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# **Instream Flow Needs: Prioritizing Salmon-Producing Watersheds in Southeast Alaska for Instream Flow Reservations**

## **Final Report**

by

**Kevin M. Brownlee**

**Shawn L. Johnson**

**Kathy M. Smikrud**

and

**Jarrod J. Sowa**

September 2003

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Alaska Department of Fish and Game

Division of Sport Fish





***SOUTHEAST SUSTAINABLE SALMON PROGRAM  
PROJECT NUMBER 45040***

**INSTREAM FLOW NEEDS: PRIORITIZING SALMON-PRODUCING  
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RESERVATIONS**

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## ABSTRACT

Alaska's instream flow law (AS 46.15.035, .037 and .145) allows the private sector and government agencies to legally acquire water rights, called instream flow reservations, to maintain instream flow rates in rivers or water levels/volumes in lakes for various purposes, including protecting fish habitat, migration, and propagation. A knowledge-based decision support system was developed to prioritize the more than 5000 salmon-producing water bodies in Southeast Alaska for submitting instream flow reservations to protect salmon habitat and sustain salmon productivity. A total of 4597 Southeast Alaska watersheds were identified at the sixth level, 14-digit, hydrologic unit (HUC) scale, as defined by the US Geological Survey. These watersheds were ranked based on an assessment of the salmon resource and instream flow dependent values within each watershed. They were also ranked based on an assessment of risks by existing and potential developments to sustaining sufficient instream flows in salmon producing rivers and lakes within each watershed. Eight watershed attributes were identified to use as indicators of resource value and eight attributes were used for risk assessment. Attribute information used to assign resource values and risks were acquired and analyzed from existing data sources. Resulting attribute values were aggregated and summarized using a geographic information system (GIS). Algorithms were defined to rate and score attribute values scales of 0-1 based on the range of values encountered in the data. Final resource values and risk scores for each watershed were calculated as the average of the individual scores for each attribute. The result of this assessment was a list of all watersheds ranked by resource values and a list of all watersheds ranked by risk. Both were summarized using a combination of spreadsheets, printed maps, and an electronic interactive map. Departmental and other natural resource professionals are being asked to use these maps and spreadsheets from this broad-scale watershed assessment, along with their own finer-scale knowledge of resource values and risks, to identify the salmon producing watersheds in their areas most in need of instream flow protection. A pilot test was conducted with Juneau Area staff to determine an effective and efficient method for soliciting staff input. Results from this evaluation were used to develop a protocol for scoping departmental staff from all management areas in Southeast Alaska. A similar effort will be used to obtain resource expertise/input from external natural resource specialists. Final priorities will be established by the Statewide Aquatic Resources Coordination Unit, using the resulting assessment to develop a prioritized list of watersheds for instream flow assessments and reservations. The information will be used to begin the next project, which will be to prepare and submit instream flow reservation applications to protect and sustain salmon production in high priority water bodies selected using the system developed by this project. We expect this framework will be updated and further refined as new information is incorporated into the prioritization process. The database of regional instream flow needs developed and maintained by this project will also be useful to integrate with and support other comprehensive aquatic resource management information and decision support systems.

### **Decision Support Framework For Instream Flow Needs Assessments**

#### **BACKGROUND**

In May 1996, the Governors of Alaska, Washington and Oregon met in Sitka, Alaska to discuss issues relating to

conservation, protection, and restoration of wild Pacific salmon stocks and their habitats. On May 28<sup>th</sup>, the three Governors outlined a variety of salmon conservation initiatives and requested Congress to create the *Pacific Salmon Fund* to "ensure stable funding for wild salmon restoration, enhancement, and management" (from May 28, 1996 Governor of Alaska Press Release #96-126). Congress acted on this request and unanimously passed legislation called the "Pacific Salmon Recovery Act", which

was signed into law by the President in mid-September 2000 (H.R. 2798). This became the first of several pieces of federal legislation authorizing funding for salmon related initiatives in the northwest and Alaska. Congress and the President passed subsequent legislation adding additional funding and years to the life of this important initiative.

Federal funds provided to Alaska under this act are referred to as the Southeast Alaska Sustainable Salmon Fund (SSSF). The Alaska State Legislature authorized the state to accept money to perform SSSF studies for the state fiscal year 2001 budget (July 1, 2000 to June 30, 2001) and authorized supplemental funding approved in the 2002 and 2003 federal appropriation bills. The Alaska Department of Fish and Game (ADF&G) has developed a variety of work plans to meet the goals and objectives of this federal legislation. The Instream Flow Needs project represents one of the many projects funded by this federal legislation to sustain salmon production.

The geographic scope of the Instream Flow Needs project extends from Cape Suckling south to Dixon Entrance (Figure 1). The project was funded by SSSF to help manage and protect salmon habitat in freshwater and estuarine habitats on a watershed basis. The goal of this project and other ADF&G projects funded by the SSSF program are consistent with mandates established by the enabling and subsequent federal legislation and the 2001 Sustainable Salmon Fisheries Policy for the State of Alaska (5 AAC 39.222).

## INTRODUCTION

Sufficient water of good quality is among the most essential requirements for sustaining fish productivity in Alaska's

ivers and lakes ([Estes 1998](#)<sup>1</sup>; [Richter, et al. 1997](#)). Alaskans are faced with the challenges of maintaining, restoring, and enhancing fish production and habitat while satisfying needs for economic growth and factors linked to the overall well being of the state. Adding to these challenges are growing demands for water for municipal, industrial, agricultural, mineral, oil and gas, aquaculture, fish processing, artificial snowmaking, and water export purposes. These water uses all have the potential to modify existing water volumes, seasonal flows, and other water quantity related characteristics in lakes and rivers. These types of modifications in water quantity can degrade aquatic habitats, reduce fish production, and result in lost resource values.

Most of Alaska's waterways are relatively unaltered and the majority of rivers are free-flowing. The Alaska Legislature recognized wise management of water allocation in Alaska is critical to the health and well being of Alaskan fisheries and the overall socioeconomic well being of the state. Accordingly, the Alaska legislature amended the Alaska Water Use Act (AS 46) in 1980 in recognition of the economic, social, and other benefits of retaining water in rivers and lakes. These amendments (AS 46.15.035, .037 and .145) provide the opportunity for the private sector and government agencies to legally acquire water rights to maintain instream flow rates in rivers or water levels/volumes in lakes for one or more of the following purposes:

- protection of fish and wildlife habitat, migration, and propagation;
- recreation and parks purposes;

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<sup>1</sup> A review of the Instream Flow Program in Alaska, along with annual progress reports, is available at the website: [Alaska Fish and Game — Instream Flow program \(http://www.sf.adfg.state.ak.us/statewide/INSFLOW/isfhome.htm\)](http://www.sf.adfg.state.ak.us/statewide/INSFLOW/isfhome.htm).

- navigation and transportation purposes; and
- sanitary and water quality purposes.

Appropriations of water for these purposes are generally referred to as instream flow reservations (in regulation as 11 AAC 93.141-147). The term instream flow is used to describe reservations of water in both rivers and lakes.

In 1984, ADF&G developed a prioritization system and waterway risk analysis ([ADF&G 1984](#)) to prioritize efforts to quantify and reserve water in rivers and lakes for fish and wildlife, water quality, recreation, park purposes, and navigation/waterway access. Although not comprehensively updated since 1986, this priority list is still the basis for the core ADF&G instream flow program, currently coordinated by the Division of Sport Fish, Research and Technical Services Section, Statewide Aquatic Resources Coordination Unit (SARCU).

The goal of this project was to update reservation of water priorities to protect salmon habitat and production in Southeast Alaska. The main objective of this multi year effort (fiscal year 2001-funded SSSF project) was to prioritize salmon producing watersheds in Southeast Alaska for purposes of identifying instream flow needs priorities. Funding to initiate a second instream flow related multi-year project (Instream Flow Reservations project) was secured in two increments during fiscal year 2002 and 2003. The second project was funded to begin at the conclusion of this Instream Flow Needs study, with the objective of quantifying and protecting instream flows based on water body priorities established by the Instream Flow Needs project.

This report describes the first project to prioritize waters for subsequent instream

flow analyses and protection during the second project.

### **Watershed Assessment**

Watershed characteristics and conditions are among the significant factors that govern salmonid production through functions and processes operating across multiple spatial and temporal scales (Figure 2). Flow-dependent functions and processes, in particular, play a vital role in creating and sustaining the habitat upon which salmon are dependent. Many water and/or land use practices can alter these functions and processes and can degrade salmon habitat and reduce salmon production, resulting in lost resource values ([Estes 2001](#); [Furniss, et al. 1991](#); [Halupka, et al. 2000](#); [McCammon, et al. 1998](#); [Richards, et al. 1996](#); [Sharma and Hilborn 2001](#)).

This report describes a framework for ranking watersheds for subsequent collection and analyses of information to quantify and protect instream flow requirements. This watershed ranking project is based on a broad-scale assessment of the resource values of, and risks to, salmon-producing water bodies within watersheds of Southeast Alaska. This assessment is being used as a tool to solicit input from ADF&G staff and other natural resource professionals on their priority concerns for watersheds most in need of instream flow protection. We will use the cumulative information obtained to prioritize watersheds for instream flow assessments and reservations during the second project to quantify and protect instream flow requirements for salmon production in targeted water bodies.

## **METHODS**

### **Framework**

Watersheds were selected as the basic landscape unit for aggregating and assessing resource values and risks for this project

(Figure 3). We used watersheds delineated by 14-digit hydrologic unit codes, referred to as sixth level hydrologic units, by the U.S. Geological Survey, U.S. Department of Agriculture Natural Resource Conservation Service, and others (reference). We chose this scale of hydrologic unit for defining watersheds boundaries because sixth level HUCs in Southeast Alaska drain directly to marine waters and contain third order or higher stream networks<sup>2</sup> and therefore best represent watersheds and stream networks potentially supporting populations of salmon in the region. Over 4,600 6<sup>th</sup>-level HUCs have been delineated for Southeast Alaska.

The framework for prioritizing salmon-producing watersheds for this project is illustrated in Figure 4. The major steps in the process were to:

1. Identify watershed attributes to use as indicators of resource value and risk.
2. Rate and score the individual resource value and risk attributes within each watershed on a scale of 0-1.
3. Calculate final resource value and risk scores for each watershed as the average of the individual scores.
4. Rank watersheds based on final resource value and risk scores.
5. Summarize watershed assessment and rankings in spreadsheets, printed maps, and an interactive map.
6. Solicit input from ADF&G staff and others on rankings and on their priorities for salmon-producing watersheds in need of instream flow protection using the information from item 5 above.
7. Develop a prioritized list of watersheds for instream flow assessments and reservations based on watershed assessment and staff priorities (these priorities represent locations of instream flow studies that will be performed during the second project).

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<sup>2</sup> See [USDA Forest Service online GIS Library](#) for background and definitions.

## **Resource Value and Risk Indicator Attributes**

Watershed attributes to use as indicators of resource values and risks were identified from existing fishery and land use databases, mapping and resource inventories, and literature sources, as listed in Table 1. The working list of resource value and risk indicator attributes summarized by watershed included:

### Resource Value Indicator Attributes

1. Total miles of anadromous streams as listed in the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* ([ADF&G 1998](#)), as updated in 2001.
2. Total miles of USDA Forest Service “Class 1” streams (streams mapped and identified as potentially capable of supporting anadromous fish with no apparent persistent migratory barriers).
3. Number of salmon species present.
4. Presence/absence of chinook and sockeye salmon water bodies.
5. Sport fish angling effort.
6. Subsistence/personal use harvest.
7. Presence/absence of ADF&G Commercial Fisheries index streams.
8. Presence/absence of ADF&G stock assessment streams.

Miles of anadromous streams was used as an indicator of potential salmonid production within a watershed. Number of salmon species present was used as an indicator of biodiversity and the diversity, extent, and integrity of habitat available to salmon within a watershed. Presence of chinook and sockeye water bodies was considered an important indicator of resource value due to the relative rarity or regional range restriction of these species. Sport fish effort and subsistence/personal use harvest represented socio-economic values of salmon fisheries in a watershed. Presence of ADF&G index and stock assessment

streams identified watersheds important for salmon management and research purposes.

#### Risk Indicator Attributes

1. Percent of area federally, state and privately owned, respectively.
2. Percent of area harvested for timber.
3. Density of roads (miles of road per square mile of watershed).
4. Percent of area urbanized.
5. Presence of water diversions, dams, and hydroelectric projects.
6. Presence of aquaculture facilities.
7. Presence of water bodies listed as impaired by ADEC<sup>3</sup>.
8. ADF&G Region I Imminent Risk Assessment.<sup>4</sup>

The first four risk attributes were used as indicators of watershed conditions that can modify and potentially degrade aquatic habitats and reduce salmonid production. Presence of water diversions, dams, hydroelectric projects, and aquaculture facilities represented water uses that can alter the hydrology and habitat condition of watersheds. Presence of ADEC impaired waters identified watersheds with known water quality problems. ADF&G Region I imminent risk assessment identified watersheds with imminent risks to salmon habitat.

A Geographic Information System (GIS) was used to aggregate and analyze the resource value and risk indicator attribute values by watershed. Sources of geo-spatial data are provided in Table 1.

#### **Rating and Scoring Indicator Attributes**

All attributes were normalized to score across a scale from zero to unity. A score of 0 represents the lowest rated resource value and lowest rated risk and a score of 1 represents the highest resource value and

highest risk. This ranking system gives attributes equal representation in the resource value and risk scores for each watershed. Continuous attributes, including anadromous stream miles, sport fish effort, subsistence/personal use harvest, timber harvest area, road density, and urbanized area, were ranked on a linear scale, with the lowest observed value assigned a score of 0, the highest observed value assigned a score of 1, and remaining intermediate values defined by linear regression parameters.<sup>5</sup>

Categorical indicator attributes were assigned values of one or zero based on presence or absence, respectively. Attributes having intermediate values were scored by linear regression except land ownership, which was scored in the following manner:

Land ownership:

Owner	Score
Federal	0.0
State	0.5
Municipal	1.0
Private	1.0

#### **Ranking Watersheds**

Final resource value scores for each watershed were calculated as the sum of the individual resource value attribute scores divided by the number of attributes used in the calculation (i.e., the final score = the mean of the individual scores, ranging from 0-1). Final risk scores for watersheds were calculated in the same way. Using the means of the scores rather than the sums of the scores accounts for watersheds that have data missing for particular attributes. In this way, the number of attributes used in the calculations does not influence final scores. Similarly, as new attributes are added in the future, new final scores can be compared to previous scores based on the same normalized range of zero to unity. The final

<sup>3</sup> Alaska Department of Environmental Conservation.

<sup>4</sup> ADF&G, Sport Fish Division, Brian Frenette, Project Leader.

<sup>5</sup> A treatment of this method is given by the State of Kentucky Department of Environmental Protection ([Ormsbee and Colten 1999](#)).

result of this scoring system was a list of all watersheds ranked by resource value and a list of all watersheds ranked by risk.

### **ADF&G Staff Scoping**

The watershed assessment was summarized and presented in an ArcGIS®-based [interactive watershed map](#), printed maps, and in spreadsheets. This information is being provided as a tool for ADF&G area staff and others to use, in combination with their own knowledge and expertise of resource values and risks, to identify watersheds they consider most in need of instream flow protection. A pilot test was conducted with Juneau area staff to evaluate the most effective, efficient method for soliciting staff input. Results from this evaluation were used to develop a protocol for scoping staff from all management areas in Southeast Alaska. Staff priorities will be used in combination with the watershed assessment to develop a prioritized list of watersheds for instream flow assessments and reservations. This list will be used for performing instream flow assessments in the second project.

## **RESULTS AND DISCUSSION**

Sustaining the integrity of riverine habitats and their biotic communities will require a management approach that works with watershed processes that form and maintain stable river systems ([NRC 1992](#); [Rosgen 1996](#); [Kauffman et al. 1997](#); [Roper et al. 1997](#)). A major component of this approach must focus on protecting and/or restoring sufficient amounts of water in rivers and lakes that are in equilibrium with geomorphic and other watershed characteristics and functions and capable of meeting biologic demands. Adhering to this approach becomes increasingly difficult when the number and types of water use demands placed on water bodies increase.

Unlike the rest of the country, most of Alaska's rivers are still free flowing and support healthy salmon stocks. Because of its infancy as the 49th state, Alaska's overall stage of water development is similar to that of the Lower 48 states 150 years ago. Alaskans are uniquely situated to take advantage of their state's early stages of resource and population development, as well as the sound basis in their instream flow laws, to ensure enough water is retained in rivers and lakes to sustain salmon production.

In Alaska, we often must assess instream flow needs given a great deal of uncertainty. Site-specific fisheries, hydrologic, and habitat capability and condition information in the region is often lacking. The risks of over-assessing priority needs for watersheds and water bodies could lead to inappropriately assigning agency resources toward providing unnecessary protection measures. Under-assessment of risk leads to potential under-protection and resource degradation. This framework, because it is knowledge based and expert driven, allows us to optimize allocation of agency resources to the aquatic habitats most in need of regulatory or programmatic protection. Additional background pertaining to the limitations, status of, and challenges specific to instream flow protection in Alaska are summarized in [Estes \(1998; 2001\)](#).

The watershed assessment appeared to accurately identify watersheds with high resource values, as well as watersheds with habitat at risk from land use and water use practices. Table 2 displays the top 100 ranked watersheds in Southeast Alaska. Tables 3 and 4 display regional resource value and risk analysis scores and variables, respectively, for the top 100 ranked watersheds. The top ranked watersheds for resource value are well known for their valuable salmon fisheries (e.g., the Chilkat,

Situk, Taku, Unuk, Stikine, and Alsek watersheds). Watersheds with high risk scores were generally in areas with intensive timber harvest and high road density, such as on Prince of Wales Island (e.g., Klawock, Staney, Harris, and Maybeso). Watersheds with low risk scores were typically in areas under congressionally designated federal protection, such as those watersheds within the Admiralty and Misty Fjords National Monuments.

The watershed assessment was summarized and presented in an [interactive watershed map](#). The ArcGIS®-based map provides a spatial display of the resource value and risk rankings, as well as the information used to develop the rankings. This map can be accessed by staff through the intranet and can be used without any special software or prior experience with GIS. The interactive map allows the user to move around the map and zoom in and out to areas of interest, to control what resource value and risk attributes are displayed, and to look at and query the data behind the map. Figures 5 and 6 show examples of watershed maps (Harris River on Prince of Wales Island) with coded resource value and risk ranks, AWC and Class I streams, timber harvest, land ownership, roads, hydroelectric projects, and U.S. Geological Survey streamflow gages.

This interactive map, along with printed maps and spreadsheets, are being provided as a tool for area staff to use in identifying water bodies most in need of instream flow protection. A pilot test was conducted with Juneau area staff to evaluate the most effective, efficient method for soliciting staff input. They reported that the interactive map and spreadsheets were very useful to them in identifying their priorities. Staff priorities will be used in combination with the watershed assessment to develop a prioritized list of watersheds for instream flow assessments and reservations

### Annual Work Plan

Results from the watershed assessment and staff scoping will be used to develop annual work plans. Work plan development will begin the Instream Flow Reservation project. The goal of this second project is to quantify, prepare, and submit applications to reserve water for important salmon-producing water bodies. Work plans will identify the final priority list of water bodies for which site-specific instream flow needs will be assessed and reservation applications will be submitted.

Final selection of water bodies and portions of water bodies to be reserved will be made by SARCU staff based on:

- Water bodies identified by staff;
- Importance of water bodies to salmon production;
- Competing out-of-stream uses of water;
- Water bodies in the 1984 Instream Flow Work Plan;
- Availability of biologic and hydrologic data needed for quantifying instream flows (e.g., stream gage and fish periodicity data); and
- Availability and effectiveness of other state and federal programs and mechanisms for protecting or reserving instream flows.

Considerations for work plan development will also include logistics; priorities identified by the State of Alaska ACWA (Alaska's Clean Water Actions) initiative; inter-departmental agreements pertaining to resource management; impending regulatory actions affecting instream flow, aquatic and riparian habitat, and watershed land use; and recommendations by other state and federal agencies, local community groups, watershed councils, non-governmental organizations, and others. Final selection of water bodies for instream flow reservations

will be summarized and provided to staff annually in workplan updates.

Agency staffing schedules and funding will determine specific work plan targets on a fiscal year basis. Partnerships that can enhance our ability to meet project objectives will be emphasized with other Sustainable Salmon projects, departmental programs, and agencies.

## RECOMMENDATIONS

We recommend that this framework be built upon as additional existing information is identified and as new information becomes available and usable. New information could be incorporated into the framework to 1) increase the capability of future iterative assessments of instream flow needs for salmon-producing water bodies, 2) evaluate priorities and assess needs for other instream uses for which reservations of water can be acquired, and 3) address functional processes that strongly govern salmonid production (Figure 2). Infrastructure will be needed to document and archive the decision support system and to allow periodic updates of watershed rankings.

Expert systems must also continue to be an integral part of the process in order to provide the essential element of verification through professional expert review. Integrating staff scoping into the knowledge-based framework also creates a fully embedded system<sup>6</sup> that may focus on a more problem-oriented approach to resolving priority needs. Area staff can carefully consider the interests of respective communities, bringing home the choice for prioritization, thus allowing community-based action, an important public involvement component of water policy implementation ([Baron, et al. 2002](#); [Instream Flow Council 2002](#)).

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<sup>6</sup> See, for example, [McKinney, et al. \(1993\)](#).

The goal of the combined analytical and expert approach is to make the prioritization process credible, transparent, accessible, and durable. This will allow the needs assessment, prioritization process, and instream flow reservation program to be carried into the future and be robust with respect to staff turnover, program trends, and administrative shifts. The database of regional instream flow needs developed and maintained by this project could serve as a foundation for a more comprehensive aquatic resource management information and decision support system.

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Figure 1.—Fourth order hydrologic units, Southeast Alaska from Cape Suckling (northwest) to Dixon Entrance (southeast).

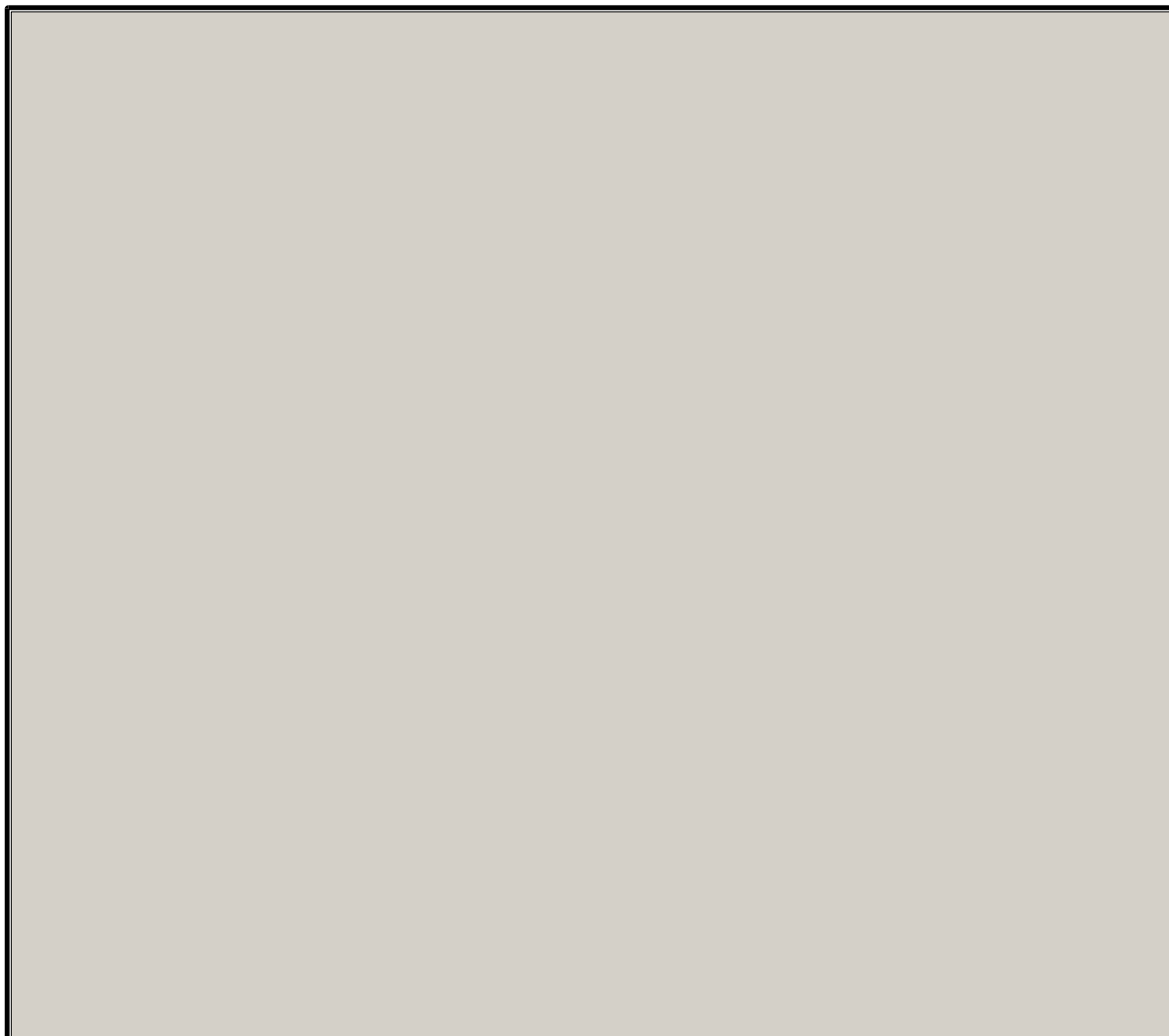


Figure 2.—Linkages among watershed functional processes governing salmon production.

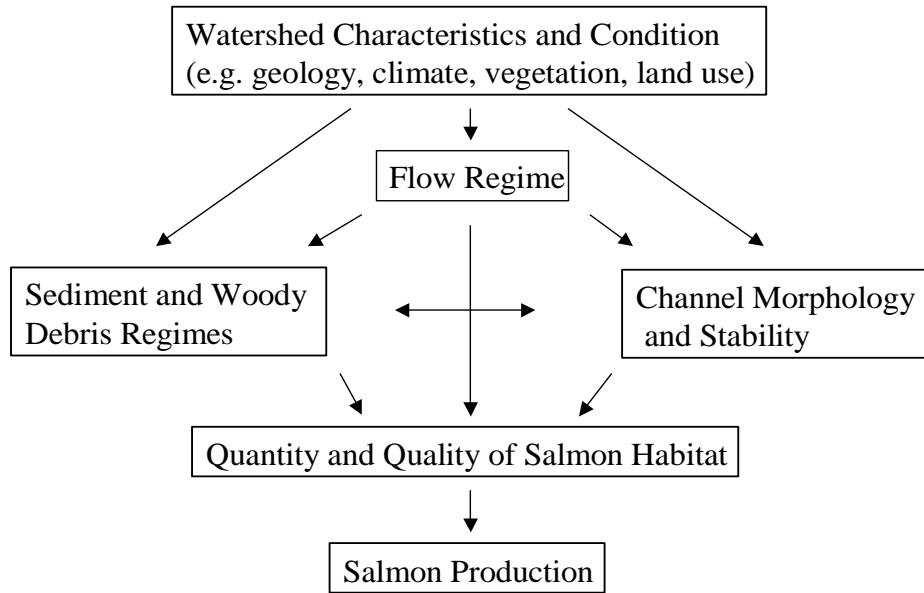


Figure 3.—Example of a sixth-order hydrologic unit (true watershed) and associated fourth-order stream network — Thorne River system on Prince of Wales Island, Southeast Alaska.

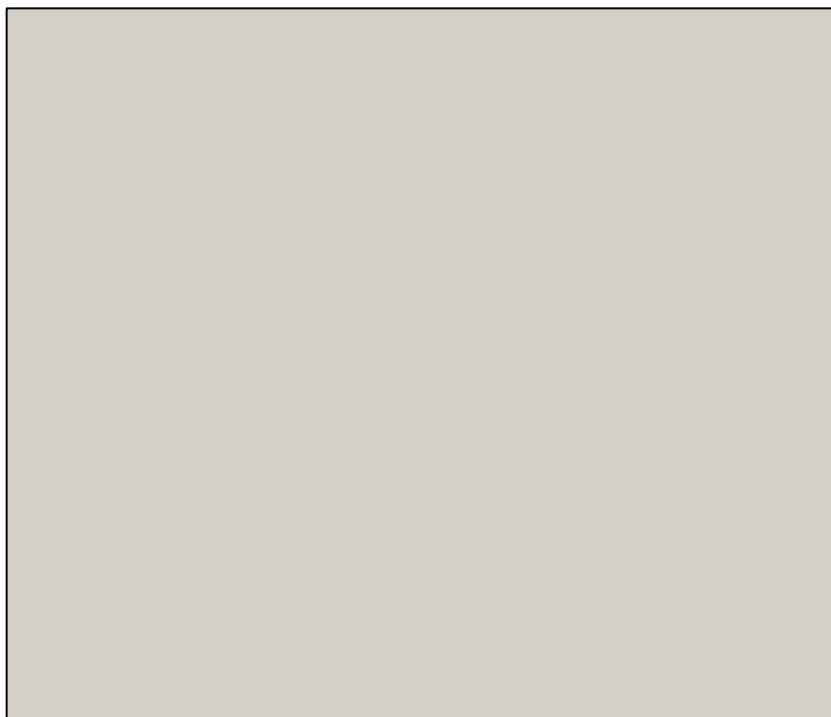


Figure 4.–Process for prioritizing watersheds for instream flow assessment and reservations.

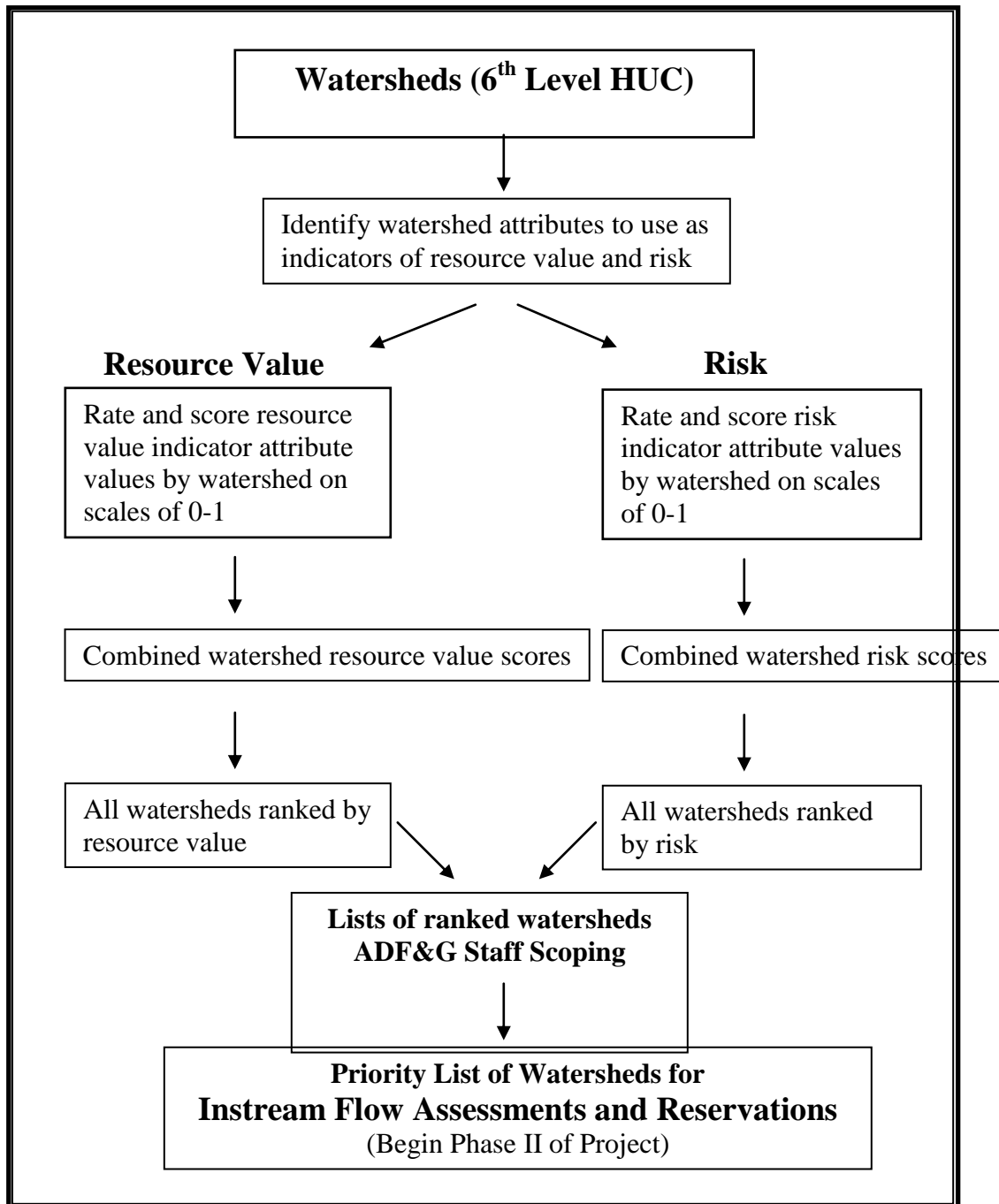


Figure 5.—Watersheds surrounding Harris River, Prince of Wales Island, Southeast Alaska coded by relative resource value rank.



Figure 6.—Watersheds surrounding Harris River, Prince of Wales Island, Southeast Alaska coded by relative risk rank.

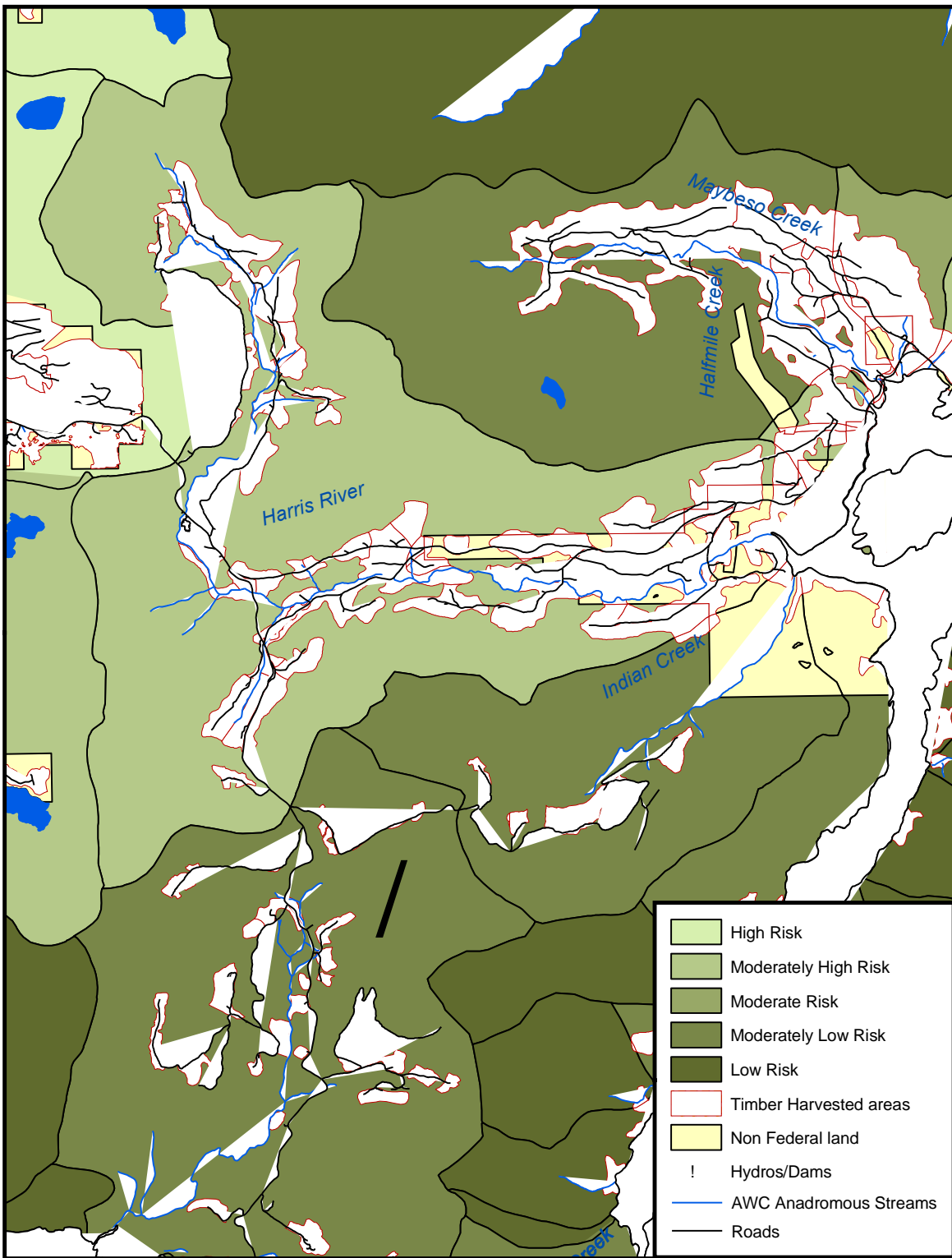


Table 1.–Attributes used to prioritize salmon producing water bodies for instream flow assessment and reservations of water.

ATTRIBUTE	SOURCE	FILE ARCHIVE	DATA TYPE
<b>Watershed Scale Assessment</b>			
6th level HUCs	FS/ECOTRUST	HUC56_4645_SE_SP83.shp	Polygon shapefile
<b>Resource Value</b>			
<b>Coarse Scale</b>			
Miles of anadromous water bodies			
1) AWC	ADF&G	AWC_SE_SP27.shp	Polyline shapefile
2) Class 1	USDA FS	AHMU_CLASS1STREAMS_TONGASS_SP27.shp	Polyline shapefile
<b>Fine Scale</b>			
Number of salmon species present	ADF&G	Core_Data\sea2002d	Point shapefile
Chinook & sockeye salmon presence	ADF&G	Core_Data\sea2002d	Point shapefile )
Personal use harvest	ADF&G	Data Query RIR 1J00-XX	Alexander (ADF&G)
Sport fish effort	ADF&G	SWHS_SE_SP27.shp	Polyline shapefile
Presence/absence of ADF&G Index and stock assessment streams	ADF&G	Data Query (Staff)	Alexander (ADF&G)
<b>Risk Analysis</b>			
<b>Coarse Scale</b>			
Land ownership	USDA FS ADNR	LAND_OWNERSHIP_TONGASS_SP27.shp	Polygon shapefile
Acres of timber harvest	USDA-FS USGS ADNR	TIMBER_HARVEST2001_SE_SP27.shp	Polygon shapefile
Miles of road	USDA-FS ADNR	ALLRDS_HUC56	Polyline shapefile
Urban areas	USDA FS	URBAN_SE_SP27.shp	Polygon coverage
<b>Fine Scale</b>			
Presence/absence of dams and hydroelectric projects		RURAL_HYDRO_SE_SP27.shp	Point shapefile
Division of H&R Coarse Assessment	ADF&G	COARSE_ASSESSMENT_02_HUCS_SP27.shp	Polygon shapefile
DEC List of Impaired Waters	ADEC	IMPAIRED_FW_SE_SP27.shp	Polyline shapefile
Aquaculture Facilities	ADF&G	HATCHERIES_SE_SP27.shp	Point shapefile

Table 1.–Top 100 regionally ranked watersheds for instream flow priorities in Southeast Alaska.

<b>Mainstem River System</b>	<b>Resource Value Rank</b>	<b>Risk Rank</b>
Chilkat River	1	3
Situk River	2	884
East Alsek River	3	588
Taku River	4	1931
Unuk River	5	2005
Itallo River	6	674
Stikine River	7	2609
Alsek River	8	1582
Klahini River	9	2839
Akwe River	10	684
Chickamin River	11	2049
Thorne River	12	1063
Ahrnklin River	13	1005
Doame River	14	1653
Karta River	15	1934
East Fork Bradfield River	16	1675
Neka River	17	1451
Harding River	18	2052
Farragut River	19	2030
Naha River	20	1958
Blossom River	21	1944
Sitkoh Creek	22	1086
Wolverine Creek	23	2018
Anan Creek	24	2095
Sylvia Creek	25	1319
Ketchikan Creek	26	60
Tom Creek	27	3134
Marten River	28	2964
Sweetheart Creek	29	2246
Eagle Creek	30	793
Hatchery Creek	31	900
Chilkoot River	32	32
Bradfield Canal	33	1978
Keta River	34	1859
Klawock River	35	1
Farragut Bay	36	800
Grant Creek	37	2835
Carroll Creek	38	1345
King Salmon River	39	2061
Auke Creek	40	41
Berners River	41	2134
Chuck Creek	42	251

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Table 2.–Page 2 of 3.

Mainstem River System	Resource Value Rank	Risk Rank
Short Creek	43	2841
Lost River	44	452
Kunayosh Creek	45	1900
Williams Creek	46	563
Chichagof Creek	47	1289
Thoms Creek	48	1245
Ford Arm	49	2394
Kutlaku Creek	50	1693
Kegan Creek	51	1781
Seal River	52	1827
Gut Bay	53	2721
Salmon Creek	54	1864
*Geek Creek	55	1158
Kook Creek	56	1104
Klakas Creek	57	3541
Shiple Creek	58	3203
Mendenhall River	59	240
Petersburg Creek	60	1855
Eva Creek	61	2453
Alecks Creek	62	2083
Politofsky Creek	63	1470
Oerns Creek	64	3131
Dog Salmon Creek	65	649
Pavlof River	66	1129
Hetta Creek	67	512
Emile Creek	68	1044
Cabin Slough	69	1041
Tuneheah Creek	70	1804
Hunter Bay	71	3610
Muddy Creek	72	1329
Wheeler Creek	73	1574
North Fork Freshwater Creek	74	1348
Mud Bay River	75	1592
Harris River	76	174
Maybeso Creek	77	924
Salt Chuck	78	2436
Kah Sheets Creek	79	1889
Lisianski River	80	2316
Southern tip Kuiu Island	81	1935
*Neva Creek	82	1277
Kushneahin Creek	83	2046
Golding Creek	84	2313
Eagle River	85	2078

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Table 2.–Page 3 of 3.

<b>Mainstem River System</b>	<b>Resource Value Rank</b>	<b>Risk Rank</b>
Lucky Cove	86	1882
Nutkwa Creek	87	2072
Saginaw Creek	88	874
Black Creek	89	50
Ratz Creek	90	794
Salt Creek	91	1091
Nawkwasina River	92	277
Bartholomew Creek	93	2966
Margaret Creek	94	701
Old Tom Creek	95	2036
Big Creek	96	311
South Arm	97	3586
Badger Creek	98	2026
Crab Creek	99	49
Shrew Creek	100	3057

Table 3.—Resource value scores and variables for the top 100 regionally ranked watersheds for instream flow priorities in Southeast Alaska.

<b>Mainstem River System</b>	<b>Final Resource Value Score</b>	<b>AWC Miles</b>	<b>AHMU Miles</b>	<b>SF Harvest (Angler days/yr)</b>	<b>Subs/Per Use Catch/Yr</b>	<b>Subs/Per Use Years of Record</b>	<b>Pink/Chum Index Stream</b>	<b>Stock Assessment Stream</b>	<b>Salmon Species Present</b>	<b>Chinook Present</b>	<b>Sockeye Present</b>	<b>Watershed Area (sq_mi)</b>
Chilkat River	0.90	184	NA	2995	4078	30	YES	YES	5	YES	YES	707
Situk River	0.72	87	92	14521	4500	13	NO	YES	5	YES	YES	68
East Alsek River	0.69	19	NA	1118	179	15	YES	YES	5	YES	YES	30
Taku River	0.68	47	133	0	1286	15	YES	YES	5	YES	YES	5.4
Unuk River	0.65	60	147	0	0	0	YES	YES	5	YES	YES	337
Italio River	0.63	43	105	1176	0	0	YES	YES	5	YES	YES	55
Stikine River	0.62	99	295	1089	0	0	NO	YES	5	YES	YES	572
Alsek River	0.56	42	NA	0	199	13	NO	YES	5	YES	YES	152
Klahini River	0.56	2.9	16	0	0	0	YES	YES	5	YES	YES	60
Akwe River	0.56	67	126	0	153	12	NO	YES	5	YES	YES	67
Chickamin River	0.56	101	205	0	0	0	YES	YES	4	YES	NO	590
Thorne River	0.55	113	280	3713	120	16	YES	NO	4	NO	YES	166
Ahrnklin River	0.53	151	202	0	166	13	NO	NO	5	YES	YES	113
Doame River	0.52	35	NA	0	0	0	NO	YES	5	YES	YES	59
Karta River	0.52	21	60	1513	1190	18	YES	YES	4	NO	YES	61
East Fork Bradfield River	0.50	34	88	0	0	0	YES	NO	5	YES	YES	339
Neka River	0.49	8.3	19	0	40	16	YES	NO	5	YES	YES	34
Harding River	0.49	22	33	0	16	8	YES	NO	5	YES	YES	69
Farragut River	0.48	25	67	0	0	0	YES	NO	5	YES	YES	110
Naha River	0.47	9.3	43	893	43	9	YES	YES	4	NO	YES	47
Blossom River	0.47	29	81	0	0	0	YES	YES	4	YES	NO	189
Sitkoh Creek	0.47	3.5	16	0	228	16	YES	YES	4	NO	YES	19

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Table 3.–Page 2 of 4.

Mainstem River System	Final Resource Value Score	AWC Miles	AHMU Miles	SF Harvest (Angler days/yr)	Subs/Per Use Catch/Yr	Subs/Per Use Years of Record	Pink/Chum Index Stream	Stock Assessment Stream	Salmon Species Present	Chinook Present	Sockeye Present	Watershed Area (sq_mi)
Wolverine Creek	0.47	4.8	40	929	7134	18	NO	NO	5	YES	YES	55
Anan Creek	0.47	12	26	900	0	0	YES	NO	5	YES	YES	55
Sylvia Creek	0.46	16	26	0	0	0	YES	NO	5	YES	YES	70
Ketchikan Creek	0.46	3.3	8.6	1381	132	1	NO	YES	5	YES	YES	14
Tom Creek	0.46	9.1	14	0	0	0	YES	NO	5	YES	YES	30
Marten River	0.45	24	49	0	0	0	YES	YES	4	YES	NO	142
Sweetheart Creek	0.45	0.7	17	0	2536	10	YES	YES	3	NO	YES	36
Eagle Creek	0.45	12	30	653	71	2	YES	YES	4	NO	YES	30
Hatchery Creek	0.45	81	225	789	0	0	NO	YES	4	NO	YES	119
Chilkoot River	0.45	18	NA	8829	57	4	NO	YES	4	NO	YES	130
Bradfield Canal	0.45	1.4	1.2	0	0	0	YES	NO	5	YES	YES	3.4
Keta River	0.44	19	30	0	0	0	YES	YES	4	YES	NO	82
Klawock River	0.44	41	48	1653	3746	18	YES	NO	4	NO	YES	49
Farragut Bay	0.44	0	0	0	0	0	YES	NO	5	YES	YES	0.3
Grant Creek	0.44	19	25	0	0	0	YES	YES	4	YES	NO	74
Carroll Creek	0.44	4.5	24	0	17	3	YES	YES	4	YES	NO	42
King Salmon River	0.43	7.1	17	0	0	0	YES	YES	4	YES	NO	36
Auke Creek	0.42	2.3	2.7	0	0	0	YES	YES	4	NO	YES	8.1
Berners River	0.42	15	38	0	0	0	YES	YES	3	NO	YES	47
Chuck Creek	0.41	1.5	7.0	0	11	3	YES	YES	3	NO	YES	2.9
Short Creek	0.41	8.0	15	0	0	0	YES	YES	3	NO	YES	23
Lost River	0.41	67	51	1438	110	21	NO	YES	3	NO	YES	45
Kunayosh Creek	0.39	54	69	0	0	0	NO	NO	5	YES	YES	25
Williams Creek	0.38	32	64	0	0	0	NO	NO	5	YES	YES	42
Chichagof Creek	0.37	5.6	6.8	0	1042	18	YES	NO	4	NO	YES	8.8
Thoms Creek	0.37	9.0	17	0	303	18	YES	NO	4	NO	YES	17

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Table 3.–Page 3 of 4.

Mainstem River System	Final Resource Value Score	AWC Miles	AHMU Miles	SF Harvest (Angler days/yr)	Subs/Per Use Catch/Yr	Subs/Per Use Years of Record	Pink/Chum Index Stream	Stock Assessment Stream	Salmon Species Present	Chinook Present	Sockeye Present	Watershed Area (sq_mi)
Ford Arm	0.36	6.6	8.1	0	314	18	YES	NO	4	NO	YES	9.8
Kutlaku Creek	0.36	1.5	4.8	0	700	18	YES	NO	4	NO	YES	8.0
Kegan Creek	0.36	4.7	15	0	86	18	YES	NO	4	NO	YES	9.0
Seal River	0.36	14	NA	0	0	0	NO	NO	4	YES	YES	405
Gut Bay	0.36	1.7	3.8	0	440	18	YES	NO	4	NO	YES	6.0
Salmon Creek	0.36	7.3	6.4	0	194	17	YES	NO	4	NO	YES	12
*Geek Creek	0.36	3.2	12	0	90	17	YES	NO	4	NO	YES	12
Kook Creek	0.36	8.2	18	0	525	22	YES	NO	3	NO	YES	22
Klakas Creek	0.35	3.9	9.9	0	74	16	YES	NO	4	NO	YES	12
Shipley Creek	0.35	1.0	8.5	0	217	15	YES	NO	4	NO	YES	6.6
Mendenhall River	0.35	26	22	1642	0	0	NO	YES	4	NO	YES	106
Petersburg Creek	0.35	16	39	1501	0	0	YES	NO	4	NO	YES	41
Eva Creek	0.35	8.6	9.3	0	68	11	YES	NO	4	NO	YES	18
Alecks Creek	0.35	10	17	0	86	9	YES	NO	4	NO	YES	13
Politofsky Creek	0.35	4.3	8.2	0	67	12	YES	NO	4	NO	YES	12
Oerns Creek	0.35	21	57	0	0	0	YES	NO	4	YES	NO	112
Dog Salmon Creek	0.34	8.5	11	0	60	10	YES	NO	4	NO	YES	14
Pavlof River	0.34	10	20	0	64	8	YES	NO	4	NO	YES	25
Hetta Creek	0.34	5.0	5.7	0	119	11	YES	NO	4	NO	YES	9.7
Emile Creek	0.34	5.2	14	0	0	0	NO	NO	5	YES	YES	15
Cabin Slough	0.34	4.5	12	0	0	0	NO	NO	5	YES	YES	19
Tuneheah Creek	0.34	24	36	0	0	0	YES	NO	4	NO	YES	37
Hunter Bay	0.34	13	54	0	0	0	YES	NO	4	NO	YES	28
Muddy Creek	0.34	44	62	0	0	0	NO	NO	3	YES	YES	147
Wheeler Creek	0.34	20	32	0	150	1	YES	NO	4	YES	NO	59
North Fork Freshwater Creek	0.34	20	37	0	0	0	YES	NO	4	YES	NO	47
Mud Bay River	0.33	15	38	0	0	0	YES	NO	4	NO	YES	52

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Table 3.–Page 4 of 4.

Mainstem River System	Final Resource Value Score	AWC Miles	AHMU Miles	SF Harvest (Angler days/yr)	Subs/Per Use Catch/Yr	Subs/Per Use Years of Record	Pink/Chum Index Stream	Stock Assessment Stream	Salmon Species Present	Chinook Present	Sockeye Present	Watershed Area (sq_mi)
Harris River	0.33	20	27	865	18	7	YES	YES	3	NO	NO	30
Maybeso Creek	0.33	5.8	12	0	149	15	YES	YES	3	NO	NO	14
Salt Chuck	0.33	8.2	32	0	0	0	YES	NO	4	NO	YES	80
Kah Sheets Creek	0.33	6.3	25	422	0	0	YES	NO	4	NO	YES	17
Lisianski River	0.33	5.5	16	0	23	3	YES	NO	4	NO	YES	22
Southern tip Kuiu Island	0.33	11	21	0	0	0	YES	NO	4	NO	YES	57
*Neva Creek	0.33	2.0	3.1	0	383	13	YES	NO	3	NO	YES	19
Kushneahin Creek	0.33	11	19	0	0	0	YES	NO	4	NO	YES	18
Golding Creek	0.32	1.5	33	0	0	0	YES	NO	4	NO	YES	32
Eagle River	0.32	6.8	24	0	0	0	YES	NO	4	YES	NO	65
Lucky Cove	0.32	8.4	21	0	0	0	YES	NO	4	NO	YES	25
Nutkwa Creek	0.32	7.7	21	0	0	0	YES	NO	4	NO	YES	26
Saginaw Creek	0.32	6.8	13	0	104	1	YES	NO	4	NO	YES	13
Black Creek	0.32	7.2	11	353	0	0	YES	NO	4	NO	YES	18
Ratz Creek	0.32	4.9	20	0	0	0	YES	NO	4	NO	YES	17
Salt Creek	0.32	7.7	15	0	0	0	YES	NO	4	NO	YES	15
Nawkwasina River	0.32	9.1	12	0	0	0	NO	YES	4	NO	YES	33
Bartholomew Creek	0.32	4.0	5.8	0	12	2	YES	NO	4	NO	YES	9.6
Margaret Creek	0.32	6.0	14	0	0	0	YES	NO	4	NO	YES	19
Old Tom Creek	0.32	2.9	5.5	0	41	2	YES	NO	4	NO	YES	6.5
Big Creek	0.32	4.3	14	0	0	0	YES	NO	4	NO	YES	12
South Arm	0.32	4.0	13	0	0	0	YES	NO	4	NO	YES	10
Badger Creek	0.32	6.6	8.2	0	0	0	YES	NO	4	NO	YES	23
Crab Creek	0.32	7.6	5.1	0	0	0	YES	NO	4	NO	YES	12
Shrew Creek	0.32	4.2	8.6	0	104	7	YES	NO	4.0	NO	YES	15

Table 4.—Risk analysis scores and variables for the top 100 regionally ranked watersheds for instream flow priorities in Southeast Alaska. Sites marked with \* indicate no AWC streams in the HUC.

Site Description	Final Risk Score	Urban (%)	Timber Harvest (%)	Federal Owned (%)	State Owned (%)	Private /City (%)	Hydro or Dam Present	Hatchery Present	Impaired Water	Coarse Assessment Score	Road Density (mi/sq_mi)	Watershed Area (sq_mi)
103-60-10470	0.50	0.3	37	26	9.0	65	YES	YES	NO	0.7	2.1	49
111-40-10150	0.49	0.3	0	6.1	0	94	YES	YES	YES	0	0.01	9.8
115-32-10250	0.48	0	3.5	38	56	6.1	YES	YES	YES	0.02	NA	707
101-23-10790	0.42	0	6.8	0	0	100	YES	YES	NO	0.3	0	134
109-42-10040	0.42	0	39	8.7	0	91	NO	YES	NO	1.0	0.9	15
114-31-10090	0.40	0.7	16	24	0	76	YES	NO	YES	0.2	1.1	20
103-60-10297	0.40	0	82	2.1	0	97	NO	NO	NO	1.0	5.2	0.9
102-60-10970	0.40	0	30	27	8.8	64	YES	NO	YES	0.2	0.3	32
111-50-10490	0.40	20	0	0	0	100	NO	NO	YES	0.7	1.8	3.0
115-32-10300	0.39	1.7	1.8	2.6	60	37	YES	NO	YES	0.01	NA	41
106-44-10010	0.38	7.7	0	0	16	83	YES	NO	YES	0	0	1.6
101-47-10300	0.38	6.6	0	18	13	68	YES	NO	YES	0	1.8	7.4
115-34-10300	0.37	2.6	0	0.01	83	9.2	YES	NO	YES	0.01	NA	35
111-50-10620	0.36	34	0	44	0	53	NO	NO	YES	0.6	0.9	4.2
103-60-10210	0.36	0	88	12	0	88	NO	NO	NO	0.8	3.7	3.7
110-33-10060	0.36	0	76	11	0	89	NO	NO	NO	1.0	3.1	2.7
109-42-10010	0.35	0	84	0	0	100	NO	NO	NO	1.0	0.2	13
110-33-10050	0.35	0	81	18	0	82	NO	NO	NO	1.0	2.2	3.2
110-17-10050	0.35	0	79	0.01	0	100	NO	NO	NO	1.0	0	4.2
109-42-10040	0.34	0	40	0	0	100	NO	NO	NO	0.9	4.7	0.07
111-40-10125	0.34	33	0	0	3.6	92	NO	NO	YES	0.07	0.7	2.2
109-42-10030	0.34	0	71	0	0	100	NO	NO	NO	1.0	0.08	5.1
110-17-10040	0.34	0	75	0	0	98	NO	NO	NO	1.0	0	2.0
114-27-10350	0.33	2.8	23	0.09	0	100	YES	NO	NO	0.2	1.4	8.9
101-90-10100	0.33	0	22	100	0	0	YES	YES	NO	0.3	0.9	14
110-34-10012	0.33	0	64	8.6	0	91	NO	NO	NO	0.9	2.2	2.0
115-33-10200	0.32	0	0.09	45	50	0.6	YES	NO	YES	0.01	NA	130
110-17-10069	0.32	0	62	0.5	0	99	NO	NO	NO	1.0	0	7.4
103-60-10090	0.32	0	42	0.4	0	100	NO	NO	NO	0.9	3.0	2.0
102-60-10578	0.32	0	90	0	0	100	NO	NO	NO	0.7	0	1.0
Big Salt L str	0.31	0	94	0	0	100	NO	NO	NO	0.3	3.2	0.7
110-33-10034	0.31	0	48	1.7	0	98	NO	NO	NO	0.9	2.2	8.4

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Table 4.–Page 2 of 3.

Site Description	Final Risk Score	Urban (%)	Timber Harvest (%)	Federal Owned (%)	State Owned (%)	Private /City (%)	Hydro or Dam Present	Hatchery Present	Impaired Water	Coarse Assessment Score	Road Density (mi/sq_mi)	Watershed Area (sq_mi)
111-50-10420	0.31	3.8	0	72	0	28	NO	YES	YES	0.1	0.4	8.1
101-47-10165	0.31	19	4.2	1.3	0	99	YES	NO	NO	0	1.2	7.0
102-60-10560	0.31	0	88	5.9	0	94	NO	NO	NO	0.7	0	0.9
110-33-10083	0.30	0	49	22	0	78	NO	NO	NO	1.0	2.6	2.8
Portage Bay stream*	0.30	0	42	0	0	97	NO	NO	NO	0.9	1.3	0.5
114-23-10298	0.30	0	72	0	0	100	NO	NO	NO	0.3	4.8	1.0
103-60-10480	0.30	4.8	69	0	0	100	NO	NO	NO	0.4	3.4	12
103-60-10310	0.30	0	33	43	1.6	55	YES	NO	NO	0.4	1.4	18
103-60-10230	0.29	0	83	3.3	0	96	NO	NO	NO	0.3	3.2	5.8
109-42-10041	0.29	0	54	26	0	74	NO	NO	NO	1.0	0.8	3.0
113-41-10190	0.29	3.2	0	69	18	13	YES	YES	NO	0	0.2	12
102-50-10050	0.29	0	76	11	2.0	88	NO	NO	NO	0.7	0	1.9
102-70-10400	0.29	0	48	0	0.1	100	NO	NO	NO	0.6	2.3	3.0
103-25-10280	0.28	0	74	10	0	90	NO	NO	NO	0.6	0	2.4
110-17-10020	0.28	0	30	0	0	100	NO	NO	NO	1.0	0	2.1
101-47-10250	0.28	2.3	0	80	0.02	20	YES	YES	NO	0	0.2	14
106-44-10030	0.28	9.0	8.6	11	0.03	88	NO	NO	YES	0	1.5	6.3
110-33-10160	0.28	0	50	29	0	71	NO	NO	NO	0.9	2.2	9.4
103-25-10230	0.27	0	95	0	0	100	NO	NO	NO	0.2	0.7	1.6
106-44-10100	0.27	0	7.6	91	8.8	0	YES	YES	NO	0	0.7	16
103-21-10480	0.27	0	50	0	0	100	NO	NO	NO	0.7	0	3.8
102-70-10280	0.27	0	52	7.1	0	93	NO	NO	NO	0.5	2.9	4.0
102-70-10300	0.27	0	49	24	0	76	NO	NO	NO	0.7	2.9	2.2
Tolstoi Mt stream*	0.26	0	53	6.5	0	93	NO	NO	NO	0.2	6.0	0.8
Port Johnson stream*	0.26	0	57	12	0	88	NO	NO	NO	0.6	0	1.0
101-45-10590	0.26	0	82	4.7	0	95	NO	NO	NO	0.3	0	1.9
111-50-10350	0.26	41	0	0	0	100	NO	NO	NO	0	3.9	0.06
102-60-10500	0.26	0	80	8.2	0	92	NO	NO	NO	0.3	0.4	1.2
103-90-10562	0.26	0	73	25	25	50	NO	NO	NO	0.3	4.8	0.3
114-34-10200	0.25	0	51	0	0	100	NO	NO	NO	0.3	2.5	18
Survey Cove stream*	0.25	0	88	0	100	0	NO	NO	NO	0.3	4.1	0.4
111-33-10300	0.25	0	0	97	2.6	0	YES	YES	NO	0	0.02	242
103-25-10150	0.25	0	61	0	0	100	NO	NO	NO	0.4	0	4.2

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Table 4.–Page 3 of 3.

Site Description	Final Risk Score	Urban (%)	Timber Harvest (%)	Federal Owned (%)	State Owned (%)	Private /City (%)	Hydro or Dam Present	Hatchery Present	Impaired Water	Coarse Assessment Score	Road Density (mi/sq_mi)	Watershed Area (sq_mi)
103-60-10430	0.25	12	39	1.4	0.3	98	NO	NO	NO	0.2	2.7	5.8
110-17-10010	0.25	0	3.5	0	0	100	NO	NO	NO	1.0	0	2.7
109-10-10020	0.25	0	0	100	0	0.2	YES	YES	NO	0	0	4.4
Burnett Creek*	0.25	0	0	100	0	0	YES	YES	NO	0	0	7.1
Tenakee Sp stream*	0.25	0	0	1.3	0	99	YES	NO	NO	0	0	2.0
103-40-10410	0.25	0	8.9	17	0	83	YES	NO	NO	0.03	0.4	10
103-60-10592	0.25	0	52	21	0	79	NO	NO	NO	0.4	3.3	4.8
102-70-10380	0.25	0	40	28	0	72	NO	NO	NO	0.7	2.5	2.4
Gold Creek	0.25	0.5	0	4.8	0	95	YES	NO	NO	0	0	10
103-60-10570	0.24	0	72	0	0	100	NO	NO	NO	0.2	0.1	1.5
Kina Cove stream*	0.24	0	55	0.7	0	99	NO	NO	NO	0.3	1.0	0.7
113-41-10170	0.24	14	0	57	5.9	37	NO	NO	YES	0	3.4	11
103-40-10350	0.24	0	47	0	0	100	NO	NO	NO	0.4	0.1	10
103-60-10330	0.24	0	64	0	0	100	NO	NO	NO	0	3.7	1.9
101-45-10460	0.24	0	58	0	4.0	96	NO	NO	NO	0.3	0.2	2.6
111-40-10280	0.23	0	0	14	0	86	NO	YES	NO	0	0.2	6.1
110-33-10080	0.23	0	0	45	42	0	NO	NO	NO	0.7	1.6	7.4
103-25-10152	0.23	0	0	48	0	0	NO	NO	NO	0.4	0	1.7
102-70-10320	0.23	0	0	26	23	0	NO	NO	NO	0.7	2.1	1.1
102-70-10150	0.23	0	0	50	0	0	NO	NO	NO	0.3	0	3.0
102-50-10070	0.23	0	0	51	20	0	NO	NO	NO	0.5	0.07	3.8
103-60-10070	0.23	0	0	28	37	0	NO	NO	NO	0.8	1.6	3.0
102-60-10563	0.22	0	0	52	16	0	NO	NO	NO	0.4	0	7.4
102-40-10330	0.22	0	0	76	20	12	NO	NO	NO	0.3	0	2.0
101-45-10490	0.22	0	0	50	0.3	0	NO	NO	NO	0.3	0.2	2.5
103-40-10110	0.22	0	0	0	11	0	NO	NO	NO	0.9	0	1.6
112-65-10230	0.22	0	0	0	28	0	YES	NO	NO	0	0.4	5.1
111-50-10670	0.22	2.5	0.05	0.6	33	1.0	YES	NO	NO	0	0.4	28
111-50-10750	0.22	0	0	0	87	0	NO	NO	YES	0.6	0.1	4.1
103-60-10589	0.22	0	0	45	0	0	NO	NO	NO	0.2	1.3	1.5
103-30-10120	0.22	0	0	62	25	0	NO	NO	NO	0.4	0	42
102-40-10325	0.22	0	0	58	17	2.4	NO	NO	NO	0.3	0	0.6
108-60-10055	0.22	31	0.6	0	0	8.8	NO	NO	NO	0	2.5	2.0
110-16-10135	0.22	0	0	3.2	26	0	NO	NO	NO	1.0	0	5.1
111-50-10750	0.21	0	0	0	64	0	NO	NO	YES	0.4	0	1.7