARY

The Matanuska-Susitna Borough has received an appropriation of State Capital Funds (FY2014) for salmon fisheries and protection. To guide expenditure of a portion of these funds, the Mat-Su Fish and Wildlife Commission has directed preparation of this research, monitoring and evaluation (RM&E) Plan for Borough salmon.

This plan is intended to encompass the interests of governing agencies and partners in guiding funds towards research, monitoring and evaluation projects selected to manage, protect and improve Mat-Su Borough salmon stocks for optimum benefits while maintaining biological productivity and diversity. The plan is concerned with all five salmon species (Chinook, coho, sockeye, chum and pink). The focal area includes fresh and estuarine waters inhabited by salmon originating from the Mat-Su Borough, as well as marine waters of the Northern and Central Districts of Upper Cook Inlet north of Anchor Point. The period of the plan is the next three to five years.

A formal, structured, and collaborative decision process was used to identify and prioritize specific goals, objectives, and issues. The process involved:

- A. Identification by the Commission of an inclusive set of goals and objectives for salmon status, fisheries, and ecosystems.
- B. Completion under Commission direction of a comprehensive information review and inventory to identify data gaps relative to goals and objectives.
- C. Identification and prioritization of issues pertinent to goals and objectives in a facilitated strategic planning workshop of invited stakeholders and a public review and comment on a draft plan.

The goals, objectives, issues, and priorities identified in this plan are those of the Mat-Su Borough Fish and Wildlife Commission. Stakeholder input was incorporated through the facilitated issue identification and ranking process. However, resulting priorities do not necessarily represent the opinions and priorities of other participating agencies or individuals.

A total of 55 research, monitoring, and evaluation issues were identified. Substantial differences in priority were apparent between highest and lowest ranked issues although ranks for many issues fell into equal or similar blocks. Issues were categorized by priority into five more-or-less equally-sized groups. The highest priority issues identified for Mat-Su salmon included:

1. Lack of current economic and social information on sport, personal use, and commercial salmon fisheries of Upper Cook Inlet.
2. Need to monitor occurrence and evaluate control of invasive species (e.g., pike and waterweed *Elodea*) in Matanuska-Susitna waters.

3. Need information for identification and/or evaluation of effective stock-specific strategies in mixed stock fisheries.
4. Need to evaluate salmon effects and control of invasive pike.
5. Insufficient information for in-season projections of Mat-Su salmon run sizes needed to manage escapements and optimize fisheries.
6. Potential impacts of invasive waterweed *Elodea* in area waters are uncertain.
7. A lack of management objectives for the smaller salmon stocks originating from Mat-Su waters.

Priorities will be one of several considerations in identifying projects for funding. Project evaluation criteria also include proposed approach, technical scientific merit, qualifications, expertise, budget, cost effectiveness, partnership, etc.

I. THE PROJECT

Background

This project is being conducted on behalf and under the direction of the Matanuska-Susitna Borough (Mat-Su Borough) Fish and Wildlife Commission (Commission). The Commission, formerly the Mayor's Blue Ribbon Sportsmen's Committee, was formed in February 2007 to represent the interests of the Mat-Su Borough in the conservation and allocation of fish and wildlife. The Commission advises the Mat-Su Borough Assembly and the State of Alaska Boards of Fish and Game regarding fish and game practices and policies that affect the Mat-Su Borough. The Commission consists of seven representatives from the following segments of the community: one representative from the Mat-Su Borough; one sportfishing representative; one hunting representative; and, four at-large positions.

Sustainability and management of the Mat-Su Borough's tremendous salmon resources is a primary focus of the Commission's efforts. Recent problems have highlighted significant research needs. Poor or declining runs of Chinook, coho and sockeye have occurred in recent years. Restrictions and closures of local sport fisheries have been widespread. Established spawning escapement goals are often not being met. The Board of Fisheries has formally designated a number of salmon Stocks of Concern. The status and causes of Mat-Su Borough salmon problems have been a particularly controversial issue in the management of Upper Cook Inlet (UCI) commercial fisheries which harvest northern-bound salmon stocks along with Kenai Peninsula fish. In many cases, the available information on stock status and limiting factors has not been adequate to serve salmon sustainability and management demands.

Through dedicated efforts, the Mat-Su Borough has received an appropriation of State Capital Funds for local fisheries and fish protection (Table 1). Funding was identified for passage improvements, critical habitat acquisition, and a sportfishing economic assessment and salmon research. Additional funds have been provided by the legislature in the Alaska Department of Fish and Game (ADFG) budget for salmon research, restoration and enhancement in the Susitna River drainage and UCI. Mat-Su Borough salmon are also the focus of a number of new initiatives and resources including a Mat-Su Basin Salmon Habitat Partnership involving the Mat-Su Borough, U.S. Fish and Wildlife Service and a coalition of other collaborators; a statewide Chinook Salmon Research Plan being implemented by ADFG; and, a large-scale salmon, habitat, and ecosystem assessment effort for Susitna-Watana Hydropower evaluations, which is overseen by the Alaska Energy Authority. These efforts are in addition to base ADFG assessment and management programs and projects.

Collectively, these appropriations, projects and programs provide a convergence of opportunity and critical mass to further substantive progress in assessment, improvement, and management of Mat-Su Borough salmon resources. The Commission has identified the need to prepare a comprehensive salmon research, monitoring and evaluation (RM&E) Plan to guide application of their dedicated funds in a complementary and effective manner. The Commission strongly

believes that a sound scientific foundation is essential for effective protection and management of sustainable salmon runs and fisheries. No such plan or guidance document currently exists. A comprehensive review of all potential issues is necessary to place the significance of any single issue in context and to focus expenditures on the most significant issues and opportunities. The funds invested in developing a comprehensive RM&E plan will produce large dividends in identifying the entire scope of need and addressing the highest priority issues. For the cost of replacing one modest-sized culvert, the RM&E plan provides a sound foundation for funding projects and seeking additional funds which address all problem culverts in the Borough as well as the full spectrum of factors impacting Mat-Su salmon.

The planning process is also expected to inform related efforts by other parties and foster working partnerships and program effectiveness by involving key stakeholders. While the primary funding source for the RM&E Plan is a capital grant from the State of Alaska to the Mat-Su Borough, the RM&E Plan has been constructed so that issues and options identified by stakeholders can be addressed by multiple funding sources.

Table 1. Partial summary of salmon-related research resources in Upper Cook Inlet.

Allocation	Purpose	Amount	Schedule
Mat-Su Borough	FY2014 State Capital Fund allocation for local fisheries and fish protection (passage, acquisition, research) ^a <ul style="list-style-type: none"> • Culvert replacement (\$900,000) • Data gap analysis (\$200,000) 	\$2.5 m	New
ADFG	FY2014 State Capital Fund allocation for Susitna salmon research, restoration & enhancement ^a <ul style="list-style-type: none"> • Susitna Chinook smolt production (\$360,000) • UCI sockeye retrospective scale analysis (\$500,000) • Habitat assessment & inventory (\$0) • Survey & prioritize wetlands (\$100,000) • Fish prioritization Optimization Model (\$25,000) • Railroad Culvert Inventory (\$20,000) • Beaver dam passage assessment (\$75,000) 	\$2.5 m	New
ADFG	FY2014 State Capital Fund allocation for UCI Chinook salmon enhancement	\$2.0 m	New
ADFG	Fishery Management Program	Not avail.	Ongoing
ADFG	Governor's Chinook Initiative	\$2.5 m	2012-present
Alaska Energy Authority	Susitna-Watana Project	\$50 m	2012-present
USFWS	Matanuska-Susitna Salmon Habitat Partnership	\$0.25 ^b	2005-present
TBD	Federal Cook Inlet Disaster Funds	~\$0.7 m	Pending

^a Bullets denote projects identified through 2014.

^b Less than 50% of the \$2.5 million in funding received to date has been for assessment and/or research.

Project Mission

Develop a strategic plan that encompasses the interests of partners and governing agencies in guiding funds towards research, monitoring and evaluation projects selected to manage, protect and improve Mat-Su Borough salmon stocks for optimum benefits while maintaining biological productivity and diversity.

Problems to be addressed

Insufficient, incomplete and uncertain information on stock status, fisheries and the ecosystem constrain conservation and management of Mat-Su Borough salmon. Primary issues contributing to the overall problem include, but are not limited to:

- Recent returns of Chinook, coho and sockeye salmon have been inconsistent and many have declined.
- Spawning escapement goals have been established for only a few salmon stocks and established goals are not consistently met.
- The Board of Fisheries has formally designated a number of salmon returning to Matanuska-Susitna waters as Stocks of Concern.
- Poor salmon returns to Matanuska-Susitna waters limit sport, commercial, and personal use fisheries in rivers, streams and coastal areas of the Matanuska-Susitna Borough.
- Poor salmon returns to Matanuska-Susitna waters also constrain UCI commercial fisheries which can intercept significant numbers of these salmon outside the Borough.
- Development and activities by people throughout the Mat-Su Borough will continue to affect salmon habitat, ecology, productivity and fisheries.
- The relative significance of many limiting factors is uncertain.
- While substantial research, monitoring, and evaluation efforts for Mat-Su salmon have been undertaken, a comprehensive RM&E plan does not exist.

Time Horizon

Issues raised and proposed options will be considered relevant within a five year time horizon (2015-2020). Five years is the period of the capital appropriation to the Mat-Su research effort (as well as one life cycle of salmon). Thereafter, updates to the plan may be needed to address changes in the original problem, and to incorporate new information and improved technologies. Any updates will also consider the effectiveness of the plan and its implementation.

Species Addressed

This Plan is concerned with all five salmon species (Chinook, coho, sockeye, chum and pink). Species priorities were not identified by the Commission at a goal or objective level but were subsequently identified on an issue-by-issue basis by stakeholders participating in a strategic planning workshop. RM&E of salmon ecosystem issues will also benefit other fish species even though they are not a direct focus of the Plan.

Geographical Area

The focal area of this plan includes all freshwater watersheds inhabited by salmon originating within the Mat-Su Borough, extending through estuaries into marine waters up to the ordinary high water mark, including the Northern and Central Districts of UCI, to Anchor Point. Significant watersheds include the Susitna and Knik arm systems. Marine waters of UCI are included because of the potential significance of this area to early survival and productivity of salmon and because significant numbers of northern Cook Inlet salmon are harvested in UCI commercial fisheries.

The Plan does not include marine waters south of Anchor Point, Kenai Peninsula systems, or the municipality of Anchorage:

- Marine waters south of Anchor Point were excluded because a) funds are intended to benefit salmon originating in the Mat-Su Borough and those stocks become increasingly diluted south of Anchor Point; b) RM&E Plan stakeholders have a limited capacity to conduct offshore marine research on salmon; and, c) other plans and funding sources are directed towards research of salmon in offshore marine waters.
- Freshwater streams in the Kenai Peninsula Borough were excluded because they are addressed by other entities and processes.
- Freshwater streams within the municipality of Anchorage were not specifically included although the plan addresses issues common to both Mat-Su and Anchorage areas. Priorities identified in the plan allow for the possibility of addressing common interests. At the same time, Anchorage has issues that are uniquely its own. Borough priorities for expenditures are primarily focused on Borough concerns. In addition, we are not aware of an entity, comparable to the Mat-Su Borough's Commission, with which a partnership can be established.
- Freshwater streams on the west side of Cook Inlet were excluded for similar reasons.

The planning team recognized the value of keeping interested parties within the Kenai Peninsula Borough and the municipality of Anchorage informed RM&E efforts in order to develop future opportunities for shared benefits of related activities.



Figure 1. *Matanuska-Susitna Borough (yellow outline) and Upper Cook Inlet marine waters north of Anchor Point addressed by this RM&E Plan.*

Related Policies and Plans

The RM&E Plan was developed within the context of policies, plans and values related to salmon protection and management as identified by the Mat-Su Borough and other entities. Examples include:

- Mat-Su Borough Comprehensive Plan
- Strategic Action Plan of the Mat-Su Basin Salmon Habitat Partnership
- Matanuska River Management Plan
- Mat-Su Stormwater Management Plan
- Mat-Su Wetlands Management Plan
- ADFG Statewide Chinook Salmon Research Plan
- Alaska Board of Fisheries policies for sustainable salmon fishery management and escapement goals
- Fishery Management Plans adopted by the Board of Fisheries
- Alaska Sustainable Salmon Fund
- Monitoring and evaluation plans by the Alaska Energy Authority for Susitna-Watana hydropower development
- Cook Inlet Regional Salmon Enhancement Plan - Phase II (2006-2025)

Information developed through this plan will ultimately inform policies, regulations and best management practices (BMPs) for management of salmon fisheries, as well as salmon habitat use, conservation and restoration, in the Mat-Su Borough. Implementation of related measures (i.e., conservation easements, setbacks, buffers, and water quality regulations) will fall under the purview of the appropriate governing, monitoring and/or enforcement entities.

II. THE PLANNING PROCESS

Planning Groups & Roles

Core Planning Team included the Mat-Su Borough Environmental Planner (Frankie Barker), a Commission representative (Larry Engel), and lead consultants (Ray Beamesderfer of R2 and Peggy Merritt of Resource Decision Support). This team facilitated the planning process on behalf of the Commission by drafting a plan scope and plan components for review by the Commission. The Core Planning Team also organized and facilitated involvement by other parties to this planning process. Jim Hasbrouck of ADF&G provided assistance to the Core Planning Team in consideration of planning goals and objectives.

Mat-Su Borough Fish and Wildlife Commission consists of seven members. The Commission established the plan's scope, goals and objectives. The Commission and Mat-Su Borough will solicit proposals and select projects with application to priority issues identified in the plan – this is not a basic research program. The Mat-Su Borough will ultimately ensure that resources are used consistent with their needs and obligations.

Stakeholder Group included invitees from state and federal agencies, fishery organizations and others as identified by the Commission. These stakeholders attended a planning workshop to identify and prioritize issues and options to address goals and objectives identified by the Commission.

Public. Consistent with long-standing Mat-Su Borough policies, Commission meetings, including the planning workshop, were open to the public. The public was also provided with opportunity to review and comment on the draft plan.

Consultants. Project coordination and implementation was facilitated on behalf of the Commission by Ray Beamesderfer and Kai Steimle of R2 Resource Consultants and Peggy Merritt of Resource Decision Support. These consultants assisted with guiding the process and drafting the plan. Additional technical assistance was provided at the planning workshop by Mac Minard of Northwestern Natural Resource Consultants.

Work Plan

1. Define plan scope and process.

This work was completed by the Core Planning Team. Scope and process were reviewed and approved by the Commission prior to implementation.

2. Clarify the mission, and identify and prioritize plan goals and objectives.

The Commission identified upper level elements of the RM&E Plan from examples prepared by the Core Planning Team. The Core Planning Team also developed criteria for judging importance and prioritize goals and objectives. Through the planning process with the Stakeholder Group, scrutiny of words, clarification of concepts and introductions of additional knowledge led to changes in the initial goal and objective statements to more accurately reflect an assessment of the problem.

3. Complete an information review and inventory to identify information gaps relative to goals and objectives identified by the Commission.

An information gap analysis helped identify critical needs for knowledge to ensure that the best possible projects are solicited and funded with existing resources. The most efficient and effective use of funds will be to complement other efforts and initiatives, capitalize on shared opportunities, and avoid duplication of effort. The state of available knowledge was identified and documented to inform subsequent efforts to identify and prioritize issues and options. This inventory characterized information availability for each goal and objective. Availability of knowledge was included in the suite of criteria used for identifying and prioritizing issues and options.

4. Identify and prioritize issues and options in a facilitated strategic planning workshop of the Stakeholder Group.

A robust RM&E Plan will objectively address concerns by a broad spectrum of interests. Involving key stakeholders in plan development provides a strong, objective foundation the plan. A summary of results of the information review and inventory was available to facilitate identification and prioritization of plan elements.

5. Complete Research, Monitoring and Evaluation plan.

The RM&E Plan documents results of all previous tasks including: a) planning scope and methodology, b) research goals and objectives, c) information summary and review, and d) issues and options. The plan will also highlights data gaps based on a comparison of the available information with needs and options identified at the strategic planning workshop. This activity was completed by the Core Planning Team consistent with workshop discussions and results.

6. Conduct public review process of the draft Plan.

Interested public were invited to attend and observe the workshop process. Per standard Mat-Su Borough protocols, the public was also provided an opportunity to review and comment on the written draft plan. Comments received were addressed in the plan with revisions and explanations as appropriate.

7. Solicit proposals for research, monitoring and evaluation projects and select for implementation.

The Commission will identify project areas for funding with available resources based on guidance in the RM&E Plan. Proposals will be invited for consideration through an open solicitation process. Proposals will be ranked according to criteria including consistency with priorities, qualifications and experience, past performance, project approach, and proposal quality, and costs.

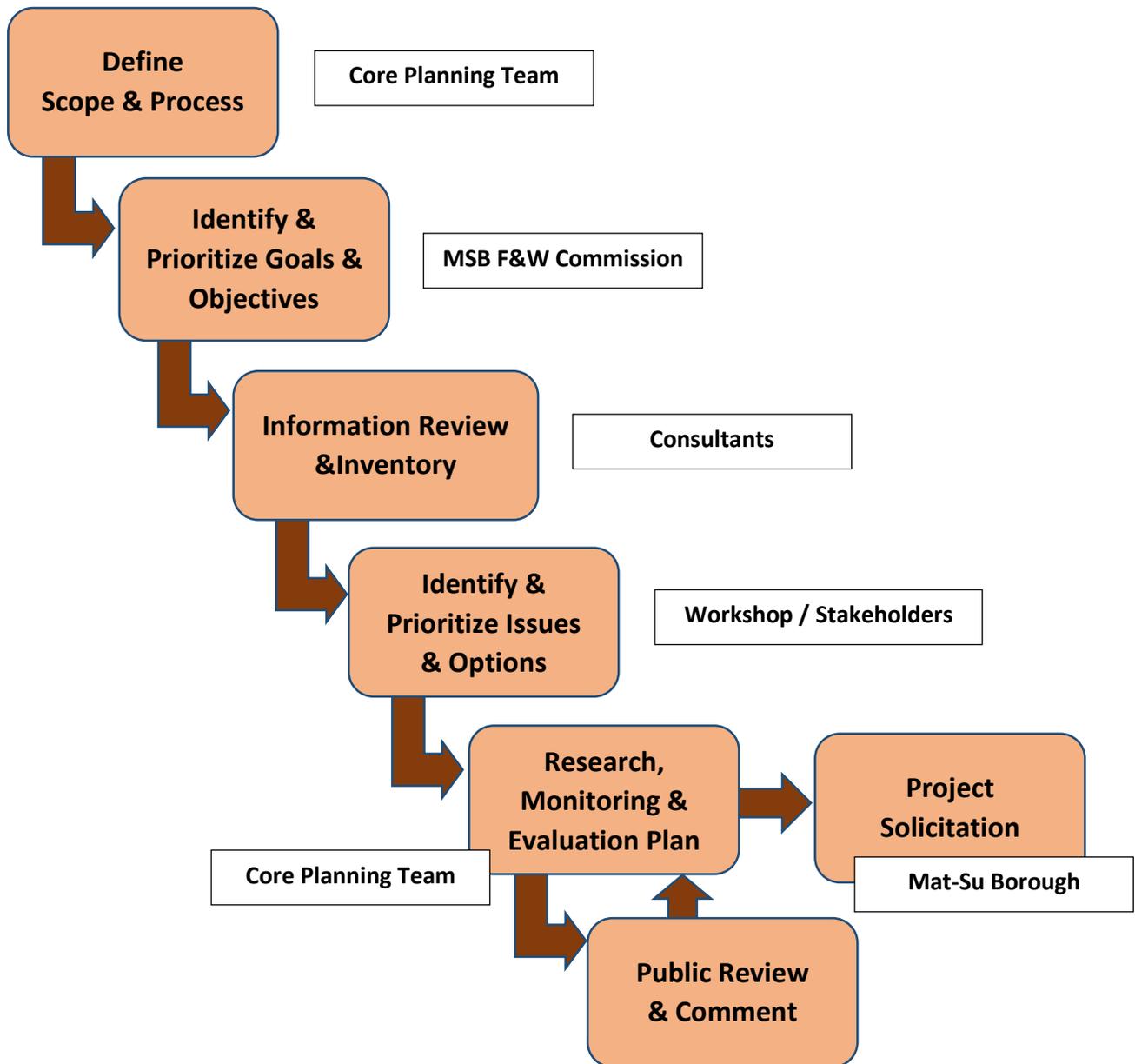


Figure 2. Plan development steps and responsibilities.

Table 2. Project schedule.

Task	2014				2015				
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
1. Plan scope & process									
2. Identify & prioritize goals & objectives									
3. Information review & inventory									
4. Workshop: issues & options									
5. Complete draft plan									
6. Public review									
7. Complete final plan									
8. Project solicitation									

Plan Elements

The RM&E Plan identifies goals, objectives, issues, and options organized in a hierarchical structure (Figure 3).

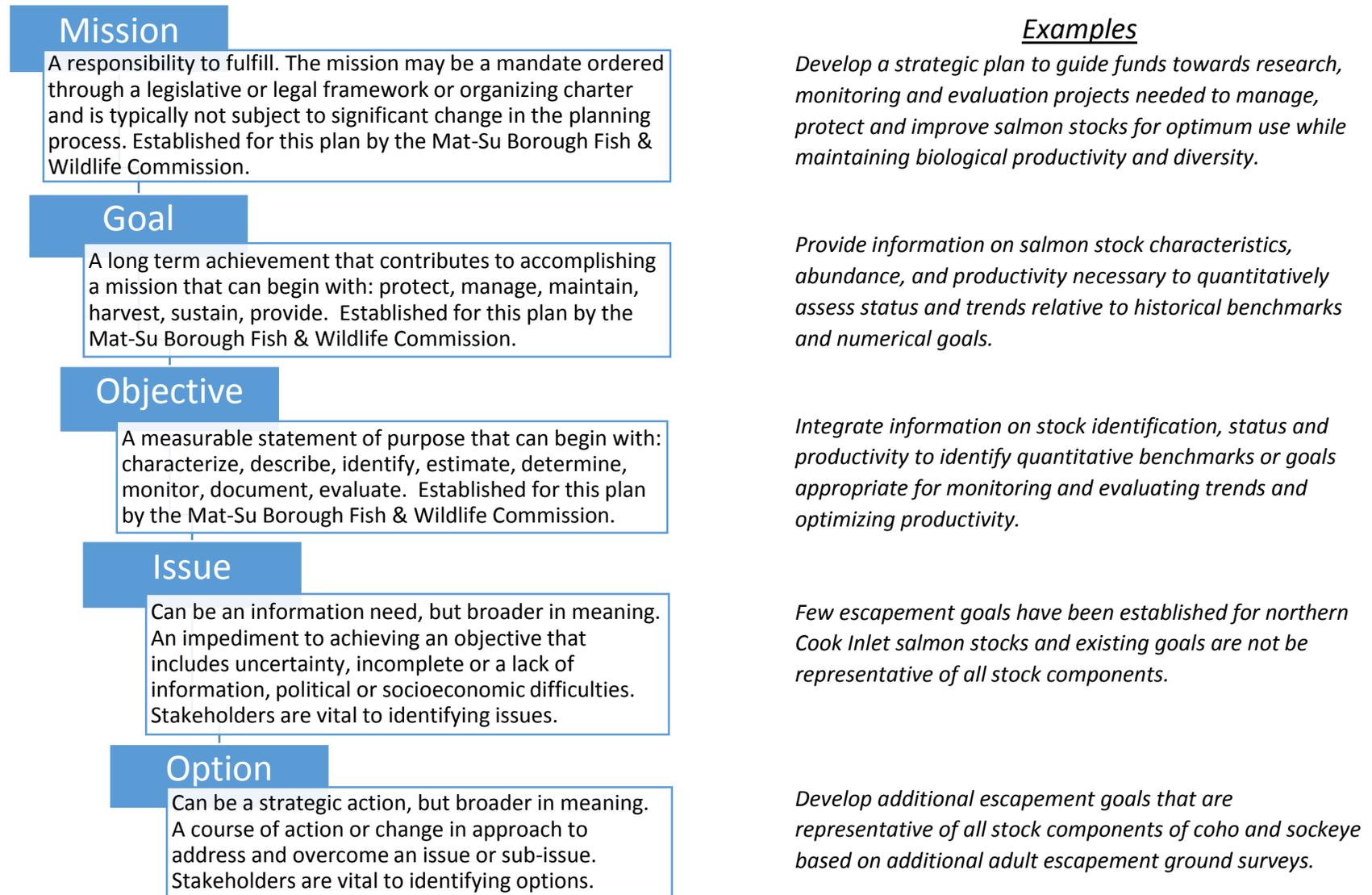


Figure 3. Definitions and examples of RM&E Plan elements.

Establishing Plan Priorities – The Analytic Hierarchy Process

A formal, structured decision process was used to identify and rate specific issues related to program goals and objectives. The Analytic Hierarchy Process (AHP) is a systems analysis tool designed to structure and address complex problems through expert judgment (Saaty 1999). Expert judgment is defined as “previous relevant experience, supported by rational thought and knowledge” (Saaty 1999). The process defines and communicates the problem, encourages explicit statements of importance or preference, incorporates diverse viewpoints, and increases the likelihood of finding an optimal solution.

This process was developed in the 1970s and has since found wide application in planning, conflict resolution, and prioritization for policy development, economics, engineering, medicine and military science, and has more recently been applied to fisheries research and management including plans in Alaska (Merritt and Criddle 1993; Merritt 1995, 2000, 2001; Merritt and Skilbred 2002; USFWS 2005; KRSA 2007; Mat-Su Partnership 2008).

AHP provides a framework for structuring a decision or problem, representing and quantifying its elements, relating those elements to overall goals, and evaluating alternative solutions. Complex problems are broken into elements comprising a hierarchy. The structure relates elements in lower levels to higher levels and prioritizes elements based on judgments. Judgments are used to compare the relative importance (or preference) of elements within a group, in the context of the element at next higher level.

Breaking a complex problem into levels permits decision makers to focus on smaller sets of decisions, improving their ability to make accurate judgments and encouraging people to explicitly state their judgments of preference or importance. Defined criteria ensure that decision makers use the same considerations in thinking about relative importance or priority. The process then synthesizes all the weights of importance assigned in the hierarchy into a ranked set of options. The ranking reflects the importance of the option, relative to its issue and objective, and ultimately the goal it addresses. In imbalanced hierarchies, an adjustment feature is used to restore priorities to their intended proportion of weight.

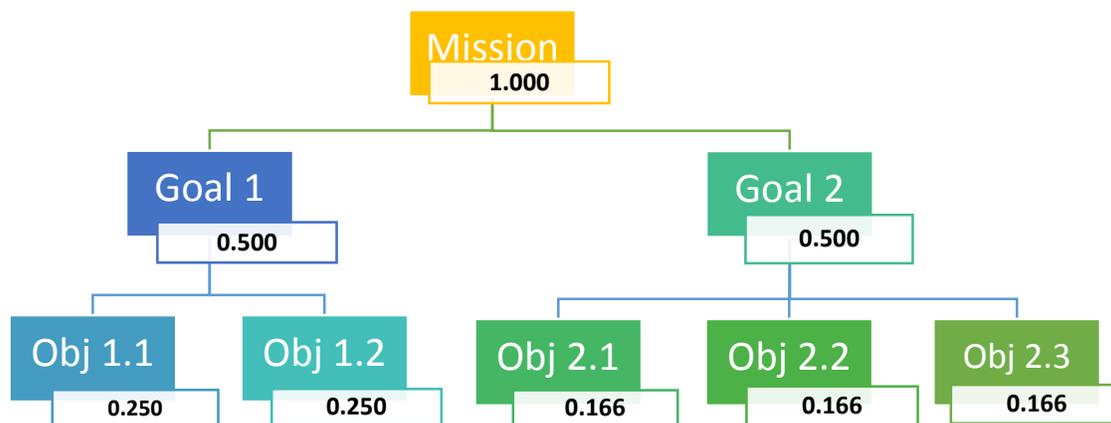


Figure 4. Example of an AHP hierarchy with global default priorities.

Workshop / Stakeholder Group

The ideal group size for decision making is about 12-15 people; larger groups may fall victim to “groupthink”, which can decrease individuality and creativity during discussions. Viewpoints represented should be approximately equivalent to foster a feeling of fairness during the prioritization phase. Sufficient expertise in describing issues comprising the complex problem, and in generating options to address issues, should be contained within the Stakeholder Group; however, too much overlap in expertise for a given topic may bias discussions towards one way of thinking about issues. If stakeholders wish, they can bring “experts” with them to consult with during planning and prioritization, however, the extra people will not be asked for their priorities, in an effort to keep the group to a manageable size.

It is vital that no key interest category, or stakeholder within a category, is inadvertently excluded from the invitation list that has either critical information on issues that describe the problem (or options that can address the problem); or, the influence to disrupt implementation of the planning outcome by claiming their absence invalidates the plan.

The Core Planning Team identified stakeholder interest categories for invitation to the planning workshop, corresponding backgrounds, and the possible number of people needed to represent that category’s spread of influence and expertise.

Ranking Priorities

Plan elements are prioritized based on group judgments. Priorities were established for goals and objectives by the Commission and the Core Planning Team. Priorities were established for issues by stakeholder workshop participants.

To make comparisons of relative importance among plan elements, in consideration of their “parent” node, criteria were established by the Core Planning Team as standards for measurement. Criteria help to discriminate among concepts. Judgments made according to criteria are then used to compare the relative importance of elements within a group.

A positive 1-9 ratio scale with verbal definitions is used for rating the importance among elements, where 9 is extremely important. Unimportance can be expressed in a positive inverse ratio scale, where $1/9^{\text{th}}$ is extremely unimportant. A scale of nine units reflects the degree to which people can reasonably discriminate the intensity of relationships between elements. A ratio scale measures magnitude; i.e., where one element is “twice as much” or “three times as much” when compared with another element. Numbers between those listed (e.g., 2, or 2.5, etc.) are used to interpolate meanings as a compromise. Unimportance is expressed in a positive inverse ratio scale, where the reciprocal $1/9$ is defined as extremely unimportant.

Elements judged to be of equal importance are given equal scores. Consensus on the rating of elements is defined for the purposes of this exercise as within a range of two to three points.

Table 3. Positive ratio scale used to rate relative importance of plan elements.

Scale of Importance	Magnitude	Definition
9	Nine times as much	Extreme importance
7	Seven times as much	Very strong importance
5	Five times as much	Strong importance
3	Three times as much	Moderate importance
1	About the same	Slight importance

Individual judgments are then combined into a group solution. In combining individual judgments, it is assumed that everyone's judgments are consistently made using the same criteria. Dissent and debate are encouraged. Debate allows for exploration of alternative viewpoints and gain of new knowledge. To be successful, debate must lead to cooperation and agreement. Debate of ideas and an exchange of information promotes learning among the group, resulting in edits to elements that clarify the meaning of concepts. Debate should bring judgments closer together. A well-informed person can change beliefs.

Individual scores are combined into a group score using the geometric mean. The geometric mean is the appropriate method for combining judgments made on a ratio scale. The geometric mean is then used to resolve differences of opinion when consensus is lacking. Because a mean score can mask extremes, we also recorded the spread of scores.

Decision support software, Microsoft Excel and Expert Choice, is used to synthesize all the weights of importance assigned to elements in the hierarchy into a ranked set. The software was used interactively to depict the influence of weights of relative importance and derive priorities. Derived priorities of elements in a hierarchy proportionally add up to their whole, 1.000.

Rank order of an element is determined from the weight of importance assigned to its "parent node" in the next higher level, as well as its weight of importance in relation to other elements under the parent (its "siblings").

Because objectives had unequal numbers of issues, the hierarchy was unbalanced. Structural imbalance in the hierarchy can lead to dilution of the weight of many issues under a single objective, so an adjustment feature in Expert Choice was used to restore priorities to their respective proportion of weight. In a conceptual example, consider that if an objective (A) has four issues, and another objective (B) has two issues, then there are six issues in all and structural adjusting multiplies A's priority by 4/6 and B's by 2/6. Thus, the overall priorities for A's issues are not diluted simply because there are many of them.

Opportunities for Stakeholder Input

The planning process afforded three opportunities for input. First, representatives of key agencies and entities were invited to the planning workshop to identify and prioritize issues. Second, public review comments were invited on the draft RM&E plan. Third, proposals for project funding by the Borough will be invited from any party.

The primary purpose of the planning process was to identify key information needs to guide funding decision by the Borough. Stakeholder involvement in the process was designed to seek guidance to the Borough in identifying funding priorities. Workshop invitations were extended to a number of parties representing a spectrum of interests including some that were unable and others who were unwilling to attend. All comments received were considered and incorporated into the plan to the fullest extent possible.

A diversity of perspectives is reflected in the broad range of issues and priorities identified in the RM&E plan. The Commission hopes that the plan will help inform RM&E efforts by others but acknowledges that this is the Borough's plan and that other parties will necessarily be obligated to their own needs and requirements which sometimes diverge from those of the Borough.

III. GOALS & OBJECTIVES

Identification and Ranking Methods

The core planning team met on August 28, 2014 in Anchorage and September 18, 2014 in Palmer to develop goals and objectives for the RM&E plan. On December 18, 2014, the core planning team participated with Commission members in a facilitated discussion in Palmer to establish priorities among goals, and objectives within each goal, using AHP.

The core planning team identified a set of five criteria to use in making comparisons of relative importance, so that everyone’s judgments were consistently made using the same standards. A key component of the criteria was the “State of the Knowledge Summary” (Summary) that resulted from the Gap Analysis. The Summary distilled a comprehensive inventory of published technical information relating to goals and objectives in the RM&E plan into an assessment of the state of knowledge, partitioned into four possible categories: extensive, moderate, limited or sparse. The core planning team relied on two highly-valued criteria derived from the Summary in making judgments of importance. The set of criteria was posted and referred to repeatedly during the day. Relative importance was judged according to the advantage that the goal or objective presented in:

Table 4. Criteria for assessing the relative importance of goals and objectives.

Category	Criteria	Value
State of Knowledge	Obtaining knowledge through research that will make a significant contribution to Mat-Su salmon in UCI.	High
	Obtaining knowledge through research to fill an information gap needed for managing, protecting and improving Mat-Su salmon stocks in UCI.	Mid-High
Feasibility and Cost Effectiveness	Obtaining cooperative funding and partnership opportunities.	Medium
	Obtaining benefits per cost or effort that are useful to achieving the RM&E plan’s mission.	Medium
	Obtaining a high likelihood of success or effectiveness to achieving the RM&E plan’s mission.	Medium

Goals

Three goals were identified by the core planning team relative to achieving the Mission. Goal 1 was salmon status which included biological attributes of each species. Goal 2 was salmon fisheries which concerned our use of the salmon resource. Goal 3 was the salmon ecosystem which included natural and human factors affecting both salmon status and use.

Goals were initially weighted unequally based on expert judgment regarding the importance of each. Based on feedback from stakeholders participating in the planning workshop, priorities of goals were subsequently revised so that each was weighted equally. Appendix A shows the effects of equalizing goal priorities on subsequent objective and issue priorities. Equal weight of goals resulted in greater deference to the collective view of participating stakeholders. Perspectives of the Mat-Su Commission are still reflected by objective priorities identified by the Commission.

Table 5. Goals and their relative priorities in the RM&E plan.

Level 1-Mission	Level 2-Goals
<p><u>1.000 Strategic Plan</u> Develop a strategic plan that encompasses the interests of partners and governing agencies in guiding funds towards research, monitoring and evaluation projects selected to manage, protect and improve Mat-Su Borough salmon stocks for optimum benefits while maintaining biological productivity and diversity.</p>	<p><u>0.333 Goal 1. Salmon Status</u> Provide information on salmon stock, abundance, productivity and biology necessary to quantitatively assess status and trends relative to historical benchmarks and numerical goals.</p>
	<p><u>0.333 Goal 2. Salmon Fisheries</u> Provide information on salmon fisheries to manage for sustainability and optimum use.</p>
	<p><u>0.333 Goal 3. Salmon Ecosystem</u> Provide information on ecosystem and human processes, effects and perturbations that limit or threaten salmon sustainability and optimum use.</p>

In regards to the goal “Salmon Status”, the core planning team believes that a primary benefit to obtaining more complete knowledge on salmon stock identification, characteristics, abundance and productivity is a more effective management system. Thus, there is a sequence of priority that needs to occur: obtaining information to achieve the goal, “Salmon Status”, facilitates achieving the goal, “Salmon Fisheries.” For example, obtaining information to establish an escapement goal that is currently lacking would make a significant contribution to Mat-Su salmon in UCI. Following discussion, the core planning team assigned a mean rating of 0.375, ranking this goal as the highest priority. The priority of this goal was subsequently revised to 0.333 based on recommendations from a number of planning workshop participants that all three goals should be equally weighted.

In regards to the goal “Salmon Fisheries”, the core planning team believes that fisheries are being managed without key information. As a result, controversies arise. Obtaining key information to develop new tools, or enhance existing tools, would be a significant contribution to increasing the effectiveness of the fisheries management system. Following discussion, the core planning team assigned a mean rating of 0.329, ranking this goal second in priority. The priority of this goal was subsequently revised to 0.333 based on recommendations from a number of planning workshop participants that all three goals should be equally weighted.

In regards to the goal “Salmon Ecosystem”, the core planning team centered their discussions around the topic of aquatic habitat. Significant impacts to salmon habitat have occurred in developed areas of the Borough and invasive pike have also impacted salmon production in large areas of the watershed. However, the footprint of human impact is relatively limited (see **Error! Reference source not found.**), compared to relatively undisturbed habitat available throughout most of the watershed where conditions and functions remain intact. The Mat-Su Fish Habitat Partnership has developed a Strategic Action Plan which has identified significant aquatic habitat issues. Not all of these issues are being actively addressed and more work is needed. Less than 50% of the \$2.5 million in funding received by the MSSP to date has been for assessment and/or research with the rest spent on restoration activities. There are existing areas of compromised habitat as well as future build out and large development projects planned or proposed that could affect significant areas. Assessment and research could significantly help quantify potential impacts from these activities.

The core planning team was aware that a large amount of money (\$900,000) has been set aside for culvert replacement in the Mat-Su Borough; they debated the benefits of restoring 10 miles of stream access versus using limited funds to obtain information that is critically needed for conservation of stocks of concern in the Mat-Su Borough. While one person pointed out that we could always better evaluate the impacts of habitat alterations on salmon, others argued that these evaluations have already been instituted, and furthermore, other funding sources are being used for this purpose. Following discussion, the core planning team assigned a mean rating of 0.296, ranking this goal third in priority. The priority of this goal was subsequently revised to 0.333 based on recommendations from a number of planning workshop participants that all three goals should be equally weighted.

Objectives

Using the above criteria as guidelines, the core planning team used their expert judgment to individually assign ratings of importance to objectives relative to achieving each goal. Numbers identifying objectives were re-assigned following prioritization. Priorities and rationales are provided below.

Table 6. Objectives and their relative priorities for the RM&E plan.¹

Level 2-Goals	Level 3-Objectives
<p>0.333 Goal 1. <u>Salmon Status</u></p> <p>Provide information on salmon stock abundance, productivity, and biology necessary to quantitatively assess status and trends relative to historical benchmarks and numerical goals.</p>	<p>0.089 Objective 1.1. Biological Reference Points Integrate information on stock identification, status and productivity to determine quantitative benchmarks/escapement goals suitable for monitoring/evaluating trends and optimizing productivity. <i>e. g., sustainable, biological, optimal escapement goals. Maximum yield, maximum production, capacity, conservation concern levels.</i></p> <p>0.085 Objective 1.2. Stock Abundance Estimate relative and/or absolute abundance of representative stocks or populations. <i>e. g., adult escapement, juveniles or smolts, age, sex, length, assessment methods, standards for escapement estimation.</i></p> <p>0.079 Objective 1.3. Stock Identification Describe distribution and stock structure of each salmon species. <i>e. g., distribution by life stage, genetic stock structure, population identification, migratory timing.</i></p> <p>0.053 Objective 1.4. Stock Productivity Determine production, survival and/or replacement rates relative to spawning escapement and other limiting factors. <i>e. g., stock-recruitment productivity and capacity, life stage survival.</i></p> <p>0.027 Objective 1.5. Biology Describe characteristics of salmon species. <i>e. g., Life History, ecology, food habits, habitat requirements, physiology.</i></p>
<p>0.333 Goal 2. <u>Salmon Fisheries</u></p> <p>Provide information on salmon fisheries to manage for sustainability and optimum use.</p>	<p>0.091 Objective 2.1. Economic & Social Values Assess the economic and social values associated with sport, commercial and personal use fisheries. <i>e. g., expenditures, revenues, ex-vessel values, wholesale value, markets, traditional utilization.</i></p> <p>0.089 Objective 2.2. Management Strategies & Tools Evaluate the effectiveness of existing and alternative management strategies and tools. <i>e. g., forecast accuracy, in-season run strength assessment, gear, time & area effects, management effectiveness, regulatory inconsistency, enforcement, conservation corridors.</i></p> <p>0.064 Objective 2.3. Harvest Estimate amount/composition of harvest for each fishery.</p>

¹ Goal priorities are equalized relative to original judgments by the core planning team based on workshop discussions. Relative priorities of objectives were identified by the core planning group.

Level 2-Goals	Level 3-Objectives
	<p><i>e. g., species/stock composition, age/sex/length, exploitation rate, incidence of catch-and-release or drop-off mortality catchability, selectivity, numbers and pounds caught, catch per effort.</i></p> <p>0.053 Objective 2.4 Hatchery Enhancement Provide information on hatchery enhancement effectiveness and opportunities consistent with salmon sustainability and optimum use. <i>e. g., production, hatchery practices, costs, returns, fishery contributions, cost recovery, wild fish interactions, evaluation criteria.</i></p> <p>0.036 Objective 2.5. Participation Characterize effort and composition of participants in each fishery. <i>e. g., numbers of permits or licenses, number and origin of participants, effort (angler days), trips per participant, trip length, access.</i></p>
<p>0.333 Goal 3. Salmon Ecosystem</p> <p>Provide information on ecosystem and human processes, effects and perturbations that limit or threaten salmon sustainability and optimum use.</p>	<p>0.080 Objective 3.1. Ecological Interactions Evaluate interactions and impacts of animal and plant species on salmon production and trends. <i>e. g., primary/secondary aquatic productivity, trophic interactions, competition, predation, invasive species (pike and Elodea), beavers, disease, parasites.</i></p> <p>0.075 Objective 3.2. Human Factors Evaluate status and effects of human development and activities on salmon production and trends. <i>e. g., land & water use, large scale development, culverts/passage, pollution, climate change, regulation & compliance, protection & restoration action effectiveness.</i></p> <p>0.068 Objective 3.3. Aquatic Habitat Conditions Characterize quantity and quality of freshwater and estuarine habitats which affect salmon production. <i>e. g., River, stream and lake physical characteristics, water quality and quantity.</i></p> <p>0.055 Objective 3.4. Marine Ecology Evaluate ecology and habitat conditions and influences of the near- and offshore marine environment in UCI on salmon production and trends. <i>e. g., temperature and circulation patterns, anomalies, productivity, environmental cycles & regimes.</i></p> <p>0.055 Objective 3.5. Landscape and Watershed Evaluate landscape, watershed, wetland, riparian, and hydrological factors which affect freshwater salmon habitat conditions. <i>e. g., characterization, function and/or analysis of landscape, watershed, wetland, floodplain, hydrology, sedimentation.</i></p>

Objectives under Goal 1, Salmon Status

In considering the five objectives under Goal 1, “Salmon Status”, the core planning team engaged in lengthy discussion. Escapement goals are established only by ADFG or the Board of Fisheries, and are typically based on a broad category of Biological Reference Points which identify population parameters such as maximum yield or production. The planning group agreed that being able to establish Biological Reference Points requires knowledge about stock status, stock identification and productivity, so the objectives are linked. It was pointed out that Biological Reference Points are an outcome of stock status research and productivity assessments. There is limited information at this time to establish Biological Reference Points for stocks of chum, coho and sockeye salmon in Mat-Su Borough waters. Ultimately, obtaining knowledge to establish Biological Reference Points (Objective 1.1) was rated the highest in priority for achieving the goal.

The core planning team thought that basic estimates of stock abundance (Objective 1.2) and stock identification (Objective 1.3) were the next highest priorities. With respect to stock identification, a key question is whether the limited number of stocks or populations that are monitored for some Mat-Su salmon are representative of all or just a portion of the run of each species.

Productivity (Objective 1.4) will be better understood once more knowledge about stock abundance and stock identification is acquired. All members agreed that significant information about general salmon biology (Objective 1.5) is available and this objective is deemed of lesser importance than assessing status and trends of Mat-Su salmon in UCI.

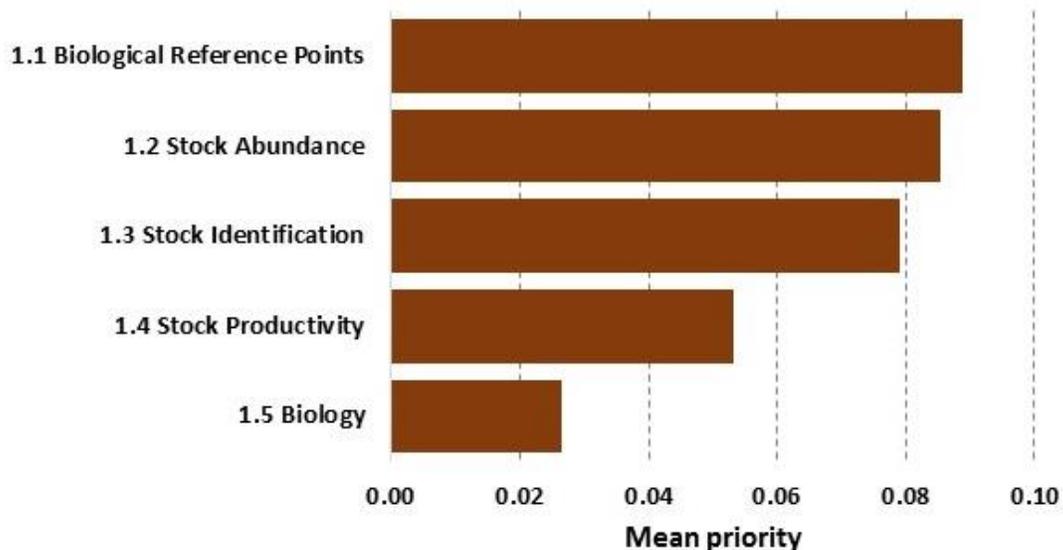


Figure 5. Rank of objectives under Goal 1: Salmon Status.

Objectives under Goal 2, Salmon Fisheries

In considering the five objectives under Goal 2, “Salmon Fisheries”, the core planning team agreed that a lot of decision-making in allocation to optimize the benefits of diverse fisheries revolves around the outcomes of research on economic and social values (Objective 2.1). For example, the economic significance of sport and personal use fishing to the Mat-Su Borough is widely referenced in relation to job growth, local and state tax revenue, and funding allocation. Thus, the group favored periodic updates of research on the value of fishing in Upper Cook Inlet. However, some members questioned whether an alternative agency, such as ADFG, should allocate funds for such a study? Members were informed that while the intent of ADFG is to conduct an economics study related to Cook Inlet salmon every 5 years, they have only produced one. At the present time, ADFG is looking into conducting another economics assessment of salmon specific to Cook Inlet, but there is no firm commitment. Given the significant contribution to the Mat-Su Borough of research on the economic and social values of salmon fishing, and, the uncertainty of alternative funding sources, the core planning team rated this objective as the highest priority for achieving the goal.

The core planning team concluded that obtaining information to develop and evaluate management tools – such as conservation corridors or net mesh size and depth - could have a substantial influence on abundance and composition of salmon returning to the Mat-Su Borough. In fact, looking at the overall effectiveness of current management strategies and tools (Objective 2.2), and different ways of doing things, would likely lead to high benefits. As an example, one person highlighted the potential value of a model for analyzing the effects of alternative salmon management strategies on harvest, allocation and escapement in UCI. The core planning team rated Objective 2.2 second highest in importance to achieving the goal.

The core planning team noted that there is extensive information about the number of salmon harvested in each UCI fishery (Objective 2.3). However, one person pointed out that information was quite limited on catch and release mortality by sport anglers and incidental fishing mortality from gill nets due to drop out. Accordingly, the group rated this objective third highest in priority.

In regards to research relating to hatchery enhancement (Objective 2.4), the group noted that ADFG has received a lot of funding on enhancement: 2 million dollars in the FY2014 capital fund allocation for Susitna River salmon research, restoration & enhancement. The group questioned whether funds for salmon enhancement efforts in UCI would be dedicated primarily to production, as in the past, or whether significant evaluations of enhancement efforts would also be included? The group was informed that basic evaluations of existing enhancement programs are underway - 100% of juvenile chinook released from hatcheries into Willow, Ninilchik and other streams are marked in some way, for example adipose fin clips, otolith marks or coded wire tags. In the end, the group considered that ADFG has funds for hatchery enhancement; and, there are uncertain benefits (salmon survival) to costs of hatchery operations.

All members agreed that significant information on fishery participation (Objective 2.5) is available, so this objective was deemed as having the least importance to achieving sustainability and optimum use.

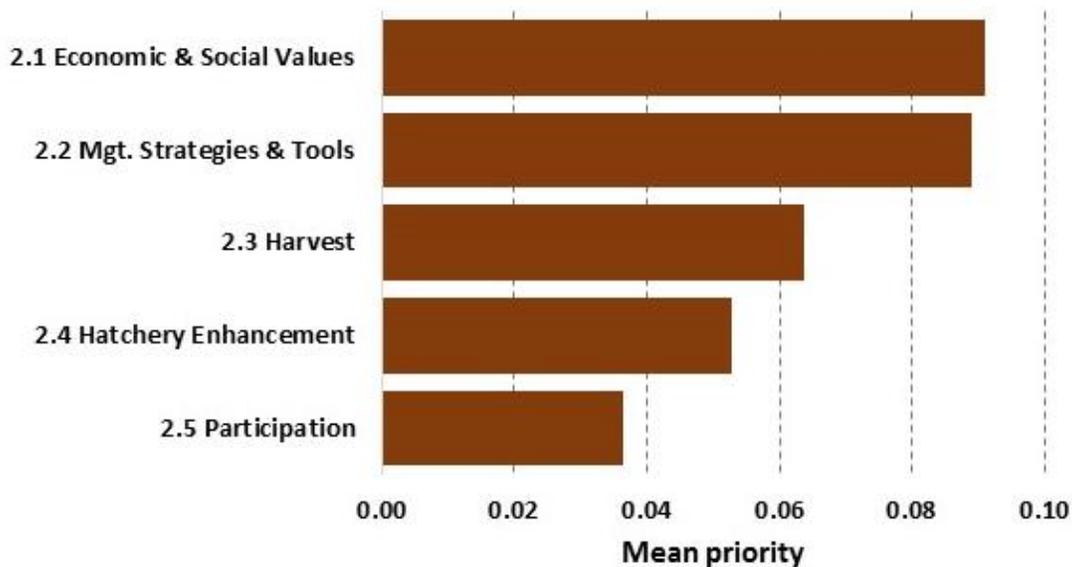


Figure 6. Rank of objectives under Goal 2: Salmon Fisheries.

Objectives under Goal 3. Salmon Ecosystem

In considering the five objectives under Goal 3, “Salmon Ecosystem”, one member mentioned the recent controversies surrounding Mat-Su salmon that relate to ecological interactions (Objective 3.1), such as predation from northern pike and habitat alterations from the lake-choking invasive weed, *Elodea*. Others noted that there are opportunities for partnership and cooperative funds to address these types of ecological interactions, such as with the Mat-Su Fish Habitat Partnership and ADFG. In fact, ADFG is currently working on several aspects of ecological interactions relating to salmon, including an experimental pike suppression program in Alexander Creek. Another member who favored research on ecological interactions said that looking at interactions and impacts of animal and plant species on salmon production and trends was something tangible, in contrast to research on ecological processes whose definition is unclear. Finally, the summary revealed that ecological interactions have only recently begun to receive attention. As a result of these arguments, the core planning team rated this objective high in priority for achieving the goal.

Considering Objective 3.2, Human Factors, several members noted that human factors are already getting a lot of attention through the Mat-Su Fish Habitat Partnership. There can be limited benefit for the cost because other funds are directed towards these types of evaluations. For example, a large amount of money (\$900,000) has been set aside for culvert replacement. While not all issues relating to human factors are currently being addressed, still, they have been identified in the Mat-Su Fish Habitat Partnership plan. Others pointed out that UCI is experiencing

impacts from humans in many forms, from development to fishing. Furthermore, research on the effects of human factors on salmon production and trends is deemed important by stakeholders and politicians. Protecting healthy salmon habitats from significant human impact will be key to the long-term health of salmon runs and fisheries. With these points in mind, the group gave a relatively high priority to this objective.

Reiterating earlier sentiments, the majority of the core planning team agrees that the state of the physical aquatic habitat (Objective 3.3) in the Mat-Su Borough is largely intact with the exception of certain developed areas. Substantial information has been developed on aquatic habitat conditions. Additionally, they believe that the Mat-Su Fish Habitat Partnership has done a good job of addressing salmon habitat issues in the Mat-Su Borough. Therefore, the group gave a priority score of lesser importance to this objective.

Some information is available on marine ecology (Objective 3.4) in UCI but gaps remain. The marine environment in UCI may have a significant effect on variability and trends in returns of salmon to Mat-Su streams. However, some questioned if studying the effects of marine conditions in UCI on salmon production is outside the scope of the RM&E plan given that marine research “gets very expensive.” The group assigned a relatively low priority to this objective due to the potential low cost effectiveness of investments of resources, but recognized the potential value of a better understanding of marine ecology in UCI on Mat-Su salmon.

In regards to landscape and watershed conditions and processes (Objective 3.5), one person pointed out that understanding related processes is important to long-term protection of aquatic habitats, but studies may not have immediate application to salmon production issues. Substantial information already exists on many aspects of landscape, watershed conditions and processes in the Mat-Su region from efforts relating to the Susitna-Watana Hydro project and projects funded by the Mat-Su Fish Habitat Partnership and ADFG.

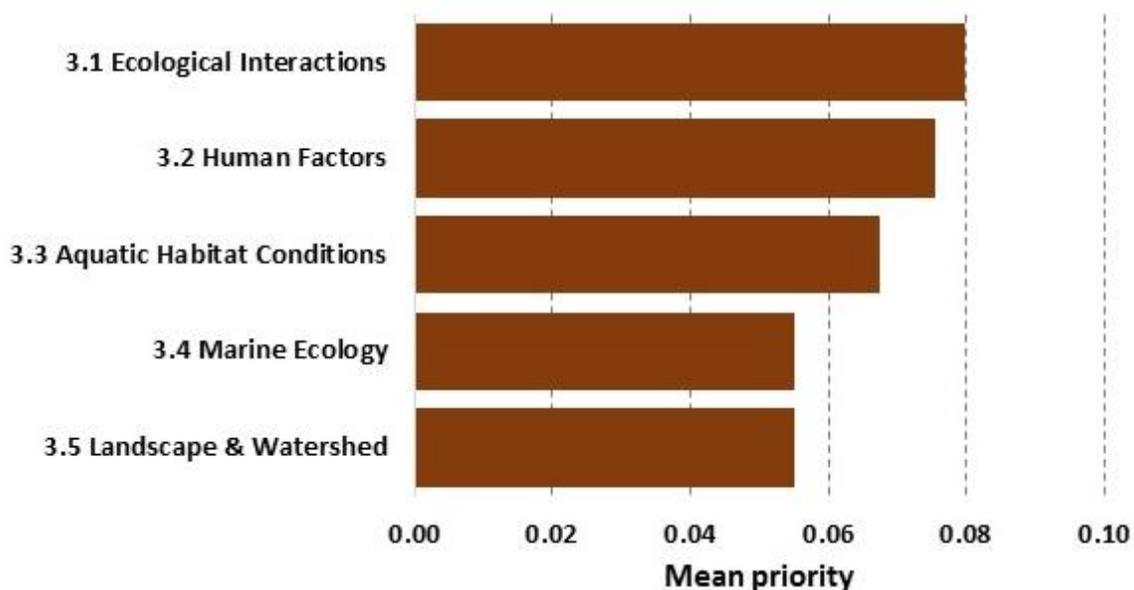


Figure 7. Rank of objectives under Goal 3: Salmon Ecosystem.

MISSION	GOALS	OBJECTIVES
<p>1.000 Develop a strategic plan encompasses the interests partners & governing in guiding funds towards research, monitoring & evaluation projects to manage, protect & Mat-Su Borough stocks for optimum benefits while maintaining biological productivity and diversity.</p>	<p>.333 <u>1. Salmon Status</u> Provide information on stock abundance, productivity & biology necessary to quantitatively assess status & trends relative to historical benchmarks & numerical</p>	<p>.089 <u>1.1 Biological Reference Points</u> Integrate information on stock identification, status productivity to determine quantitative benchmarks/ escapement goals for monitoring/evaluating trends optimizing productivity.</p> <p>.085 <u>1.2 Stock Abundance</u> Estimate relative &/or absolute abundance of representative stocks or populations.</p> <p>.079 <u>1.3 Stock Identification</u> Describe distribution and stock structure of each species.</p> <p>.053 <u>1.4 Stock Productivity</u> Determine production, survival &/or replacement relative to spawning escapement & other limiting</p> <p>.027 <u>1.5 Biology</u> Describe characteristics of salmon species.</p>
	<p>.333 <u>2. Salmon Fisheries</u> Provide information on fisheries to manage for sustainability & optimum use.</p>	<p>.091 <u>2.1 Economic & Social Values</u> Assess the economic & social values associated with sport, commercial & personal use fisheries.</p> <p>.089 <u>2.2 Management Strategies& Tools</u> Evaluate the effectiveness of existing & alternative management strategies & tools.</p> <p>.064 <u>2.3 Harvest</u> Estimate amount/composition of harvest for each</p> <p>.053 <u>2.4 Hatchery Enhancement</u> Provide information on hatchery enhancement effectiveness &opportunities consistent with salmon sustainability &optimum use.</p> <p>.036 <u>2.5 Participation</u> Characterize effort & composition of participants in each fishery.</p>
	<p>.333 <u>3. Salmon Ecosystem</u> Provide information on ecosystem & human effects & perturbations that limit or threaten salmon sustainability & optimum use.</p>	<p>.080 <u>3.1 Ecological Interactions</u> Evaluate interactions & impacts of animal & plant on salmon production & trends.</p> <p>.075 <u>3.2 Human Factors</u> Evaluate status & effects of human development & activities on salmon production & trends.</p> <p>.068 <u>3.3 Aquatic Habitat Conditions</u> Characterize quantity & quality of freshwater & habitats which affect salmon production.</p> <p>.055 <u>3.4 Marine Ecology</u> Evaluate ecology & habitat conditions & influences of near- and off-shore marine environment in Upper Inlet on salmon production & trends.</p> <p>.055 <u>3.5 Landscape & Watershed</u> Evaluate landscape, watershed, wetland, riparian & hydrological factors which affect freshwater salmon habitat conditions.</p>

Figure 8. Global priorities of goals and objectives. Goal priorities were equalized based on workshop discussions and public comments. Objective priorities were established by the core planning team.

IV. STATE OF KNOWLEDGE SUMMARY

Information gaps for goals and objectives were identified based on a preliminary assessment of the state of knowledge for goal and objective subjects identified in the draft research plan. This assessment is based on a qualitative assessment of quantity and quality of the available published and unpublished technical information (Beamesderfer et al. 2015) and will be subject to refinement based on continuing planning discussions.

Assessment Categories

A) Extensive: This subject has been or is being addressed in a comprehensive fashion by a number of well-designed studies. There is little uncertainty regarding this subject. Findings have been extensively reviewed and corroborated by complementary efforts. Work has found direct application through the identification of alternatives and implication of significant actions. The existing information provides sufficiently meaningful and timely guidance to policy makers and resource managers. While additional work might be done, the marginal contribution to related actions or alternatives is relatively modest in relation to past work. Substantial consensus exists on the implications and outcomes associated with the available information on this subject.

B) Moderate: Significant information is available but it is incomplete. Significant uncertainty remains. Findings may not have been extensively reviewed and corroborated by complementary efforts or contradictory results are unresolved. Information may need to be updated or existing studies may need to be improved to give better guidance to resource managers. The existing information provides only partial guidance to policy makers and resource managers on related questions. Additional work might make a substantial contribution to related actions or alternatives in relation to past work. Disagreements exist regarding the implications and outcomes associated with the available information on this subject.

C) Limited: Some related information is available but major questions remain unanswered. Information is highly uncertain. The existing information provides inadequate guidance to policy makers and resource managers on related questions. Additional work might make a very substantial contribution to related actions or alternatives in relation to past work. Substantial disagreements exist regarding the implications and outcomes associated with the available information on this subject.

D) Sparse: Very little information is available. The existing information does not provide substantive guidance to policy makers and resource managers on related questions.

Goal 1 - Salmon Status

Table 7. Summary of the current state of knowledge regarding status of Matanuska-Susitna salmon.

Objective	Salmon Species				
	Coho	Chinook	Sockeye	Chum	Pink
1.1. Reference Points	C	B	C	D	--
1.2. Stock Abundance	B	A	B	C	D
1.3. Stock Identification	B	A	A	--	--
1.4. Stock Productivity	C	B	B	D	D
1.5. Biology	B	B	B		

Coho

Information on coho salmon is quite limited relative to their importance in Mat-Su region sport fisheries. Stock assessments are difficult for coho due to their wide distribution and run timing. Some stock assessment information is available but significant information and escapement goals are limited to only a few Knik area streams which may or may not be representative of the entire region. Genetic studies have been initiated and hold promise for identifying stock structure and harvest composition in mixed stock fisheries. However, it remains to be determined whether current and planned genetic sampling and assessments will be adequate. Stock productivity and factors driving productivity have not been effectively quantified.

Chinook

A substantial amount of information is available for Chinook salmon including time series of escapement index data and SEGs based on that data. Surveys and goals include representative populations from throughout northern Cook Inlet. Substantial efforts to identify and characterize stock structure have been undertaken in recent years based on advanced genetic methodologies. Some information exists on productivity (e.g. Deshka weir) but data have not been sufficient to identify BEGs for most populations. New work is estimating in-river run size based on fish wheel samples, smolt abundance including Coded Wire Tagging which will be sampled in the sport harvest. Marine harvest is being estimated in mixed stock commercial fisheries of Cook Inlet. Some questions remain regarding trends in productivity of marine and freshwater environments.

Sockeye

Susitna sockeye have been subject to substantial stock assessments in the Mat-Su region although substantial gaps remain. Stock structure has now been very well described with extensive genetic assessments which are now being utilized in mixed stock analyses of UCI commercial fishery data. Several escapement goals have been established but these do not appear representative of the very diverse Susitna sockeye run. Productivity is being documented based on stock-recruitment analyses and juvenile migrant sampling but substantial questions remain regarding limitations and trends in productivity.

Chum

Chum salmon stock assessments have historically received relatively little attention since UCI commercial fishery values shifted in favor of sockeye. No escapement goals are established for the Mat-Su region. Stock structure has not been subject to substantial investigation in UCI. More

recently, chum salmon abundance was estimated in 2010-2012 based on fish wheel studies in the Susitna and Yentna rivers.

Pink

Very limited data is available for pink salmon in UCI due to their relatively high abundance and limited importance in current commercial and sport fisheries. No escapement goals have been identified.

Goal 2 - Salmon Fisheries

Table 8. Summary of the current state of knowledge regarding fisheries for Matanuska-Susitna salmon.

Objective	Sport			Personal	Commercial	
	Coho	Chinook	Other	Use	Drift	N. Set
2.1. Economic & Social Values	B	B	B	C?	A	A
2.2. Management System & Tools	B	A	C	B	C	B
2.3. Harvest	A	A	A	A	A	A
2.5. Participation	A	A	A	A	A	A
	Coho		Chinook		Sockeye	
2.4. Enhancement	B		B		--	

Economic & Social Values

Economic values of commercial fishing are well documented in terms of ex-vessel values but a full assessment of the economic and social value of commercial fishing requires more than an evaluation of the ex-vessel value available to commercial fishermen. Economic values of sport fishing in Alaska and the Mat-Su Borough have been assessed by studies in 2008 and 2009.

Management System & Tools

Effects of fishery regulation on the Chinook sport fishery and escapement are well understood. Substantial information exists for the coho sport fishery, personal use fishery in northern Cook Inlet, and northern district set net fishery although some questions remain. Management of northern inlet sport fisheries is considerably less intensive. The effectiveness of time and area restrictions in the Central District drift net fishery for the benefit of northern coho and sockeye remains a subject of substantial uncertainty.

Harvest

Harvest numbers and composition is very well documented in current sport, personal use and commercial fisheries through a statewide angler harvest survey, permit reporting and fish ticket reporting systems, respectively.

Participation

Participation in numbers is very well documented in current sport, personal use and commercial fisheries through a license sales, permitting systems, statewide angler harvest survey, permit reporting and fish ticket reporting systems, respectively.

Enhancement

Current and planned production is well-documented. Some information is available on hatchery contributions to fisheries. Information is limited on cost/benefit relationships of hatchery programs and effects on hatchery production on wild fish.

Goal 3 - Salmon Ecosystem

Table 9. Summary of the current state of knowledge regarding the Matanuska-Susitna salmon ecosystem.

Objective	Issue	Knowledge
3.1. Ecological Interactions	Aquatic productivity	B
	Pike	B
	Beaver dams/blockages	B
	Other aquatic invasive species (e.g. <i>Elodea</i>)	C
3.2. Human Factors (other)	Land use & development	B
	Large-scale resource development	B
	Culverts	A
	Motorized off-road recreation	C
	Stormwater runoff	B
	Waste water treatment (e.g. Septic Tanks)	B
	Water withdrawals	B
	Climate change	B
3.3. Aquatic Habitat	Rivers & streams	B
	Lakes	A
	Hydrology & water quality	B
3.3. Marine Effects	Estuarine/Nearshore	B
	Cook Inlet	B
	Ocean	B
3.4. Habitat Processes	Riparian	B
	Wetland	B
	Floodplain/Uplands	B

Ecological Interactions

Ecological interactions of significance to Mat-Su salmon have only recently begun to receive substantive attention. Aquatic productivity studies are being conducted in the Susitna for the Susitna Watana Hydro projects with smaller scale efforts completed in a number of other areas. Pike distribution has been partially documented and efficacy of pike suppression is being evaluated – ADFG and CIAA have identified additional opportunities for experimental eradication and evaluation. Effects of beaver dams on salmon passage have been identified in a number of systems. ADFG and CIAA are conducting additional surveys in other areas. Information is more limited on new threats (e.g. *Elodea*).

Human Factors

Substantial information is available on other human factors affecting salmon habitats although the available material is by no means comprehensive. Large-scale development such as the potential Susitna-Watana Hydro project are subject to extensive evaluations. Land use and

development is well documented although effects may be less well understood. Extensive efforts have been undertaken to inventory, characterize and remediate impacts of culverts on fish passage – ADFG has also undertaken a project to improve the existing culvert prioritization process to optimize benefit from fish passage dollars as available. ATV crossings, storm water runoff, wastewater treatment, and water withdrawal have been partially addressed by a number of assessments and plans but opportunities for additional work exist. Effects on climate change on Mat-Su salmon are subject to substantial uncertainty.

Aquatic Habitat

Substantial information has been developed in recent years on aquatic habitat conditions within the Mat-Su region through the efforts of the Habitat Partnership as well as the Susitna-Watana Hydro projects. River and stream habitats have been mapped in the Susitna and Matanuska rivers with a combination of LiDAR, orthoimagery and ground surveys. Extensive information has been collected on lakes, particularly large sockeye-producing systems. Significant information is also available regarding hydrology and water quality (including temperature and contaminants) in selected systems. Habitat information may be incomplete for representative and at-risk systems throughout the basin.

Landscape & Watershed

Substantial information has been developed in recent years on aquatic habitat conditions in areas of the Mat-Su region through the efforts of the Habitat Partnership as well as the Susitna-Watana Hydro projects. Extensive riparian and wetland mapping and assessment work has been completed for many areas, particularly in the Susitna. A need for additional work has been identified to synthesize and augment work conducted by various agencies and organizations to identify priorities and provide guidance for future protection and restoration activities (Hughes 2013). For instance, ADFG is conducting related work for wetlands.

Marine Ecology

Substantial information has been developed in recent years identifying estuary habitats throughout the Knik arm and evaluating the status of each. Some information exists on environmental conditions in Cook Inlet. Information on environmental conditions in salmon habitats in the Gulf of Alaska and Bering Sea is available from large-scale monitoring efforts largely overseen by the National Marine Fisheries Service. Effects of marine conditions in UCI and the ocean on Mat-Su salmon are only partially understood.

V. ISSUES & OPTIONS

Identification & Ranking Methods

The Core Planning Team identified stakeholder interest categories for invitation to the planning workshop and the number of people needed to represent that category's spread of influence and expertise. Stakeholders indicating they were able to attend the workshop were sent preparation materials, including a handout that contained: and introduction to the planning process, term definitions, training in the AHP, an explanation of the plan's mission, goals and objectives, criteria for judging importance, and an invitation to bring a list of salient issues and possible options for each objective. Their primary task was to use expert judgment to identify and prioritize issues that are currently impeding the achieving of objectives, such as incomplete knowledge, uncertainty, and difficulties that need to be overcome. A secondary task was to brainstorm for possible options (project ideas) that might be implemented to address issues.

The workshop was held on January 21 and 22, 2015 in Wasilla. A total of 15 invited stakeholders were able to attend. Several additional attendees observed but did not participate in discussions or ranking of priorities. A complete list of workshop attendees and observers can be found in Appendix B.

Table 10. Stakeholders invited to the planning workshop.

Interest	Background	Invited	Attended
Mat-Su Borough & Fish and Wildlife Commission	Business, Sport fish, Personal Use	3	3
ADFG	Sport fish, Habitat, Commercial fish	3	3
Board of Fisheries Advisory Committees: Mat Valley & Susitna Valley	Sport fish, Business, Habitat, Commercial fish	2	2
Mat-Su Borough local government	Politics, Business, Habitat	1	1
Mat-Su Salmon Habitat Partnership	Habitat	1	1
USFWS	Habitat & Fisheries	2	2
NMFS	Marine waters	1	0
Cook Inlet Aquaculture	Enhancement & Monitoring	2	2
Northern District Setnet Fishery	Commercial fish	1	0
Central District Driftnet Fishery-UCI Drift Association	Commercial fish	1	0
East Side Setnet Fishery -Kenai Peninsula Fisherman's Association	Commercial fish	1	1
Native Community-Chickaloon Village Traditional Council	Subsistence	1	0
Private non-profit	Environment, Monitoring	1	0
	Total	20	15



On the first day of the workshop, participants were introduced, the purpose of the meeting and reference material were reviewed, and the planning process and funding source were explained. To use time efficiently, participants were asked to self-select one of three workgroups to join, representing the three goals of the plan: Salmon Status, Salmon Fisheries and Salmon Ecosystem. Participants joined workgroups based on their interest and expertise; people were free to sit in on all workgroups if they so desired. Moderators guided workgroups in articulating issues and possible options systematically by objective, which were written on flip chart pages. In the afternoon, everyone reconvened and each workgroup shared summarized results, allowing others to comment upon or add issues and options. In this manner, a total of 55 issues and 102 options were generated on the first day of the workshop. At the end of the day, an exercise in rating the importance among issues relative to their objective was undertaken to prepare the group for prioritization on the following day.

On the second day of the workshop, criteria for judging relative importance among issues under each objective were reviewed and posted (see Table 4). One additional criterion – knowledge is sequential in nature – was added to the list. A professional facilitator led the entire group in using AHP to state their judgments of relative importance. Time was taken to discuss differences of viewpoint, which allowed an exchange of ideas, resulting in learning and at times changes in ratings of importance to more closely reflect a person’s newly-gained knowledge. Group discussion also clarified the wording of issues (e.g., edits were made) and refined their organization within the hierarchy (e.g., similar issues were combined and others moved under more appropriate objectives). The group succeeded in discussing all issues under the three goals and completing judgments of importance among issues by the end of day 2. Options for issues were identified during the workshop, but were not rated for importance.

During the workshop, the three workgroups submitted their work on issues pertaining to Goals 1, 2 and 3 which was combined to build a framework that represented the entire problem. As people watched the framework take shape on-screen, they could view specific issues in context to the entire problem. Viewing specific issues in context helped people to clarify their thinking about the problem. As the problem became clearer, people voiced ways to improve how the

problems were visualized and articulated. Everyone was asked to review the framework and the workgroup as a whole was encouraged to offer edits throughout the day. Many changes were made to the framework based on comments from the workgroup. Changes included spelling corrections, better word substitutions, re-phrasing sentences to increase clarification, discarding duplicate issues and moving issues that fit more appropriately under a different objective.

Small revisions were also made to issue and option descriptions following the workshop. First, descriptions of several issues framed in terms of measure implementation were revised for consistency with the research, monitoring and evaluation purpose of this plan. For instance, one workshop issue initially discussed in terms of a need to develop and implement an invasive species plan, was revised to *identify the need to monitor and evaluate the incidence of invasive species* to guide implementation of effective remediation strategies.

Second, descriptions of several issues was amended based on review comments. For instance, beaver-salmon issues were identified with respect to both salmon passage and broader habitat or ecological effects. In every case, revisions were inclusive of related RM&E issues discussed at the workshop.

Third, two objectives were dropped from the issue ranking calculation based on workshop results. No issues were identified at the workshop for Objective 1.5 (Salmon Biology). Objective 2.5 (participation) was rolled into Objective 2.1 (economic and social values). Objective priorities were revised so that the total for all remaining objectives under a goal matched the overall goal objective.

Goal 1 Issues by Objective

A total of 22 issues were described for Objectives 1.1 through 1.4. The workgroup decided that there were no salient issues for Objective 1.5 Biology that were not already addressed under the other objectives for that goal. Thus, the weight of importance for that objective was appropriately re-distributed among the remaining four objectives under Goal 1. Issues were classified as either pertaining to specific salmon species or all salmon.

Table 11. Issues and options identified for Objective 1.1 Biological Reference Points.

<p>Level 3: Objective 1.1 Biological Reference Points Integrate information on stock identification, status and productivity to determine quantitative benchmarks/escapement goals suitable for monitoring/evaluating trends and optimizing productivity.</p>
<p>Level 4: Issues with Example Options</p>
<p>1.1.1. Coho-Knowledge is insufficient to establish escapement goals for Susitna coho; existing escapement goals in the Knik system may not represent the status of coho in the Susitna system. <i>Suggested options:</i></p> <ol style="list-style-type: none"> a. <i>Identify alternative benchmarks for use as interim reference points.</i> b. <i>Develop additional goals for representative populations from existing or new information.</i> c. <i>Use mark recapture estimates of total abundance.</i> d. <i>Conduct inseason monitoring of escapement with sonar, weir, fishwheel, etc.</i>
<p>1.1.2. Chinook-Because knowledge is insufficient to establish BEGs for Susitna Chinook, only SEGs are established; thus, assessment needs to be improved in order to identify BEGs that provide the greatest potential for maximum sustained yield and production. <i>Suggested options:</i></p> <ol style="list-style-type: none"> a. <i>Collect additional data on ASL and harvest apportionment.</i> b. <i>Conduct more quantitative assessments than the current single aerial survey.</i>
<p>1.1.3. Sockeye-The historical baseline of sockeye escapement in the Susitna is unknown; current SEGs may not be representative of existing sockeye status and diversity. <i>Suggested options:</i></p> <ol style="list-style-type: none"> a. <i>Use genetic analysis of scales collected in the commercial fishery to revise run reconstruction; conduct a retrospective analysis.</i> b. <i>Evaluate adequacy of goals relative to sockeye distribution and genetic stock structure.</i> c. <i>Monitor major sockeye escapements in the Susitna inseason with sonar, weir, etc.</i> d. <i>On an annual basis, monitor smaller sockeye escapements in the Susitna.</i>
<p>1.1.4. All salmon-No basis for instituting sustainable escapement thresholds (SETs) has been developed, thus no SETs have been established. There may be instances where SETs are applicable (e.g., Shell Lake).Without a technical basis for establishing a trigger point, there is no process for identifying conservation concerns which trigger substantive actions even in cases of obvious need. <i>Suggested options:</i></p> <ol style="list-style-type: none"> a. <i>Develop and apply a systematic approach to SET identification based on the best available science (e.g., ESA guidance).</i>
<p>1.1.5. Pink-No biological reference points have been identified for pink salmon in UCI. <i>Suggested options:</i></p> <ol style="list-style-type: none"> a. <i>Identify an appropriate framework or approach for identifying benchmarks or goals for pink salmon escapement in the Susitna (e.g., existing data, new data).</i> b. <i>Identify the genetic stock structure of pinks to provide a basis for selecting units for assessment.</i> c. <i>Implement or adapt annual pink monitoring.</i>
<p>1.1.6. Chum-No biological reference points have been identified for chum salmon in UCI. <i>Suggested options:</i></p> <ol style="list-style-type: none"> a. <i>Identify an appropriate framework or approach for identifying benchmarks or goals for chum salmon escapement in the Susitna (e.g., existing data, new data).</i> b. <i>Identify the genetic stock structure of chums to provide a basis for selecting units for assessment.</i> c. <i>Implement or adapt annual chum monitoring.</i>

Under Objective 1.1, Biological Reference Points, the group discussed empirical estimates of production-related stock parameters (maximum yield, maximum production, capacity, etc.) and escapement goals. The strongest rating of importance (mean score of 6.4) was assigned to the issue of insufficient knowledge to establish escapement goals (or comparable management reference points) for Susitna coho salmon (Issue 1.1.1). No escapement goals have been established for any Susitna coho population. Goals have been established for a few Knik Arm streams but some people questioned whether these goals are representative of the entire species or stock due to the extent of human activities in more-developed areas of the region. The lack of escapement goals for assessing coho salmon status limits the ability to manage fisheries to ensure sustainability while also identifying and accessing harvestable surpluses.

The group assigned a strong rating of importance (mean score of 5.4) to the issue of insufficient knowledge to establish biological escapement goals (BEGs) for Chinook salmon in UCI streams (Issue 1.1.2). A number of sustainable escapement goals (SEGs) have been identified for Chinook and these appear to include representative populations throughout the watershed. By establishing BEGs for Chinook, and identifying those escapements which maximize sustainable production or yield, fishery benefits could be potentially improved.

The historical baseline of sockeye escapement in the Susitna is unknown (Issue 1.1.3). The group assigned a strong rating of importance (mean score of 5.3) to this issue because current SEGs may not represent the full range of diversity and status among the numerous sockeye populations in the region. Susitna sockeye have experienced an extended decline. One participant also identified the need in the establishment of escapement goals to consider environmental changes such as the introduction and expansion of predator pike.

The group noted a lack of established sustainable escapement thresholds (SETs) for any salmon stock (Issue 1.1.4). SETs are defined in the Sustainable Salmon Policy as a point of conservation concern. Without this benchmark, there is no formal mechanism to identify stock-specific conservation concerns. There are situations where stocks have fallen to critically low levels of abundance (e. g., Alexander Creek Chinook, Shell Lake sockeye), and having a trigger for conservation action, such as a SET, would be helpful to managers. The problem is that ADFG has not described a technical basis for establishing a SET. Issue 1.1.4 was rated of moderate importance (mean score of 3.2) by the group, relative to other escapement information deficits, such as gaps in baseline knowledge of escapement. One person pointed out, “No salmon runs in Alaska appear to have disappeared because SETs were not established”.

No biological reference points (escapement goals) have been established for pink (Issue 1.1.5) or chum (Issue 1.1.6) salmon in Mat-Su waters. These issues were rated of low importance (mean scores of 2.7 to 2.8) because these species are not intensively managed and exploitation rates appear to be relatively low in relation to production capacity.

Table 12. Issues and example options identified for Objective 1.2 Stock Abundance.

<p>Level 3: Objective 1.2 Stock Abundance Estimate relative and/or absolute abundance of representative stocks or populations.</p>
<p>Level 4: Issues with Example Options</p>
<p>1.2.1. Chinook-Substantial imprecision exists in current Chinook salmon assessment in the Susitna (single aerial flights) which reduces confidence in escapement estimates and risks failure to implement appropriate management measures to ensure that escapement goals are met. <i>Suggested options:</i> a. <i>Implement more rigorous, quantitative assessments (e.g., mark-recapture, weirs).</i></p>
<p>1.2.2. Coho-Abundance information is limited for Susitna coho salmon drainage-wide as well as for representative drainages. <i>Suggested options:</i> a. <i>Continue annual mark-recapture estimates of total abundance for coho.</i> b. <i>Conduct annual monitoring of escapement for additional representative coho populations.</i></p>
<p>1.2.3. Sockeye-Current abundance estimates of sockeye salmon in the Susitna do not include a representative range of existing status and diversity (weaker components of the run).Insufficient information can mask declines in abundance and diversity and result in failure to implement appropriate management actions. <i>Suggested options:</i> a. <i>Monitor the escapement of index sockeye populations on an annual basis and other populations on a periodic rotating schedule.</i></p>
<p>1.2.4. Chum-Historical and current trends in chum salmon abundance in the Susitna are unknown because information on escapement is lacking. <i>Suggested options:</i> a. <i>Implement or adapt annual chum monitoring for representative units.</i> b. <i>Identify and implement appropriate analysis of existing information.</i></p>
<p>1.2.5. Pink-Information on pink salmon escapement in the Susitna is lacking. <i>Suggested options:</i> a. <i>Implement or adapt annual pink monitoring for representative units.</i></p>

Under Objective 1.2, Stock Abundance, the group agreed that abundance information is important for monitoring status and trends in relation to limiting factors over time, and for establishing escapement goals which help guide fishery management. The group achieved a high degree of consensus regarding the relative priority of issues related to stock abundance – there was not a lot of disparity in individual scores.

A strong rating of importance (mean score of 6.5) was assigned to the issue of substantial imprecision in current Chinook abundance assessment (Issue 1.2.1). Imprecision in Chinook abundance assessment is a highly important issue because Chinook are highly valued and utilized in fisheries and they have experienced recent declines in abundance relative to historical numbers. Chinook escapements are currently monitored in a variety of streams throughout the Mat-Su region based on single aerial surveys. In addition, Chinook are counted at a weir on the Deshka River, which is one of the major populations and fisheries in the region. Aerial surveys include representative populations and provide indices of relative abundance useful for distinguishing large, average and small runs. However, reliance on single aerial surveys introduces substantial imprecision into the Chinook assessment. Indices may be affected by annual differences in run timing and variation in stream flows which affect counting conditions.

A strong rating of importance (mean score of 6.2) was given to the issue of limited and overall insufficient abundance information for Susitna coho salmon drainage-wide (Issue 1.2.2) because of their importance in Mat-su sport fisheries and demonstrated declines. There is some information being developed, but information on coho abundance is limited to only a few streams or years with data. Long-term data on coho abundance is available for several Knik area streams, but questions have been raised regarding how representative these sites are of the entire region. Mark-recapture studies have estimated total abundance of coho in the Susitna for several recent years but this information may not be representative of long-term patterns.

The issue of limited and overall insufficient abundance information for Susitna sockeye salmon (Issue 1.2.3) was also rated strongly important (mean score of 6.0) because of their high value and use by fishers and a recent designation as a Stock of Concern by the Alaska Board of Fisheries. Abundance is currently monitored for several populations but these may not be representative of the numerous sockeye populations of varying productivity in the region. Population data is also available for a limited time period. Long-term index data is available for sockeye from Yentna sonar counts but these estimates are highly uncertain due to species apportionment problems.

A lack of information to assess abundance of chum (Issue 1.2.4) and pink (Issue 1.2.5) salmon was recognized, but rated of low importance (mean scores of 2.9 and 2.3, respectively) because of the limited fishery utilization of these species.

Table 13. Issues and example options identified for Objective 1.3 Stock Identification.

<p>Level 3: Objective 1.3 Stock Identification Describe distribution and stock structure of each salmon species.</p>
<p>Level 4: Issues with Example Options</p>
<p>1.3.1. All salmon-There is insufficient information on the distribution and relative importance of streams for salmon in order to identify and prioritizes areas for protection from human-caused habitat disturbance. <i>Suggested options:</i></p> <ul style="list-style-type: none"> <i>a. Conduct surveys of additional streams that may support significant salmon production but are not currently included in the anadromous waters catalog.</i> <i>b. Analyze recent salmon radiotelemetry information to identify streams utilized by salmon but are not included in the anadromous waters catalog.</i> <i>c. Identify the significance of different rivers and streams for salmon production based on relative fish abundance by life stage or inferences from habitat suitability.</i>
<p>1.3.2. Coho salmon-There is insufficient understanding about the genetic stock structure of coho salmon to identify representative units and to be able to conduct mixed stock analyses for stock apportionment of the commercial harvest. <i>Suggested options:</i></p> <ul style="list-style-type: none"> <i>a. Collect additional information for genetic baseline, including additional populations and multi-generational sampling.</i>
<p>1.3.3. Sockeye salmon-The current sockeye salmon apportionment in the commercial harvest may not provide sufficient detail on the full range of representative populations needed to evaluate status and impacts on significant subcomponents. <i>Suggested options:</i></p> <ul style="list-style-type: none"> <i>a. Evaluate the potential for finer scale stock apportionment relative to representative populations.</i>
<p>1.3.4. Chinook salmon-A Chinook salmon genetic baseline exists for current applications but additional information is needed to distinguish some Chinook stocks in order to identify significant management units and accurately assess stock-specific fishery impacts from mixed stock analysis. <i>Suggested options:</i></p> <ul style="list-style-type: none"> <i>a. Collect additional information for chinook genetic baseline and mixed stock analysis as appropriate.</i>
<p>1.3.5. Chum salmon-Insufficient information is available on the stock structure of UCI chum salmon to identify significant management units, assess status, and evaluate limiting factors. <i>Suggested options:</i></p> <ul style="list-style-type: none"> <i>a. Develop genetic stock identification tools for chum salmon in UCI.</i> <i>b. Sample and analyze chum populations throughout UCI to identify their genetic stock structure.</i>
<p>1.3.6. Pink salmon-Insufficient information is available on the stock structure of UCI pink salmon to identify significant management units, assess status, and evaluate limiting factors. <i>Suggested options:</i></p> <ul style="list-style-type: none"> <i>a. Develop genetic stock identification tools for pink salmon in UCI.</i> <i>b. Sample and analyze pink populations throughout UCI to identify their genetic stock structure.</i>

Under Objective 1.3, Stock Identification, the group engaged in lengthy discussions about where salmon occur, the relative importance of different areas, how stocks are organized across their distribution, and how this organization translates into management units for the purposes of conservation and fishery sustainability. The highest rated issue (mean score of 7.1) under Objective 1.3 is the need for more information on salmon distribution and the relative importance of streams to identify areas for protection from land use and development disturbance (Issue 1.3.1).

Salmon occurrence in waters throughout the state is documented in an anadromous waters catalog (catalog). The catalog is relatively complete for larger rivers and streams but may not be well informed for smaller streams, particularly in remote areas. The catalog is updated as new information becomes available. For example, several new areas in the Susitna River above Devils Canyon have been nominated for inclusion in the catalog as a result of recent hydro licensing studies. In another example, areas have been recently added to the catalog as a result of telemetry research. One person cautioned that telemetry data is useful but typically needs to be supported with juvenile sampling of smaller tributaries. Despite ongoing efforts, the issue remains that Mat-Su streams used by salmon are likely missing from the catalog. For instance, there are several streams used by salmon in the Matanuska Valley adjacent to mine development that are not in the catalog. Another aspect of the issue is that the relative importance of river or stream reaches has not been quantified. The catalog may simply identify salmon occurrence but not use or productivity. Several options to this issue were suggested, such as linking salmon distribution to habitat condition and using GIS overlaid with habitat mapping (e.g. Nature Conservancy effort).

The need to obtain information on coho salmon genetic stock structure to identify representative units and thus conduct mixed stock analyses for stock apportionment (Issue 1.3.2) was rated strongly important (mean score of 6.5). A project is currently underway to collect genetic baseline data for coho in order to identify genetic stock structure. Additional sampling may be required to fill data gaps and then management-test applications for mixed stock analysis of fisheries.

Sockeye stock structure has been described with genetic analysis, and this information has been successfully applied to stock apportionment of the commercial fishery harvest using mixed stock analysis. However, the current sockeye apportionment may not provide sufficient detail on the full range of representative populations needed to evaluate status and impacts on significant subcomponents (Issue 1.3.3). Because sockeye populations exhibit a high degree of differentiation and home faithfully to specific locations, this feature may provide an opportunity to more finely apportion harvest among representative populations. Further investigation of this option was enthusiastically proposed. This issue was rated strongly important (mean score of 6.0).

Chinook salmon are largely harvested inriver and in Federal waters on the high seas. The current genetic stock structure baseline serves the need for stock apportionment on the high seas. However, additional genetic baseline information would be helpful for stock apportionment in the northern Cook Inlet commercial Chinook fishery, the Tyonek subsistence fishery and inriver sport fisheries (Issue 1.3.4). In particular, additional samples and markers are needed to distinguish western inlet stocks of concern from Susitna fish. Studies are underway to determine if distinguishing markers can be identified for Chinook stocks. In addition, additional baseline data is needed to distinguish the Talachulitna drainage. An incomplete baseline can result in samples

being apportioned to the wrong stock unit in mixed stock analyses of harvest. The ability to use distinguishing markers would improve mixed stock analysis of harvest in UCI. While these questions about genetic stock structure of Chinook remain, the group generally deemed their significance smaller in comparison to similar questions for coho and sockeye, so the rating of this issue was of moderate importance (mean score of 4.2).

Information is limited on chum and pink salmon distribution and little exists on genetic stock structure (Issues 1.3.5 and 1.3.6). The need to obtain information on the stock structure of pink and chum salmon to identify management units was rated relatively low in importance (mean scores of 2.8 and 2.4, respectively) due to their lower levels of exploitation in current fisheries.

Table 14. Issues and example options identified for Objective 1.4 Stock Productivity.

<p>Level 3: Objective 1.4 Stock Productivity Determine production, survival and/or replacement rates relative to spawning escapement and other limiting factors.</p>
<p>Level 4: Issues with Example Options</p>
<p>1.4.1. Chinook salmon-Existing information on Chinook salmon productivity in the Susitna is inadequate to identify stock-recruitment relationships needed to identify and manage for escapements consistent with maximum yield or production. <i>Suggested options:</i> <ul style="list-style-type: none"> a. <i>Expand the collection of ASL information needed for run reconstruction.</i> b. <i>Mark juvenile Chinook in the Susitna to estimate juvenile to adult survival.</i> c. <i>Estimate the marine harvest component.</i> </p>
<p>1.4.2. Coho salmon-Information on coho salmon productivity in the Susitna is inadequate to identify stock-recruitment relationships needed to identify and manage for escapements consistent with maximum yield or production. <i>Suggested options:</i> <ul style="list-style-type: none"> a. <i>Evaluate appropriate information to assess productivity of coho in the Susitna (abundance, ASL, stock-specific harvest based on apportionment).</i> b. <i>Mark juvenile coho in the Susitna to estimate juvenile to adult survival.</i> </p>
<p>1.4.3. Sockeye salmon-Information on sockeye salmon productivity in the Susitna is inadequate to identify stock-recruitment relationships needed to identify and manage for escapements consistent with maximum yield or production. <i>Suggested options:</i> <ul style="list-style-type: none"> a. <i>Evaluate appropriate information to assess productivity of sockeye in the Susitna (abundance, ASL, stock-specific harvest based on apportionment).</i> </p>
<p>1.4.4. Chum salmon-Information on chum salmon productivity in the Susitna is inadequate to identify stock-recruitment relationships needed to identify and manage for escapements consistent with maximum yield or production. <i>Suggested options:</i> <ul style="list-style-type: none"> a. <i>Evaluate appropriate information to assess productivity of chum in the Susitna.</i> </p>
<p>1.4.5. Pink salmon-Information on pink salmon productivity in the Susitna is inadequate to identify stock-recruitment relationships needed to identify and manage for escapements consistent with maximum yield or production. <i>Suggested options:</i> <ul style="list-style-type: none"> a. <i>Evaluate appropriate information to assess productivity of pinks in the Susitna.</i> </p>

Under Objective 1.4 Stock Productivity, concerns about inadequate information on productivity was rated strongly important (mean scores of 6.8, 6.5 and 5.8, respectively) for Chinook (Issue 1.4.1), coho (Issue 1.4.2) and sockeye (Issue 1.4.3) because productivity is critical for evaluating trends in abundance and identifying optimum fishing strategies and goals. One person pointed out that information about Chinook productivity would add to the narrative about why those stocks are in decline in UCI.

While inadequate, information about productivity of chum (Issue 1.4.4) and pink (Issue 1.4.5) salmon were thought to be an issue relating more to ecology than to harvest and thus rated moderately important (mean scores of 2.6 and 2.3, respectively) one person cautioned that attention needs to be paid to these species “before the rug is completely pulled out from under us”. It was hoped that projects undertaken to obtain knowledge about productivity would benefit all salmon.

Synthesis of all 22 Issues under Goal 1

Synthesis of adjusted priorities for all 22 issues under Goal 1 resulted in a distribution of importance, where 1.1.1 lack of coho escapement goals in the Susitna is the highest ranked issue. Other important issues concern 1.2.1 imprecision in current Chinook assessment, 1.3.1 incomplete information on salmon use of streams, 1.1.2 insufficient knowledge to establish Chinook BEGs and 1.1.3 unknown baseline of sockeye escapement. Lowest ranked issues concern chum and pink salmon.

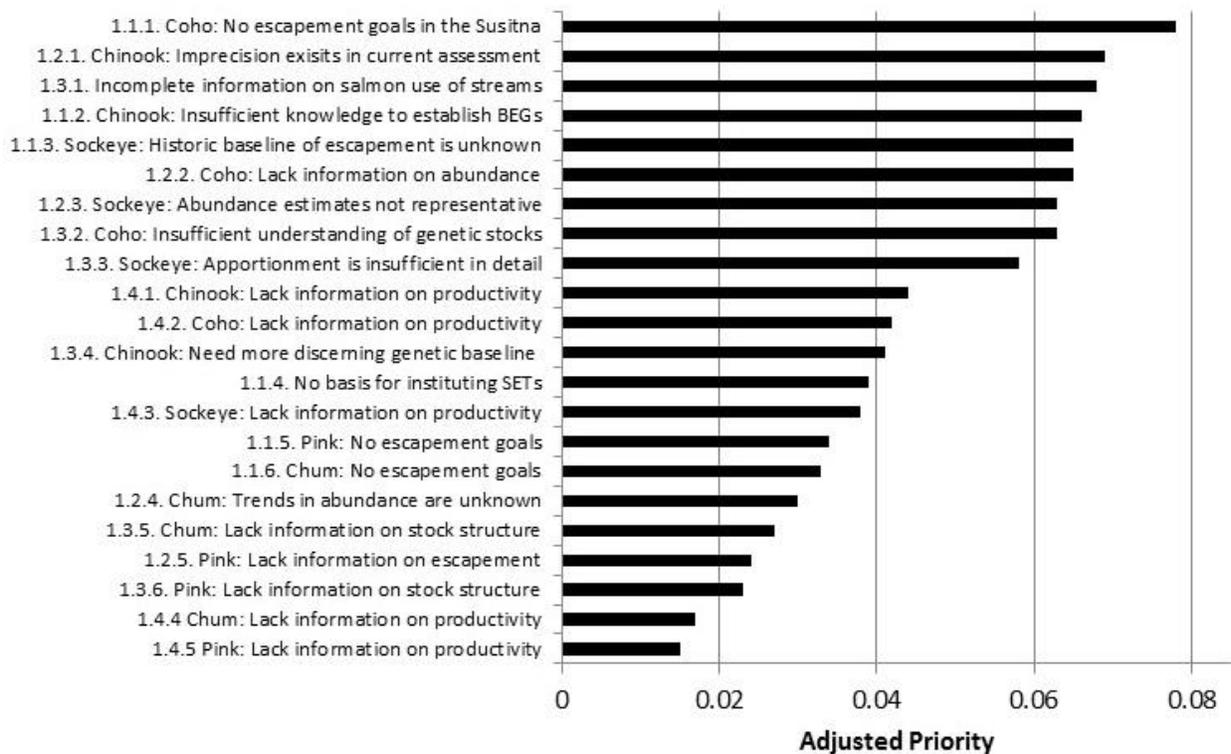


Figure 9. Adjusted priorities for all 22 issues under Goal 1 Salmon Status.

Goal 2 Issues by Objective

A total of 13 issues were described for Objectives 2.1 through 2.4. The workgroup decided to combine issues under Objective 2.5 Participation with those under Objective 2.1 Economic and Social Values. Thus, the weight of importance for Objective 2.5 was appropriately re-distributed among the remaining four objectives under Goal 2.

Table 15. Issues and example options identified for Objective 2.1 Economic and Social Values.

<p>Level 3: Objective 2.1 Economic and Social Values Assess the economic and social values associated with sport, commercial and personal use fisheries.</p>
<p>Level 4: Issues with Example Options</p>
<p>2.1.1. Information on economic and social values is: a) not current, particularly in regard to changing values in relation to changing trends in fishing and management strategies; b) not well understood by policy makers and the public; and, c) not well integrated into decision-making affecting salmon in UCI. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. Conduct (repeat) the 2007 ADFG economic study, with a focus on UCI salmon. b. Strengthen advice to the BOF on the socioeconomic impact of management strategies and regulations on stakeholders of UCI salmon fisheries. c. Assess the economic and social impacts of the proposed ballot initiative to eliminate set net salmon fishing in UCI.
<p>2.1.2. Need to obtain information on additional variables relating to fishing participation to: a) assess the accuracy of current data-collection efforts, b) explain factors influencing fishing, and c) project changes in participation trends in order to improve the socioeconomic body of knowledge for decision-making affecting salmon in UCI. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. Expand independent assessment of bias and precision (e.g., onsite surveys) of the State Wide Harvest Survey (SWHS), including a preference survey. b. Maintain/improve estimates of variables associated with participation by fishery.

Under Objective 2.1, Economic and Social Values, many pointed out that benefits derived from fishing are influenced by the Alaska Board of Fisheries, who are presented with economic and social data for their consideration of alternative management proposals, particularly proposals affecting allocation among users. Thus, it is imperative that data on economic and social values be up to date, understandable and clearly integrated into decisions affecting salmon in UCI (Issue 2.1.1). All rated information on economic and social values as the strongest importance (mean score of 6.9). The need for updated economic and social information was ultimately the highest rated issue in the plan. This high rating reflected a high objective priority by the Commission and a high ranking of the specific issue by workshop participants. The importance of this information was also highlighted by plan review comments of ADFG’s Commercial Fishery Division regarding the relationship between ex-vessel values and true economic value which is not well documented.

Two aspects of fishing participation were discussed (Issue 2.1.2) and rated of moderate importance (mean score of 3.3). The first aspect is the use of participation data to provide estimates of sport harvest and effort, as accomplished by ADFG’s Statewide Harvest Survey (SWHS), conducted through mail-outs. While one person maintained that accuracy of the SWHS has already been verified, another pointed out that there is a lag time in the availability of data. Onsite surveys conducted inseason would not only continue to check the accuracy of the mail-

out survey, but also provide more timely data. The second aspect concerned “holes” in the current collection of participation data. While numbers of participants in commercial fisheries are collected by the Alaska Commercial Fisheries Entry Commission, and several types of data about participants in sport fisheries are collected by the SWHS, nonetheless additional variables associated with fishing participation could be collected that would be helpful in explaining factors that influence fishing (e.g., social and cultural constraints), estimating trips and expenditures, and projecting changes in participation rates. These additional variables would add to the socioeconomic body of knowledge relating to salmon fishing in UCI. For example, one person was curious about the relationship of income to participation in multiple fisheries (e.g., sport, personal use, and commercial). Another aspect of participation not well understood are people who purchase salmon from commercial fishers – are not buyers participants? What are their characteristics? And, what are the estimated benefits that they accrue from fishing?

Table 16. Issues and example options identified for Objective 2.2 Management Strategies and Tools.

<p>Level 3: Objective 2.2 Management Strategies and Tools Evaluate the effectiveness of existing and alternative management strategies and tools.</p>
<p>Level 4: Issues with Example Options</p>
<p>2.2.1. Need to develop management strategies and tools to avoid over-harvesting weak stocks and under-harvesting strong stocks in mixed stock fisheries and to avoid fishery selection in sport and personal use fisheries. <i>Suggested options:</i></p> <ol style="list-style-type: none"> a. <i>Conduct acoustic studies to gain a better understanding of migratory routes and timing for major species/stocks.</i> b. <i>Collect additional information on gear/area/timing options on harvest by species.</i> c. <i>Evaluate alternative commercial management strategies and tools that more-effectively focus harvest on target stocks and species (e.g. time and area fishing patterns).</i> d. <i>Evaluate effects of catch and release in sport fisheries.</i> e. <i>Evaluate size and sex selectivity of sport fisheries.</i>
<p>2.2.2. In-season projections of timing and run strength for both marine and freshwater fisheries are inadequate to guide management actions to focus harvest on abundant stocks while also meeting escapement goals. <i>Suggested options:</i></p> <ol style="list-style-type: none"> a. <i>Improve/increase test fishing for stock specific projections.</i> b. <i>Conduct genetic studies for stock identification beyond sockeye.</i> c. <i>Improve precision of commercial catch allocations by stock.</i>
<p>2.2.3. A lack of management objectives for species and stocks other than major sockeye and Chinook stocks limits management effectiveness for accessing harvestable surpluses while also ensuring sustainable escapement levels of all run components. <i>Suggested options:</i></p> <ol style="list-style-type: none"> a. <i>Establish management objectives for additional stocks of Chinook, sockeye and coho.</i>
<p>2.2.4. Preseason forecasting accuracy is insufficient for effective management of salmon in UCI; and, there is a lack of preseason forecasts for some important species including coho salmon. <i>Suggested options:</i></p> <ol style="list-style-type: none"> a. <i>Improve precision of commercial catch allocations by stock by reducing stock assessment measurement error.</i> b. <i>Conduct genetic studies for stock identification beyond sockeye in order to provide information needed to improve stock-specific forecasting accuracy.</i>

Under Objective 2.2 Management Strategies and Tools, the concern rated of strongest importance (mean score of 7.5) was the need to establish effective mixed stock management strategies (Issue 2.2.1). Stock-specific management strategies are important for optimizing benefits while preserving sustainability of all stocks. While habitat is essential and its importance should not be overlooked, the development of effective fishery management strategies and tools may be a more pressing need where habitat is in relatively good shape.

To address Issue 2.2.1, several options were discussed. A key to devising an effective mixed stock management strategy is to know what fish are being caught. Understanding migratory pathways and timing will help focus fisheries on target stocks. Advances in technology provide more effective methods for stock identification than historical analyses, such as scale pattern analysis which identified time and area patterns. Newer technology includes acoustic studies. Options to evaluate management tools used in efforts to manage mixed stocks were highly favored by the group. For example, new commercial fishing regulations have mandated the use of shallower-depth gillnets with the purpose of reducing catch of Chinook salmon while increasing net selectivity for sockeye salmon. This new regulation needs to be evaluated as to whether it is achieving its intended effect. In another example, recent time and area restrictions have been imposed on drift gillnet fisheries for the purpose of providing a conservation corridor for northern-bound salmon. These new restrictions need to be evaluated as to whether they are achieving their intended effects. Based on plan review comments, Issue 2.2.1 was modified to also include evaluation of sport and personal use management strategies.

The need for inseason information on run timing and strength to guide management actions (Issue 2.2.2) was rated strongly important (mean score of 6.3) because effective mixed stock management strategies rely on stock-specific data in order to focus harvest on abundant stocks while meeting escapement goals. Variables such as migration patterns may exhibit year to year differences, so timely inseason information is critical to achieving optimal benefits from sustainable fisheries.

A lack of management objectives for stocks other than major sockeye and Chinook runs (e.g., northern stocks of coho and minor runs of sockeye and Chinook), as well as for several species of salmon (chum and pink) (Issue 2.2.3) was rated strongly important (mean score of 5.9) because management effort is driven by objectives. If there are no established objectives, the concern is that these other stocks and species will be subject to less management and research attention.

Limitations on the accuracy of preseason forecasts in run size was identified as a management constraint (Issue 2.2.4). This issue was moderately important (mean score of 4.3) in recognition of the priority placed on in season information for effective implementation of mixed stock management strategies.

Table 17. Issues and example options identified for Objective 2.3 Harvest.

<p>Level 3: Objective 2.3 Harvest Estimate amount/composition of harvest for each fishery.</p>
<p>Level 4: Issues with Example Options</p>
<p>2.3.1. Information on age, sex and length (ASL) in the sport harvest of Chinook salmon is not sufficient to evaluate run composition and fishery effects on different run components. <i>Suggested options:</i> a. <i>Expand angler surveys to collect additional information on ASL in the Chinook sport harvest.</i></p>
<p>2.3.2. Information on freshwater catch & release mortality of Chinook, coho and sockeye salmon in the Susitna is insufficient to accurately estimate total returns, impacts of fishing, and the effectiveness of management measures intended to reduce this impact where needed. <i>Suggested options:</i> a. <i>Conduct tagging studies to estimate freshwater catch & release mortality in key fisheries where information is lacking.</i></p>
<p>2.3.3. Information on the incidental effects of commercial fisheries due to drop out mortality and sublethal effects in net-marked Chinook, coho and sockeye salmon of the Susitna is insufficient to accurately estimate returns, impacts of fishing, and the effectiveness of management measures intended to reduce this impact where needed. <i>Suggested options:</i> a. <i>Conduct tagging studies to estimate drop out mortality and sublethal effects of net marked fish.</i></p>

Under Objective 2.3 Harvest, the group agreed that harvest estimates by user group are critical to fishery management. Currently, excellent fish harvest reporting systems provide sufficiently accurate and timely estimates for effective fishery management. For example, commercial fish harvest is reported by daily fish tickets; sport harvest is reported post season by ADFG’s Statewide Harvest Survey (SWHS), conducted through mail-outs. However, the group highlighted the utility of additional information on several harvest-related issues.

Strong importance (mean score of 5.1) was placed on the need to better understand age, sex and length (ASL) in the Susitna sport harvest of Chinook (Issue 2.3.1) for run reconstruction to document changes in composition over time. While it is difficult to separate out impacts of fishing selectivity on a fish stock from impacts of environmental changes, nonetheless, studies conducted in other areas have found that management tactics (e.g., mesh size in gillnets) can affect traits related to fish size. That is, size-selective fishing can lead to a decrease in the average size in salmon. Similar studies have not been conducted in the Susitna, however trends in declining sizes of Chinook salmon have been observed. One person noted that while few Chinook originating in the Susitna are harvested in the UCI commercial fishery, commercial harvest of coho and sockeye salmon bound for waters of the Mat-Su Borough is substantially greater. Additional collection of ASL data through angler creel surveys was suggested to address Issue 2.3.1, as well as issues found under Goal 1, Salmon Status (Issues 1.4.1, 1.4.2 and 1.4.3).

Questions arose about the accuracy of catch and release mortality estimates for highly active inriver salmon fisheries (Issue 2.3.2). Some catch and release mortality estimates are available for sport fisheries in other areas, but their applicability to sport fishing for salmon in the Susitna is unclear. Little information is available about the sublethal effects of catch and release fish. This issue was rated moderately important (mean score of 4.1). There is almost no information on the magnitude of unaccounted mortality of fish that drop out of commercial nets or the fate of net-

marked fish (Issue 2.3.3) which escape nets but experience delayed mortality. Impacts from injured drop outs may include reduced viability on the spawning grounds. This issue was rated moderately important (mean score of 3.5).

Table 18. Issues and options identified for Objective 2.4 Hatchery Enhancement.

<p>Level 3: Objective 2.4 Hatchery Enhancement Provide information on hatchery enhancement effectiveness and opportunities consistent with salmon sustainability and optimum use.</p>
<p>Level 4: Issues with Example Options</p>
<p>2.4.1. There is an inaccurate perception by policy-makers and the public about the effectiveness and limitations of salmon hatcheries for supplementing salmon in the Mat-Su region. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Synthesize information on salmon hatchery effectiveness and risks based on evaluations of comparable programs in other areas.</i> b. <i>Document evaluations in technical and non-technical forms to serve a variety of audiences.</i>
<p>2.4.2. There is a lack of knowledge about where in the Mat-Su region hatcheries might be effective for providing additional fishing opportunities or otherwise addressing declines in wild stocks. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Complete an assessment of potential opportunities for additional hatchery production of Chinook, coho or sockeye in northern Cook Inlet for fishery harvest or conservation based on an evaluation of benefits, costs and risks.</i>
<p>2.4.3. Need to quantify current hatchery contributions to the harvest of Chinook in order to assess the benefits and cost-effectiveness of existing programs. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Conduct creel survey sampling programs to estimate wild/hatchery harvest.</i>
<p>2.4.4. Need a better understanding of wild/hatchery salmon interactions in spawning escapements in order to more clearly weight potentially undesirable impacts of hatchery production. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Quantify percent of hatchery origin spawners on wild spawning grounds.</i> b. <i>Estimate the relative productivity of hatchery and wild fish.</i>

Under Objective 2.4 Hatchery Enhancement, the group noted the limited use of hatchery enhancement in the Mat-Su region. However, a concern of strong importance (mean score of 6.0) was that policy-makers and the public have an incomplete understanding about the effectiveness and limitations of salmon hatcheries, which has led to misperceptions regarding the value of hatchery investments (Issue 2.4.1). Policy-makers and the public need information about the estimated costs, benefits and risks of supplemental hatchery production for Susitna salmon. For example, building more hatcheries won't solve problems associated with complex (mixed stock and mixed species) fisheries. Complex fisheries, as are found in UCI, create management challenges from differences in salmon productivity - these differences are not resolved by hatchery production.

There may be situations in the Mat-Su region where hatchery enhancement can be an appropriate and effective tool in producing salmon to support fisheries or address declines. Currently, there is a lack of knowledge about where in the Mat-Su region hatchery enhancement might be effective in providing additional salmon (Issue 2.4.2). To be successful, the hatchery enhancement tool must be matched to the environment. For example, hatchery production

should not be regarded as a replacement for declining habitat. The issue was rated of moderate importance (mean score of 4.8)

Questions arose about hatchery contributions to the Chinook harvest (Issue 2.4.3), resulting from funds recently directed by the legislature for Chinook production. There is a need to assess the benefits and cost-effectiveness of this kind of hatchery enhancement program. The issue was rated of moderate importance (mean score of 3.3)

The need for a better understanding of wild/hatchery salmon interactions in the Susitna (Issue 2.4.4) was rated of low importance (mean score of 2.7) because significant research on hatchery and wild stock interactions are underway in Southeast Alaska. Upon completion and peer review, the results of this research can be expected to address many hatchery-related questions in other parts of Alaska, including the Susitna. With this in mind, several of the group advised, "Information is out there and coming in, we just need to wait for it."

Synthesis of all 13 Issues under Goal 2

Synthesis of adjusted priorities for all 13 issues under Goal 2 resulted in a distribution of importance, where 2.1.1 lack of updated economic and social information is the highest ranked issue. Other important issues concern 2.2.1 need for stock-specific strategies in mixed stock fisheries, 2.2.2 insufficient information for preseason projections, 2.2.3 lack of management objectives for smaller stocks and 2.3.1 need for additional collection of ASL in the sport harvest of Chinook. Lowest ranked issues concern 2.4.4 unknown effects of wild/hatchery spawning interactions and 2.4.3 unknown contribution of hatchery Chinook to the total return.

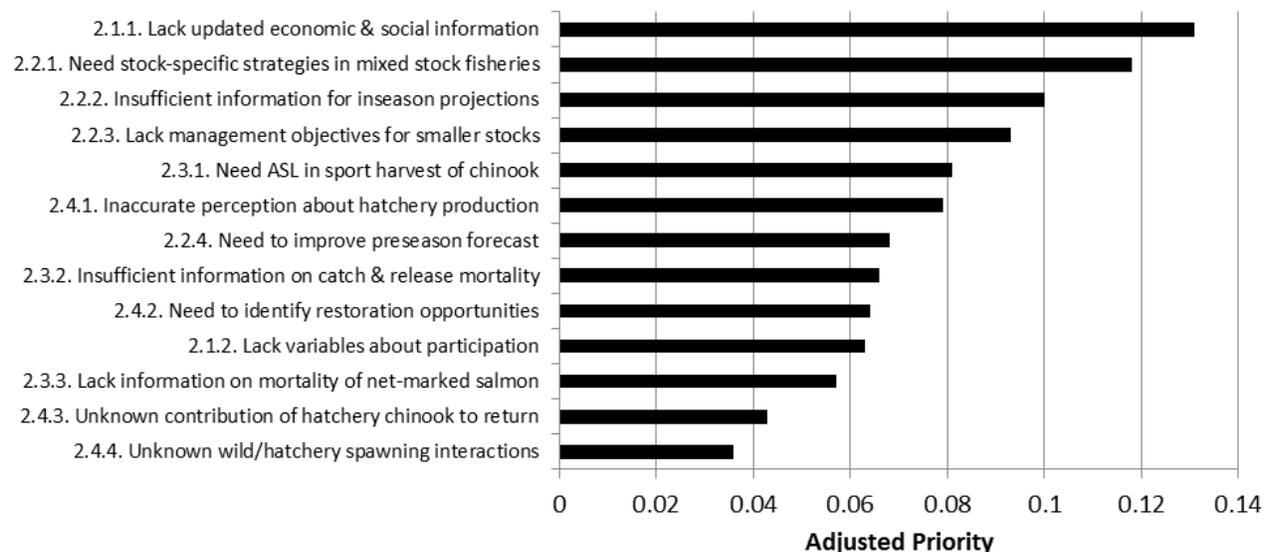


Figure 10. Adjusted priorities for all 13 issues under Goal 2 Salmon Fisheries.

Goal 3 Issues by Objective

A total of 20 issues were described for Objectives 3.1 - 3.5, ranging from one to seven issues per objective. Several issues can be addressed through changes in protocols, policies or planning.

Table 19. Issues and example options identified for Objective 3.1 Ecological Interactions.

<p>Level 3: Objective 3.1 Ecological Interactions Evaluate interactions and impacts of animal and plant species on salmon production and trends.</p>
<p>Level 4: Issues with Example Options</p>
<p>3.1.1. Need to monitor and evaluate the incidence of invasive aquatic species in the Susitna to guide implementation of effective remediation strategies. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Develop invasive species monitoring and evaluation protocols.</i> b. <i>Develop an early detection, rapid response plan.</i> c. <i>Implement systematic invasive species monitoring and evaluation program.</i>
<p>3.1.2. The feasibility and benefits of controlling pike to improve salmon production in Alexander Creek and elsewhere in the Susitna drainage are unclear. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Conduct a pike distribution assessment (e.g., environmental DNA).</i> b. <i>Evaluate alternative control and suppression methods.</i>
<p>3.1.3. The impacts of the invasive aquatic plant, <i>Elodea</i>, on salmon production, efficacy of control measures for eradication and preventing spread, and cost of control in the Susitna are unclear. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Continue Elodea monitoring in vulnerable lakes.</i> b. <i>Evaluate effectiveness of Elodea eradication efforts.</i> c. <i>Conduct prevention and education outreach efforts.</i>
<p>3.1.4. The significance of parasites and disease to sockeye production in Shell Lake and elsewhere is unclear. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Assess PKD presence and other parasite/disease in other sockeye lakes.</i> b. <i>Evaluate success of enhancement in countering related sockeye declines in Shell Lake.</i> c. <i>Evaluate the importance of temperature in the incidence of disease.</i>
<p>3.1.5. Beaver dams may affect salmon in the Susitna by impeding adult salmon passage or influencing habitat or ecological function. These effects may be both positive and negative. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Evaluate where and when beaver dams negatively impact salmon.</i> b. <i>Evaluate effectiveness of remediation alternatives (breaching, trapping, etc.)</i> c. <i>Evaluate effects of beaver dams on habitat or ecological processes influencing salmon.</i>
<p>3.1.6. The ecological significance of varying levels of Marine Derived Nutrients (MDN) related to salmon escapement in the Susitna is poorly understood. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Investigate MDN effects of sockeye, pink and chum escapement.</i>
<p>3.1.7. There is a lack of information on ecological relationships of marine mammals and salmon in UCI. <i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Describe marine mammal distribution and diet in UCI.</i> b. <i>Evaluate use of marine mammals as indicators or salmon ecosystem health.</i>

Under Objective 3.1 Ecological Interaction, a variety of biological factors affecting salmon abundance and productivity were discussed. Three issues about invasive aquatic species were rated strongly important. Most critical (mean score of 7.5) was the need to monitor and evaluate the incidence, impacts and risk of invasive aquatic species in the Susitna to guide prevention and remediation strategies (Issue 3.1.1) because once invasive species are established, they are difficult to control. The group highlighted the importance of a comprehensive plan for addressing invasive aquatic species in the Susitna.² There are currently a handful of positions in state Agencies that have some invasive species duties but limited funding to address emerging threats such as *Elodea*.

Biologists have difficulty in controlling invasive pike in connected water systems of the Susitna. Salmon abundance has declined in historically-productive lakes coincident with pike colonization. An experimental control program is being implemented in Alexander Creek. Preliminary results suggest that significant numbers of pike can be removed and that salmon production correspondingly improves. However, control efforts are costly and effects are expected to be temporary unless removal efforts are sustained. In addition, the scale of pike invasion in lower elevation Mat-Su waters is such that costs of a widespread control effort would be daunting even if it were feasible. Finally, interactions of pike predation and habitat changes are not clearly understood. Thus, the feasibility and benefits of attempting to control pike to improve salmon production are unclear (Issue 3.1.2). The issue was rated strongly important (mean score of 6.4).

Another invasive species, the aquatic plant, *Elodea*, is extremely aggressive and contributes to changes in primary production patterns (Issue 3.1.3). Decreased oxygen levels have been documented. Additionally, *Elodea* is believed to provide preferred habitat for pike, enhancing that predator's effectiveness. While only one lake in the Mat-Su has been found to contain *Elodea*, the plant has established elsewhere in the state, including Anchorage, Fairbanks, Cordova and Kenai areas. Questions arose about effective alternatives for control of *Elodea* and potential impacts on salmon. The best prospects for long-term control of *Elodea* come when the problem is addressed in the early stages before the scale of invasion overtakes the potential remedies. There is currently a draft document for the *Elodea* Statewide Management Plan that is being put together by DNR, USFWS, FS, Kenai Wildlife Refuge, Homer Soil and Water Conservation District (SWCD), Fairbanks SWCD, and the Copper River Watershed project (H. Stewart, ADNR – see public review comments in Appendix C). The issue was rated strongly important (mean score of 5.7).

Concerns about disease in Shell Lake are based on the analysis of samples taken from moribund sockeye which tested positive for the only documented case of Proliferative Kidney Disease (PKD) in the Mat-Su Borough. There may be additional instances of this highly infectious parasitic disease that are unknown (Issue 3.1.4). Diseases are endemic in wild fish and outbreaks can cause significant mortality. Outbreaks are often triggered by environmental stressors such as warm temperatures, low flows and fish crowding. Additional information is needed on salmon diseases in the wild to understand significance and implications of observed incidences. One person commented that it is better to inventory the extent of the concern and address its occurrence

² The corresponding issue consistent with the research, monitoring and evaluation purpose of this plan would be monitoring and evaluation of the incidence of invasive aquatic species in the Susitna to guide implementation of effective remediation strategies

sooner rather than later, as prevention and control measures in the wild are limited. The issue was rated moderately important (mean score of 3.4).

The group acknowledged that beaver dam impacts on salmon are complex: their impacts depend upon the location of the dam and species of salmon. Beaver dams can either benefit salmon by creating favorable habitats for rearing salmon, particularly for coho juveniles; or, impede salmon by blocking upstream adult passage, particularly for adult sockeye in small streams (Issue 3.1.5). The issue of beaver dams impeding adult salmon passage was deemed of moderate importance (mean score of 3.2) because beavers have always been present and their activity is integral to habitat function and processes in the natural ecosystem. Questions were raised about the short and long-term efficacy and cost-benefits of dam removal efforts. Subsequent public comments highlighted the potential significance of ecological function of beaver activities.

While the group agreed that there is a fair amount of knowledge regarding the contributions of Marine Derived Nutrients (MDN) delivered by salmon to watershed and terrestrial productivity for other areas, there is difficulty in translating that body of information to specific guidance for management of salmon escapement in the Susitna (Issue 3.1.6). Questions concerning the ecological significance of varying levels of MDN vectored by salmon spawning in the Susitna received scores of relatively low importance (mean score of 2.0).

The lowest rated (mean score of 1.3) issue concerned a lack of information on marine mammal ecological relationships with salmon in UCI (Issue 3.1.7). Marine mammals were discussed as something else potentially eating salmon. However, marine mammals are native and have diverse food sources available thus likely pose a low risk to Susitna salmon. The importance of salmon as food for listed Beluga was also noted but Beluga population dynamics are being addressed by other initiatives. The use of marine mammals as indicators of salmon ecosystem health was also discussed.

Table 20. Issues and example options identified for Objective 3.2 Human Factors.

<p>Level 3: Objective 3.2 Human Factors Evaluate status and effects of human development and activities on salmon production and trends.</p>
<p>Level 4: Issues with Example Options</p>
<p>3.2.1. Information on impacts to salmon from land use development, and guidelines for avoiding impacts, is needed for the development of policy requiring consideration of impacts to salmon in Mat-Su Borough land use plans. <i>Suggested options:</i> <ul style="list-style-type: none"> a. <i>Identify appropriate criteria for riparian buffers in different areas.</i> b. <i>Identify appropriate criteria for septic system restrictions to maintain water quality.</i> </p>
<p>3.2.2. Culverts block fish passage into otherwise favorable salmon habitat in the Susitna. <i>Suggested options:</i> <ul style="list-style-type: none"> a. <i>Identify and prioritize problem areas for culvert replacement (borough and state roads and the railroad) based on the quantity and quality of affected salmon habitat.</i> </p>
<p>3.2.3. The extent of unregulated development in floodplains of the Mat-Su Borough is uncertain and impacts to salmon habitat are unknown. <i>Suggested options:</i> <ul style="list-style-type: none"> a. <i>Document the extent of unregulated development in floodplains.</i> b. <i>Identify critical areas at risk of further development.</i> </p>
<p>3.2.4. The amount and distribution of impervious surfaces mapped in 2008 is out of date, thus is inadequate to assess recent trends and effectiveness of stormwater runoff controls for avoiding detrimental impacts to salmon habitat quality. <i>Suggested options:</i> <ul style="list-style-type: none"> a. <i>Update the 2008 map of impervious surfaces.</i> b. <i>Map stormwater outfalls (this was not on the 2008 map).</i> c. <i>Monitor water quality of stormwater outfalls.</i> </p>
<p>3.2.5. Existing information on shoreline degradation at sport fish access sites is inadequate to assess the magnitude of this potential problem, its significance to salmon habitat, and ensure effective remediation. <i>Suggested options:</i> <ul style="list-style-type: none"> a. <i>Assess the magnitude of shoreline and riparian habitat degradation at angler access sites.</i> </p>

Under Objective 3.2 Human Factors, the strongest rated issue (mean score of 6.2) concerned the need to obtain information for avoiding impacts to salmon from land use development that can inform effective Mat-Su Borough land use plans and guidelines (Issue 3.2.1). Of particular value would be information that translates into criteria for various activities such as riparian buffers or septic systems restrictions. While it is often all too easy to identify blanket criteria, the most effective criteria include considerations for the specifics on any given case so that ineffective restrictions are not implemented unnecessarily.

Information on culverts that potentially block salmon movement (Issue 3.2.2) continues to command attention and was thus rated strongly important (mean score of 5.8). While culverts do not impact salmon in the major portion of the Mat-Su region which is roadless, poorly designed and constructed culverts have been identified in developed areas. Substantial efforts have been undertaken to address culverts that impede salmon passage. Additional information on the locations of problem culverts (especially those located on borough and state-owned roads

as well as the railroad) and prioritization as to degree of salmon habitat value, would ensure cost-effective remediation.

An issue came to light concerning unregulated development in the floodplains of the Mat-Su Borough and impacts to salmon habitat (Issue 3.2.3). Floodplain conditions and connections to rivers and streams are critical to processes and function that shape salmon habitat. There are significant violations – information is needed to document the location and extent of unregulated development in the floodplain and how much salmon habitat has been affected. Obtaining this knowledge is the first step towards improving protection of salmon habitat in the floodplain. The group assigned a moderate rating of importance to this issue (mean score of 4.7).

The amount and distribution of impervious surfaces mapped in 2008 is out of date, thus is inadequate to assess recent trends and effectiveness of stormwater runoff controls for avoiding detrimental impacts to salmon habitat quality (Issue 3.2.4). Hard surface, including roads and parking lots, can substantially increase stormwater runoff in developed areas with concomitant effects on stream hydrology, erosion and a variety of other water quality features important to salmon. The group assigned a moderate rating of importance to this issue (mean score of 4.6).

Shoreline damage at sport fish access points caused by anglers and off-road vehicles trampling vegetation and eroding the bank, thereby increasing sedimentation, may negatively impact salmon habitat on a local scale (Issue 3.2.5). Additional information on the scale and location of these impacts to assess the magnitude and significance of the problem would be useful for guiding protection, restoration and education activities. However, angler access points are confined in area; most of the Mat-Su Basin is not affected by this issue, so the mean rating of this issue was of moderate importance (mean score of 3.8). The issue needs to be brought to the public's attention because there are improved ways of accessing the water without destroying the shoreline. Upon assessing the problem, restoration along with public outreach can be used to remedy habitat degradation.

Table 21. Issues and example options identified for Objective 3.3 Aquatic Habitat Conditions.

<p>Level 3: Objective 3.3 Aquatic Habitat Conditions Characterize quantity and quality of freshwater and estuarine habitats which affect salmon production.</p>
<p>Level 4: Issues with Example Options</p>
<p>3.3.1. Water quality baselines in the Susitna are not adequate to assess patterns and trends which may impact salmon. <i>Suggested options:</i> a. <i>Identify index watersheds and sites for long-term water quality monitoring.</i> b. <i>Initiate broad scale temperature monitoring.</i></p>
<p>3.3.2. Water quantity baselines in the Susitna are not adequate to assess patterns and trends which may impact salmon. <i>Suggested options:</i> a. <i>Install river gauge stations to monitor hydrology.</i> b. <i>Collect data to support water reservation proposals.</i></p>
<p>3.3.3. There is a lack of information (through space and time) on changing habitat conditions in the Susitna (habitat types, channel morphology, bank stability, substrates, rising water temperature, etc.) in relation to salmon production. <i>Suggested options:</i> a. <i>Describe important salmon habitat by life stage.</i> b. <i>Complete physical habitat surveys of representative areas.</i> c. <i>Select index watersheds and sites to monitor over time.</i> d. <i>Monitor and evaluate changing habitat conditions in relation to salmon production.</i></p>

Basic information on water quality (Issue 3.3.1), water quantity (Issue 3.3.2), and aquatic habitat conditions (Issue 3.3.3) throughout the Mat-Su Borough is incomplete and is needed to evaluate changes over time and impacts of related factors. The quality of the existing information is also quite variable. The need for this information was afforded a relatively strong priority by the group (mean scores ranging from 5.9 to 6.3).

Table 22. Issues and example options identified for Objective 3.4 Marine Ecology.

<p>Level 3: Objective 3.4 Marine Ecology Evaluate ecology and habitat conditions and influences of the near- and offshore marine environment in Upper Cook Inlet on salmon production and trends.</p>
<p>Level 4: Issues with Example Options</p>
<p>3.4.1. Information on the distribution of juvenile salmon in estuarine and nearshore marine waters of UCI, and use of these areas, is not adequate to assess their importance to salmon ecology and production. <i>Suggested options:</i> a. <i>Identify juvenile salmon habitat use and availability in estuary and nearshore marine waters of UCI.</i> b. <i>Estimate condition, growth and survival of salmon in estuary/nearshore habitat.</i></p>

The sole issue identified by the group for Objective 3.4 Marine Ecology was a need for information on the distribution and use by juvenile salmon of estuarine and nearshore areas in UCI (Issue 3.4.1). While understanding of juvenile salmon use of these areas in UCI is currently inadequate to assess significance of habitat and environmental changes, direct application of this information to salmon conservation and management is unclear.

Table 23. Issues and example options identified for Objective 3.5 Landscape and Watershed.

<p>Level 3: Objective 3.5 Landscape and Watershed (0.049)Evaluate landscape, watershed, wetland, riparian and hydrological factors which affect freshwater salmon habitat conditions.</p>
<p>Level 4: Issues with Example Options</p>
<p>3.5.1. Loss of wetland salmon habitat to filling and development in the Mat-Su Borough has not been quantified, nor assessed in relation to salmon production.</p> <p><i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Develop an estimate of wetland losses from 2000 to present and current reference conditions based on aerial photogrammetry and/or index sites.</i> b. <i>Assess site-specific impacts related to human activities (e.g., off road vehicle use, etc.)</i>
<p>3.5.2. Inaccurate stream maps may limit the ability to assess and protect important salmon habitats.</p> <p><i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Conduct additional mapping studies.</i>
<p>3.5.3. A lack of understanding of groundwater and surface water exchanges in the Susitna River limits the ability to assess the significance of these processes to salmon production and to identify critical areas in need of protection.</p> <p><i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Continue groundwater monitoring initiated by AEA for the Susitna Watana project.</i>
<p>3.5.4. An incomplete understanding of sediment processes in the Susitna limits the ability to assess the significance of these processes to salmon production, and impacts and risks of land use and development.</p> <p><i>Suggested options:</i></p> <ul style="list-style-type: none"> a. <i>Study sediment processes near the three river confluences.</i>

Under Objective 3.5 Landscape and Watershed, the group agreed that landscape and watershed conditions which affect salmon habitat in the Mat-Su region, with few localized exceptions, are in excellent shape. Four issues were identified as needing attention, including loss of wetland habitat to filling and development (Issue 3.5.1). Quantification of changes in wetlands was rated strongly important (mean score of 5.2). Wetlands were inventoried in 2000 but current information is needed to evaluate changes and identify problem areas.

Inaccurate mapping of streams (Issue 3.5.2) was deemed an issue of moderate importance (mean score of 4.5). Accurate maps of streams are a foundational piece for habitat assessment activities. Changes in stream course following high water events are a continuing challenge to maintaining accurate maps in dynamic systems like the Susitna. The availability of advanced technologies such as LiDAR has vastly improved the capability to develop accurate maps.

Lack of understanding of groundwater and surfaces exchanges in the Susitna River (Issue 3.5.3) was rated moderately important (mean score of 4.4). Upwelling areas in rivers and streams have been found to be critically important spawning and rearing areas for salmon. Chum salmon in particular are closely linked with these upwelling areas for spawning. Information on the quantity, quality and dynamics of these critical areas is limited.

An incomplete understanding of sediment processes (Issue 3.5.4) was rated moderately important (mean score of 3.7). Sediment processes are important to the quantity, quality and distribution of productive salmon habitats, particularly in glacial systems like the Susitna. Processes may involve complex interaction between inputs, export, and the rate of water flow. Sediment processes can also have significant implications to land use, for instance by affecting dynamics of flooding and erosion.

Synthesis of all 20 Issues under Goal 3

Synthesis of adjusted priorities for all 20 issues under Goal 3 resulted in a distribution of importance, where 3.1.1 need to monitor and evaluate invasive aquatic species is the highest ranked issue. Other important issues concern 3.1.2 presence of pike and 3.1.3 *Elodea*, 3.2.1 lack of information to consider impacts to salmon in land use development plans and 3.2.2 culverts that block fish passage. Lowest ranked issues concern 3.1.7 lack of information on marine ecological relationships between marine mammals and salmon in UCI and 3.1.6 poor understanding of the effects of varying levels of Marine Derived Nutrients on production in the Susitna.

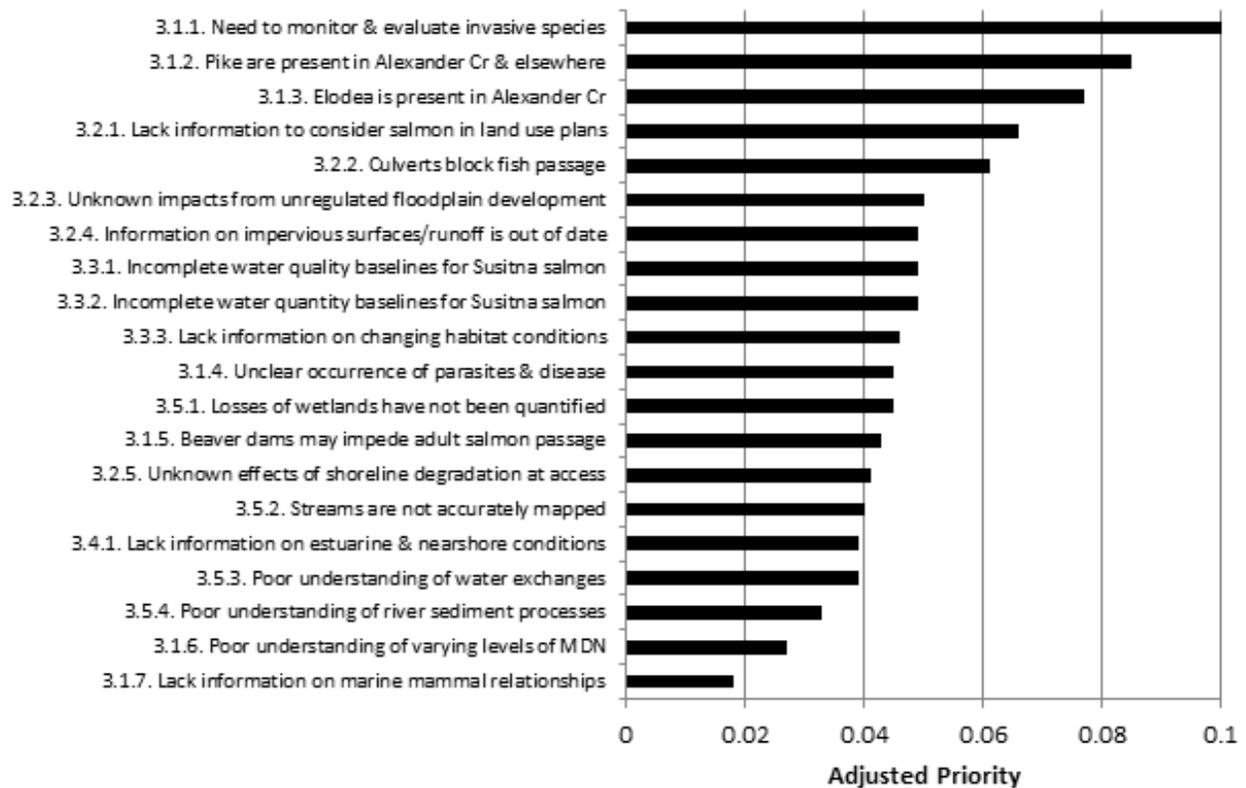


Figure 11. Adjusted priorities for all 20 issues under Goal 3 Salmon Ecosystem.

Synthesis of all 55 Issues

Synthesis of adjusted priorities for all 55 issues resulted in a distribution of ranks derived from the proportional weight of importance of an issue relative to others in its group, as well as from the weight of its parent node – the objective. Substantial differences in priority were apparent between highest and lowest ranked issues although ranks for many issues fall into equal or similar blocks. Issues were distinguished in five more or less equally-sized groups based on priority.³ These priorities will be one of several considerations in identifying projects for funding.

Those issues ranking highest include 2.1.1 lack updated economic and social information, 2.2.1 need stock-specific strategies in mixed stock fisheries and 1.1.1 lack of coho escapement goals in the Susitna. Issues ranking lowest include 3.1.7 lack information on marine mammal relationships with salmon, and lack information on pink (1.4.5) and chum (1.4.4) productivity.

High priorities were reflected in workshop ratings of specific information needs on coho, Chinook and sockeye. Priorities for information on chum and pink salmon were uniformly lower than those of other species.

³ *Issues with equal ranks are included in the same tier.*

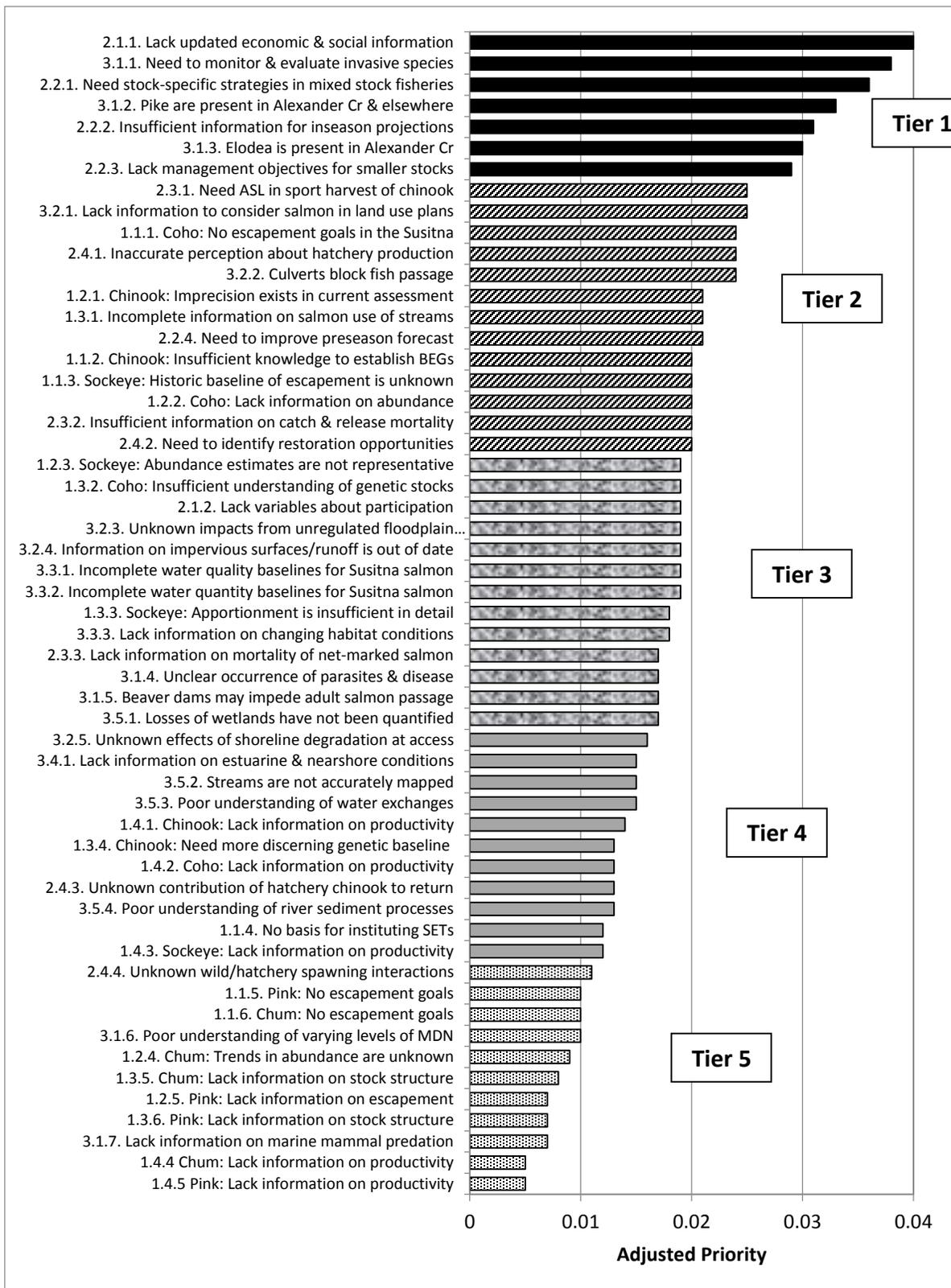


Figure 12. Adjusted priorities for all 55 issues in the Mat-Su Salmon RM&E Plan.

Discussion

Priorities identified for issues in this plan ultimately reflect input by both the Commission and stakeholders participating in the planning workshop. The three goals were ranked equally based on recommendations from stakeholder workshop participants. Objectives under each goal continue to reflect weights assigned by the Commission. Issues corresponding to each objective were identified and ranked by workshop participants. A close examination of workshop outcomes shows that issue priorities are heavily influenced by rankings provided by workshop participants. Workshop participants often had differing views on the significance of specific issues depending on their interest and expertise. The final priority rankings reflect the combined perspective from workshop participants in aggregate. Issues that received a high level of interest by workshop participants were ranked highly regardless of priorities identified by the Commission for corresponding objectives.

Goals and objectives identified by the Commission included all salmon-related concerns. No potential issue identified by workshop participants was excluded from consideration. Within each goal, the highest ranked issues were rated highly at the objective level by the Commission and at the issue level by workshop participants. The lowest ranked issues were rated low by both the Commission and workshop participants.

A great body of peer-reviewed literature exists on priority setting - would outcomes change if different groups of people made the priorities? If the groups are comprised of people with sufficient expertise and varying perspectives of the problem, there will be a large degree of similarity in the outcome between groups. Specifically, the core planning team was comprised of a sufficient level of expertise to describe the general problems in fairly good detail. The larger group of workshop participants was also comprised of a sufficient level of expertise to describe the problem in fairly good detail. That's why both groups agree that the important issues are in the top ranks, and the less important issues are in the bottom ranks.

In designing an RM&E planning process to guide direction of salmon research funds, the Commission sought to balance their sense of priorities with those of other interested parties. The Commission invited input from diverse interests. Resulting issue priorities reflect that input to a very large degree. At the same time, funding was directed to the Borough and it is incumbent on the Commission to identify projects that address the Borough's needs. The RM&E plan is ultimately the Borough's plan and the Fish and Wildlife Commission greatly appreciates the participation and input from other parties in providing guidance for the Commission's efforts. While different priorities might be assigned to specific issues by various interests, the Commission feels that the current plan is inclusive of issues of concern to a broad spectrum of interests.

It should also be noted that while priorities identified in the plan will be a consideration in funding decisions, they will not be the only consideration. Project selection criteria will also include considerations of benefits vs. costs, cooperative funding and partner opportunities, likelihood of success, etc. Projects addressing some moderately ranked issues will likely be funded in preference to some more highly ranked issues based on those criteria.

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Glossary

Benefits. Value and satisfaction accrued to humans through their harvest and enjoyment of salmon, as well as value to the riparian habitat to sustain ecosystem functioning.

Biological Escapement Goal (BEG). A spawning escapement that provides the greatest potential for maximum sustained yield.

Evaluation. Systematic and objection synthesis of data and information for the purpose of informing strategic decisions. Example: evaluate the effectiveness of management alternatives for meeting established escapement goals.

Expert judgment. Relevant experience, supported by rational thought and knowledge.

Goal. A long-term achievement that contributes to accomplishing a mission that can begin with: protect, manage, maintain, harvest, sustain, provide. An example is, "Protect wild Chinook salmon freshwater habitat to provide for ecosystem diversity." Goals can either be: already mandated in a legal or management framework; established prior to group planning by the funding agency; or, created by stakeholders in a group setting. In prior salmon plans developed by the State, goals have incorporated principles of the Sustainable Salmon Fisheries Policy.

Importance. Meant to convey degree of dominance, one over another. For example, are all objectives of equal importance to achieving the goal? If not, which one is the most important?

Issue. Includes an information need, but is broader in meaning. An impediment to achieving an objective that includes uncertainty, incomplete or a lack of information, political or socioeconomic difficulties. An example is, "Total harvest is uncertain." Stakeholders are vital to identifying issues.

Mission. A responsibility to fulfill. The mission is usually (but not always) a mandate ordered through a legal framework and is not subject to (much) change by the funding agency or stakeholders. An example is, "Sustain a healthy and biologically diverse wild salmon ecosystem in southeast Alaska and the human use of wild salmon in that ecosystem, through salmon research, monitoring, restoration and stewardship."

Monitoring. Systematic and routine collection of information over a period of time, typically for the quantification of status, trends, and effects. Monitor fresh water temperature and flow volume in indicator streams.

Objective. A measurable statement of purpose that can begin with: characterize, describe, identify, estimate, monitor, document. An example is, "Characterize physical parameters of spawning and rearing habitat." Stakeholders are often invited to participate in a group setting in creating objectives.

Option. Includes a strategic action, but is broader in meaning. A course of action or protocol to address and overcome an issue or sub-issue. Examples are conduct coded wire tag projects, radiotelemetry, adopt standards, etc. Stakeholders are vital to identifying options.

Planning. A *repetitive* decision-making activity involving *thinking & social* processes that help to design what is perceived as a *desirable outcome*.

Priority. Also priority score. In AHP, priority is expressed using a positive inverse ratio scale. Priority implies units of measurement.

Problem. The difference between the current condition and the desired condition. An example of a problem: salmon are declining. Problem-solving is an approach taken to describe the desired condition and how to get there. The problem statement is usually the overarching premise for funding.

Rank. The position of an element relative to others in the group, such as top-ranked.

Rating. Classifying importance according to a standard or scale. For example, people rated the importance of Goal 1, “Salmon Status” using the positive inverse ratio scale. The result was a priority score.

Research. Systematic investigation in order to establish or confirm facts, reaffirm the results of previous work, solve new or existing problems, support theorems, or develop new theories. Example: identify spawning areas using radiotelemetry.

Scope. Limitations placed on the range of activities or intent; a clear definition of what will or will not be addressed. Example: geographic scope defines the physical boundaries of the research plan.

Stakeholder. Individuals who are either responsible for oversight or are directly affected by decisions.

Statewide Harvest Survey (SWHS) – mail in survey distributed to a sample of sport fishing license holders to estimate annual harvest.

Strategic. Long-term future based on goals. Most strategic plans for salmon have a 3-5 time year horizon.

Sub-issue. Specific categories of the main issue to help direct thinking about options. If the main issue is, “Total harvest is unknown”, its sub-issues can be: interception in Area M, unreported subsistence harvest, identification error in the commercial fishery, etc. Stakeholders are vital to identifying sub-issues.

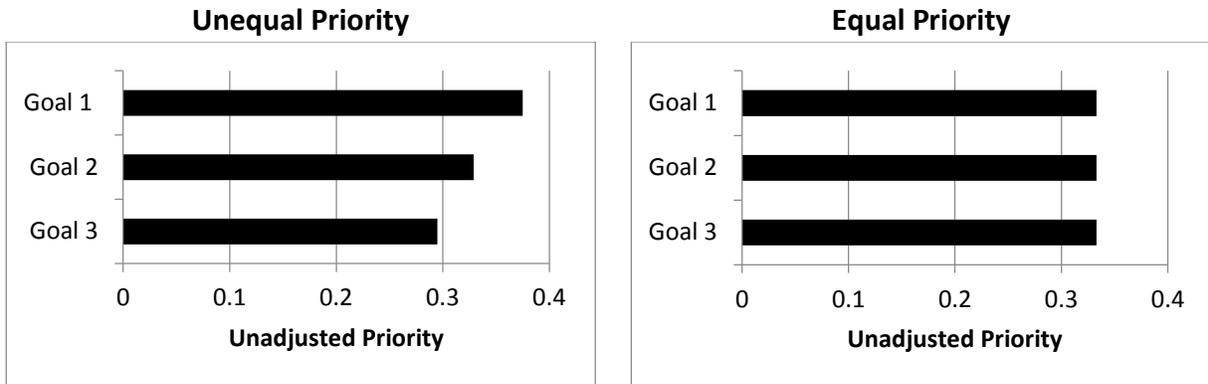
Sustainable Escapement Goal (SEG). A level of spawning escapement, indicated by an index or estimate that is known to provide for sustained yield over a 5 to 10 year period. An SEG is used in situations where a BEG cannot be estimated or managed for.

Sustainable Escapement Threshold (SET). A threshold level of spawning escapement below which the ability of the salmon stock to sustain itself is jeopardized. The SET is lower than the lower bound of a BEG or SEG.

Systematic approach. The whole problem is viewed as a system, whose parts are structured, and the links between the parts identify interactions and influences. Used in solving complex problems.

APPENDIX A – EFFECTS OF GOAL PRIORITY EQUALIZATION

This appendix describes how the rank order of 55 issues was influenced by changes in priorities at the goal level. The AHP model was run with two different goal ranks. The original priorities of the goals considered by the core planning team, were: Goal 1 (Salmon Status) = 0.375, Goal 2 (Salmon Fisheries) = 0.329 and Goal 3 (Salmon Ecosystem) = 0.295 (hereafter called the original model). Based on comments from workshop participants, all goals were subsequently given equal importance (0.333) in the final analysis.



Appendix Figure 1. *Priorities of goals initially considered by Mat-Su Commission core planning team (left) and equal goal priorities (right) subsequently used in this plan.*

Appendix Figure 2 and Appendix Figure 3 show changes in priorities of goals and objectives from initial values identified by the core planning team (unequal goal priorities) to final values based on stakeholder comments (equal goal priorities). Changes also reflect workshop outcomes which eliminated objectives 1.5 (Salmon Biology) and 2.5 (Fishery Participation) when no significant issues were identified for those objectives independent of coverage in other objectives.

Appendix Figure 4 shows the ranking of issues under for unequal goal priorities. Appendix Figure 5 shows the how rankings changed under equal goal weights. The rank order of issues was relatively robust in regard to the changes in priorities at the goal level.

Fourteen of the 17 (82%) highly ranked issues in the original model were also highly ranked in when goal ranks were equal. The three issues that dropped in rank to the middle were in both Goals 1 and 2; they were replaced by issues from Goals 2 and 3 that rose in rank, from middle to high. It makes sense that a few issues from Goal 3 would rise in rank order when goal priorities were equalized, since the priority of Goal 3 was changed from 0.295 to 0.333, thus giving more weight of importance to its components.

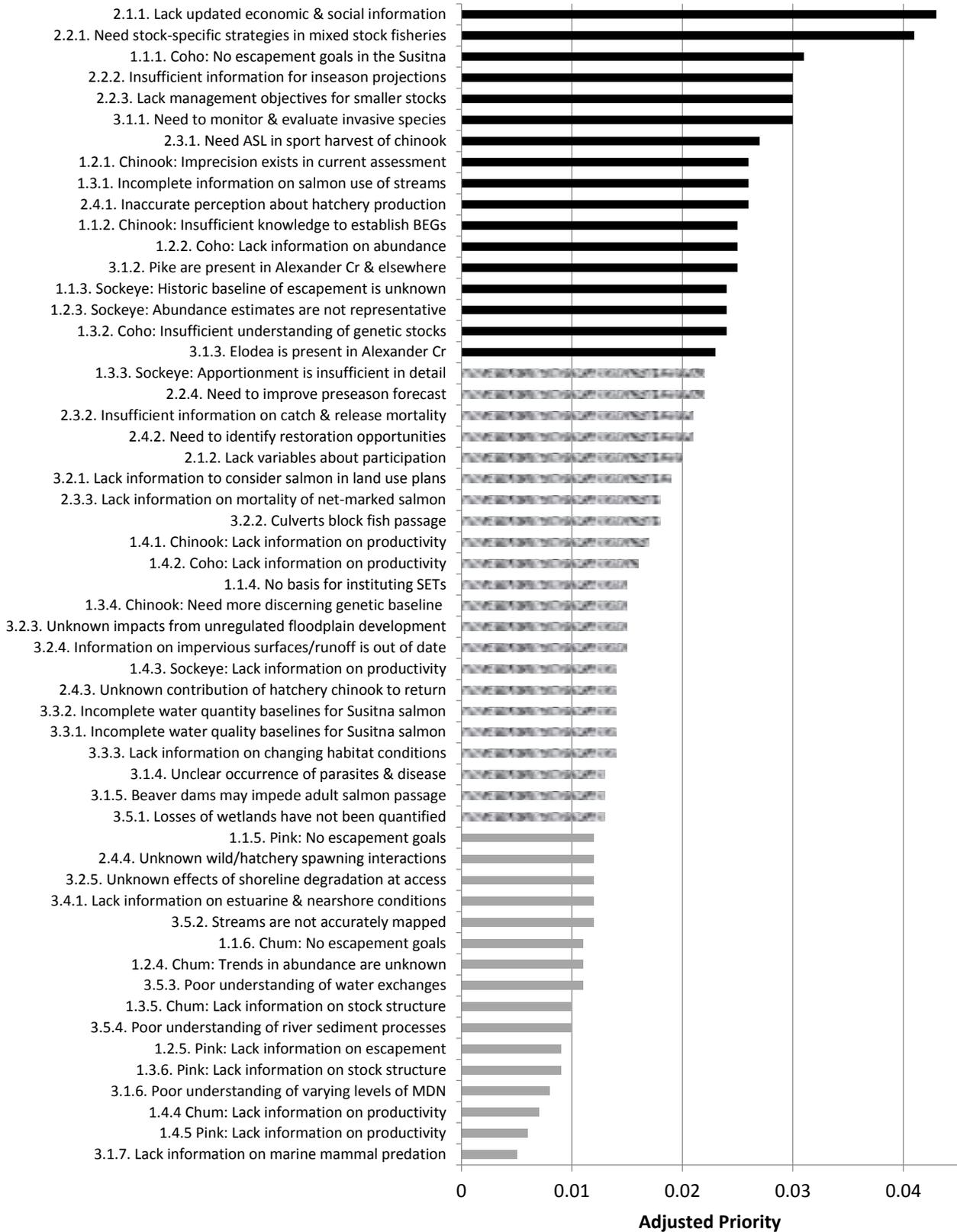
Similarly, 12 of the 16 (75%) low ranked issues in the original model were also low ranked in the equal-goal model. The four issues that rose in rank to the middle were all in Goal 3. Again, a few issues from Goal 3 rose in rank order in the equal-goal model since the priority of Goal 3 was changed from 0.295 to 0.333. The four issues that dropped in rank order from middle to low priority were in Goals 1 and 2.

MISSION	GOALS	OBJECTIVES
<p>1.000 Develop a strategic plan encompasses the interests partners & governing in guiding funds towards research, monitoring & evaluation projects to manage, protect & Mat-Su Borough stocks for optimum benefits while maintaining biological productivity and diversity.</p>	<p>.375 <u>1. Salmon Status</u> Provide information on stock abundance, productivity & biology necessary to quantitatively assess status & trends relative to historical benchmarks & numerical</p>	<p>.100 <u>1.1 Biological Reference Points</u> Integrate information on stock identification, status productivity to determine quantitative benchmarks/ escapement goals for monitoring/evaluating trends optimizing productivity.</p> <p>.096 <u>1.2 Stock Abundance</u> Estimate relative &/or absolute abundance of representative stocks or populations.</p> <p>.089 <u>1.3 Stock Identification</u> Describe distribution and stock structure of each species.</p> <p>.060 <u>1.4 Stock Productivity</u> Determine production, survival &/or replacement relative to spawning escapement & other limiting</p> <p>.030 <u>1.5 Biology</u> Describe characteristics of salmon species.</p>
	<p>.329 <u>2. Salmon Fisheries</u> Provide information on fisheries to manage for sustainability & optimum use.</p>	<p>.090 <u>2.1 Economic & Social Values</u> Assess the economic & social values associated with sport, commercial & personal use fisheries.</p> <p>.088 <u>2.2 Management Strategies & Tools</u> Evaluate the effectiveness of existing & alternative management strategies & tools.</p>
	<p>.296 <u>3. Salmon Ecosystem</u> Provide information on ecosystem & human effects & perturbations that limit or threaten salmon sustainability & optimum use.</p>	<p>.063 <u>2.3 Harvest</u> Estimate amount/composition of harvest for each</p> <p>.052 <u>2.4 Hatchery Enhancement</u> Provide information on hatchery enhancement effectiveness & opportunities consistent with salmon sustainability & optimum use.</p> <p>.036 <u>2.5 Participation</u> Characterize effort & composition of participants in each fishery.</p>
		<p>.071 <u>3.1 Ecological Interactions</u> Evaluate interactions & impacts of animal & plant on salmon production & trends.</p>
		<p>.067 <u>3.2 Human Factors</u> Evaluate status & effects of human development & activities on salmon production & trends.</p>
		<p>.060 <u>3.3 Aquatic Habitat Conditions</u> Characterize quantity & quality of freshwater & habitats which affect salmon production.</p>
		<p>.049 <u>3.4 Marine Ecology</u> Evaluate ecology & habitat conditions & influences of near- and off-shore marine environment in Upper Inlet on salmon production & trends.</p>
		<p>.049 <u>3.5 Landscape & Watershed</u> Evaluate landscape, watershed, wetland, riparian & hydrological factors which affect freshwater salmon habitat conditions.</p>

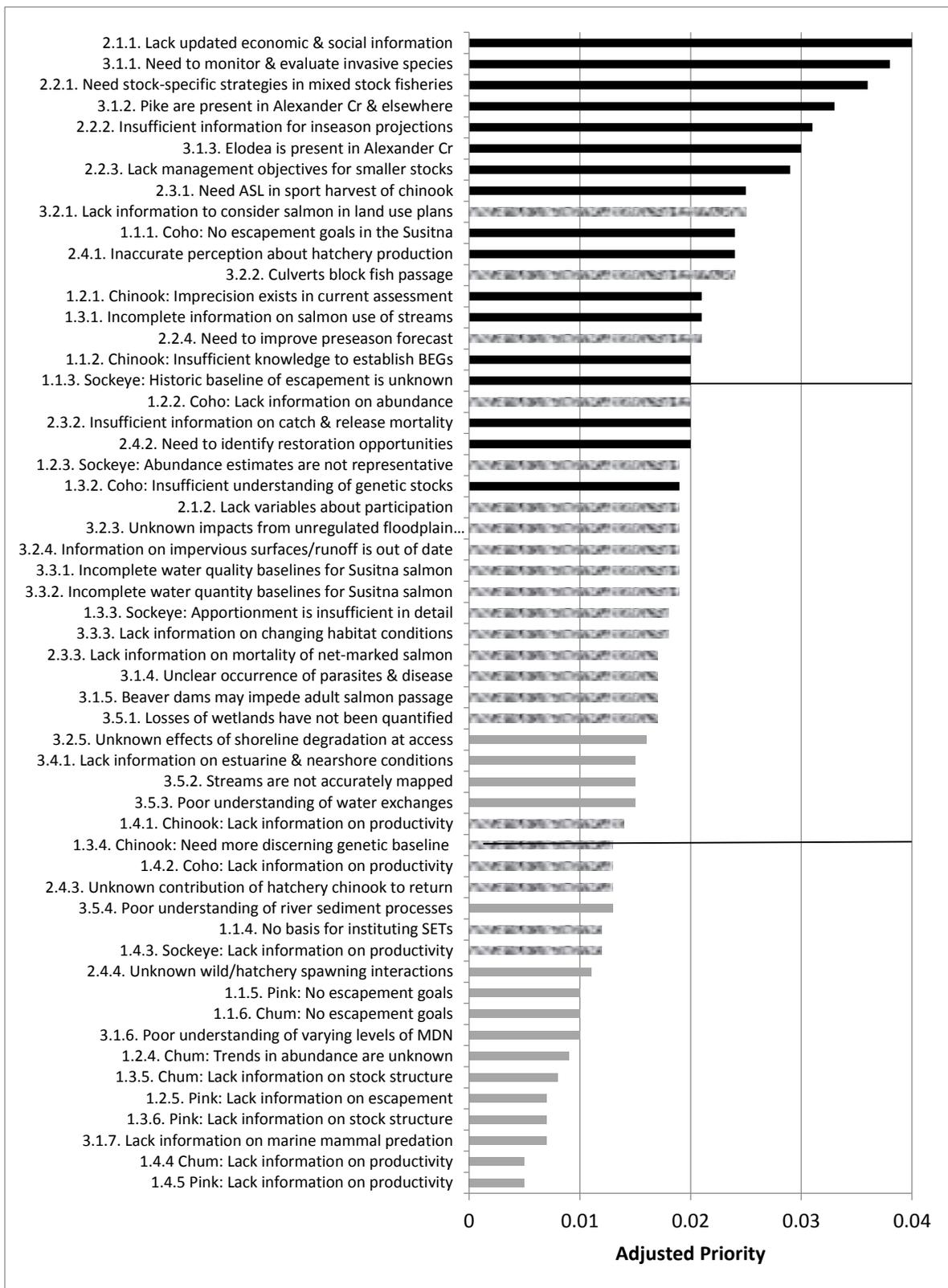
Appendix Figure 2. Unadjusted global priorities of goals and objectives developed by the core planning team.

MISSION	GOALS	OBJECTIVES
		<p>.097 <u>1.1 Biological Reference Points</u> Integrate information on stock identification, status productivity to determine quantitative benchmarks/ escapement goals for monitoring/evaluating trends optimizing productivity.</p> <p>.093 <u>1.2 Stock Abundance</u> Estimate relative &/or absolute abundance of representative stocks or populations.</p> <p>.086 <u>1.3 Stock Identification</u> Describe distribution and stock structure of each species.</p> <p>.057 <u>1.4 Stock Productivity</u> Determine production, survival &/or replacement relative to spawning escapement & other limiting</p>
<p>1.000 Develop a strategic plan encompasses the interests partners & governing in guiding funds towards research, monitoring & evaluation projects to manage, protect & Mat-Su Borough stocks for optimum benefits while maintaining biological productivity and diversity.</p>	<p>.333 <u>1. Salmon Status</u> Provide information on stock abundance, productivity & biology necessary to quantitatively assess status & trends relative to historical benchmarks & numerical</p> <p>.333 <u>2. Salmon Fisheries</u> Provide information on fisheries to manage for sustainability & optimum use.</p>	<p>.102 <u>2.1 Economic & Social Values & Participation</u> Assess the economic & social values associated with sport, commercial & personal use fisheries; and,</p> <p>.100 <u>2.2 Management Strategies & Tools</u> Evaluate the effectiveness of existing & alternative management strategies & tools.</p> <p>.072 <u>2.3 Harvest</u> Estimate amount/composition of harvest for each</p> <p>.059 <u>2.4 Hatchery Enhancement</u> Provide information on hatchery enhancement effectiveness & opportunities consistent with salmon sustainability & optimum use.</p>
	<p>.333 <u>3. Salmon Ecosystem</u> Provide information on ecosystem & human effects & perturbations that limit or threaten salmon sustainability & optimum use.</p>	<p>.080 <u>3.1 Ecological Interactions</u> Evaluate interactions & impacts of animal & plant on salmon production & trends.</p> <p>.075 <u>3.2 Human Factors</u> Evaluate status & effects of human development & activities on salmon production & trends.</p> <p>.068 <u>3.3 Aquatic Habitat Conditions</u> Characterize quantity & quality of freshwater & habitats which affect salmon production.</p> <p>.055 <u>3.4 Marine Ecology</u> Evaluate ecology & habitat conditions & influences of near- and off-shore marine environment in Upper Inlet on salmon production & trends.</p> <p>.055 <u>3.5 Landscape & Watershed</u> Evaluate landscape, watershed, wetland, riparian & hydrological factors which affect freshwater salmon habitat conditions.</p>

Appendix Figure 3. Unadjusted global priorities of goals and their objectives, revised based on stakeholder input and public comments received on the draft plan.



Appendix Figure 4. *Priorities for all 55 issues based on unequal goal weights initially considered by the Mat-Su Commission core planning team (Goal 1 Salmon Status 0.375, Goal 2. Salmon Fisheries 0.329 and Goal 3. Salmon Ecosystem 0.29).*



Appendix Figure 5. Adjusted priorities for all 55 issues based on equal goal priorities. Key: black bars are highly ranked issues, textured bars are middle ranked issues, and grey bars are low ranked issues in the original model.

APPENDIX B – PLANNING WORKSHOP PARTICIPANTS

Appendix Table 1. Participants in the Mat-Su salmon planning workshop, January 21-22, 2015.

	Affiliation	Background	Person	Email	Phone
1	MSB Fish & Wildlife Comm.	Sport /Personal use	Larry Engel	larryengel@gci.net	(907) 745-4132
2	MSB Fish & Wildlife Comm.	Sport /Personal use	Howard Delo	hodelo@mtaonline.net	(907) 892-8796
3	MSB Fish & Wildlife Comm.	Sport /Personal use/Business	Bruce Knowles ¹	bigfish@mtaonline.net	(907) 495-4965
4	ADFG	Sport fish	Tim McKinley	Timothy.mckinley@alaska.gov	(907) 267-2124
5	ADFG	Commercial fish	Jack Erickson	Jack.erickson@alaska.gov	(907) 267-2376
6	ADFG	Habitat	Mike Bethe ²	Mike.bethe@alaska.gov	(907) 861-3202
7	Susitna Valley Advisory Committee (AC)	Sport/Business/Commercial	Mike Wood	mike@susitnarivercoalition.org	(907) 354-5815
8	Mat Valley AC/MSB Fish & Wildlife Comm.	Sport/Business	Jehnifer Ehmann	jehnifer.ehmann@gmail.com	(907) 354-0059
9	Mat-Su Borough (MSB)	Local government	Frankie Barker	frankie.barker@matsugov.us	(907) 746-7439
10	USFWS	Habitat	Jon Gerken	jonathon_gerken@fws.gov	(907) 271-1798
11	USFWS	Fisheries	Doug McBride	doug_mcbride@fws.gov	(907) 271-2871
12	NMFS	Marine waters	Did not attend		
13	Cook Inlet Aquaculture	Enhancement & Monitoring	Gary Fandrei	gfandrei@ciaanet.org	(907)283-5761
14			Lisa Ka'aihue	lisak@ciaanet.org	(907)283-5761
15	Northern District Setnet Fishery	Commercial fish	Did not attend		
16	Central District Driftnet Fishery - UCI Drift Assoc.	Commercial fish	Did not attend		
17	East side Setnet fishery - Kenai Peninsula Fishermen's Assoc.	Commercial fish	Rob Williams	krvwilliams@gmail.com	(907)398-2719
18	Chickaloon Village Traditional Council	Subsistence	Did not attend		
19	Aquatic Restoration & Research Institute	Private non-profit	Did not attend		
20	Mat-Su Salmon Partnership	Habitat	Jessica Speed ³	jspeed@tnc.org	(907) 865-5713

¹ Attended Jan 21 only.

² Attended Jan. 22 only.

³ Participation was limited to discussion and clarification of ecosystem goals.

Appendix Table 2. Observers present at the Mat-Su salmon planning workshop, January 21-22, 2015.

Affiliation	Background	Person	Email	Phone
MSB Fish & Wildlife Comm.	Sport/personal use	Terry Nininger	nininger@alaska.net	--
Kenai River Sportfishing Association	Non governmental organization	Ricky Gease	ricky@krsa.com	(907) 262-8588
Mat-Su Borough Assembly	Local government	Jim Sykes	--	--
Alaska Outdoor Council	Sport/personal use	Rod Arno	--	--
Public	HDR & commercial fisherman	Mark Doner	--	--

Appendix Table 3. Support staff at the Mat-Su salmon planning workshop, January 21-22, 2015.

Affiliation	Role	Person	Email	Phone
R2 Resource Consultants	Project Lead	Ray Beamesderfer	rbeamesderfer@r2usa.com	(360) 975-7688
Resource Decision Support	Workshop Lead	Peggy Merritt	pmerritt@ak.net	(907) 457-5911
R2 Resource Consultants	Project Assistance	Kai Steimle	ksteimle@r2usa.com	(360) 244-7070
Northwestern Natural Resource Consultants	Regional Expert	Mac Minard	macminard@mt.net	(406) 439-2059

APPENDIX C - PUBLIC COMMENTS & RESPONSES

This section summarizes major comments on the draft master plan from the public review and corresponding plan revisions or explanations –subjects are numbered in the summary list below and these numbers are referenced on copies of public review comments that follow the summary. Public comments also included many additional suggestions for improvement ranging from clarification to typographical errors – corresponding edits are included in the revised plan but not in the summary list below (denoted by check marks on attached public review comments).

Appendix Table 4. List of public commenters on draft plan.

Affiliation	Author	Date
ADFG – Commercial Fisheries Division	J. Erickson	3/20/15
ADFG – Sport Fisheries Division	T. McKinley	3/19/15
ADFG – Anadromous Waters Catalog Biologist	J. Johnson	3/11/15
ADNR – Invasive Weed & Ag Pest Coordinator	H. Stewart	
Chickaloon Village Council	G. Hay	3/23/15
Cook Inlet Aquaculture Association	G. Fandrei, L. Ka’aihue	3/17/15
Knik River Watershed Group	R. Howard	3/14/15
University of Alaska – Research Associate	M. Krupa	3/10/15
Mat-Su Salmon Partnership	C. Smith	3/20/15
United Cook Inlet Drift Association	D. Martin	3/19/15
U. S. Fish & Wildlife Service	D. McBride, J. Gerken	3/20/15

1. Need for a research plan (UCIDA)

One workshop invitee declined to attend, questioned the need for a research plan and subsequently criticized the plan as lacking in new information.

The Matanuska-Susitna Fish and Wildlife Commission strongly believes that a sound scientific foundation is essential for effective protection and management of sustainable salmon runs and fisheries. No such plan or guidance document currently exists. The value of the research planning process was affirmed by a number of workshop participants, by their attendance and in their comments. For instance ADFG Commercial Fishery Division comments noted “Clearly we agree when additional funding becomes available, a research plan with priorities is critical to ensure those funds are spent in a productive manner.”

2. Funds are more properly spent on obvious problems like culverts (UCIDA)

One commenter questioned why grant money is not being spent on solutions to those documented problems rather than additional research. In particular, this commenter suggested more spending on culverts.

The reason is because a comprehensive review of all potential issues is necessary to place the significance of any single issue in context and to focus expenditures to the most significant issues and opportunities. The funds invested in developing a comprehensive RM&E plan will produce large dividends in identifying the entire scope of need and in developing information to address the highest priority issues. For the cost of replacing one modest-sized culvert, the RM&E plan provides a sound foundation for funding projects and obtaining additional funds to address all problem culverts in the Borough as well as the full spectrum of factors impacting Mat-Su salmon.

3. Limited opportunities for input (Chickaloon Village Council, MSSP)

One commenter was unable to attend the planning workshop due to scheduling conflicts and suggested that additional meetings would be appropriate. Another commenter expressed disappointment that the planning process was not more inclusive.

The planning process afforded three opportunities for input. First, representatives of key agencies and entities were invited to the planning workshop to identify and prioritize issues. Second, public review comments were invited on the draft RM&E plan. Third, proposals for project funding by the Borough will be invited from any party.

The primary purpose of the planning process was to identify key information needs to guide funding decision by the Borough. Stakeholder involvement in the process was designed to seek guidance to the Borough in identifying funding priorities. Workshop invitations were extended to a number of parties representing a spectrum of interests including some that were unable and others who were unwilling to attend. All comments received were considered and incorporated into the plan to the fullest extent possible.

A diversity of perspectives is reflected in the broad range of issues and priorities identified in the RM&E plan. The Commission hopes that the plan will help inform RM&E efforts by others but acknowledges that this is the Borough's plan and that other parties will necessarily be obligated to their own needs and requirements which sometimes diverge from those of the Borough.

4. Goal & Objective Priorities (ADFG, CIAA, MSSP, USFWS)

A number of parties questioned the structure of the planning process where overarching goal and objective priorities were identified by the Mat-Su Fish and Wildlife Commission and the identification and ranking of issues related to those priorities was completed by workshop participants. Several workshop participants suggested that they would have prioritized goals and objectives differently based on the focus of their interests. It was also noted that the ranking of issues was affected by the overall goal and objective priorities identified by the Commission and that the ranking would have been different if goal and objective priorities were assigned by workshop participants rather than the Commission.

To address this comment, the Commission revised ranking of the three goals so that all were ranked equally. Thus, salmon ecosystem issues are more highly ranked and salmon status issues lower ranked than in the review draft of this plan. Objectives under each goal continue to reflect weights assigned by the Commission. Priorities identified for issues in this plan thus reflect input

by both the Commission and stakeholders participating in the planning workshop. A close examination of workshop outcomes shows that issue priorities are heavily influenced by rankings provided by workshop participants. Issues that received a high level of interest by workshop participants were ranked highly regardless of priorities identified by the Commission for corresponding objectives.

Goals and objectives identified by the Commission included all salmon-related concerns. No potential issue identified by workshop participants was excluded from consideration. Within each goal, the highest ranked issues were rated highly at the objective level by the Commission and at the issue level by workshop participants. The lowest ranked issues were rated low by both the Commission and workshop participants.

A great body of peer-reviewed literature exists on priority setting - would outcomes change if different groups of people made the priorities? If the groups are comprised of people with sufficient expertise and varying perspectives of the problem, there will be a large degree of similarity in the outcome between groups. Specifically, the core planning team was comprised of a sufficient level of expertise to describe the general problems in fairly good detail. The larger group of workshop participants was also comprised of a sufficient level of expertise to describe the problem in fairly good detail. That's why both groups agree that the important issues are in the top ranks, and the less important issues are in the bottom ranks.

In designing an RM&E planning process to guide direction of salmon research funds, the Commission sought to balance their sense of priorities with those of other interested parties. The Commission invited input from diverse interests. Resulting issue priorities reflect that input to a very large degree. At the same time, funding was directed to the Borough and it is incumbent on the Commission to identify projects that address the Borough's needs. The RM&E plan is ultimately the Borough's plan and the Fish and Wildlife Commission greatly appreciates the participation and input from other parties in providing guidance for the Commission's efforts. While different priorities might be assigned to specific issues by various interests, the Commission feels that the current plan is inclusive of issues of concern to a broad spectrum of interests.

It should also be noted that while priorities identified in the plan will be a consideration in funding decisions, they will not be the only consideration. Project selection criteria will also include considerations of benefits vs. costs, cooperative funding and partner opportunities, likelihood of success, etc. Projects addressing some moderately ranked issues will likely be funded in preference to some more highly ranked issues based on those criteria.

5. Attribution of Opinions (ADFG, MSSP)

Several commenters noted that there are examples where opinions are provided within the draft document but whose opinions these are is not clear. Commenters also recommended more detailed explanations on when stakeholders were involved and to what degree, as well as describing how or if stakeholders will continue to be involved throughout the plan's completion and implementation.

The plan was revised to clarify that it is the Borough's plan, how and where guidance from stakeholders was incorporated, and to whom opinions in discussion of issues were attributed. An introductory paragraph was included that states the opinions and priorities of the plan are those of the Mat-Su Fish and Wildlife Commission and they do not necessarily represent the opinions and priorities of the individuals or agencies that participated in the scoring process. Stakeholders will be invited to submit project proposals. A final plan and descriptions of proposal evaluation criteria will be distributed as well as periodic reports on program implementation.

6. Species addressed (ADFG)

It was pointed out that significant concerns exist for Susitna sockeye and this species should be treated in similar detail to Chinook and coho salmon which were identified as a particular concern by the Commission due to their sport fishery significance.

The plan was revised to clarify that concerns exist for all salmon species including sockeye which have been identified as a stock of concern. Species priorities were not identified by the Commission at the goal or objective level. Species priorities were discussed at the workshop, particularly under goal 1. Issues were identified and prioritized at the species level. High priorities were reflected in workshop ratings of specific information needs on coho, Chinook and sockeye. Priorities for information on chum and pink salmon were uniformly lower than those of other species.

7. Overlap in Goal 1 & 2 Objectives (CIAA)

One commenter suggested that overlap of Goals 1 and 3 was confusing and that some goal 1 objectives related to salmon productivity, biology, and trends are ecosystem functions and appropriately considered in Goal 3.

The Commission identified three information goals. Goal 1 was salmon status which included biological attributes of each species. Goal 2 was salmon fisheries which concerned our use of the salmon resource. Goal 3 was the salmon ecosystem which included natural and human factors affecting both salmon status and use. Complex problems, such as Upper Cook Inlet salmon, are inevitably comprised of linked components. While components in salmon status are linked to salmon ecosystem, they are viewed from slightly different perspectives, as we endeavored to clarify. Information identified under specific issues can clearly have application to different goals. For instance, estimates of salmon productivity are an attribute describing species or stock health and viability relative to conservation and sustainability objectives, a measure of harvestable surplus and optimum escapement levels in fishery management, and can also be used to estimate the impact of various limiting factors. Related information may be used to address multiple needs. That is part of the reason that the Commission initially assigned a high priority to species status information. Attempts were made during the workshop to clarify each goal, objective and issue to the extent possible and current issue priorities reflect the understanding by workshop participants.

8. Significance of Habitat Issues (UCIDA, MSSP)

Several parties took issue with the descriptions of current ecosystem and habitat conditions in the Mat-Su Borough and the corresponding priority for this goal assigned by the Commission. In particular, exception was taken to characterizations of Mat-Su habitat as being in “pretty good shape” and that habitat-related concerns are effectively addressed by activities of the Mat-Su Salmon Partnership.

The plan was revised to clarify that significant habitat impacts to salmon habitat have occurred in developed areas and that invasive pike have impacted salmon production in large areas of the watershed. Clarification was also included to the effect that, while the MSSP Strategic Action Plan has identified significant issues, not all of these issues are being actively addressed and more work is needed. At the same time, these explanations are qualified with recognition that physical habitat conditions and functions remain intact throughout the large majority of the watershed and it would be grossly inaccurate to represent concerns for Mat-Su salmon to be entirely due to in-basin conditions.

Additional information and descriptions of the MSSP program and strategic plan were incorporated into the RM&E Plan based on review comments. All habitat issues identified in the MSSP Strategic Plan are included in the Mat-Su RM&E plan and the majority are prioritized at a moderate to high level. The Mat-Su Borough is an active participant in the MSSP process and welcomes the opportunity to utilize this Borough funding process to address high priority issues identified in the MSSP Strategic Action Plan and the Borough’s Salmon Research, Monitoring and Evaluation Plan.

9. Priorities of Specific Habitat Issues (USFWS, MSSP)

Several comments suggested that the priorities of specific issues should have been higher than currently identified in the plan. For instance, one commenter suggested that having three issues for invasive species (3.1.1, 3.1.2, and 3.1.3) might have diluted the rankings of other habitat-related issues which would otherwise have ranked in the top tier. Comments proposed a higher ranking for the Anadromous Waters Catalog (1.3.1) and land use planning (3.2.1). Comments also suggested merging three invasive species issues into one issue to avoid dilution of the importance of other habitat issues identified in the draft plan.

Issue priorities reflect a combination of goal and objective priorities and issue significance identified by workshop participants. Workshop participants often had differing views on the significance of specific issues depending on their interest and expertise. The final priority rankings reflect the combined perspective from workshop participants in aggregate. Workshop participants raised concerns about specific issues, which the entire group discussed, edited and prioritized in good faith. Changing ranks of specific issues after the fact would erode the intent of the workshop process.

The need for more information for the anadromous waters catalog was already highly rated under goal 1. While the AWC has specific regulatory application, it is also the most comprehensive description of the spatial distribution of salmon in Alaska at a stream and reach level. Related

salmon distribution information was included under salmon status because this RM&E plan defines status broadly in terms of abundance, productivity, distribution, and diversity. Much of the information on salmon status identified under goal 1 has multiple applications. For instance, abundance information may be used to provide a basic inventory of stock status (goal 1), escapement goals that provide guidance for fishery management (goal 2), and evaluations of the effects of various limiting factors (goal 3). While this information has application in land use planning identified under Goal 3, inclusion under goal 3 does not change the funding priority.

Land use planning is ranked with a relatively high priority. It should also be noted that a moderate ranking does not exclude this issue from the potential for funding. All of the issues included in the plan are important and appropriate for funding but obviously funds will not be currently available to fund every item. Funding decisions will be based on a variety of criteria. People tend to submit proposals for issues they feel they have a reasonable degree of succeeding at addressing, regardless of rank. It is likely that several projects addressing lower ranked issues will be funded in preference to some highly ranked issues where supported with strong project proposals.

An adjustment feature in the Expert Choice AHP software was used so that issues were not diluted due to unequal numbers under each objective. In a conceptual example, consider that if an objective (A) has four issues, and another objective (B) has two issues, then there are six issues in all and structural adjusting multiplies A's priority by 4/6 and B's by 2/6. Thus, the overall priorities for A's issues are not diluted simply because there are many of them.

10. Scope not including the Municipality of Anchorage (CIAA)

One commenter suggested that excluding the Municipality of Anchorage is a major shortcoming of the plan because it is the source of existing and evolving problems (e.g., *Elodea*).

*The Planning core team discussed inclusion of Anchorage in the planning process and recognized that the Mat-Su Borough shares many of the same concerns and problems. The plan ultimately included issues common to both areas and priorities identified in the plan allow for the possibility of addressing common interests. For instance, the need for information to monitor and evaluate invasive species (3.1.1) was among the highest rated priorities and the presence of *Elodea* in Mat-Su waters was specifically addressed by an issue (3.1.3) in the highest priority tier. This would presumably include both Anchorage and Mat-Su waters. At the same time, Anchorage has issues that are uniquely its own. Borough priorities for expenditures are primarily focused on Borough concerns.*

11. Biological Reference Points under 1.1 (ADFG)

A disagreement was identified regarding characterization of biological reference points. The commenter objected to a suggestion that maximum production, rather than maximum yield, is an appropriate reference point for Chinook subject primarily to sport fisheries.

This statement was deleted from the plan because a more in-depth discussion of the distinctions among sustained yield for the benefit of Alaskans, maximum sustained yield, maximum production, and optimum sustained yield is beyond the scope of this document.

12. Need for Additional Information on Invasive Species (MSSP, ADNR)

The MSSP recommended contacting the Invasive Species Coordinator at Alaska Department of Natural Resources, for more information about *Elodea* in the Mat-Su and the prevention of its introduction and spread and general *Elodea* education.

Heather Stewart of the ADNR subsequently provided additional information as specified. The RM&E plan was revised to reference this information which was also summarized in the separate information review report. The corresponding information may be found in its entirety in the copies of public comments that follow this summary.

13. Treatment of Beaver Impacts on Salmon (MSSP, M. Krupa, USFWS)

Two comments addressed issue 3.1.5 regarding effects of beavers on salmon. The MSSP recognized a diversity of opinion on this issue and recommended that the actions under this issue expand the knowledge about the role that beavers play in ecosystem processes and not focus solely on adult fish passage. Another commenter was skeptical of the significance of this issue and highlighted the importance of related ecological functions.

The description of this issue in the plan was revised to clarify that it includes ecosystem as well as passage questions.

14. Marine Ecology & Related Issues (MSSP)

One commenter suggested clarification of descriptions regarding marine mammals under Objective 3.4 Marine Ecology and Related Issues to better capture workshop discussions.

The issue description was revised to clarify that marine mammals were discussed from the perspective of ecological interactions with salmon including potential consideration as indicator species on the health of salmon populations.

15. Importance of Economics (M. Krupa)

One commenter was pleased to see that the inclusion of socio-economic data was addressed by the plan and recognized the importance of this information in watershed planning.

The need for updated economic and social information was the highest rated issue in the plan. This high rating reflected a high objective priority by the Commission and a high ranking of the specific issue by workshop participants. The importance of this information was also highlighted by comments of ADFG's Commercial Fishery Division regarding the relationship between ex-vessel values and true economic value which is not well documented. (Corresponding references in the plan to interpretations of ex-vessel value are revised as per ADFG comments).

16. Knik Watershed Issues (KRWG)

One commenter highlighted concerns for impacts of off-road vehicle use in Jim Swan wetlands and uplands habitat on salmon habitats.

While off road vehicle use was not specifically identified as a separate issue at the workshop, it may be addressed under Issue 3.5.1 (Loss of wetlands). An option was added in the plan under this issue to this effect.

17. Allocative aspects of the plan (UCIDA)

One workshop invitee suggested that the planning process was conceived and designed to promote research designed with allocative intentions.

In fact, the RM&E planning process was designed to identify information needed to provide a sound scientific basis for managing, protecting and improving Mat-Su salmon stocks for optimum benefits while maintaining biological productivity and diversity. No allocative agenda is identified or implied by this objective statement. RM&E goals and objectives were defined to include the full scope of factors affecting Mat-Su salmon. The fact that there are significant disagreements over the relative impact of habitat and fisheries for Mat-Su salmon highlights the need for additional information on both factors. Allocation decisions may be informed by a technical understanding of fishery effects, management alternatives, and tradeoffs. However, technical scientific information is not inherently allocative. All fishery sectors can be expected to benefit from accurate scientific information. The availability of information is no more allocative than the lack thereof.

18. Proposal solicitation process (ADFG)

Clarification of criteria and timeline to be used by the Commission for soliciting and ranking proposals was requested.

Details of the proposal solicitation process are currently under development and will be distributed to workshop participants and interested parties along with the final RM&E plan. A solicitation is expected to be issued around the end of April. The current plan involves first soliciting pre-proposals and then inviting full proposals from selected opportunities. Proposal evaluation criteria are expected to include a combination of the following:

- *Issue priority*
- *Project Approach / Technical scientific merit*
- *Qualifications & expertise*
- *Past Performance*
- *Proposal Quality*
- *Budget / Cost effectiveness*
- *Partnership / Cost sharing*

Alaska Department of Fish & Game – Commercial Fisheries Division⁴



THE STATE
of ALASKA
GOVERNOR BILL WALKER

DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES
Region II Office

333 Raspberry Road
Anchorage, Alaska 99518-1565
Main: 907.267.2105
Fax: 907.267.2442

MEMORANDUM

TO: Frankie Barker
Environmental Planner
Matanuska-Susitna Borough
350 E. Dahlia Avenue
Palmer, AK 99645

DATE: March 20, 2015

FROM: Jack Erickson
Region II Research Coordinator
Commercial Fisheries Division

SUBJECT: Mat-Su FWC Research
Workshop

THRU: Tracy Lingnau
Regional Supervisor
Commercial Fisheries Division

Dear Ms. Barker,

Thank you for the invitation to attend and participate in the Matanuska-Susitna Fish and Wildlife Commission's Fish Research Workshop (commission) held on January 21-22, 2015 in Wasilla. Coordinating a meeting of this magnitude is not easy and I appreciate your efforts in making it happen. Clearly we agree when additional funding becomes available, a research plan with priorities is critical to ensure those funds are spent in a productive manner.

I have received and reviewed the Matanuska-Susitna Salmon Research, Monitoring and Evaluation Plan for Upper Cook Inlet. First and foremost, it should be noted that although the Division of Commercial Fisheries (DCF), Alaska Department of Fish and Game (ADF&G) participated in this learned exercise, by no means does that indicate we support the resulting document as a whole. There are portions of the report that I will outline below where we currently differ in thought.

✓

Project Mission: Although it states "*Restrictions and closures of local sport fisheries have been widespread*", there is no mention about the significant restrictions that have occurred in the commercial fisheries, both drift and in the Northern District.

✓

Problems to be Addressed: The statement "*Poor salmon returns to Matanuska-Susitna waters limit important sport and personal use*" falls short on all the fisheries that occur in Upper Cook Inlet.

⁴ Detailed edits were also provided in mark-up on a copy of the draft plan.

Specifically, there are two subsistence fisheries which are not mentioned, and again, the poor salmon runs limit commercial fishing opportunities as well.

The statement "*The Board of Fisheries has formally designated a number of salmon returning to Matanuska-Susitna waters as Stocks of Concern.*" Designation of a stock of concern and development of an action plan is a mechanism to improve poor salmon runs.

Species Addressed:

6 "Chinook and coho salmon are of particular concern due to their sport fishery significance." At each board of fish meeting, there is also concern for the lack of sockeye salmon by non-commercial entities in the northern Cook Inlet drainages. The DCF believes it would be in the best interest of the commission to include sockeye salmon stocks as well.

Solicit proposals for research, monitoring and evaluation projects and select for implementation:

18 "Proposals will be invited for consideration through an open solicitation process. Proposals will be ranked according to criteria including consistency with priorities, qualifications and experience, past performance, project approach, and proposal quality, and costs." The document does not clarify if the criteria for proposals have been developed nor does it provide a timeline as to when it will. This is critical in order to rank and evaluate the cost vs. benefits of the issues identified on page 55.

Objectives, Economic & Social Values:

15 The statement "*Economic values of commercial fishing are well documented by ex-vessel values*" is a very misunderstood and incorrect statement. The true economic value of the commercial fishery is not reflected by the exvessel value. The exvessel value only reflects what is paid to the commercial fisherman for the fish and not what the value of the fish is to the public. For example, a fisherman may be getting paid \$2.00 per lb. of whole fish. Market value, the amount you pay at the store for that same fish may be \$10.00 per lb.

Under Objective 1.1, Biological Reference Points:

11 It is here DCF could not disagree more. The appropriate reference point is "maximum sustained yield" or "sustained yield" **NOT** "maximum production". The statement "*By establishing BEGs for Chinook, and identifying those escapements which maximize sustainable production, fishery benefits could be potentially improved. Maximum production, rather than maximum yield, is an appropriate reference point for Chinook because UCI stocks are subject primarily to sport fishing with little commercial harvest.*" is in direct conflict with Article VIII (Natural Resources) Section 8.4 (Sustained Yield) of the Alaska Constitution. "*Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the sustained yield principle, subject to preferences among beneficial uses.*"

Board regulations state under 5 AAC 39.223. Policy for statewide salmon escapement goals, (a) "*The Department of Fish and Game (department) and the Board of Fisheries (board) are charged with the duty to conserve and develop Alaska's salmon fisheries on the sustained yield principle.*"

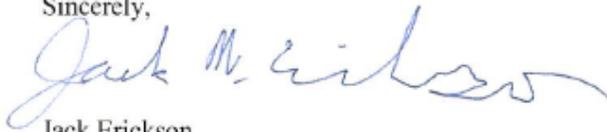
Although DCF does agree that the productivity of some stocks are down, there may be mitigating actions that could be implemented to aide in restoring these stocks to a sustained yield, if not maximum sustained yield.

5

Within the draft document there are examples where opinions are provided but whose opinions these are is not clear. It would be beneficial to clearly identify what is an opinion and to whom the opinion can be attributed to. Throughout the draft document I have tried to identify who opinions belong to, but I likely have likely missed a few or gotten some wrong. One possible solution would be to include an introductory paragraph that states the opinions and priorities of the plan are those of the Mat-Su Fish and Wildlife Commission and they do not necessarily reflect the opinions and priorities of the individuals or agencies that participated in the scoring process.

Feel free to call me if you (or your consultants assisting with the development your plan) need clarification regarding my comments or suggested changes.

Sincerely,

A handwritten signature in blue ink that reads "Jack M. Erickson". The signature is fluid and cursive, with the first name "Jack" being the most prominent.

Jack Erickson
Fisheries Research Coordinator
Division of Commercial Fisheries
Alaska Department of Fish and Game

Alaska Department of Fish & Game – Sport Fisheries Division



**ALASKA DEPARTMENT OF
FISH AND GAME**

DIVISION OF SPORT FISH

MEMORANDUM

TO: Ray Beamesderfer
R2 Resource Consultants

DATE: 19 March 2015

FROM: Tim McKinley
Regional Research Coordinator
Division of Sport Fish, Region II

TELEPHONE: 260-2913

SUBJECT: Mat-Su Research Plan

Thank you for the opportunity to participate in and review the draft *Matanuska-Susitna Salmon Research, Monitoring & Evaluation Plan For Upper Cook Inlet (Plan)*. I found the Plan well written, and of course the method for developing the Plan (the Analytic Hierarchy Process) is very sound.

My brief comments are limited to the parts of the Plan that occurred prior to my participation, and after, as I think the Plan as written captured the discussion while I was in attendance very well. And that during my participation any outlier rankings were pointed out by the facilitator and discussed at length. Also, any significant comments that I had verbalized during the process appear to be included in the narrative of the draft Plan.

The Plan contains what are generally considered to be the key elements for successfully maintaining and evaluating salmon stocks in Alaska, and you've made it specific to the Mat-Su area. In evaluating the Plan I was unable to identify significant elements that may have been missed. However, I would say that if the Stakeholder Group, and not the Mat-Su Borough Fish and Wildlife Commission (MSBF&WC), had been tasked with the step *Identify & Prioritize Goals & Objectives*, that the priorities would be somewhat different. How that result would trickle down to affect the adjusted priorities for Issues is difficult to say, but as an example, biological reference points would likely have ranked somewhat lower.

4

Alaska Department of Fish & Game – Anadromous Waters Catalog Biologist

From: Jessica Speed [mailto:jsspeed@TNC.ORG]

Sent: Wednesday, March 11, 2015 10:01 AM

To: Johnson, J D (DFG)

Subject: RE: catalog (Sears & Roebuck) ? - i suggest a rewrite

Hi J,

I appreciate you taking the time to provide input. Unless I hear otherwise from you, I will forward your email on to Frankie Barker who is accepting comments.

Jessica

From: Johnson, J D (DFG) [mailto:j.johnson@alaska.gov]

Sent: Tuesday, March 10, 2015 1:49 PM

To: Jessica Speed

Subject: catalog (Sears & Roebuck)? - i suggest a rewrite

V

Salmon occurrence in waters throughout the state is documented in an anadromous waters catalog (catalog). The catalog is relatively complete for larger rivers and streams but may not be well informed for smaller streams, particularly in remote areas. The catalog is updated as new information becomes available. For example, several new areas in the Susitna River above Devils Canyon have been nominated for inclusion in the catalog as a result of recent hydro licensing studies. In another example, areas have been recently added to the catalog as a result of telemetry research. One person cautioned that telemetry data is useful but typically needs to be supported with juvenile sampling of smaller tributaries. Despite ongoing efforts, the issue remains that Mat-Su streams used by salmon are likely missing from the catalog. For instance, there are several streams used by salmon in the Matanuska Valley adjacent to mine development that are not in the catalog. Another aspect of the issue is that the relative importance of river or stream reaches has not been quantified. The catalog may simply identify salmon occurrence but not use or productivity. Several options to this issue were suggested, such as linking salmon distribution to habitat condition and using GIS overlaid with habitat mapping (e.g. Nature Conservancy effort).

Page 38 refers to anadromous waters catalog (lower case)

I'd change that too

J. Johnson

AWC Project Biologist

907-267-2337

Alaska Department of Natural Resources

Public Review Draft:

Matanuska-Susitna Salmon Research, Monitoring & Evaluation Plan for Upper Cook Inlet

12

Heather Stewart

DNR, Division of Agriculture

Invasive Weed and Agricultural Pest Coordinator

Here is some more information and suggestions regarding Elodea in the public review draft:

1. There is currently a draft document for the Elodea Statewide Management Plan that is being put together by DNR, USFWS, FS, Kenai Wildlife Refuge, Homer Soil and Water Conservation District (SWCD), Fairbanks SWCD, and the Copper River Watershed project. The statewide goal for Elodea is *eradication*. That being said, I'm glad there is 3.1.3.b to "evaluate Elodea eradication methods for efficacy." However, I think that this can be a little misleading because we *know* these methods.

Unlike large scale, lake-wide management techniques, hand and suction harvesting can be conducted on a single plant or a small bed at a minimal expense, if not minimal labor. It is useful for preventing re-infestations after a larger-sale plant management strategy, particularly when combined with a vigilant surveillance program. Even when performed properly, hand and suction harvesting often results in some fragmentation, which could result in new infestations.

Mechanical removal by suction dredge, dragline, cutting, or similar mechanical treatments have a high risk of spreading Elodea further in the lake and stream systems. Since Elodea fragments easily into small pieces when disturbed, mechanical treatments are likely to make the Elodea problem worse. Mechanical treatments have not demonstrated success with Elodea removal except in cases where removal is done merely to reduce biomass on an annual basis. Mechanical removal would not eradicate Elodea in the lakes, and would only serve to reduce biomass rather than eradicate the population while increasing risk of spread.

Tarping may be effective in suppressing growth in areas where the population in the nearshore littoral zone is sparse, but as evidence from distribution surveys both in Alexander and in the State, this would not be possible in any of Alaska's infested waterbodies. In areas of thick biomass, tarping would not work. Tarping may reduce biomass or prevent growth after several years of tarping application, but would not eradicate elodea from the lakes. Again, not the goal of the state or the Mat-Su!

Biological controls such as the introduction of grass carp are considered illegal in the State of Alaska, and are not considered for control. Also, because grass carp reduce biomass, biological control utilizing herbivorous piscivorous species is not eradication.

Herbicidal applications are the most efficient and cost effective means of eradication of Elodea. Fluridone, a systemic herbicide is absorbed through leaves, shoots, and roots of susceptible plants and interferes with the synthesis of RNA, proteins, and carotenoid pigments in plants, and disrupts photosynthesis. In the case of Alaska Elodea, very small concentrations of fluridone (5-9 ppb) are prescribed for effective efficacy of Elodea and minimal non-target plant effects. There are also no water contact restrictions or drinking water restrictions when fluridone is applied at such low concentrations.

“Evaluating” eradication methods might not be the most important issue because we already know how to eradicate Elodea and prevent spread by fragmentation by means of responsible herbicide applications. I also think that alternative control options in the Susitna are not necessarily “unclear” but maybe just completely understood in effectiveness measures? If you would like some literature, I am more than happy to send some your way.

2. I agree that it is somewhat unclear of Elodea’s direct impact on salmon production. I have attached (in the email) an article that describes how Elodea and some other aquatic macrophytes have altered salmon spawning habitat selection; mostly *Egeria densa* and *Myriophyllum spicatum*. There is, however, quite a bit of literature that addresses other non-native submersed aquatic plants that do impact fisheries resources, water quality, sedimentation rates, etc. For example, the Minnesota DNR’s special publication 160 (November 2004), summarizes the role of submersed aquatic vegetation as habitat for fish in Minnesota lakes, including implications of non-native plant invasions and their management. In this document, it states that removing vegetation (both mechanically and chemically) will have varying effects on fish populations depending on the extent and distribution, but when vegetation forms extensive, homogeneous beds throughout the littoral zone, there are less abundant fish and invertebrates than do areas with diverse plants. In Alexander lake the whole lake is considered a littoral zone since it does not exceed 6 feet in depth; therefore, making the entire lake susceptible for Elodea invasion.
3. I also agree that continue monitoring efforts in the Upper Cook Inlet is key for rapid response to infestations. The Public Review Draft states “vulnerable” lakes. I suggest we expand this to waterbodies since Elodea can establish in streams and sloughs. For example, it is found in the Chena Slough in Fairbanks. I also suggest that (maybe not in this document) we identify which of these waterbodies in the Upper Cook Inlet are considered “vulnerable”.
4. Prevention and education outreach efforts are the *most important* option to prevent the spread of Elodea. To realistically keep Elodea out of the Mat-Su, there needs to be more outreach to cabin owners travelling by boat and floatplanes. They will be additional needed eyes in the field for identification of Elodea in areas not previously known. The lack of surveys completed in remote areas is alarming, considering a total of 62 surveys have been completed in the Mat-Su since 2014, and are almost exclusively along roadsides. In order for us to get the full picture of distribution in the Upper Cook Inlet, we need to have more surveys completed. To prioritize which waterbodies that need to be surveyed, I think we need to answer the “vulnerability” question. I also think that most of the discoveries have been opportunistic findings and not species specific to Elodea. For example, Krissy Dunker found it in Alexander Lake when she was check pike traps. Also, USFWS have been doing shore bird nest surveys and have also been looking for Elodea at the same time. There needs to be more of these opportunistic and species specific surveys completed to the Mat-Su’s remote areas.

Thankfully, there is limited boat access to these remote areas with a few boat launch sites by both cabin owners and recreationalists. I suggest signage of best management practices (Inspect, Clean, Drain, Dry) at each of these sites either by traffic style sign or pavement markings. For targeting float plane pilots, I suggest directing education efforts towards associations, businesses and private plane operators.

5. Minor edit: In Figure 12 issue 3.1.3 should say *Alexander Lake*, not “Cr” creek. As far as we know, it hasn’t been found in Alexander Creek.

6. To give you a better picture of what the status is of our Elodea efforts around the state, here is a brief summary of to-date actions. As mentioned above, there is a draft of the Statewide Elodea Management Plan being written with stakeholders in different areas around the state where Elodea is found. Is there anyone in the Upper Cook Inlet area that would like to be included in this document?

Local efforts: *In Fairbanks*: Their attempts of manual and suction dredging proved to be labor-intensive, time consuming and largely ineffective. They are currently writing an integrated management plan to utilize fluridone in the Chena River, Chena Slough and the Chena Lake. *In Cordova*: A public meeting and workshop bringing together experts and stakeholders was held last week to discuss future management and realistic and attainable goals for Elodea management. *In Kenai*: The first herbicide treatment in the 3 infested lakes was completed in 2014. The results of efficacy of Elodea are proving management strategies to be effective with minimal non-target plant effects. Two more years (if needed) of treatments are scheduled along with continual monitoring efforts. *In Anchorage*: USFWS funding is available for herbicide treatments in the three infested lakes. Work is planned for the first treatment to occur in 2015, with continued monitoring. *In Alexander*: DNR is writing an EA and permits to potentially treat the small infestation in 2015 with fluridone. A Mat-Su/Upper Cook Inlet management plan for Aquatic Invasive Species will be drafted in the next few years for not just Elodea, but other potential threats.

Chickaloon Village Council



Chickaloon Village Traditional Council
(Nay'dini'aa Na')

March 23, 2015

Chief Gary Harrison,
Chairman

Rick Harrison,
Vice-Chairman

Penny Westing,
Secretary/Elder

Albert Harrison,
Treasurer/Elder

Doug Wade,
Elder Member

Shawan Larson,
Member

Kari Shugloff,
Member

Lisa Wade,
Member

Gary Hay,
Executive Director

Frankie Barker
Environmental Planner
Matanuska-Susitna Borough
Planning and Land Use Department
350 E Dahlia Avenue
Palmer, AK 99645

Re: Draft Matanuska-Susitna Salmon Research, Monitoring and Evaluation Plan for Upper Cook Inlet

Dear Ms. Barker,

Chickaloon Village Traditional Council is the governing body of the federally-recognized Tribe of Chickaloon Native Village. Our Tribal service area covers approximately half of the Mat-Su Borough and since 2003 we have been actively involved in salmon research, restoration, and preservation, working collaboratively with many Tribal, federal and state agencies as well as non-profits. We are concerned about the current process of collecting information for the Matanuska-Susitna Salmon Research, Monitoring and Evaluation Plan for Upper Cook Inlet. The two primary areas of concern are:

3

1) There was only one stake holder meeting. Completing a project of this nature should involve more stakeholders and provide an adequate number of meetings so all may participate. Our Tribal Environmental Stewardship Department staff were unavailable to attend the one stake holder meeting in January and would have appreciated other opportunities to participate.

2) There appeared to be no input from Tribes within the project area. Tribes have a wealth of traditional knowledge and should be consulted or at least provided more opportunities to engage in this project.

Thank you for your consideration of these comments and if you have any questions please contact Jessica Winnestaffer, Environmental Stewardship Director, by email jessica@chickaloon.org or phone (907)745-0737.

May Creator Guide Our Footsteps,


Gary Hay
Executive Director

P. O. BOX 1105 Chickaloon, Alaska 99674
e-mail: cvaadmin@chickaloon.org

Phone (907) 745-0707 Fax (907) 745-0709
Home Page: <http://www.chickaloon.org>

Cook Inlet Aquaculture Association



40610 Kalfornsky Beach Road
Kenai, Alaska 99611

Phone: 907-283-5761
Fax: 907-283-9433
info@ciaanet.org
www.ciaanet.org

March 17, 2015

Frankie Barker, Environmental Planner
Matanuska-Susitna Borough
350 E. Dahlia Ave.
Palmer, AK 99645

Dear Ms. Barker,

We would like to thank you for the opportunity to participate in the stakeholders workshop held January 21 and 22, 2015 in Wasilla, Alaska and for the opportunity to provide comments on the public review draft of the Matanuska-Susitna Salmon Research, Monitoring, and Evaluation Plan for Upper Cook Inlet dated February 26, 2015. The following comments are provided by me and Lisa Ka'ainue who attended the workshop with me. Our comments are based on our knowledge and experience with Cook Inlet salmon fisheries; however, they have not been reviewed by the Cook Inlet Aquaculture Association (CIAA) Board of Directors due to the tight schedule for plan review. We believe a good plan is an asset that will benefit all user groups and our comments are intended to be helpful and constructive, but should not be considered at this time as an endorsement of the plan by CIAA.

Commenting on a comprehensive planning effort like the Matanuska-Susitna Salmon Research, Monitoring, and Evaluation Plan for Upper Cook Inlet can be difficult because of the complexity of the issues. As a result we have divided our comments into two categories. Comments in the first category are broad based comments covering the plan and planning process in general. The second category is specific comments relating directly to the draft plan document. Our objective for splitting the comments into two categories is to make their review easier to follow.

Broad-Based Comments:

1. The ranking of the three plan goals is not forward looking. Goal number 1, the highest ranked goal, and its objectives address the status of the salmon populations in the Matanuska-Susitna Borough, i.e., it focuses on the current conditions. Goal number 2, the second ranked goal, and its objectives address the salmon fisheries of Upper Cook Inlet, i.e., it focuses on historical and current conditions. Goal number 3, the lowest ranked goal, and its objectives address environmental conditions. We feel this goal recognizes the changes confronting the salmon resource and believe it should have been ranked equal to or higher than the other two goals.

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2. A shortcoming of the Level 2-Goals is the overlap of Goals 1 and 3. Goal 1 is too inclusive in that it looks at salmon stock abundance and productivity, biology, and trends. Abundance itself is a goal. Productivity, biology, and trends are ecosystem functions and appropriately considered in Goal 3. This was evident during the workshop as it caused confusion among the participants and attempts were made to move some issues and options between the two goals on the second day of the workshop.

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3. The ranking of issues and options was limited by the ranking of the “parent node.” During the workshop, stakeholders were tasked to identify and rank issues and options for the previously ranked goals and objectives. Because the “parent node” modified the final rank of the issues and options, the final rank of the issues and options are reflective of the stakeholders only if the stakeholders agreed with the previously developed ranking of the goals and objectives. Without being involved in or hearing the discussions for developing the ranking of the goals and objectives, an understanding of and an agreement with the rankings by the stakeholders was cursory at best.

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4. Excluding the Municipality of Anchorage is a major shortcoming of the plan. Not because we need to look at Anchorage as the source of fish, but because it is the source of existing and evolving problems. The invasive species Elodea is a good example. It has become established in at least one system in the Matanuska-Susitna Borough, Alexander Lake, and likely originated from floatplanes based out of Anchorage.

Plan Specific Comments:

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1. Overall, place a comma after “e.g.” and “i.e.” Sometimes a comma is included, and sometimes not.
2. Page 6 “Problems to be Addressed” Fourth Bullet. – Suggest adding “commercial” to the list of Matanuska-Susitna Borough fisheries impacted by poor salmon returns and “coastal areas” to the areas where fisheries occur in the Borough. Commercial fishery operations in the Matanuska-Susitna Borough are impacted for the same reasons sport and personal use fisheries are impacted.
3. Page 6 “Problems to be Addressed” Fifth Bullet. – Suggest adding “outside of the Matanuska-Susitna Borough” to clarify the problem addressed.
4. Page 6 “Species Addressed,” Second Sentence. – Suggest adding at the end of the sentence “and the impact low returns have on the management of other species and stocks.”
5. Page 7 “Geographical Area” Second Bullet. – The statement that Kenai Peninsula Borough watersheds are subject to a different suite of issues is misleading and incorrect. Kenai Peninsula Borough watersheds are subject to the same issues – lack of sufficient data, overuse, fish passage, environmental threats, management of other stocks and species, etc.
6. Page 7 “Geographical Area” Fourth Bullet. – delete the first “for” in the statement.

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7. Page 9 “Related Policies and Plans.” – Recommend adding the “Cook Inlet Regional Salmon Enhancement Planning Phase II Plan: 2006 – 2025” to the list. This plan includes background information on many Matanuska-Susitna waters and provides direction on salmon enhancement activities.
8. Page 10 “Work Plan” Number 1. – This is the first mention of “proposals” and it is unclear what the authors are referencing here, especially since the title of this section is “Define plan scope and process (described in this document.)”
9. Page 11 “4. Identify and prioritize...” – The last sentence says the results of the information review and inventory were presented to facilitate identification and prioritization of plan elements is misleading. The results of the information review and inventory were available to facilitate identification and prioritization of plan elements, but not much more than a summary of the information review and inventory was presented at the workshop.
10. Page 13 “Plan Elements” Figure 3. – This figure is misleading as the examples provided in the figure do not coincide with the description of Mission, Goal, and Objective. Based on the descriptions of Mission, Goal, and Objective, the first example appears to be a Goal, the second and third examples appear to be Objectives.
11. Page 14 Second Paragraph Last Sentence. – The semicolons in the text references should be commas.
12. Page 16 Third Paragraph, Second Sentence. – Missing a period.
13. Page 19 Line 1. – There is an extra “r” in the middle of the line.
14. Page 20 Table 6 Goal 1 Objective 1.4. – This objective is very closely associated with Goal 3. The degree of overlap with Goal 3 is confusing the purpose of Goal 1.
15. Page 20 Table 6 Goal 2 Objective 2.2. – Need a space between “Strategies” and “&”.
16. Page 21 Table 6 Goal 3 Objective 3.3. – Need a space between “0.060” and “Objective”.
17. Page 22 Second Sentence. – It is “Board of Fisheries,” not “Board of fisheries.”
18. Page 22 Last Full Sentence. – Missing a period.
19. Page 23 Second Paragraph, First Line. – Suggest substituting the word “theorized” for “acknowledged” in the first line. Acknowledging that more information on management tools would substantially influence the abundance of returning fish strongly suggests that the other 2 goals are not necessary.
20. Page 24 Second Paragraph, Second to Last Line. – There is an extra “T” in that sentence.
21. Page 24 “Objectives under Goal 3. Salmon Ecosystem” Tenth Line. – There appears to be something missing near the end of this line.
22. Page 25 Second Paragraph First Sentence. – The statement that the aquatic habitat in the Matanuska-Susitna borough “is in pretty good shape” is a concern. This statement may pertain to the physical and chemical components of aquatic habitat, but it certainly is not

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V

representative of the biological component where substantial changes are occurring due to invasive species. This point was brought up at the workshop. It is also contrary to statements made at the workshop that the impact to salmon habitat due to unregulated development is unknown (see page 51, Third Paragraph).

23. Page 25 Fourth Paragraph, Third Line. – Extra period at the end of the sentence.
24. Page 29. “Economic and Social Values.” – We agree with the statement from the Gap Analysis that ex-vessel values of the commercial fishery are well documented, but disagree that this value provides a full assessment of the economic and social value of commercial fishing. Assessing the economic and social value of commercial fishing requires more than an evaluation of the ex-vessel value available to commercial fishermen.
25. Page 29 “Management Systems and Tools” Last Sentence. – The description of the assessment categories on page 27 states the Gap analysis would be based on “disagreements.” The last sentence under Management Systems and Tools uses the phrase “substantial controversy.” Controversy is not the same as disagreement in terms of a gap analysis because everyone could agree on the number of fish being harvested, but there could still be controversy on who is harvesting the fish. Disagreement and controversy are not the same.
26. Page 29 “Aquatic Habitat” Line 6. – The word at the end of line 6 should be “in” and not “is.”
27. Page 29 “Landscape and Watershed” Line 4 and Last Line. – In line 4 the word “addition” should be “additional”; in the last line there should be a space after the first period.
28. Page 30 Last Paragraph, Last Two Lines. – Add and “CIAA” after “ADFG” in both these sentences. We have been surveying, researching and eradicating northern pike in the Mat-Su region for the last three years, and we have also been surveying for Elodea this past year.
29. Page 31 “Human Factors” Last Sentence. – We challenge the validity of the statement “Climate change is generally being addressed...” based on the limited activity throughout the world to address climate change.
30. Page 32 “Identification and Ranking Methods” Line 4. – The word “and” in the middle of the line should be “an”.
31. Page 32 “Identification and Ranking Methods” Second Paragraph. – The workshop was held in Wasilla not Palmer. The list of attendees found in the Appendix is not a complete list of attendees—it is a list of those invited that attended. There were other people in attendance. Please include a complete list of attendees.
32. Page 32 Table 10. – Please identify who was invited from the “Private non-profit” interest group. It would be clearer if those entities were named, just as the others above in

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this table. The Appendix includes the organization names, so they should be included here too. Also, East Side Sernet Fishery lists KPFA and they use “Fishermen’s” not “Fisherman’s.”

33. Pages 32 and 33. – Early during the second day, an exercise was conducted in which some issues and options were switched between the Goals where they were originally discussed. Manipulation of the workshop participants’ discussion and justification for the changes should be clearly reported. This is particularly important as the final ranking of options and issues is dependent on the ranking of the “parent node.” Also, there was confusion by some participants later in the second day during the review process.
34. Page 35 – There was a concern by at least one member of the stakeholders that the establishment of escapement goals must consider environmental changes such as the introduction and rapid expansion of predatory pike in the system.
35. Page 35 – Please define SEG, BEG, and SET. A lay person reading this document may not understand the differences between SEG, BEG, and SET.
36. Page 35 Fourth Paragraph, Last Line. – This statement does not add anything to the conclusion of the group already stated in the previous line.
37. Page 37 – Here and elsewhere in the document is reference to coho salmon as being a high value species. It would be helpful to define what high value means. Does value imply a monetary measure or does it also imply desirability. It’s hard to tell. The two paragraphs that run together on this page should also be separated by a space.
38. Page 39 First Paragraph Line 4. – Add a space after the period in this line.
39. Page 39 Last Paragraph Line 5. – Add a space after the period in this line.
40. Page 40 Table 14. – Add a space after 1.4 in the table title.
41. Page 42 Table 15, 2.1.2. – “SWHS” is used without definition. Assume it is Statewide Harvest Survey, but it is better to not make the reader assume.
42. Page 43 Table 16. – Options should be expanded to evaluate sport fish and personal use management strategies. For example, include an evaluation of catch and release; better precision on sport fish harvest to provide estimate of potential spawners; and an evaluation of the size of fish retained.
43. Page 44 Second Paragraph Lines 7, 8 and 9. – The statement that the use of shallower-depth gillnets increases the catch of sockeye salmon is incorrect. They do not increase the catch of sockeye salmon. At best the catch of sockeye salmon is insignificantly reduced.
44. Page 45 First Paragraph after Table 17 Last Line. – Remove the “T” from the end of the line.
45. Page 45 Third Paragraph Second Line. – Add a space after the first period.
46. Page 46 First Paragraph after Table 18 Fifth Line. – Add a space after the first period.

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47. Page 40 Level 4, 3.1.1. – The group working on this suggested the development of an “early detection, rapid response plan” (ED&RR) to invasive threats in the Matanuska-Susitna Borough. We recommend that language be used here, rather than just “develop monitoring and evaluation protocols,” which does not convey the urgency associated with ED&RR plans. These plans are commonly used to combat invasive species and they involve early detection, rapid assessment, and rapid response.
48. Page 49, First Full Sentence. – The State of Alaska already has a State Coordinator for Invasive Species—Tammy Davis, Project Leader, Invasive Species Program. This makes it sound like there is not one and this could lead to misinformation. The real issue is that although there may be a handful of State positions that have some invasive species duties, there is no funding to address emerging threats such as elodea.
49. Page 49, Second Full Paragraph Fifth Line. – Add “Fairbanks” to the areas where elodea has already been established.
50. Page 49, Second Full Paragraph Seventh Line. – It is “long-term” (adjective).
51. Page 49 Fourth Paragraph First Line. – Samples were taken from “moribund” fish not “dead” fish. It is very difficult to identify a disease from dead fish.
52. Page 51 Second Paragraph Second Line. – Add a space after the first period.
53. Page 51 Third Paragraph. – The statement that the impact of unregulated development to salmon habitat is unknown is in contrast to the statement on page 25 that it is believed the habitat is intact. If the impact of unregulated development is unknown it follows that intact habitat is also unknown.
54. Page 51 Fourth Paragraph. – The font size appears smaller in this paragraph.
55. Page 53 Table 23 Level 3. – In the salmon colored area of the table the number (0.049) is included. What does this number mean? A similar number is not included in the other tables.
56. Page 53 Table 23. – The statement that there is a lack of understanding sufficient to assess impacts to salmon is in contrast to the statement on page 25 that it is believed the habitat is intact. It appears the condition of the habitat is not really known.
57. Page 53 Second Paragraph, Last Line. – Use LIDAR, not lidar. Both are used in this document.
58. Pages 59 and 60. Table 24. “Participants...” – Please include Lisa Ka’aihue with Gary Fandrei as a participant for Cook Inlet Aquaculture Association.
59. Pages 59 and 60. Table 24. Participants...” – As stated previously, this is not a complete list of participants in the workshop. There were many other people who attended and participated. Please include Ricky Gease of the Kenai River Sportfishing Association who met with the consultants and attended the second day of the meeting and other participants that had an opportunity to discuss issues with the invited stakeholders during

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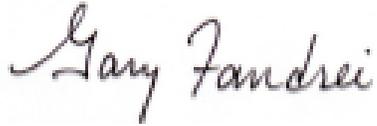
✓

breaks, etc. It is important to be transparent in this process and that includes letting the public know who all attended.

- 60. Page 59. Table 24. Participants... – Line 16 of the table lists KPFA and they use “Fishermen’s” not “Fisherman’s.”
- 61. Page 59. Table 24. Participants... Footnote 1. – The “Jan” in footnote 1 needs a period to be consistent with footnote 2.

We hope these comments are helpful.

Sincerely,



Gary Fandrei
Executive Director



Lisa Ka'aihue
Special Projects Manager

Salmon enhancement today means better salmon fishing tomorrow.

Knik River Watershed Group

From: Robert Howard [mailto:rvhoward@mac.com]

16

Sent: Saturday, March 14, 2015 9:35 AM

To: Frankie Barker

Subject: Mat-Su RM&E Plan Public Review Draft 20150226

Hello Frankie,

Knik R. watershed Group is excited about this effort inclusive of the Knik Watershed.

Please find the below comments of ongoing concern: (They are excerpted from talking points authored for a meeting with the new DNR Commissioner, as a time saver due to my leaving on vacation today. All comments are supportable by ample documentation. Thanks for including these in public comment on the Public Review Draft. Please contact us for any additional, applicable documentation or questions as needed.)

R. Howard

KRWG, Chair

Palmer Alaska

745-1868

Knik River Public Use Area Issues - 2015

Headwaters of Cook Inlet

Value Statement - The KRPUA includes the Jim Swan Wetlands and Uplands habitats, the extreme value of which is recognized and documented all the way from MSB to NOAA. The 1985 Susitna Plan which contained a 'must comply' clause for future planning efforts, listed Jim Swan as a "first priority" area with specific recommendations.

HB 307 language calls for habitat protections and recognizes, equally, motor and non-motor recreational uses. Problems:

1. Anadromous fish habitat is being continually degraded by motorized abuse. USFWS and ADF&G recognize these issues on record.

Example reference:

http://www.matsusalmon.org/wp-content/uploads/2012/12/SmithC_Inventory-of-Salmon-Off-road-Vehicle-Trail-

Distribution-in-the-Knik-River-Public-Use-Area.pdf

Waterfowl, and all wildlife habitat is also impacted by the same and similar abuses.

2. Lack of effective enforcement is ongoing:

ATVs travel unabated beyond DNR's poorly conceived loop turnaround on Rippy Trail deeper into recognized prime habitat, including DNR's acknowledged 'Sensitive Moose Birthing Area'.

Although provided an expensive bridge to cross salmon bearing Upper Jim Cr., motor traffic continues to travel down both sides of the creek to the mouth and cross in defiance of F&G and Div. of Wildlife signage.

Excessive poaching and wanton waste continue to be problematic.

ORV's are penetrating and damaging the wetlands on all sides.

Waterways continue to be degraded by airboat and overpowered boat traffic. Dumping, vandalism, and illegal target shooting continue - one cannot safely leave a vehicle to pursue recreational activities.

Known Anadromous Waters Crossing Permit violations in the KRPUA go unenforced.

"DNR is living an insane fantasy until they get effective enforcement out there." (Palmer F&G Habitat Biologist)

The above listed issues are spilling onto lands within and adjacent to the KRPUA. DNR is failing effective coordination efforts with Eklutna Inc., BLM and MSB. DNR continues to spend large amounts accommodating special interests while not attending to sustainable habitat practices. DNR may identify 'incompatible uses', but fails to do so.

In summary, decades old documented problems in want of solutions still exist in the Knik Watershed.

M. Krupa – University of Alaska Research Associate

From: Meagan B Krupa [mailto:mnboltwood@uaa.alaska.edu]

Sent: Tuesday, March 10, 2015 9:31 AM

To: Frankie Barker

Subject: Public Review Draft of Mat-Su Salmon Research, Monitoring & Evaluation Plan

Hi Frankie,

It's been a while! I'm now at UAA, collecting socio-economic data for the Kenai River Fishery. I'm conducting a stakeholder analysis of the 50+ groups involved and will be collaborating on the construction of a model to predict future management scenarios. It's keeping me very busy!

15

I've read through the Mat-Su plan, and it looks like a solid plan. I am especially pleased to see the inclusion of vital socio-economic data. Hopefully, this can become the foundation of some comprehensive watershed planning.

13

I have one specific concern regarding the \$75,000 allocated to study fish passage at beaver dams. I was shocked when the set netters assn. brought up this idea at the MatSu Science Conference in November 2013 and even more shocked to see it given "moderate" importance in this report. The idea that beaver dams block adult fish was discredited through several scientific studies about 30-40 years ago. The report mentions that ADFG has evidence that the dams in the MatSu are blocking adult fish passage. If possible, I would like to see this evidence because I'm very skeptical that this is the case. I've talked with several Alaskan stream ecologists and fisheries biologists, and there is consensus that beaver dams are not substantial enough to block adult fish passage. As the report mentions, beaver dams serve several important ecological functions - one of which is providing crucial rearing habitat to juveniles. Also, as someone who grew up canoeing and snorkeling around these structures, I can tell you with confidence that notching or removing these structures would be an exercise in futility. Those beavers are quite industrious.

Hope you are well,

Meagan Krupa, PhD

Research Associate

Alaska EPSCoR

Department of Biology

University of Alaska

Mat-Su Salmon Partnership



20 March 2015

TO: Mat-Su Borough Fish and Wildlife Commission

RE: Matanuska-Susitna Salmon Research, Monitoring, and Evaluation Plan for Upper Cook Inlet, Public Review Draft

Thank you for the opportunity to comment on the borough's draft of the Matanuska-Susitna Salmon Research, Monitoring, and Evaluation Plan for Upper Cook Inlet. Jessica Speed, the coordinator of the Mat-Su Basin Salmon Habitat Partnership, participated in the habitat discussions at the workshop for this plan on January 21st and 22nd, 2015, and the Partnership Steering Committee has reviewed and discussed the draft plan. We are encouraged that the legislature and the borough see the importance of better understanding the salmon that return to the Mat-Su each year and the habitat that produces them. We offer the following comments and suggestions on the draft plan in the hopes that the funds the borough currently has and any future funding will be expended on the highest priorities to ensure the long-term health of Mat-Su salmon and their habitat.

The main areas where we provide comment are on the planning process, information about our partnership, and goals, objectives, and issues related to habitat.

Planning Process

4

We appreciate that the borough chose to include the public in a process for deciding how to spend the funds it received from the state's capital budget. We are concerned that there was a perception that stakeholders were going to be involved earlier in the prioritization process. Goals, objectives, and their relative importance were determined preceding the public's first opportunity to participate through the workshop. This misunderstanding alienated some stakeholders who are also concerned about the future of Mat-Su salmon. We suggest that the plan needs to be very clear on when stakeholders were involved and to what degree, as well as describing how or if stakeholders will continue to be involved throughout the plan's completion (e.g. how will comments be incorporated) and implementation.

3

We are disappointed that the borough did not devise a more inclusive planning process that might have bridged some of the current divide between sport and commercial fishing interests in Cook Inlet. By leaving commercial fishermen as well as other stakeholders and partners out of the goal and objective setting phases, the borough missed an opportunity to find common ground and develop a plan that will be embraced, supported, and used by others. Some of our members have questioned the participation of our partnership coordinator, Jessica Speed, in the workshop. We hope that her participation will result in a plan that includes the highest priorities for salmon habitat research and assessment.

v

Jessica attended the planning workshop with the specific and exclusive intent of providing input on elements of the plan related to habitat (referred to as ecosystems in the plan). This reflects our operating principle that we "focus Partnership activities on issues pertaining to habitat conservation

– not fishery management allocation decisions.¹ Jessica did not vote on content related to the goals for Salmon Status or Salmon Fisheries and did participate in those working groups. The plan incorrectly notes Jon Gerken from US Fish and Wildlife Service as the Partnership’s representative. While Jon’s organization is a member of the partnership and he has provided his scientific expertise to our efforts, Jessica Speed was invited as our representative, and the Steering Committee understood that she was representing the partnership’s perspective. We request a correction of Table 24 to reflect that Jessica attended for the Mat-Su Salmon Partnership (i.e. revise Affiliation) and add a footnote to clarify that her participation was limited to discussion and prioritization of ecosystem goals.

V

Partnership

We appreciate the kudos that our partnership receives in the plan, and we would like to clear up some misunderstandings about our Strategic Action Plan, its implementation, and our funding.

The partnership is a broad based coalition of diverse organizations that has been in existence since 2005. At this point we no longer think of ourselves as new, as noted on page 4, and we’d prefer to be described as a ‘coalition of organizations’ instead of ‘coalition of collaborators.’ While collaboration is one of our goals, membership in the partnership is based on the common objective of conserving salmon habitat in the Mat-Su Basin and collaboration among over fifty organizations is rarely possible. We also request that the name of the partnership be consistently used in the plan. The full name - Mat-Su Basin Salmon Habitat Partnership - or the shortened – Mat-Su Salmon Partnership – are both appropriate (not ‘fish habitat partnership or ‘habitat partnership’).

The partnership completed a Strategic Action Plan in 2008 and updated that plan in 2013. While the Partnership has identified threats to salmon habitat in the Mat-Su and conservation strategies to mitigate those threats in our Strategic Action Plan, the listing of those conservation objectives does not assure in any way that those strategies are being fulfilled. Fulfillment of the plan’s objectives requires organizations to take initiative and have capacity to do that work. Considering a threat taken care of or giving a goal a lower priority because it’s identified in our plan is inaccurate. A better strategy for achieving salmon habitat conservation would be for our plan and the borough’s plan to agree on priority habitat issues. That could open up more possibilities for the borough and the partnership in seeking additional funding for salmon habitat projects.

Since 2005, the partnership has received \$2.1 million total (Table 1), about \$270,000 per year, through the National Fish Habitat Partnership (NFHP) supported by the US Fish and Wildlife Service (USFWS). Less than half of those funds were used for research and assessment projects. We compete for these funds nationally so they are not an assured funding source. Furthermore, funding of research by USFWS is limited. We anticipate that future NFHP funds will place higher priority on on-the-ground projects in the future, which will reduce our ability to support research and assessment projects. In addition to including our funds in Table 1, we suggest that it be revised to be clearer about the type of projects that the listed funds supported (e.g. research, assessment, on-the-ground restoration). For example, the \$900,000 that the borough spent on culvert replacements were for actual construction costs, not research, monitoring, or evaluation.

¹ *Conserving Salmon Habitat in the Mat-Su Basin, the Strategic Action Plan of the Mat-Su Basin Salmon Habitat Partnership, 2013 Update, page 30. Available at www.matvsalmon.org.*

Salmon Ecosystem Goal #3 and Related Objectives and Issues

4

We think that the three goals are independent and should have equal weight. We'd like to see the Salmon Ecosystem goal have an equal importance with Salmon Status and Salmon Fisheries. For without habitat, there would be no salmon.

8

The assumptions used to give habitat a lower score were inaccurate. On page 19 it's written that the "planning team agrees that the aquatic habitat (objective 3.3) in the Mat-Su Borough 'is in pretty good shape.'" The plan does not specify how the planning team assessed the status of aquatic habitat. More accurately, the greatest impacts to salmon habitat are in the more developed areas. The exceptions are for invasive species which occur in developed areas (i.e. reed canary grass) and more remote areas with little development (i.e. northern pike, elodea). The same page (19) notes that the "Partnership has done a good job addressing salmon habitat issues in the Borough". As discussed above, identification of issues in our Strategic Action Plan does not mean that all issues are being actively addressed. While we have made great progress on some issues, more needs to be done to understand the habitats that salmon need throughout their life cycle and the impacts that human activities have upon those habitats. The Mat-Su is the fastest growing area of the state and understanding development impacts now can inform the land use decisions that will be made in the following decades. Because of these inaccurate assumptions, we think the ecosystem goal, its objectives, and issues received a lower ranking in the plan than they warrant. An investment in better understanding of habitat today provides the information we need to better manage lands and waters in the future.

9

Objective 3.1 Ecological Interactions and Related Issues: While we agree that invasive aquatic species are important, having three issues (3.1.1, 3.1.2, and 3.1.3) about invasive species might have diluted the rankings. We recommend combining these very similar issues, which might provide room for other habitat-related issues to be in the top tier (Table 12). At the top of page 49 there's a note about the state's invasive species coordinator. We recommend contacting Heather Stewart, Invasive Species Coordinator at Alaska Department of Natural Resources, for more information about Elodea in the Mat-Su and the prevention of its introduction and spread and general Elodea education.

The Mat-Su Salmon Partnership Strategic Action Plan focuses on human-caused stresses to salmon habitat, so it does not address beavers (3.1.5). Our member organizations have varying opinions about the impediments that beaver dams pose to migrating adults versus the habitat that they create for juvenile salmon. We would recommend that the actions under this issue expand the knowledge about the role that beavers play in ecosystem processes and not focus solely on adult fish passage.

9

Objective 3.2 Human Factors and Related Issues: We would like to see information for land use planning (3.2.1) ranked higher. Key information is the mapping of salmon distribution and identification of key salmon habitat. In our plan, the Anadromous Waters Catalog (AWC) is a tool to identify the presence of salmon and the habitat in which they are found. Though this tool is only one part of the picture of salmon presence in habitats, it is a priority for us and commonly utilized by agencies that make decisions about land use. Listing waters in the AWC has the added benefit of providing them additional protections under state law. We do not think that the importance of surveying streams for the Anadromous Waters Catalog is accurately reflected in the plan. We do not agree that it is a Stock Identification action. We understand that the habitat working group at the workshop included it in their priorities. We recommend that it be included in this plan as a habitat issue and be given a higher priority.

Objective 3.4 Marine Ecology and Related Issues: We think there was a misunderstanding about marine mammals in the plan. Jessica remembers the discussion at the workshop being about marine mammals as indicator species on the health of salmon populations, not as a threat due to predation. We ask that this issue be more thoroughly vetted before including as currently written.

We can assist the Fish and Wildlife Commission in reviewing potential research projects related to freshwater habitat and provide information about current work underway and the gaps that are currently not being addressed by any organization.

Thank you for the opportunity to comment on the plan. If you need additional information, please contact the Mat-Su Salmon Partnership Coordinator, Jessica Speed, (907) 865-5713 and jspeed@mc.org.

Sincerely,

The Steering Committee of the Mat-Su Basin Salmon Habitat Partnership

Arni Thomson (Alaska Salmon Alliance)

Bill Rice (U.S. Fish & Wildlife Service)

Christy Cincotta (Tyonek Tribal Conservation District)

Corinne Smith (The Nature Conservancy)

Erika Anmann (National Oceanic and Atmospheric Administration)

Frankie Barker (Mat-Su Borough)

Jessica Winnestaffer (Chickaloon Village Traditional Council)

Kim Ryals (Mat-Su Trails & Parks Foundation)

Roger Harding (Alaska Department of Fish and Game)

United Cook Inlet Drift Association – Comment on Workshop Invitation



United Cook Inlet Drift Association

43961 K-Beach Road, Suite E . Soldotna, Alaska 99669 . (907) 260-9436 . fax (907) 260-9438
• info@ucida.org .

Date: January 14, 2015

Addressee: Frankie Barker
Environmental Planner
Matanuska-Susitna Borough
350 E. Dahlia Avenue
Palmer, AK 99645

RE: Fish Research Workshop

Dear Ms. Barker,

17

Thank you for the invitation to attend the Mat-Su Fish and Wildlife Commission (Commission) Fish Research Workshop. For some time, UCIDA has been aware of and has been following the Commission's efforts to create a research plan to further their allocation agenda. Aside from the clear allocative nature of the proposed plan, we also object to the Commission's plan for spending 1.6 million state dollars for the following reasons.

2

Existing research has clearly defined the factors that are limiting salmon production in the Mat-Su: impaired/polluted water bodies; the introduced and now abundant invasive Northern Pike populations; invasive elodea, disease and parasite occurrences; beaver dams blocking salmon passage; warm water temperatures that are lethal to most salmon populations; improperly installed road culverts that block salmon movements; unregulated habitat destruction due to 4x4's, ATVs and air boats; and known poaching occurrences. There are plenty of known problems, with already identified solutions, that are limiting salmon production in the Mat-Su Basin.

1

Considering the current \$3.5 billion State of Alaska budget deficit, we recommend that the funds the Commission is proposing to spend on workshops, planning and research be returned to the State of Alaska. Governor Walker has been very clear that we, as a state, should not spend additional funds on studying what needs to be done. It's time to roll up our sleeves and get to work.

With limited funding available, efforts need to be coordinated and focused. ADF&G has the legal charge and responsibility to develop and maintain salmon stocks throughout Cook Inlet and the State. ADF&G has the scientific staff to establish research priorities, when needed, and develop work plans to maintain salmon populations. We suggest that ADF&G do their job. We believe it is inappropriate for a local group, such as the Commission, to construct a plan for

furthering their parochial agenda and presume that state and federal agencies will follow along. The Commission has not received a State or Federal mandate and the Commission represents only their own interests.

6 Funding for further Chinook salmon research was just eliminated by the new State Administration. Since the funding for the Commission's plan originally came from Governor Parnell's Chinook Salmon Research Initiative, why is the plan not targeted towards restoring Chinook salmon stocks? We also raise the question, is it appropriate for ADF&G employees to participate in this workshop when the Commission's plan would directly compete with ADF&G and other state agencies for increasingly scarce funding sources?

2 We cannot condone wasting funds on meetings, planning and research when primary threats to salmon production in the Mat-Su, and solutions, are already identified. UCIDA believes that if this money is not going to be spent on killing pike, eliminating elodea, notching beaver dams, replacing culverts or reducing pollution sources then the funds should be returned to the State of Alaska.

6 In addition, after reviewing the gap analysis and other documents you provided, we noticed multiple errors and omissions that will affect the discussions and possible outcomes of the workshop. The gap analysis is clearly designed to advance the concept of weak stock management, which has never been recognized as the primary method of salmon management anywhere in the State. The gap analysis also indicates that the current low economic value of chum and pink harvest somehow diminishes their importance. This is an example of one of the many misrepresentations contained in your documents. The drift fleet and set net fisheries have repeatedly requested to be allowed to harvest more chum and pink stocks. At the present time commercial fisheries harvest less than 10 percent of the chum and pink stocks, leaving an immense harvestable surplus.

4 To convene a "stakeholder" group at this stage of the process is disingenuous at best. Goals, objectives and their rankings within the plan have already been decided by the core planning team. Some members of this team have a history of making false statements about and attacking the commercial industry for over a decade. This biased perspective is indelibly built into the core of this plan.

These are just a few examples of why only ADF&G should plan and conduct fishery research.

For all of the above reasons, UCIDA will not participate in the Commission's Fish Research Workshop.

Sincerely,

Original Signed Document

David R. Martin
UCIDA President

Matanuska-Susitna Fish & Wildlife Commission Response to UCIDA Invitation Decline



Matanuska-Susitna Borough
FISH AND WILDLIFE COMMISSION
350 East Dahlia Avenue • Palmer, AK 99645

January 19, 2015

David R. Martin, President
United Cook Inlet Drift Association
43961 K-Beach Road, Suite E
Soldotna AK 99669

Dear Mr. Martin:

We are disappointed that UCIDA has chosen not to attend our January workshop to identify research, monitoring and evaluation needs and priorities for Upper Cook Inlet salmon.

The Mat-Su Research, Monitoring and Evaluation (RM&E) planning process is designed to provide essential guidance on needs and priorities for Upper Cook Inlet salmon. No such plan or guidance document currently exists. Our Commission strongly believes that a sound scientific foundation is essential for effective protection and management of sustainable salmon runs and fisheries. RM&E projects and programs are the bricks by which the scientific foundation is laid. The Commission feels that it makes no more sense to implement a complex and costly RM&E program without a comprehensive plan, than it does to try to build a house without a blueprint.

The funding for this research project came from the Alaska State Legislature through a capital grant to the Mat-Su Borough in 2013 (FY2014). Part of the grant funds (\$900,000) have already been used to match federal funds and local road service area funds to complete culvert replacement projects to improve fish passage. In 2014, a research firm was contracted through a competitive bid process to coordinate the fish research planning process prior to soliciting and funding field research projects.

Significant research, monitoring and evaluations projects are currently underway on Mat-Su salmon runs, fisheries and habitats. Members of your organization are supporting a variety of state-funded research projects on Mat-Su salmon through your involvement with the Cook Inlet Aquaculture Association. As noted in your letter, there are significant factors affecting Mat-Su salmon runs. Limitations occur in freshwater as well as marine areas. Continuing controversies regarding the significance of many of these factors and effective remediation, highlight the need and value of additional RM&E. However, the needs are many and funding is limited.

Current state budget circumstances will require even more careful scrutiny of current and future projects to ensure that limited resources are focused on the most important and cost effective activities. Cutbacks in current state funding of programs including the Chinook

Initiative and the Susitna-Watana fish studies only heighten the need for critical consideration of specific needs and priorities.

As the drift net gillnet fishery is historically the largest harvester of salmon from Northern Cook Inlet, we extended an invitation for a representative from UCIDA to participate in the RM&E planning process. The invitation remains open. It was clear from your letter of January 14, 2015, that your organization has strong ideas on priorities for salmon-related work in the Mat-Su. We will enter your letter into the record to assure that the ideas and priorities expressed therein are reflected in the workshop discussions and results. Draft workshop proceedings will also be distributed for public review which will afford you with an additional opportunity to provide any comments that you might choose to provide on specific issues.

Sincerely,

Bruce Knowles, Chairman
Matanuska-Susitna Fish and Wildlife

CC:

Matanuska-Susitna Borough Mayor & Assembly

Governor Bill Walker

Alaska State Senate

Alaska House of Representatives

Kenai Peninsula Borough Mayor Mike Navarre

ADF&G Commissioner Sam Cotton

Deputy Commissioner Charles Swanton

Tim McKinley

Jack Erickson

Michael L. Bethe

Julie Speegle

Mike Wood

Jon Gerken

Doug McBride

Gary Fandrei

Jessica Winnestaffer

Jeff Davis

Jessica Speed

James J. Hasbrouck

William Rice

Robert Williams

Ed Farley

Steven Braund

Erika Ammann

Corinne Smith

Rashah McChesney

United Cook Inlet Drift Association – Comment on Research Plan



United Cook Inlet Drift Association

43961 K-Beach Road, Suite E . Soldotna, Alaska 99669 . (907) 260-9436 . fax (907) 260-9438
 . info@ucida.org .

Date: March 19, 2015

Addressee: Frankie Barker
Environmental Planner
Matanuska-Susitna Borough
350 E. Dahlia Avenue
Palmer, AK 99645

RE: Comments on Draft Plan

Dear Ms. Barker,

17

It is clear that the Mat-Su Borough Fish and Wildlife Commission (Commission) conceived, designed, and is promoting their Salmon Research, Monitoring and Evaluation Plan (Plan) in an effort to fund research designed with allocative intentions. We do not believe this is appropriate use of state capital funds.

1

If the allocative aspects of the Plan are removed there is virtually no new information within it. The Draft Plan summarizes the current state of knowledge of the Mat-Su salmon status, fisheries and ecosystem. This work has already been done by the Mat-Su Basin Salmon Habitat Partnership.

2

In addition to duplicating previous work, in the Draft Plan the Commission uses disingenuous conclusions to rule out spending money on projects that are not allocative. The Draft Plan states repeatedly that "...a large amount of money (\$900,000) has been set aside for culvert replacement." According to the Mat-Su Borough, it costs between \$200,000 and \$500,000 to replace *one* culvert. So, setting aside enough funds to fix two or three of the 400+ culverts blocking fish access is not "a large amount of money". In the "Salmon Ecosystem" section (p.24) there is much discussion about all of the research that has already been done identifying problems and issues. It begs the question of why the grant money is not being spent on solutions to those documented problems rather than additional research.

8

On page 25 the Draft Plan states that *"the majority of the core planning team agrees that the state of the aquatic habitat in the Mat-Su Borough "is in pretty good shape"*. There are hundreds of documented examples of impaired habitats in the borough. The proliferation of the invasive species Northern pike is the most obvious and egregious example, with elodea beginning a separate assault on salmon and trout habitat in the valley. We do not consider the habitat to be "in pretty good shape" when invasive pike have eliminated 100% of the sockeye salmon production in one-third of the salmon producing lakes and have reduced production in another third of the salmon producing lakes, resulting in an estimated 50% reduction in total sockeye salmon production. Pike are having a significant effect on coho and Chinook salmon production as well, with the devastating results only

documented in two (Alexander Lake and Creek) of the over 135 lakes and waterways currently listed as infested.

In addition to specific examples listed above the Draft Plan contains numerous other errors and omissions.

Until the Mat-Su Borough and ADF&G establishes an extensive pike eradication and management program and a stocking and rehabilitation program the salmon runs in the Mat-Su Basin will never recover.

David Martin, President

U. S. Fish & Wildlife Service



United States Department of the Interior



U.S. FISH AND WILDLIFE SERVICE
Anchorage Fish and Wildlife Field Office
4700 BLM Road
Anchorage, Alaska 99507

IN REPLY REFER TO:
FWS/AFES/AFWFO

Frankie Barker, Environmental Planner
Matanuska-Susitna Borough
350 E. Dahlia Ave
Palmer, AK 99645

MAR 20 2015

Re: Review of *Matanuska-Susitna Salmon Research, Monitoring and Evaluation Plan for Upper Cook Inlet- February 26, 2015 Public Review Draft*

Dear Ms. Barker:

Per request, US Fish and Wildlife Service (Service) is providing comment on the public review of the *Matanuska-Susitna Salmon Research, Monitoring and Evaluation Plan for Upper Cook Inlet Draft Plan*. As stated, this draft plan was prepared under the direction of the Mat-Su Fish and Wildlife Commission, including input from stakeholder participants in a January 21-22 workshop in Wasilla. The Service was invited to participate and provided two Fisheries staff from Anchorage Fish and Wildlife Field Office for the stakeholder workshop: Doug McBride and Jon Gerken. The Service thanks you for both the opportunity to participate and provide comment. Prior to finalizing a revised plan, we recommend that you consider and address the following:

Planning Process:

Listed affiliation for both Doug McBride and Jon Gerken should be US Fish and Wildlife Service (Appendix VII of the draft plan). As drafted, Jon is the only person listed with affiliation on the Mat-Su Basin Salmon Habitat Partnership (Partnership). The Partnership was represented by their coordinator, Jessica Speed, who should be listed as representing the Partnership and not The Nature Conservancy (TNC). Also, the information on stakeholders invited to the workshop (1. see Table 10) appears inconsistent with Service participation (2).

V

As clearly stated during the workshop and in the draft plan, many of the decisions were already drafted prior to the stakeholder workshop. Specifically, the Core Planning Team had already defined scope and process for the Plan, and the Mat-Su Borough (MSB) Fish and Wildlife Commission had already identified and prioritized Goals and Objectives (see Figure 2 in the draft plan). Also, consultants for MSB had already drafted the State of Knowledge summary. The process of using an Analytical Hierarchy Process (AHP) should meaningfully weight the subsequent input from the stakeholder workshop along the entire prioritization of the Goals and Objectives. The draft plan does not currently reflect the priorities of stakeholders at the workshop; for instance we recommend that the three Goals be equally weighted as Goal 3, the habitat goal, is significantly lower weighted than other goals. Without habitat research, there is no understanding of critical habitat or impacts to it and the assumptions used in the draft plan to lower Goal 3 should be reviewed. Specific comments for Goals and Objectives are

5

4

made below. We also highly recommend that the final Plan clearly state the extent to which final prioritized Issues reflect stakeholder input.

Goals and Objectives:

4 Of concern to the Service is the lower priority given to Goal 3 (Salmon Ecosystem). The stated reasons for the low ranking (pgs 18-19) are 1) the work by the Partnership already addressing habitat concerns, 2) the relatively undisturbed nature of salmon habitat in the Mat-Su, and 3) the investment of \$900K by the MSB from this funding for culvert replacement. Please note that:

v

- While the Partnership does work on habitat concerns, less than 50% of the \$2.5 million in funding received to date has been for assessment and/or research, with the rest spent on restoration activities. Divided by the years we have received funding, this amounts to \$90,000 annually for research or assessments; easily an order of magnitude less than other efforts listed on Table 1. The federal funds the Partnership receives annually is not dedicated funding and the Partnership competes nationally for funding projects every year. Service funding (federal funding for the Partnership is provided by the Service) for assessments and research will also decrease as national direction for program funding shifts away from these types of projects and more toward protection and restoration activities.

8

- While there are large areas of relatively undisturbed salmon habitat in Mat-Su, there are existing areas of compromised habitat as well as future build out extent and large development projects planned or proposed that could in the future impact large swaths of habitat. Assessment and research could significantly help quantify potential impacts from these activities. The Partnership is primarily focused on habitat impacts related to rapid urbanization and limited by its ability and diversity of members to address all habitat issues. For instance, there are significant future habitat concerns (e.g. large development projects such as the Watana dam) that are for the most part outside the purview of the Partnership itself to assess or conduct research.

v

- The \$900k in culvert work MSB invested was for construction, not assessment and research.

v

Also, the case made for Goal 3 that there is already effort and investment in habitat conservation through the Partnership can similarly be made for Goals 1 and 2; there is much greater effort and investment through ADFG to address salmon status and salmon fisheries. For example, the annual amount that would be entered for the Partnership into Table 1 (pg 5) is \$250K annually, an order of magnitude less than any of the capital budgets listed in that table and as stated above, less than 50% of that has been for assessment and research annually.

8

For habitat issues and assessment, a much more comprehensive and rigorous planning process was utilized by the Partnership to identify habitat issues and conservation actions in the Mat-Su Basin into a strategic action plan (<http://www.matsusalmon.org/see-the-partnership-s-updated-strategic-action-plan/>). The MSB should consider further process with the Partnership to ensure that habitat issues under Goal 3 accurately reflect that body of work.

9

Issues for Goal 3:
We agree with the five issues ranked as high priority (see Fig 12 pg 54), though we recommend merging the three invasive issues to one issue of dealing with aquatic invasives. Breaking aquatic invasives into three issues dilutes the importance of other habitat priorities listed in the draft plan.

9 An issue that we don't think was captured under this Goal, and that should rank as a high priority, is completion of the Anadromous Waters Catalog (AWC). While it appears this was captured under 1.3.1; the logic of including the AWC as an issue of Stock Identification under the Goal of Salmon Status is difficult to follow.

13 We agree with most of the issues ranked as medium and low priority. The Partnership only addresses fish passage issues from anthropogenic causes and therefore does not address beaver dams as a habitat issue and question this as warranting a medium priority (Priority 3.1.5). A better way for this priority is to think of assessment and research as understanding the ecological effects of beaver dams for different species and life stages of salmon and not solely concentrating on beaver dams as an adult salmon migration issue.

Figure 13. Adjusted Priorities for all 55 Issues:

4 We agree with Goal 3 issues that ranked as high priorities (see Fig 13 pg. 55), noting as above our recommendation to consider merging the invasive study priorities. We also note that completion of the AWC (included in 1.3.1) is also ranked as a high priority and we agree. Issue 3.2.1 (lack of information to consider salmon in land use plans), while ranked as a high priority under Goal 3, was in a lower tier on Figure 13 because of the low rating for Goal 3 in general (see above comments under Process and Goals and Objectives). Priority 3.2.1 only ranks as of medium priority in the overall rankings and we would like to see this in the top tier priorities as it is of high priority in understanding critical areas for salmon that land use planners and others can take into account now and in future planning efforts.

Thank you for the opportunity to participate and provide comment. Please feel free to contact me if you would like to discuss any of these comments or if I can provide anything further in this matter.

Sincerely,



William Rice, P.E.
Habitat Restoration Branch Chief

