Salmon Watersheds in the Mat-Su Basin

A Map Atlas to Prioritize Conservation

Mat-Su Basin Salmon Habitat Partnership

2009

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Copies of this report, the map atlas, and the dataset are available from The Nature Conservancy (alaska@tnc.org) and on the website of the Mat-Su Salmon Partnership (http://conserveonline.org/workspaces/MatSuSalmon)

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Introduction

In 2005 the Matanuska-Susitna Basin Salmon Habitat Partnership formed to address increasing impacts on salmon from human use and development in the Mat-Su Basin with a collaborative, cooperative, and non-regulatory approach that would bring together diverse stakeholders. In 2008 the Partnership completed a Strategic Action Plan[1] that outlines goals and actions for conserving salmon habitat in the Mat-Su Basin. Those objectives are directed toward streams, lakes, and wetlands that provide important habitat for all life stages of the five species of Pacific salmon that occur here.

This map atlas and accompanying dataset is a first step to determining priority locations for restoration and protection of salmon habitat. Those organizations working on salmon habitat restoration and protection can use this information to select watersheds where they might want to work. Finer scale information can then be used for watershed planning or to locate restoration or protection project sites.

The 22 maps that comprise this map atlas represent information that shows watersheds based on their biological value to salmon and their vulnerability to human activities. As shown in the aggregate maps (***Maps 10, 11, 20, and 21***), the factors within these two categories can be added together to find watersheds with the highest concentration of particular biological value or vulnerability. The intersection of biological value and vulnerability can also be mapped (***Map 22***). Intersection maps can highlight watersheds where high biological values for salmon occur with high vulnerability to different types of human activities.

Appendices A and B contain the normalized scores for each biological value and vulnerability factor for each of the 329 watersheds that were assessed in this project. The accompanying dataset allows the user to apply different weights to factors to answer individual questions about where to protect or restore salmon habitat. This data can be viewed in a tabular format (e.g. Microsoft Excel) or in a Geographic Information System (e.g. ArcGIS).

The assessment provides a first step at assessing the relative biological value and vulnerability of individual watersheds. It is intended to help the Mat-Su Salmon Partnership, its partners, and others concerned about salmon conservation to identify priorities for their own efforts. Additional information for more vulnerable watersheds can be added to this assessment to select priority watersheds for restoration and protection of salmon habitat. Due to limitations in the available data, these maps are most appropriately interpreted at a subwatershed or larger (i.e. watershed or subbasin) scale. The dynamic nature of many of the datasets will result in changes to these maps if these analyses are reexamined in the future. Priority-setting should also be a dynamic process, with decisions about conservation and restoration relying upon the most up-to-date information available and the inclusion of finer-scale data where available.

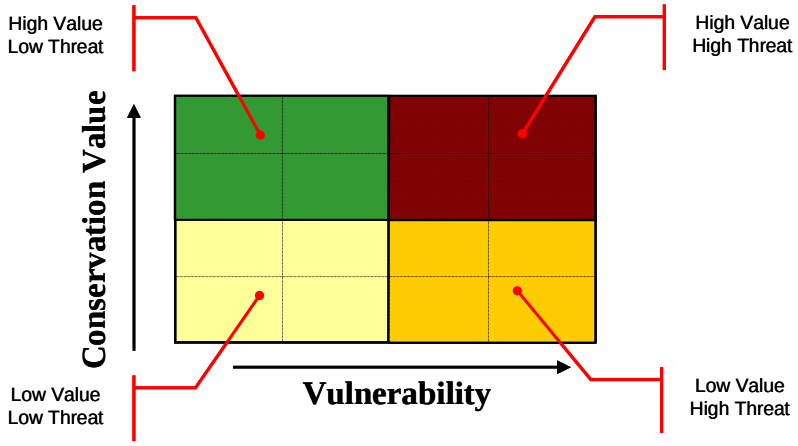
[1] *Conserving Salmon Habitat in the Mat-Su Basin: The Strategic Action Plan of the Mat-Su Basin Salmon Habitat Partnership*, available at http://conserveonline.org/workspaces/MatSuSalmon

Methods

Scientists have proposed a number of methods for prioritizing conservation sites. Two broad categories of factors are often used, either independently or in some combination. The first may be called biological or conservation value, and refers to the relative biological contribution of a site to a larger area of interest. Quantitative measures can include species richness, species rarity, endemism, and irreplaceability. The second category, vulnerability, addresses the imminence and level of threat to the biological characteristics of a site.

A scheme developed by Pressey et al. (1994) and applied by Noss et al. (2001) and Rumsey et al. (2003) is based on the interaction of biological (conservation) value and vulnerability. Pressey et al. (1994) calculated conservation value and threat for multiple sites and plotted the intersection of the values. This scatter plot was used to define quadrants of conservation value and threat (Figure 1).

Figure 1. Interaction of biological (conservation) value and vulnerability (Pressey et al. 1994).



Similar methods of assessing natural resource values and human-related impacts have been used to prioritize waterbodies, watersheds and subbasins for conservation for ecosystem health (ICBEMP 2000, Moilanen et al 2007, Skidmore 2006), for species recovery (CDFG 2004, TPL 2000), for restoration (Dean et al 2000) or for management (ADEC 2006).

To start prioritizing locations for conserving salmon habitat in the Mat-Su Basin, the Science Working Group of the Mat-Su Salmon Partnership applied this general method of identifying factors of biological value and vulnerability by watershed, aggregating these factors, and plotting biological value against vulnerability.

Watersheds were defined based on USGS hydrologic unit codes (HUC). State and federal agencies have defined watersheds in a nested hierarchy of these units. The Mat-Su Basin is comprised of six subbasins (HUC8), 88 watersheds (HUC10), and 519 subwatersheds (HUC12). For this project, two unit levels were used. HUC10s were used at upper elevations due to either an absence of salmon or lack of data about salmon in those areas. Lower elevations were delineated by HUC12s to capture finer scale information available for salmon, landscape

features, and human activities. This project analyzed a combination of HUC10s and HUC12s for a total of 329 distinct drainages with areas ranging from 6,345 acres to 260,342 acres (***Map 1***).

In selecting factors for biological value, the Science Working Group considered the specific needs of different salmon species at different lifestages, what is known about Mat-Su Basin salmon, and what can be mapped with a digital Geographic Information System. The success of some species is limited by the availability of specific habitat for certain life stages and yet different habitat for multiple life stages must be available for each species. Within a section of river, different species may use much different habitats for various life stages. Recognizing the variety of ways that salmon habitat can be quantified and the differing importance that humans place on species, the Science Working Group suggested a list of biological value factors that are not mutually exclusive. Quantifying some factors in multiple ways should enable a greater variety of uses of this dataset.

Eight biological value factors[2] were selected and summarized by watershed:

1. *Salmon Spawning and Rearing* – documented miles of spawning and rearing for all salmon species within a watershed; measured two ways:
    a. Total length in watershed (***Map 2***)
    b. Density calculated as total length divided by watershed area (inset ***Map 3***)
2. *Salmon All Lifestages* - documented miles of all anadromous habitat for all salmon species within a watershed; measured two ways:
    a. Proportion calculated as total length of anadromous habitat divided by total number of stream miles (inset ***Map 2***)
    b. Density calculated as total length of anadromous habitat divided by watershed area (inset ***Map 3***)
3. *Chinook Salmon Spawning* - presence of stream reaches with Chinook spawning (***Map 4***)
4. *Coho Salmon Rearing* - presence of stream reaches with coho rearing (***Map 5***)
5. *Sockeye Salmon Spawning* - presence of stream reaches with sockeye spawning (***Map 6***)
6. *Chum Salmon Spawning* - presence of stream reaches with chum spawning (***Map 7***)
7. *Salmon Species Richness* – number of salmon species documented (***Map 8***)
8. *Wetlands and Lakes* – percent of watershed that is categorized as wetland or lake (***Map 9***)

Vulnerability factors were selected based on the human activities ranked as the greatest threats to salmon habitat in the Strategic Action Plan. That plan identified housing and urban development in the Mat-Su and the corresponding infrastructure as the human activities that have the greatest potential to degrade salmon habitat. Invasive northern pike are an additional threat in some Mat-Su waters as a result of human introduction. In addition to these factors based on the plan, two factors that indicate general levels of protection for land and water within a watershed were selected – conservation management status and instream flow reservations.

In total, eight vulnerability factors[2] were summarized by watershed:

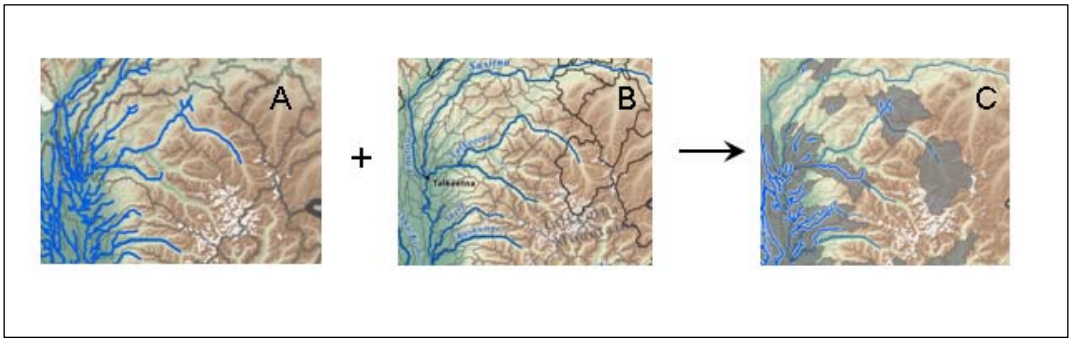
1. *Road Density* – total miles of roads divided by watershed area (***Map 12***)
2. *Culverts that Impede Fish Passage* – total number of culverts within a watershed that impede passage of adult or juvenile salmon (***Map 13***)

[2] Each map contains more detail about each factor and its relevance to Mat-Su salmon.

3. *Converted and Impervious Land Cover* - percent of watershed that has been converted from natural land cover for agriculture or housing and urban development (***Map 14***)
4. *Platted Subdivisions* - percent of watershed that has been subdivided for actual or potential development (***Map 15***)
5. *Water Quality* – presence of waterbodies within a watershed that have been listed by the Alaska Clean Water Actions program as of concern or impaired (***Map 16***)
6. *Invasive Northern Pike* – presence of northern pike within a watershed (***Map 17***)
7. *Conservation Management Status* – percentage of watershed that is managed with low or no emphasis on conservation (***Map 18***)
8. *Instream Flow Reservations* – absence of instream flow reservations within a watershed (***Map 19***)

A Geographic Information System (GIS) was used to summarize each factor within a watershed. All data used in this project is publicly available, and most exist in a GIS format. The base data for each factor was intersected with the watersheds to calculate the value (e.g. length, presence) within each watershed (Figure 2).

Figure 2. Base data for each factor (A) was intersected with the watersheds layer (B) to summarize the factor within each watershed and calculate a score (C). In this example, Anadromous Waters Catalog line segments showing coho salmon rearing (A) are intersected with the watersheds layer (B) to identify which subwatersheds support coho salmon rearing (C).



Values for biological value and vulnerability factors varied from binomial to ordinal to continuous (Table 1). For all but one binomial factor, a value of 1 signifies presence; for Instream Flow Reservations, a value of 1 signifies absence. For addition of factors, ordinal and continuous values within each factor were normalized based on the maximum value to a 0 to 1 scale.

Factor scores can be added together to examine scenarios of biological value, vulnerability, or the interaction these two categories. Any prioritization is sensitive to assumptions about relative importance of factors, the factors themselves, and the data used to represent them. To allow flexibility in combining the factors, each factor can be weighted relative to the other factors within the categories of biological value and vulnerability. These subjective weights express the importance of a factor relative to the other factors for biological value or vulnerability. Subjective weights are the same for each watershed and only varied by factor.

Table 1. Prioritization Factors, Data Type and Value Range prior to Normalizing

Factor	Data Type[3]	Value Range
Biological Value		
Salmon Spawning and Rearing	Continuous	
Total Length		0 - 75
Density of stream miles		0 – 1*
Salmon All Lifestages	Continuous	
Density within watershed		0 – 1*
Proportion of stream miles		0 – 1*
Chinook Salmon Spawning	Binomial	0, 1
Coho Salmon Rearing	Binomial	0, 1
Sockeye Salmon Spawning	Binomial	0, 1
Chum Salmon Spawning	Binomial	0, 1
Salmon Species Richness	Ordinal	0 - 5
Wetland and Lakes	Continuous	0 - 82
Vulnerability		
Road Density	Continuous	0 – 1*
Culverts that Impede Fish Passage	Ordinal	0 - 36
Converted and Impervious Land Cover	Continuous	0 - 13
Platted Subdivisions	Continuous	0 - 54
Water Quality	Binomial	0, 1
Invasive Northern Pike	Binomial	0, 1
Conservation Management Status	Continuous	0 - 100
Instream Flow Reservations	Binomial	0, 1

* This density value is a unitless number that was normalized to a 0 – 1 scale for comparing watersheds.

Two scenarios that aggregate factors were calculated and mapped for biological value (***Maps 10, 11***) and vulnerability (***Maps 20, 21***) to illustrate how varying weights can be used and how they can affect relative aggregate values of watersheds and the patterns of value and vulnerability across the basin (Table 2). For each category, the first scenario applied equal weight to all factors. Within the biological value category, only one of the all species factors – Salmon All Lifestages Density – was used because of the strong relationship between the data in the Anadromous Waters Catalog for all life stages and for spawning and rearing habitat (see figure in Appendix D). The second Biological Value scenario attempts to decrease the influence of the Anadromous Waters Catalog further by applying a lower weight to the single species factors. The second Vulnerability scenario only includes factors that represent current development.

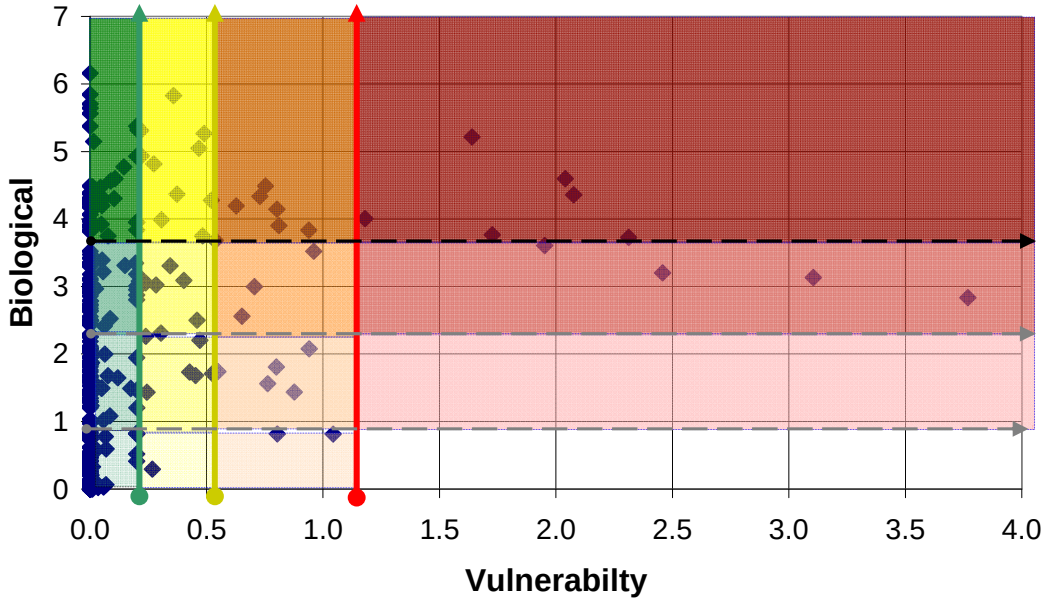
The interaction of biological value and vulnerability factors, as aggregated in Scenarios B1 and V2, were mapped (***Map 22***). Watersheds were depicted in graduated colors to represent levels of biological value and vulnerability (Figure 3).

[3] A note about mapping of most factors with continuous values: the factors were mapped into bins based on 'natural breaks' (e.g. *Total Miles of Salmon Spawning and Rearing, Map 2*). Natural breaks is a data classification method that partitions data into classes based on natural groups in the data distribution. This classification assigns data to classes so that the variances within classes are minimized, while the variances among classes are maximized. For more, see http://www.cdc.gov/BRfss/maps/faqs.htm#13.

Table 2. Scenarios for Aggregation of Biological Values and Vulnerability Factors

Factor	Scenario 1	Scenario 2
Biological Value	**B1**	**B2**
Salmon Spawning and Rearing		
Total Length	1	1
Density of stream miles	0	0
Salmon All Lifestages		
Density within watershed	0	0
Proportion of stream miles	0	0
Chinook Salmon Spawning	1	0.5
Coho Salmon Rearing	1	0.5
Sockeye Salmon Spawning	1	0.5
Chum Salmon Spawning	1	0.5
Salmon Species Richness	1	1
Wetland and Lakes	1	1
Vulnerability	**V1**	**V2**
Road Density	1	1
Culverts that Impede Fish Passage	1	1
Converted and Impervious Land Cover	1	1
Platted Subdivisions	1	0
Water Quality	1	1
Invasive Northern Pike	1	0
Conservation Management Status	1	0
Instream Flow Reservations	1	0

Figure 3. Normalized scores for aggregated biological value (Scenario B1) and vulnerability factors (Scenario V2) were grouped and mapped based on natural breaks (see footnote 3)



Data Gaps and Limitations

A project that relies upon maps is only as good as the spatial data that is available. In Alaska, biological data tends to be incomplete for many species and other natural resources; the Mat-Su Basin is no exception. Yet decisions about management, restoration, and protection can be based on existing data if data limitations are acknowledged and the data are used appropriately. Many of the datasets used in the map atlas are dynamic in nature, with additional refinements and additions being made on a regular basis (data list in Appendix C).

Most of the biological value factors rely upon the Anadromous Waters Catalog, maintained by Alaska Department of Fish and Game (ADF&G). The *Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes* documents spawning, rearing, and presence of anadromous fish and some resident fish. Inclusion in the catalog affords certain state protections under the Anadromous Fish Act (AS 16.05.871). Documenting anadromous waters in Alaska is complicated by remoteness, short field seasons, and limited resources to conduct inventories. As the catalog primarily serves a regulatory function, its development has had scientific purposes as a secondary role at best. Currently the catalog contains fewer than 5000 miles of the more than 23,900 miles of mapped streams in the Mat-Su Basin.

Surveys may not capture lifestage information due to varying timing of return of spawning adults of different species and seasonal movement of rearing juveniles. In the Susitna drainage, ADF&G has a greater body of knowledge about Chinook and sockeye salmon spawning locations than for the other three species (J. Hasbrouck, pers. comm. 2009). This may mean that the catalog better reflects spawning distribution for those two species. ADF&G also knows much more about some streams, including life stage specificity, than others due to a variety of factors, including proximity to the road network, fishing effort, and potential development.

Despite providing an incomplete record of salmon habitat, the catalog can be used to identify patterns of spawning and rearing habitat across the Mat-Su Basin. This map atlas includes the catalog in multiple ways (e.g. length, density) to allow users to select the factor that best fits their assumptions about the data and their priorities. The user must be cautious, however, when adding together multiple biological values that use the Anadromous Waters Catalog. Biases toward species and stream systems, as mentioned above, could be magnified and thus skew aggregate scores and patterns of resulting maps.

The National Hydrography Dataset aims to map all national waterbodies. Like the Anadromous Waters Catalog, however, it is not complete yet for the Mat-Su Basin. It does, however, provide a way to assess the relative amount of salmon habitat for all the waterbodies in a watershed.

Information about salmon populations is available for some species in some streams, but data for all salmon species across Mat-Su watersheds are not available. Without this comprehensive coverage, a factor that could capture abundance, such as population size or system productivity, could not be included in this project. This information could be included when considering a few watersheds for conservation activities or if developing a management plan for one watershed or stream. ADF&G collects and catalogs information related to salmon productivity in some Mat-Su rivers and streams.

The data for human activities in the Mat-Su Basin tends to be more comprehensive than that for biological values. Currency and resolution need to be considered when using two datasets. The National Dataset (NLCD) provided information for converted lands (Map 14) as well as wetlands and lakes (Map 9). This dataset is based on satellite imagery that was gathered and analyzed in 1999 to 2001 so development in the Mat-Su Basin in the last decade is not fully represented. This dataset is mapped at a resolution of 30 meters, so it allows comparison between watersheds but may be too coarse for analysis within watersheds at the HUC12 level. Similarly, the dataset for Conservation Management Status (Map 18) is based on ownership data available prior to 2005 and was mapped at the section level (i.e. 640 acre blocks). Recent changes in land management and finer scale protection may not be adequately represented at the watershed scale.

An additional piece of information that was considered for use in mapping human activities is a Stream Condition Index for Cook Inlet streams (Major et al. 2001). The index includes an aggregate of biological metrics that differ for three stream types. A measurement of these metrics at a single point on a stream resulted in an overall condition rating as poor, fair, good, or excellent. While this data could have added a valuable overall condition score to watersheds, the index does not include points for most watersheds considered in this study, so it was not included.

Many of the datasets used in this atlas, like the NLCD, are best interpreted at a subwatershed or larger (e.g. watershed) scale due to limitations in their resolution. Even the Anadromous Waters Catalog and National Hydrography datasets can be coarse in depicting some stream reaches and do disagree with each other on the location of some streams. This watershed atlas is intended to provide the user with a high-level that can help in determining which watersheds to target for protection or restoration activities. Once watersheds of interest are selected, additional finer scale data should be applied and on-the-ground reconnaissance should be performed.

Discussion

This method facilitates the examination of how the combinations of factors translate to patterns of biological value or vulnerability across the Mat-Su Basin. In the map atlas, two scenarios each of biological value factors (***Maps 10, 11***) and vulnerability factors are shown (***Maps 20, 21***). These maps illustrate how the selection of factors and varying weights can affect the pattern of high values across watersheds.

For biological value, some watersheds show high aggregate scores in both scenarios, possibly indicating that these watersheds should be considered highly in all conservation planning. These watersheds may also be places where the Anadromous Waters Catalog is especially complete, resulting in higher scores for factors measured with that data. Varying weights applied to factors in Scenario B2 does changes the overall pattern. This may be because salmon remain in almost all watersheds in the Mat-Su Basin, except those at the highest elevations. With healthy salmon populations across the basin, distinguishing between watersheds based on salmon presence alone may not be sufficient.

Some Science Working Group members think that vulnerability may be a better way to prioritize restoration and protection in the Mat-Su Basin. The aggregation of factors that indicate current development, Scenario V2, (***Map 21***) presents a pattern that matches expectations. Salmon habitat is most threatened in the developed areas and along the road system in the basin.

The other vulnerability scenario, Scenario V1, (***Map 20***) includes the factors that indicate potential future development (*Platted Subdivisions*), protections (*Conservation Management Status* and *Instream Flow Reservations*), and a difficult problem (*Invasive Northern Pike*). This map has a much different pattern than the current development scenario with watersheds off the road system showing high vulnerability. In these watersheds, these factors may be best investigated separately for making decisions about restoration and protection. For example, watersheds with high numbers of pike may be too impacted for restoration or protection, despite historically high salmon populations. Similarly, platted subdivisions vary in parcel size and feasibility of development, and the actual threat to salmon habitat will vary based on access routes and modes, size of parcels, and feasibility of construction.

The vulnerability factors were chosen based on the human activities that ranked high in the Mat-Su Salmon Partnership's Strategic Action Plan[4] to help focus the Partnership's work on these issues. Many other human activities can impact salmon habitat in some watersheds, and these other activities could change the overall pattern on the vulnerability scenario maps and drive conservation strategies in particular watersheds. Organizations concerned about conservation of salmon habitat should consider other human activities in watersheds where they intend to undertake restoration or protection.

Another consideration that could not be incorporated into this project is connectivity between watersheds. As water flows downhill, natural processes and human activities affect not only the watershed where they occur but also those downstream. Adult salmon migrate upstream each year and juvenile salmon migrate up and downstream; their ability to move from one watershed to another is important not only for individual fish and populations but also for transfer of important nutrients between watersheds. So even though *Culverts that Block Fish Passage* is a Vulnerability factor, the score for each watershed is based only on the culverts in that watershed and does not include the possible effect of culverts located in watersheds upstream or downstream.

The decision about where to expend limited conservation resources can be based on imminent threat or biological value. One organization may decide to take a proactive approach and ensure that places of high biological value are protected before they become vulnerable to development. Another organization may try to mitigate the damage of current or impending development. The prioritization method presented here can identify those places that both types of organizations are looking for.

This method can also help to identify regional priorities for conservation. The interaction map (***Map 22***) suggests that some subbasins with high biological value may be vulnerable due to current land management intent and human activities. The sources of the vulnerability may provide a strategy for working with land managers or industry to protect biological resources in those regions. These places may also lend themselves to the implementation of multiple conservation strategies through collaborations between members of the Mat-Su Salmon

[4]For a complete list of human activities considered in the Strategic Action Plan, read the plan at http://conserveonline.org/workspaces/MatSuSalmon.

Partnership. Watersheds with high biological value and low vulnerability are also evident and may indicate places where protection strategies would be most appropriate.

This map atlas presents one method for making decisions about conserving salmon habitat in the Mat-Su Basin. Even though this method presents a relative ranking between watersheds, the biological value maps clearly show that most watersheds in the Mat-Su Basin contain important habitat for salmon in various life stages. Even the high elevation headwater watersheds where salmon either do not occur or have not been documented contribute to the health of the watersheds below them, and decisions made here can affect the overall health of Mat-Su Basin salmon and their habitat. Given the role that most watersheds play for salmon here, the vulnerability maps may be more critical for determining where restoration and protection of salmon habitat should happen. Maintenance of healthy salmon populations in the Mat-Su Basin will depend upon balancing the needs of salmon with the needs of a growing human population.

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Appendix A. Normalized Scores for Biological Value Factors

Watershed Name	HUC Level	HUC 10 Number	Spawning & Rearing Length All Species (1)	Coho Rearing	Sockeye Spawning	Chinook Spawning	Chum Spawning	Species Richness (2)	Wetlands and Lakes (3)	Biological Scenario B1 (4)	Biological Scenario B2 (4)
196 Mile Creek	12	190205051001	0.10	1	0	0	0	0.40	0.50	2.00	1.50
Alexander Creek Headwaters	12	190205051106	0.30	1	0	1	0	0.60	0.62	3.52	2.52
Alexander Creek Mouth	12	190205051111	0.29	1	1	1	0	0.80	0.22	4.31	2.81
Anderson Creek	12	190205051201	0.00	0	0	0	0	0.40	0.14	0.54	0.54
Answer Creek	12	190205050303	0.23	1	1	0	0	0.60	0.17	3.00	2.00
Archangel Creek	12	190205051301	0.00	0	0	1	0	0.20	0.00	1.20	0.70
Bashful Peak	12	190204021202	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Bear Creek (Alexander Creek)	12	190205051105	0.14	0	0	0	0	0.40	0.22	0.76	0.76
Bear Creek (South Kahiltna River)	12	190205041905	0.30	1	0	0	0	0.40	0.17	1.87	1.37
Beaver Creek (Kahiltna River)	12	190205041910	0.64	1	0	0	0	1.00	0.36	3.00	2.50
Big Lake	12	190205051404	0.01	1	1	0	0	1.00	0.72	3.73	2.73
Birch Creek	12	190205050302	0.15	1	1	0	1	1.00	0.12	4.28	2.78
Black River	10	190205011300	0.00	0	0	0	0	0.00	0.03	0.03	0.03
Boulder Creek	12	190204020507	0.00	0	0	0	0	0.00	0.04	0.04	0.04
Buckskin Glacier	12	190205020601	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Buddy Creek	12	190205050104	0.09	1	0	0	0	0.20	0.20	1.49	0.99
Bunco Creek	12	190205020905	0.49	1	1	0	0	0.60	0.23	3.32	2.32
Butterfly Lake (Little Susitna River)	12	190205051307	0.56	1	0	1	1	1.00	0.71	5.26	3.76
Byers Creek	12	190205020603	0.10	0	1	0	1	0.80	0.06	2.97	1.97
Cache Creek (Lower Talkeetna River)	12	190205030601	0.01	0	0	0	0	0.80	0.01	0.82	0.82
Cache Creek (North Kahiltna River)	12	190205041804	0.41	1	0	1	0	0.60	0.05	3.05	2.05
Camp Creek	12	190205041603	0.35	1	1	1	0	0.80	0.24	4.39	2.89
Canyon Creek (Happy River)	12	190205041008	0.11	0	0	0	0	0.40	0.01	0.52	0.52
Canyon Creek (Willow Creek)	12	190205050602	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Carbon Creek	12	190204020701	0.00	0	0	0	0	0.20	0.00	0.20	0.20
Caribou Creek	10	190204020100	0.02	0	0	0	1	0.20	0.01	1.23	0.73
Carpenter Creek	12	190204020702	0.02	0	0	0	0	0.80	0.00	0.82	0.82
Caswell Creek	12	190205050308	0.14	1	0	0	0	0.20	0.34	1.68	1.18
Central Kashwitna River	12	190205050404	0.11	0	0	0	0	0.40	0.01	0.51	0.51
Central Sheep River	12	190205030405	0.00	0	0	0	0	0.40	0.01	0.41	0.41
Central Susitna River	12	190205012105	0.00	0	0	0	0	0.20	0.11	0.31	0.31
Central Talkeetna River	12	190205030602	0.00	0	0	0	0	0.80	0.03	0.83	0.83
Central Yentna River	12	190205042004	0.45	1	1	0	0	1.00	0.45	3.90	2.90
Chase	12	190205012407	0.33	1	1	0	1	1.00	0.15	4.48	2.98
Chickaloon Glacier	12	190204020501	0.00	0	0	0	0	0.00	0.00	0.00	0.00

Normalized scores are based on maximum values for each factor: (1) 75 miles; (2) 5 species (3) 82% total area.
(4) Additive score of Biological Value factors (Maps 10 and 11).

Appendix A. Normalized Scores for Biological Value Factors

Watershed Name	HUC Level	HUC 10 Number	Spawning & Rearing Length All Species (1)	Coho Rearing	Sockeye Spawning	Chinook Spawning	Chum Spawning	Species Richness (2)	Wetlands and Lakes (3)	Biological Scenario B1 (4)	Biological Scenario B2 (4)
Chickaloon River	**12**	190204020502	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Chickaloon River Mouth	**12**	190204020509	0.07	1	1	0	1	0.80	0.03	3.90	2.40
Chijuk Creek	**12**	190205050800	1.00	1	0	1	0	0.80	0.35	4.15	3.15
Chinook Creek	**12**	190205012302	0.00	0	0	0	0	0.20	0.01	0.21	0.21
Chulitna River Headwaters	**12**	190205020409	0.23	1	0	1	0	1.00	0.08	3.31	2.31
Chulitna River Mouth	**12**	190205021003	0.36	1	0	1	1	1.00	0.41	4.77	3.27
Clear Creek	**12**	190205051102	0.00	1	0	0	0	0.60	0.27	1.87	1.37
Clearwater Creek	**12**	190205040403	0.17	1	0	0	0	0.80	0.11	2.08	1.58
Clearwater Creek	**10**	190205010500	0.00	0	0	0	0	0.00	0.07	0.07	0.07
Clearwater Mountains (Susitna River)	**10**	190205010800	0.00	0	0	0	0	0.00	0.13	0.13	0.13
Coal Creek (Upper Chulitna River)	**12**	190205020408	0.00	0	0	0	0	0.80	0.03	0.83	0.83
Coal Creek (West Matanuska River)	**12**	190204020405	0.01	0	1	0	0	0.80	0.00	1.81	1.31
Coffee River	**12**	190205020605	0.00	0	0	0	0	0.00	0.01	0.01	0.01
Colony Glacier	**10**	190204020900	0.00	0	0	0	0	0.00	0.09	0.09	0.09
Contact Creek	**12**	190205041505	0.07	0	0	0	1	1.00	0.01	2.08	1.58
Copeland Creek	**12**	190205020405	0.00	0	0	0	0	0.00	0.01	0.01	0.01
Cottonwood Creek	**12**	190204021306	0.28	1	1	0	0	0.40	0.16	2.83	1.83
Crystal Creek	**12**	190205020604	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Curry	**12**	190205012404	0.19	0	0	0	1	1.00	0.07	2.26	1.76
Deadman Creek	**10**	190205011800	0.00	0	0	0	0	0.00	0.03	0.03	0.03
Deception Creek	**12**	190205050605	0.52	1	0	0	0	0.60	0.14	2.26	1.76
Deep Creek (Alexander Creek)	**12**	190205051101	0.06	1	0	0	0	0.40	0.63	2.10	1.60
Deep Creek (Talachulitna River)	**12**	190205041409	0.05	1	0	1	1	1.00	0.02	4.07	2.57
Delta-Island	**12**	190205051002	0.39	1	1	1	1	1.00	0.44	5.83	3.83
Denali	**10**	190205010400	0.00	0	0	0	0	0.00	0.08	0.08	0.08
Devil Creek	**12**	190205012301	0.00	0	0	0	0	0.00	0.03	0.03	0.03
Devils Canyon (Susitna River)	**12**	190205012304	0.00	0	0	0	0	0.20	0.01	0.21	0.21
Diamond Lake (Little Susitna River)	**12**	190205051308	0.39	1	0	0	1	1.00	0.29	3.68	2.68
Dickenson Mountain	**12**	190205041502	0.01	0	0	0	0	0.60	0.01	0.62	0.62
Disappointment Creek	**12**	190205030605	0.03	0	0	0	1	0.40	0.01	1.44	0.94
Dog Hair Creek	**12**	190205030505	0.14	1	0	1	1	0.80	0.02	3.95	2.45
Donkey Creek Lakes	**12**	190205040802	0.33	1	1	0	0	0.80	0.19	3.32	2.32
Donkey Creek Slough	**12**	190205042002	0.07	0	0	0	0	0.80	0.59	1.45	1.45
Duck Flats	**12**	190204021305	0.31	1	0	0	1	0.80	0.66	3.77	2.77
Dutch Creek	**12**	190205041801	0.00	0	0	0	0	0.00	0.00	0.00	0.00

Normalized scores are based on maximum values for each factor: (1) 75 miles; (2) 5 species (3) 82% total area.
(4) Additive score of Biological Value factors (Maps 10 and 11).

Appendix A. Normalized Scores for Biological Value Factors

Watershed Name	HUC Level	HUC 10 Number	Spawning & Rearing Length All Species (1)	Coho Rearing	Sockeye Spawning	Chinook Spawning	Chum Spawning	Species Richness (2)	Wetlands and Lakes (3)	Biological Scenario B1 (4)	Biological Scenario B2 (4)
East Boulder Creek	12	190204020506	0.00	0	0	0	0	0.00	0.01	0.01	0.01
East Devils Canyon	12	190205012303	0.13	0	0	0	0	0.20	0.04	0.37	0.37
East Fork Chulitna River	10	190205020200	0.16	0	0	0	0	0.40	0.03	0.60	0.60
East Fork Iron Creek	12	190205030303	0.00	0	0	0	0	0.00	0.00	0.00	0.00
East Fork Susitna River	10	190205010200	0.00	0	0	0	0	0.00	0.11	0.11	0.11
East Fork Yentna River	10	190205040300	0.14	0	1	0	0	0.20	0.06	1.40	0.90
East Kashwitna River	12	190205050402	0.06	0	0	0	0	0.40	0.00	0.46	0.46
East Kichatna River	12	190205040603	0.31	1	0	0	0	0.60	0.15	2.06	1.56
East Sheep River	12	190205030406	0.00	0	0	0	0	0.40	0.00	0.40	0.40
East Susitna Flats	12	190205051408	0.00	0	0	0	0	0.20	0.61	0.81	0.81
East Susitna River	10	190205011500	0.00	0	0	0	0	0.20	0.04	0.25	0.25
East Talachulitna Creek	12	190205041402	0.20	0	1	0	0	1.00	0.05	2.25	1.75
East Talkeetna River	12	190205030202	0.12	0	0	0	0	0.40	0.00	0.52	0.52
East Wells Mountain	12	190205030304	0.00	0	0	0	0	0.00	0.01	0.01	0.01
East Yentna River	12	190205042001	0.13	1	0	0	0	0.20	0.35	1.68	1.18
East-Chunilna Creek	12	190205030504	0.00	0	0	1	1	0.80	0.00	2.81	1.81
Eightmile Creek	12	190205041507	0.39	1	1	0	0	1.00	0.51	3.91	2.91
Eklutna Glacier	12	190204010101	0.00	0	0	0	0	0.00	0.01	0.01	0.01
Eklutna Lake	12	190204010103	0.00	0	0	0	0	0.00	0.13	0.13	0.13
Eldridge Glacier	10	190205020500	0.00	0	0	0	0	0.00	0.01	0.01	0.01
Eklutna River	12	190204010105	0.04	1	0	0	1	1.00	0.04	3.08	2.08
Eska Creek	12	190204020705	0.03	0	0	0	1	0.40	0.01	1.43	0.93
Farmers Creek	12	190205040801	0.07	1	0	0	0	0.20	0.35	1.62	1.12
Fish Creek (Goose Bay)	12	190205051405	0.18	1	0	0	0	1.00	0.38	2.56	2.06
Fish Creek (Susitna River Delta)	12	190205051203	0.03	1	1	0	0	0.80	0.64	3.48	2.48
Fish Creek (Susitna River)	12	190205051004	0.57	1	0	0	0	0.60	0.32	2.49	1.99
Fish Lake Creek	12	190205042005	0.21	1	1	1	1	1.00	0.16	5.37	3.37
Fog Creek	10	190205012000	0.01	0	0	0	0	0.20	0.05	0.26	0.26
Fourth of July Creek	12	190205040401	0.01	1	1	0	0	0.40	0.03	2.43	1.43
Friday Creek (Talachulitna River)	12	190205041407	0.09	1	0	1	1	1.00	0.08	4.18	2.68
Friday Creek (Knik River)	12	190204021201	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Gagnan Creek	12	190205040604	0.38	1	0	0	0	0.20	0.50	2.08	1.58
Gate Creek	12	190205050703	0.27	1	1	1	0	0.80	0.50	4.56	3.06
Glacier Creek	12	190205041007	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Goat Creek	12	190204021301	0.00	0	0	0	0	0.00	0.00	0.00	0.00

Normalized scores are based on maximum values for each factor: (1) 75 miles; (2) 5 species (3) 82% total area.
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Watershed Name	HUC Level	HUC 10 Number	Spawning & Rearing Length All Species (1)	Coho Rearing	Sockeye Spawning	Chinook Spawning	Chum Spawning	Species Richness (2)	Wetlands and Lakes (3)	Biological Scenario B1 (4)	Biological Scenario B2 (4)
Gold Creek	12	190205012402	0.05	0	0	0	1	0.80	0.00	1.86	1.36
Goose Creek (Goose Bay)	12	190205051406	0.02	1	0	0	0	1.00	0.48	2.50	2.00
Goose Creek (Talkeetna to Caswell)	12	190205050307	0.26	1	0	1	1	0.80	0.30	4.37	2.87
Government Creek (Little Susitna River)	12	190205051303	0.52	1	0	1	1	0.60	0.02	4.14	2.64
Granite Creek (East Matanuska River)	12	190204020704	0.07	0	0	0	1	0.80	0.00	1.87	1.37
Granite Creek (North Kahiltna River)	12	190205041802	0.00	0	0	0	0	0.20	0.02	0.22	0.22
Gravel Creek Mouth	12	190204020402	0.00	0	0	0	0	0.00	0.01	0.01	0.01
Happy River Headwaters	12	190205041002	0.17	0	1	0	0	0.40	0.02	1.59	1.09
Happy River Mouth	12	190205041009	0.24	0	1	0	0	0.40	0.01	1.65	1.15
Hayes River	10	190205041300	0.08	0	1	0	0	0.80	0.02	1.89	1.39
Hewitt Creek	12	190205042003	0.08	1	1	0	0	0.40	0.54	3.02	2.02
Hicks Creek	12	190204020401	0.00	0	0	0	0	0.00	0.02	0.02	0.02
Hidden River	12	190205020602	0.00	0	0	0	0	0.00	0.03	0.03	0.03
Home Creek	12	190205041604	0.37	1	0	1	0	0.80	0.67	3.84	2.84
Honolulu Creek	12	190205020401	0.08	1	0	0	0	0.40	0.02	1.50	1.00
Houston (Little Susitna River)	12	190205051304	0.42	1	0	1	1	0.80	0.12	4.33	2.83
Hungryman Creek	12	190205041901	0.10	1	0	0	0	0.40	0.34	1.84	1.34
Hunter Creek	12	190204021203	0.00	0	0	0	0	0.20	0.00	0.20	0.20
Hurricane Gulch	12	190205020402	0.00	0	0	0	0	0.00	0.03	0.03	0.03
Indian Creek (East Yentna River)	12	190205042006	0.00	0	0	0	0	1.00	0.30	1.30	1.30
Indian Creek (Happy River)	12	190205041005	0.02	0	0	0	0	0.40	0.00	0.42	0.42
Indian River	12	190205012401	0.19	1	0	1	0	0.80	0.02	3.02	2.02
Iron Creek	12	190205050503	0.19	1	0	0	0	0.40	0.08	1.67	1.17
Ivan River	12	190205051205	0.32	0	0	0	0	0.60	0.66	1.59	1.59
Johnson Creek Headwaters	12	190205040701	0.13	0	1	0	0	0.20	0.02	1.35	0.85
Johnson Creek Mouth	12	190205040703	0.39	1	1	0	0	1.00	0.03	3.42	2.42
Kahiltna Glacier	10	190205041700	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Kahiltna River Mouth	12	190205041909	0.14	1	0	0	0	0.20	0.62	1.96	1.46
Kankiula Glacier	12	190205020901	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Kashwitna River	12	190205050403	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Kashwitna River Headwaters	12	190205050401	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Kashwitna River Mouth	12	190205050407	0.25	1	0	1	1	0.80	0.25	4.30	2.80
Kichatna River Mouth	12	190205040605	0.42	1	0	0	0	1.00	0.21	2.63	2.13
Kings River	12	190204020602	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Kitty Lake	12	190205041401	0.08	1	1	1	1	1.00	0.48	5.56	3.56

Normalized scores are based on maximum values for each factor: (1) 75 miles; (2) 5 species (3) 82% total area.
(4) Additive score of Biological Value factors (Maps 10 and 11).

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Watershed Name	HUC Level	HUC 10 Number	Spawning & Rearing Length All Species (1)	Coho Rearing	Sockeye Spawning	Chinook Spawning	Chum Spawning	Species Richness (2)	Wetlands and Lakes (3)	Biological Scenario B1 (4)	Biological Scenario B2 (4)
Knik Glacier	**10**	190204021000	0.00	0	0	0	0	0.20	0.01	0.21	0.21
Knik River Delta	**12**	190204021303	0.11	1	1	0	0	1.00	0.41	3.52	2.52
Knik River Headwaters	**12**	190204021205	0.29	0	1	0	1	0.60	0.20	3.09	2.09
Kosina Creek	**10**	190205011600	0.10	0	0	0	0	0.20	0.04	0.34	0.34
Kroto Creek Headwaters	**12**	190205050902	0.60	1	1	1	0	0.80	0.42	4.82	3.32
Kroto Creek Mouth	**12**	190205050907	0.42	1	0	1	0	1.00	0.41	3.84	2.84
Kroto Slough	**12**	190205051005	0.16	1	0	0	0	0.60	0.43	2.19	1.69
Lake Creek	**12**	190205051306	0.16	1	1	0	0	0.40	0.47	3.02	2.02
Lake Creek Headwaters	**12**	190205041601	0.13	1	1	0	0	0.80	0.17	3.10	2.10
Lake Creek Mouth	**12**	190205041607	0.74	1	1	1	1	1.00	0.42	6.16	4.16
Lake George Glacier	**10**	190204020800	0.00	0	0	0	0	0.20	0.03	0.23	0.23
Lane Creek	**12**	190205012405	0.02	0	0	0	0	0.80	0.00	0.83	0.83
Larson Lake	**12**	190205030607	0.09	0	1	0	1	1.00	0.09	3.18	2.18
Lewis River	**12**	190205051206	0.40	1	0	1	0	0.60	0.39	3.39	2.39
Little Meadow Creek	**12**	190205051401	0.19	1	1	0	0	0.80	0.21	3.20	2.20
Little Peters Hills (Kahiltna River)	**12**	190205041904	0.24	1	0	0	0	0.80	0.46	2.50	2.00
Little Susitna River Headwaters	**12**	190205051302	0.13	0	0	1	0	0.60	0.00	1.73	1.23
Little Susitna River Mouth	**12**	190205051310	0.38	1	0	0	1	1.00	0.63	4.00	3.00
Lower Chunilna Creek	**12**	190205030507	0.34	1	1	1	1	1.00	0.04	5.38	3.38
Lower Iron Creek	**12**	190205030305	0.00	0	0	0	0	0.40	0.02	0.42	0.42
Lower Little Willow Creek	**12**	190205050504	0.62	1	0	1	0	0.80	0.33	3.75	2.75
Lower Sheep Creek	**12**	190205050203	0.33	1	0	1	1	0.80	0.17	4.30	2.80
Lower Skwentna River	**12**	190205041504	0.03	0	0	0	1	0.20	0.30	1.53	1.03
Lower Sucker Creek	**12**	190205051109	0.19	1	1	1	0	0.80	0.24	4.23	2.73
Lower Tokositna River	**12**	190205020906	0.26	0	1	0	0	1.00	0.46	2.72	2.22
Lucile Creek	**12**	190205051402	0.16	1	1	0	0	0.80	0.18	3.13	2.13
Maguire Creek	**12**	190205051309	0.09	1	0	0	0	0.40	1.00	2.49	1.99
Marcus Baker Glacier (Glacier Fork Knik River)	**10**	190204021100	0.00	0	0	0	0	0.00	0.01	0.01	0.01
Martin Creek	**12**	190205041906	0.35	1	0	0	0	1.00	0.16	2.51	2.01
Matanuska Glacier	**10**	190204020200	0.00	0	0	0	0	0.00	0.01	0.01	0.01
Matanuska Peak (Matanuska River)	**12**	190204020708	0.16	1	1	1	1	1.00	0.06	5.22	3.22
Matanuska River Delta	**12**	190204021302	0.14	1	1	0	1	1.00	0.46	4.60	3.10
Matanuska River Headwaters	**10**	190204020300	0.01	0	0	0	1	0.40	0.03	1.44	0.94
McCallie Creek	**12**	190205020403	0.00	0	0	0	0	0.00	0.00	0.00	0.00
McRoberts Creek	**12**	190204021204	0.14	1	0	0	0	0.40	0.17	1.71	1.21

Normalized scores are based on maximum values for each factor: (1) 75 miles; (2) 5 species (3) 82% total area.
(4) Additive score of Biological Value factors (Maps 10 and 11).

Appendix A. Normalized Scores for Biological Value Factors

Watershed Name	HUC Level	HUC 10 Number	Spawning & Rearing Length All Species (1)	Coho Rearing	Sockeye Spawning	Chinook Spawning	Chum Spawning	Species Richness (2)	Wetlands and Lakes (3)	Biological Scenario B1 (4)	Biological Scenario B2 (4)
Meadow Creek	**12**	190205051403	0.17	1	1	0	0	0.80	0.64	3.61	2.61
Middle Chickaloon River	**12**	190204020505	0.00	0	0	0	0	0.00	0.01	0.01	0.01
Middle Chunilna Creek	**12**	190205030503	0.14	0	0	1	1	0.80	0.01	2.95	1.95
Middle Fork Chulitna River	**10**	190205020100	0.32	0	0	0	0	0.40	0.06	0.78	0.78
Middle Fork Montana Creek	**12**	190205050102	0.06	0	0	0	0	0.40	0.07	0.53	0.53
Middle Iron Creek	**12**	190205030302	0.00	0	0	0	0	0.20	0.01	0.21	0.21
Middle Little Willow Creek	**12**	190205050502	0.14	0	0	1	0	0.60	0.02	1.76	1.26
Middle Sheep Creek	**12**	190205050202	0.14	1	0	1	0	0.40	0.01	2.55	1.55
Middle Skwentna River	**10**	190205041100	0.06	0	0	0	0	0.40	0.01	0.47	0.47
Middle Talkeetna River - Grebe	**12**	190205030205	0.05	1	0	1	0	0.80	0.01	2.86	1.86
Middle Talkeetna River - Jaina East	**12**	190205030201	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Middle Talkeetna River - Remus West	**12**	190205030203	0.01	0	0	0	0	0.40	0.00	0.41	0.41
Middle Talkeetna River - Tafia North	**12**	190205030207	0.18	1	0	1	0	0.80	0.02	3.01	2.01
Middle Tokositna River	**12**	190205020904	0.13	0	0	0	0	0.40	0.20	0.73	0.73
Montana Creek	**12**	190205050105	0.11	1	0	1	1	0.80	0.28	4.19	2.69
Monument Creek	**12**	190204020403	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Moose Creek (East Matanuska River)	**12**	190204020706	0.12	1	0	1	1	0.80	0.00	3.92	2.42
Moose Creek (Happy River)	**12**	190205041004	0.10	0	1	0	0	0.20	0.01	1.31	0.81
Moose Creek Headwaters	**12**	190205050702	0.44	1	1	1	0	0.80	0.36	4.60	3.10
Moose Creek Mouth	**12**	190205050706	0.59	1	1	1	0	0.80	0.76	5.15	3.65
Moss Creek	**12**	190204020504	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Nakochna River	**12**	190205040602	0.17	0	0	0	0	0.60	0.02	0.79	0.79
Nancy Lake	**12**	190205051305	0.11	1	0	0	0	0.40	0.23	1.74	1.24
Ninemile Creek	**12**	190205050705	0.46	1	0	0	0	0.40	0.67	2.52	2.02
Ninemile Creek (Matanuska River)	**12**	190204020406	0.21	0	1	0	0	0.80	0.07	2.08	1.58
North Chulitna River	**12**	190205020606	0.05	0	1	1	1	1.00	0.14	4.20	2.70
North Elmendorf Moraine	**12**	190205051407	0.07	1	0	0	0	0.20	0.29	1.56	1.06
North Fork Kashwitna River	**12**	190205050406	0.33	1	0	1	0	0.60	0.04	2.97	1.97
North Fork Montana Creek	**12**	190205050101	0.07	0	0	0	0	0.40	0.10	0.56	0.56
North Kings River	**12**	190204020601	0.00	0	0	0	0	0.00	0.00	0.00	0.00
North Kroto Creek	**12**	190205050903	0.62	1	1	1	0	0.80	0.51	4.94	3.44
North Maclaren River	**10**	190205010600	0.00	0	0	0	0	0.00	0.10	0.10	0.10
North Skwentna River	**12**	190205041503	0.09	1	0	0	1	1.00	0.25	3.34	2.34
North Talachulitna River	**12**	190205041408	0.13	1	0	1	1	1.00	0.24	4.37	2.87
North Wells Mountain	**12**	190205030603	0.00	0	0	0	0	0.00	0.00	0.00	0.00

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Appendix A. Normalized Scores for Biological Value Factors

Watershed Name	HUC Level	HUC 10 Number	Spawning & Rearing Length All Species (1)	Coho Rearing	Sockeye Spawning	Chinook Spawning	Chum Spawning	Species Richness (2)	Wetlands and Lakes (3)	Biological Scenario B1 (4)	Biological Scenario B2 (4)
North Yentna River	12	190205040404	0.18	1	0	0	0	0.80	0.47	2.45	1.95
Northeast Portage Creek	12	190205012201	0.05	0	0	1	0	0.40	0.01	1.46	0.96
Ohio Creek	12	190205020406	0.00	0	0	0	0	0.60	0.02	0.62	0.62
Oshetna River	10	190205011400	0.03	0	0	0	0	0.20	0.04	0.27	0.27
Papa Bear Lake	12	190205030506	0.12	1	1	0	1	1.00	0.06	4.18	2.68
Pass Creek	12	190205020407	0.00	0	0	0	0	1.00	0.08	1.08	1.08
Peters Creek (South Kahiltna River)	12	190205041907	0.82	1	0	1	0	1.00	0.17	3.99	2.99
Peters Creek (Willow Creek)	12	190205050603	0.02	1	0	0	0	0.20	0.01	1.23	0.73
Pickle Creek	12	190205041902	0.07	1	0	0	0	0.60	0.59	2.26	1.76
Pinnacle Mountain (Matanuska River)	12	190204020703	0.01	1	1	0	1	0.80	0.03	3.83	2.33
Portage Creek	12	190205012202	0.05	0	0	1	0	0.40	0.00	1.45	0.95
Prairie Creek Headwaters	12	190205030204	0.02	1	1	1	0	0.80	0.09	3.91	2.41
Prairie Creek Mouth	12	190205030206	0.19	1	0	1	0	0.80	0.02	3.01	2.01
Puntilla Creek	12	190205041001	0.00	0	1	0	0	0.40	0.01	1.41	0.91
Purches Creek	12	190205050601	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Purinton Creek	12	190204020404	0.00	0	0	0	0	0.00	0.07	0.07	0.07
Queer Creek	12	190205050305	0.07	1	0	0	0	0.40	0.94	2.41	1.91
Rabideux Creek	12	190205050306	0.29	1	0	0	0	0.40	0.62	2.31	1.81
Rainbow Lake (Sheep River)	12	190205030407	0.11	1	0	0	0	0.60	0.03	1.73	1.23
Red Creek	12	190205040702	0.35	1	0	0	0	0.60	0.35	2.30	1.80
Red Salmon Lake	12	190205041501	0.09	1	1	0	1	0.60	0.13	3.82	2.32
Red Shirt Lake	12	190205051202	0.21	1	1	0	0	0.60	0.41	3.22	2.22
Rolly Creek	12	190205051003	0.00	0	0	0	0	0.20	0.38	0.58	0.58
Ruth Glacier River	10	190205020800	0.02	0	0	0	0	1.00	0.01	1.03	1.03
Sanona Creek	10	190205011000	0.00	0	0	0	0	0.00	0.07	0.07	0.07
Saturday Creek	12	190205041406	0.09	0	0	0	0	0.40	0.01	0.49	0.49
Sawmill Creek	12	190204020508	0.00	0	0	0	0	0.00	0.13	0.13	0.13
Sheep Creek Slough	12	190205050309	0.47	1	0	1	1	1.00	0.58	5.05	3.55
Sheep River	12	190205030404	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Sheep River Headwaters	12	190205030402	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Sheep River Mouth	12	190205030408	0.20	1	0	0	0	0.60	0.05	1.84	1.34
Shell Creek	12	190205041506	0.16	1	1	0	0	0.60	0.27	3.03	2.03
Sherman	12	190205012403	0.10	0	0	1	1	1.00	0.08	3.18	2.18
Shotgun Creek	12	190205020404	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Shulin Lake (Kahiltna River)	12	190205041908	0.34	1	0	1	0	1.00	0.54	3.88	2.88

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Appendix A. Normalized Scores for Biological Value Factors

Watershed Name	HUC Level	HUC 10 Number	Spawning & Rearing Length All Species (1)	Coho Rearing	Sockeye Spawning	Chinook Spawning	Chum Spawning	Species Richness (2)	Wetlands and Lakes (3)	Biological Scenario B1 (4)	Biological Scenario B2 (4)
Skwentna River Mouth	**12**	190205041508	0.10	1	0	1	1	1.00	0.25	4.35	2.85
South Chulitna River	**12**	190205021002	0.20	0	0	1	1	1.00	0.15	3.35	2.35
South Fork Montana Creek	**12**	190205050103	0.10	0	0	0	0	0.20	0.03	0.33	0.33
South Kichatna River	**12**	190205040601	0.17	0	0	0	0	0.80	0.01	0.97	0.97
South Kings River	**12**	190204020604	0.17	1	0	0	1	0.60	0.01	2.78	1.78
South Kroto Creek	**12**	190205050904	0.79	1	1	1	0	1.00	0.53	5.31	3.81
South Maclaren River	**10**	190205010700	0.00	0	0	0	0	0.00	0.14	0.14	0.14
South Sheep River	**12**	190205030403	0.00	0	0	0	0	0.20	0.00	0.20	0.20
South Talachulitna River	**12**	190205041405	0.14	1	0	1	1	1.00	0.13	4.27	2.77
South Yentna River	**12**	190205042007	0.36	1	1	1	1	1.00	0.49	5.84	3.84
Southwest Chunilna Creek	**12**	190205030502	0.11	1	0	0	1	0.80	0.00	2.91	1.91
Southwest Portage Creek	**12**	190205012204	0.19	0	0	1	0	0.80	0.04	2.03	1.53
Sovereign Mountain	**12**	190205030401	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Squaw Creek	**12**	190205041006	0.03	0	1	0	0	0.40	0.01	1.45	0.95
Sunflower Creek	**12**	190205041602	0.31	1	1	0	0	1.00	0.05	3.35	2.35
Susitna	**12**	190205051006	0.19	1	0	0	0	1.00	0.55	2.73	2.23
Susitna Glacier	**10**	190205010100	0.00	0	0	0	0	0.00	0.03	0.03	0.03
Susitna River Mouth	**12**	190205051204	0.25	1	0	1	0	1.00	0.98	4.22	3.22
Talachulitna River Headwaters	**12**	190205041404	0.40	1	1	1	1	1.00	0.25	5.64	3.64
Talachulitna River Mouth	**12**	190205041411	0.21	1	0	1	1	1.00	0.06	4.27	2.77
Talkeetna	**12**	190205050304	0.37	1	0	0	1	1.00	0.38	3.75	2.75
Talkeetna River Mouth	**12**	190205030609	0.19	1	1	1	1	1.00	0.12	5.31	3.31
Texas Creek	**12**	190205051104	0.03	0	0	0	0	0.20	0.24	0.47	0.47
Thoroughfare Creek	**12**	190205012203	0.06	0	0	1	0	0.40	0.00	1.46	0.96
Threemile Creek	**12**	190205041003	0.08	0	1	0	0	0.20	0.01	1.29	0.79
Thunder Bird Creek	**12**	190204010104	0.01	1	0	0	0	0.80	0.00	1.81	1.31
Thunder Bird Creek (Eklutna River)	**12**	190204010102	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Thursday Creek	**12**	190205041410	0.09	0	0	0	0	0.40	0.03	0.52	0.52
Tokositna Glacier	**10**	190205020700	0.00	0	0	0	0	0.00	0.01	0.01	0.01
Toms Creek	**12**	190205051103	0.00	0	0	0	0	0.00	0.36	0.36	0.36
Trail Creek	**12**	190205051110	0.12	1	0	1	0	0.80	0.08	2.99	1.99
Trapper Creek (Kroto Creek)	**12**	190205050906	0.40	1	0	1	0	1.00	0.55	3.95	2.95
Trapper Creek (Talkeetna to Caswell)	**12**	190205050301	0.45	1	0	0	0	0.40	0.35	2.20	1.70
Trapper Lake	**12**	190205050905	0.46	1	0	0	0	0.40	0.93	2.79	2.29
Treasure Creek (North Kahiltna River)	**12**	190205041803	0.12	0	1	0	0	0.60	0.40	2.12	1.62

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Watershed Name	HUC Level	HUC 10 Number	Spawning & Rearing Length All Species (1)	Coho Rearing	Sockeye Spawning	Chinook Spawning	Chum Spawning	Species Richness (2)	Wetlands and Lakes (3)	Biological Scenario B1 (4)	Biological Scenario B2 (4)
Treasure Creek (South Kahiltna River)	12	190205041903	0.00	0	0	0	0	0.20	0.69	0.89	0.89
Trimble Glacier	10	190205041200	0.13	0	1	0	0	0.20	0.01	1.34	0.84
Troublesome Creek	12	190205021001	0.10	0	0	0	1	0.80	0.04	1.94	1.44
Tsusena Creek	10	190205011900	0.00	0	0	0	0	0.00	0.02	0.02	0.02
Twentymile Creek	12	190205050901	0.13	1	0	1	0	0.80	0.37	3.31	2.31
Tyone Creek	10	190205011100	0.00	0	0	0	0	0.00	0.11	0.11	0.11
Tyone Lake	10	190205010900	0.00	0	0	0	0	0.00	0.29	0.29	0.29
Tyone River	10	190205011200	0.00	0	0	0	0	0.00	0.13	0.13	0.13
Upper Chickaloon River	12	190204020503	0.00	0	0	0	0	0.00	0.01	0.01	0.01
Upper Chunilna Creek	12	190205030501	0.07	0	0	1	1	0.80	0.00	2.87	1.87
Upper Iron Creek	12	190205030301	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Upper Little Willow Creek	12	190205050501	0.06	0	0	1	0	0.40	0.00	1.46	0.96
Upper Sheep Creek	12	190205050201	0.08	0	0	1	0	0.20	0.01	1.29	0.79
Upper Skwentna River	10	190205040900	0.00	0	1	0	0	0.20	0.00	1.20	0.70
Upper Sucker Creek	12	190205051107	0.07	1	1	1	0	0.80	0.10	3.96	2.46
Upper Talkeetna River	10	190205030100	0.06	1	0	0	0	0.40	0.00	1.46	0.96
Upper Tokositna River	12	190205020903	0.15	0	1	0	0	0.40	0.03	1.58	1.08
Wasilla Creek	12	190204021304	0.39	1	1	0	1	0.80	0.17	4.36	2.86
Watana Creek	10	190205011700	0.00	0	0	0	0	0.00	0.04	0.04	0.04
Watana Lake (Susitna River)	12	190205012102	0.00	0	0	0	0	0.20	0.07	0.27	0.27
Watana Mountain (Susitna River) A	12	190205012101	0.00	0	0	0	0	0.00	0.02	0.02	0.02
Watana Mountain (Susitna River)	12	190205012106	0.14	0	0	0	0	0.20	0.08	0.42	0.42
Watana Mountain (Susitna River) D	12	190205012104	0.00	0	0	0	0	0.00	0.02	0.02	0.02
Watana Mountain (Susitna River) G	12	190205012103	0.00	0	0	0	0	0.00	0.11	0.11	0.11
Wells Mountain (Talkeetna River)	12	190205030604	0.00	0	0	0	0	0.80	0.01	0.81	0.81
West Devils Canyon	12	190205012305	0.00	0	0	1	0	1.00	0.06	2.06	1.56
West Fork Chulitna River	10	190205020300	0.02	0	0	1	1	0.60	0.02	2.64	1.64
West Fork Moose Creek	12	190205050701	0.18	0	0	0	0	0.20	0.36	0.74	0.74
West Fork Susitna Glacier-River	10	190205010300	0.00	0	0	0	0	0.00	0.11	0.11	0.11
West Fork Yentna River	10	190205040100	0.25	0	1	0	0	0.40	0.03	1.68	1.18
West Kashwitna River	12	190205050405	0.30	0	0	0	1	0.60	0.05	1.95	1.45
West Kichatna River	10	190205040500	0.30	1	1	0	0	0.80	0.01	3.11	2.11
West Talachulitna Creek	12	190205041403	0.33	1	1	1	1	1.00	0.37	5.70	3.70
West Talkeetna River	12	190205030606	0.11	0	0	0	1	0.80	0.04	1.95	1.45
Wetbutt Creek (Kahiltna River)	12	190205041805	0.47	1	1	1	0	0.80	0.66	4.93	3.43

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Watershed Name	HUC Level	HUC 10 Number	Spawning & Rearing Length All Species (1)	Coho Rearing	Sockeye Spawning	Chinook Spawning	Chum Spawning	Species Richness (2)	Wetlands and Lakes (3)	Biological Scenario B1 (4)	Biological Scenario B2 (4)
Whiskers Creek	**12**	190205012406	0.21	0	0	0	0	0.40	0.25	0.86	0.86
Whistling Lake	**12**	190205050704	0.29	1	1	1	0	0.80	0.38	4.47	2.97
Wiggle Creek	**12**	190205030608	0.06	1	0	0	0	0.20	0.23	1.49	0.99
Wildhorse Creek	**12**	190205020902	0.01	0	1	0	0	0.40	0.00	1.41	0.91
Willow Creek Headwaters	**12**	190205050604	0.00	0	0	1	0	0.00	0.02	1.02	0.52
Willow Creek Mouth	**12**	190205050606	0.47	1	0	1	1	0.80	0.22	4.49	2.99
Willow Mountain	**12**	190205041605	0.15	1	0	1	0	0.80	0.35	3.30	2.30
Wolverine Creek (East Matanuska River)	**12**	190204020707	0.04	1	0	0	0	0.60	0.00	1.65	1.15
Wolverine Creek (Alexander Creek)	**12**	190205051108	0.15	1	1	1	0	0.80	0.03	3.98	2.48
Yenlo Creek	**12**	190205041606	0.27	1	0	1	1	1.00	0.22	4.49	2.99
Yentna Glacier	**10**	190205040200	0.00	0	0	0	0	0.00	0.00	0.00	0.00
Yentna River Headwaters	**12**	190205040402	0.30	1	1	0	0	0.40	0.23	2.93	1.93
Yentna River Mouth	**12**	190205042008	0.25	1	0	0	0	1.00	0.43	2.68	2.18
Young Creek	**12**	190204020603	0.00	0	0	0	0	0.00	0.00	0.00	0.00

Normalized scores are based on maximum values for each factor: (1) 75 miles; (2) 5 species (3) 82% total area.
(4) Additive score of Biological Value factors (Maps 10 and 11).

Appendix B. Normalized Scores for Vulnerability Factors

Watershed Name	HUC Level	HUC 10 Number	Road Density (1)	Culverts (2)	Converted & Impervious Land Cover (3)	Platted Subdivisions (4)	Water Quality	Invasieve Northern Pike	Conservation Management Status (5)	Instream Flow Reservations	Vulneability Scenario V1 (6)	Vulneability Scenario V2 (6)
196 Mile Creek	12	190205051001	0.01	0.02	0.03	0.00	0.00	0.00	1.00	1	2.07	0.06
Alexander Creek Headwaters	12	190205051106	0.00	0.00	0.00	0.01	0.00	1.00	0.99	1	3.00	0.00
Alexander Creek Mouth	12	190205051111	0.00	0.00	0.00	0.29	0.00	0.00	0.99	1	2.28	0.00
Anderson Creek	12	190205051201	0.00	0.00	0.00	0.61	0.00	0.50	1.00	1	3.11	0.00
Answer Creek	12	190205050303	0.24	0.06	0.21	0.46	0.20	0.00	1.00	1	3.16	0.71
Archangel Creek	12	190205051301	0.00	0.00	0.00	0.00	0.20	0.00	1.00	0	1.20	0.20
Bashful Peak	12	190204021202	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.98	0.00
Bear Creek (Alexander Creek)	12	190205051105	0.00	0.00	0.00	0.00	0.00	1.00	0.98	1	2.99	0.00
Bear Creek (South Kahiltna River)	12	190205041905	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Beaver Creek (Kahiltna River)	12	190205041910	0.00	0.00	0.00	0.06	0.00	0.00	1.00	1	2.07	0.00
Big Lake	12	190205051404	0.48	0.26	0.57	0.33	1.00	1.00	1.00	0	4.64	2.31
Birch Creek	12	190205050302	0.16	0.04	0.13	0.63	0.20	0.00	1.00	1	3.15	0.52
Black River	10	190205011300	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Boulder Creek	12	190204020507	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1	1.99	0.00
Buckskin Glacier	12	190205020601	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	1.00	0.00
Buddy Creek	12	190205050104	0.06	0.00	0.11	0.15	0.00	0.00	1.00	1	2.32	0.17
Bunco Creek	12	190205020905	0.00	0.00	0.00	0.08	0.00	0.00	0.93	1	2.01	0.00
Butterfly Lake (Little Susitna River)	12	190205051307	0.05	0.19	0.06	0.06	0.20	1.00	0.65	0	2.21	0.49
Byers Creek	12	190205020603	0.02	0.00	0.01	0.00	0.00	0.00	0.02	1	1.05	0.02
Cache Creek (Lower Talkeetna River)	12	190205030601	0.00	0.00	0.00	0.00	0.20	0.00	1.00	1	2.20	0.20
Cache Creek (North Kahiltna River)	12	190205041804	0.03	0.00	0.01	0.06	0.20	0.00	1.00	1	2.29	0.24
Camp Creek	12	190205041603	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1	1.99	0.00
Canyon Creek (Happy River)	12	190205041008	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Canyon Creek (Willow Creek)	12	190205050602	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Carbon Creek	12	190204020701	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Caribou Creek	10	190204020100	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.01	0.00
Carpenter Creek	12	190204020702	0.00	0.00	0.00	0.00	0.80	0.00	1.00	1	2.80	0.80
Caswell Creek	12	190205050308	0.37	0.02	0.07	0.38	0.00	0.50	1.00	1	3.33	0.45
Central Kashwitna River	12	190205050404	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Central Sheep River	12	190205030405	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Central Susitna River	12	190205012105	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Central Talkeetna River	12	190205030602	0.00	0.00	0.00	0.00	0.20	0.00	0.98	1	2.18	0.20
Central Yentna River	12	190205042004	0.00	0.00	0.00	0.07	0.00	0.00	1.00	1	2.07	0.00
Chase	12	190205012407	0.01	0.00	0.00	0.04	0.00	0.00	0.78	1	1.84	0.01
Chickaloon Glacier	12	190204020501	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00

Normalized scores are based on maximum values for each factor: (1) unitless (2) 36 (3) 13% total area (4) 54% (5) 100%
(6) Additive score of Vulnerability factors (Maps 20 and 21).

Appendix B. Normalized Scores for Vulnerability Factors

Watershed Name	HUC Level	HUC 10 Number	Road Density (1)	Culverts (2)	Converted & Impervious Land Cover (3)	Platted Subdivisions (4)	Water Quality	Invasieve Northern Pike	Conservation Management Status (5)	Instream Flow Reservations	Vulneability Scenario V1 (6)	Vulneability Scenario V2 (6)
Chickaloon River	**12**	190204020502	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Chickaloon River Mouth	**12**	190204020509	0.01	0.00	0.00	0.00	0.80	0.00	0.98	1	2.79	0.81
Chijuk Creek	**12**	190205050800	0.01	0.00	0.00	1.00	0.00	1.00	0.94	1	3.95	0.01
Chinook Creek	**12**	190205012302	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Chulitna River Headwaters	**12**	190205020409	0.04	0.09	0.02	0.05	0.00	0.00	0.64	1	1.84	0.15
Chulitna River Mouth	**12**	190205021003	0.04	0.08	0.03	0.13	0.00	0.00	0.78	1	2.05	0.15
Clear Creek	**12**	190205051102	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Clearwater Creek	**12**	190205040403	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Clearwater Creek	**10**	190205010500	0.01	0.00	0.01	0.00	0.00	0.00	1.00	1	2.03	0.03
Clearwater Mountains (Susitna River)	**10**	190205010800	0.01	0.00	0.01	0.00	0.00	0.00	1.00	1	2.01	0.01
Coal Creek (Upper Chulitna River)	**12**	190205020408	0.00	0.00	0.00	0.00	0.00	0.00	0.18	1	1.18	0.00
Coal Creek (West Matanuska River)	**12**	190204020405	0.00	0.00	0.00	0.00	0.80	0.00	1.00	1	2.80	0.80
Coffee River	**12**	190205020605	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	1.00	0.00
Colony Glacier	**10**	190204020900	0.00	0.00	0.00	0.00	0.00	0.00	0.94	1	1.94	0.00
Contact Creek	**12**	190205041505	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Copeland Creek	**12**	190205020405	0.00	0.00	0.00	0.00	0.00	0.00	0.43	1	1.43	0.00
Cottonwood Creek	**12**	190204021306	1.00	0.87	0.90	0.82	1.00	1.00	0.97	0	6.56	3.77
Crystal Creek	**12**	190205020604	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	1.00	0.00
Curry	**12**	190205012404	0.00	0.00	0.00	0.01	0.00	0.00	0.17	1	1.18	0.00
Deadman Creek	**10**	190205011800	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Deception Creek	**12**	190205050605	0.02	0.00	0.02	0.01	0.20	0.00	1.00	0	1.25	0.24
Deep Creek (Alexander Creek)	**12**	190205051101	0.00	0.00	0.00	0.03	0.00	0.00	1.00	1	2.03	0.00
Deep Creek (Talachulitna River)	**12**	190205041409	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.98	0.00
Delta-Island	**12**	190205051002	0.07	0.00	0.08	0.11	0.20	1.00	0.99	0	2.46	0.36
Denali	**10**	190205010400	0.01	0.00	0.01	0.00	0.00	0.00	1.00	1	2.01	0.01
Devil Creek	**12**	190205012301	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Devils Canyon (Susitna River)	**12**	190205012304	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Diamond Lake (Little Susitna River)	**12**	190205051308	0.15	0.06	0.13	0.18	0.20	0.00	0.78	1	2.49	0.54
Dickenson Mountain	**12**	190205041502	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Disappointment Creek	**12**	190205030605	0.00	0.00	0.00	0.00	0.00	0.00	0.92	1	1.92	0.00
Dog Hair Creek	**12**	190205030505	0.00	0.00	0.00	0.11	0.20	0.00	1.00	1	2.30	0.20
Donkey Creek Lakes	**12**	190205040802	0.00	0.00	0.00	0.08	0.00	1.00	1.00	1	3.08	0.00
Donkey Creek Slough	**12**	190205042002	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Duck Flats	**12**	190204021305	0.40	0.38	0.75	0.30	0.20	0.00	0.69	1	3.72	1.73
Dutch Creek	**12**	190205041801	0.00	0.00	0.00	0.00	0.00	0.00	0.51	1	1.51	0.00

Normalized scores are based on maximum values for each factor: (1) unitless (2) 36 (3) 13% total area (4) 54% (5) 100%
(6) Additive score of Vulnerability factors (Maps 20 and 21).

Appendix B. Normalized Scores for Vulnerability Factors

Watershed Name	HUC Level	HUC 10 Number	Road Density (1)	Culverts (2)	Converted & Impervious Land Cover (3)	Platted Subdivisions (4)	Water Quality	Invasieve Northern Pike	Conservation Management Status (5)	Instream Flow Reservations	Vulneability Scenario V1 (6)	Vulneability Scenario V2 (6)
East Boulder Creek	12	190204020506	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
East Devils Canyon	12	190205012303	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
East Fork Chulitna River	10	190205020200	0.01	0.06	0.00	0.00	0.00	0.00	1.00	1	2.07	0.07
East Fork Iron Creek	12	190205030303	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
East Fork Susitna River	10	190205010200	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
East Fork Yentna River	10	190205040300	0.00	0.00	0.00	0.00	0.00	0.00	0.51	1	1.51	0.00
East Kashwitna River	12	190205050402	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
East Kichatna River	12	190205040603	0.00	0.00	0.00	0.11	0.00	0.00	1.00	1	2.11	0.00
East Sheep River	12	190205030406	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
East Susitna Flats	12	190205051408	0.07	0.00	0.98	0.40	0.00	0.00	0.11	1	2.56	1.04
East Susitna River	10	190205011500	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
East Talachulitna Creek	12	190205041402	0.00	0.00	0.00	0.09	0.00	0.00	1.00	1	2.09	0.00
East Talkeetna River	12	190205030202	0.00	0.00	0.00	0.00	0.20	0.00	1.00	1	2.20	0.20
East Wells Mountain	12	190205030304	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
East Yentna River	12	190205042001	0.08	0.00	0.00	0.23	0.00	0.00	1.00	1	2.31	0.08
East-Chunilna Creek	12	190205030504	0.00	0.00	0.00	0.00	0.20	0.00	1.00	1	2.20	0.20
Eightmile Creek	12	190205041507	0.00	0.00	0.00	0.04	0.00	1.00	0.98	1	3.03	0.00
Eklutna Glacier	12	190204010101	0.00	0.00	0.00	0.00	0.00	0.00	0.04	1	1.04	0.00
Eklutna Lake	12	190204010103	0.00	0.00	0.00	0.00	0.00	0.00	0.28	1	1.28	0.01
Eldridge Glacier	10	190205020500	0.00	0.00	0.00	0.00	0.00	0.00	0.03	1	1.03	0.00
Eklutna River	12	190204010105	0.14	0.00	0.07	0.00	0.00	0.00	0.59	0	0.80	0.21
Eska Creek	12	190204020705	0.08	0.11	0.05	0.03	0.00	0.00	0.56	1	1.83	0.24
Farmers Creek	12	190205040801	0.00	0.00	0.00	0.04	0.00	0.00	1.00	1	2.04	0.00
Fish Creek (Goose Bay)	12	190205051405	0.32	0.00	0.13	0.26	0.20	0.00	1.00	0	1.91	0.65
Fish Creek (Susitna River Delta)	12	190205051203	0.00	0.00	0.00	0.08	0.00	1.00	0.73	1	2.81	0.00
Fish Creek (Susitna River)	12	190205051004	0.00	0.00	0.00	0.14	0.00	1.00	1.00	1	3.14	0.00
Fish Lake Creek	12	190205042005	0.00	0.00	0.00	0.21	0.00	1.00	1.00	1	3.20	0.00
Fog Creek	10	190205012000	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Fourth of July Creek	12	190205040401	0.00	0.00	0.00	0.00	0.00	0.00	0.78	1	1.78	0.00
Friday Creek (Talachulitna River)	12	190205041407	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.98	0.00
Friday Creek (Knik River)	12	190204021201	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Gagnan Creek	12	190205040604	0.00	0.00	0.00	0.01	0.00	0.00	1.00	1	2.01	0.00
Gate Creek	12	190205050703	0.03	0.06	0.00	0.09	0.00	0.00	0.93	1	2.11	0.09
Glacier Creek	12	190205041007	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Goat Creek	12	190204021301	0.01	0.00	0.00	0.00	0.00	0.00	0.23	1	1.24	0.01

Normalized scores are based on maximum values for each factor: (1) unitless (2) 36 (3) 13% total area (4) 54% (5) 100%
(6) Additive score of Vulnerability factors (Maps 20 and 21).

Appendix B. Normalized Scores for Vulnerability Factors

Watershed Name	HUC Level	HUC 10 Number	Road Density (1)	Culverts (2)	Converted & Impervious Land Cover (3)	Platted Subdivisions (4)	Water Quality	Invasieve Northern Pike	Conservation Management Status (5)	Instream Flow Reservations	Vulneability Scenario V1 (6)	Vulneability Scenario V2 (6)
Gold Creek	12	190205012402	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Goose Creek (Goose Bay)	12	190205051406	0.13	0.06	0.07	0.13	0.20	1.00	0.91	1	3.50	0.46
Goose Creek (Talkeetna to Caswell)	12	190205050307	0.15	0.00	0.02	0.16	0.20	0.00	1.00	1	2.53	0.37
Government Creek (Little Susitna River)	12	190205051303	0.21	0.26	0.13	0.12	0.20	0.00	1.00	0	1.92	0.80
Granite Creek (East Matanuska River)	12	190204020704	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.98	0.01
Granite Creek (North Kahiltna River)	12	190205041802	0.00	0.00	0.00	0.00	0.00	0.00	0.03	1	1.03	0.00
Gravel Creek Mouth	12	190204020402	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Happy River Headwaters	12	190205041002	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Happy River Mouth	12	190205041009	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Hayes River	10	190205041300	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Hewitt Creek	12	190205042003	0.01	0.00	0.00	0.26	0.00	1.00	1.00	1	3.28	0.01
Hicks Creek	12	190204020401	0.01	0.02	0.01	0.00	0.00	0.00	1.00	1	2.03	0.03
Hidden River	12	190205020602	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	1.00	0.00
Home Creek	12	190205041604	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1	1.99	0.00
Honolulu Creek	12	190205020401	0.01	0.04	0.01	0.00	0.00	0.00	1.00	1	2.05	0.05
Houston (Little Susitna River)	12	190205051304	0.18	0.19	0.16	0.12	0.20	0.00	0.99	0	1.84	0.73
Hungryman Creek	12	190205041901	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Hunter Creek	12	190204021203	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.99	0.00
Hurricane Gulch	12	190205020402	0.03	0.00	0.03	0.00	0.00	0.00	1.00	1	2.06	0.06
Indian Creek (East Yentna River)	12	190205042006	0.00	0.00	0.00	0.09	0.00	0.00	1.00	1	2.09	0.00
Indian Creek (Happy River)	12	190205041005	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Indian River	12	190205012401	0.00	0.00	0.00	0.01	0.00	0.00	0.69	1	1.70	0.00
Iron Creek	12	190205050503	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1	1.99	0.00
Ivan River	12	190205051205	0.00	0.00	0.01	0.00	0.00	0.00	0.91	1	1.92	0.01
Johnson Creek Headwaters	12	190205040701	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Johnson Creek Mouth	12	190205040703	0.00	0.00	0.00	0.01	0.00	0.00	1.00	1	2.01	0.00
Kahiltna Glacier	10	190205041700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	1.00	0.00
Kahiltna River Mouth	12	190205041909	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Kankiula Glacier	12	190205020901	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	1.00	0.00
Kashwitna River	12	190205050403	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Kashwitna River Headwaters	12	190205050401	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Kashwitna River Mouth	12	190205050407	0.07	0.00	0.03	0.07	0.00	0.00	1.00	1	2.18	0.10
Kichatna River Mouth	12	190205040605	0.00	0.00	0.00	0.01	0.00	0.00	1.00	1	2.01	0.00
Kings River	12	190204020602	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Kitty Lake	12	190205041401	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.98	0.00

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Appendix B. Normalized Scores for Vulnerability Factors

Watershed Name	HUC Level	HUC 10 Number	Road Density (1)	Culverts (2)	Converted & Impervious Land Cover (3)	Platted Subdivisions (4)	Water Quality	Invasieve Northern Pike	Conservation Management Status (5)	Instream Flow Reservations	Vulneability Scenario V1 (6)	Vulneability Scenario V2 (6)
Knik Glacier	**10**	190204021000	0.00	0.00	0.00	0.00	0.00	0.00	0.94	1	1.94	0.00
Knik River Delta	**12**	190204021303	0.18	0.17	0.41	0.07	0.20	0.00	0.71	1	2.75	0.96
Knik River Headwaters	**12**	190204021205	0.03	0.17	0.00	0.01	0.20	1.00	0.98	1	3.40	0.40
Kosina Creek	**10**	190205011600	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Kroto Creek Headwaters	**12**	190205050902	0.03	0.04	0.00	0.16	0.20	1.00	0.97	1	3.40	0.27
Kroto Creek Mouth	**12**	190205050907	0.00	0.00	0.00	0.37	0.20	0.00	0.95	0	1.52	0.20
Kroto Slough	**12**	190205051005	0.00	0.00	0.00	0.03	0.00	1.00	1.00	1	3.03	0.00
Lake Creek	**12**	190205051306	0.10	0.06	0.13	0.01	0.00	0.00	0.91	1	2.20	0.28
Lake Creek Headwaters	**12**	190205041601	0.00	0.00	0.00	0.01	0.00	1.00	0.64	1	2.64	0.00
Lake Creek Mouth	**12**	190205041607	0.00	0.00	0.00	0.06	0.00	1.00	0.99	1	3.04	0.00
Lake George Glacier	**10**	190204020800	0.00	0.00	0.00	0.00	0.00	0.00	0.92	1	1.92	0.00
Lane Creek	**12**	190205012405	0.00	0.00	0.00	0.03	0.00	0.00	1.00	1	2.03	0.00
Larson Lake	**12**	190205030607	0.00	0.00	0.00	0.76	0.20	0.00	1.00	1	2.96	0.20
Lewis River	**12**	190205051206	0.00	0.00	0.05	0.00	0.00	0.00	0.91	1	1.96	0.05
Little Meadow Creek	**12**	190205051401	0.80	1.00	0.65	0.65	0.00	1.00	1.00	1	6.11	2.46
Little Peters Hills (Kahiltna River)	**12**	190205041904	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Little Susitna River Headwaters	**12**	190205051302	0.09	0.11	0.02	0.03	0.20	0.00	0.88	0	1.35	0.43
Little Susitna River Mouth	**12**	190205051310	0.02	0.00	0.96	0.30	0.20	0.50	0.05	1	3.03	1.18
Lower Chunilna Creek	**12**	190205030507	0.00	0.00	0.00	0.12	0.20	0.00	1.00	1	2.31	0.20
Lower Iron Creek	**12**	190205030305	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.98	0.00
Lower Little Willow Creek	**12**	190205050504	0.04	0.00	0.04	0.03	0.00	0.50	0.98	1	2.59	0.08
Lower Sheep Creek	**12**	190205050203	0.04	0.00	0.01	0.06	0.00	0.00	1.00	1	2.11	0.06
Lower Skwentna River	**12**	190205041504	0.00	0.00	0.00	0.23	0.00	0.00	1.00	1	2.23	0.00
Lower Sucker Creek	**12**	190205051109	0.00	0.00	0.00	0.00	0.00	1.00	0.99	1	3.00	0.00
Lower Tokositna River	**12**	190205020906	0.00	0.00	0.00	0.02	0.00	0.50	0.05	1	1.56	0.00
Lucile Creek	**12**	190205051402	0.99	0.11	1.00	0.73	1.00	0.00	1.00	0	4.84	3.11
Maguire Creek	**12**	190205051309	0.00	0.00	0.00	0.00	0.00	0.00	0.01	1	1.01	0.00
Marcus Baker Glacier (Glacier Fork Knik River)	**10**	190204021100	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Martin Creek	**12**	190205041906	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Matanuska Glacier	**10**	190204020200	0.00	0.00	0.00	0.00	0.00	0.00	0.97	1	1.97	0.00
Matanuska Peak (Matanuska River)	**12**	190204020708	0.25	0.17	0.42	0.16	0.80	0.00	0.99	1	3.79	1.64
Matanuska River Delta	**12**	190204021302	0.35	0.00	0.89	0.23	0.80	0.00	0.70	1	3.97	2.04
Matanuska River Headwaters	**10**	190204020300	0.02	0.04	0.02	0.00	0.80	0.00	1.00	1	2.88	0.88
McCallie Creek	**12**	190205020403	0.00	0.00	0.00	0.00	0.00	0.00	0.86	1	1.86	0.00
McRoberts Creek	**12**	190204021204	0.07	0.00	0.06	0.03	0.40	0.50	1.00	1	3.06	0.53

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Watershed Name	HUC Level	HUC 10 Number	Road Density (1)	Culverts (2)	Converted & Impervious Land Cover (3)	Platted Subdivisions (4)	Water Quality	Invasieve Northern Pike	Conservation Management Status (5)	Instream Flow Reservations	Vulneability Scenario V1 (6)	Vulneability Scenario V2 (6)
Meadow Creek	**12**	190205051403	0.69	0.43	0.63	0.49	0.20	1.00	1.00	0	4.44	1.95
Middle Chickaloon River	**12**	190204020505	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Middle Chunilna Creek	**12**	190205030503	0.00	0.00	0.00	0.00	0.20	0.00	1.00	1	2.20	0.20
Middle Fork Chulitna River	**10**	190205020100	0.02	0.04	0.01	0.01	0.00	0.00	0.67	1	1.75	0.07
Middle Fork Montana Creek	**12**	190205050102	0.00	0.00	0.00	0.14	0.00	0.00	1.00	1	2.15	0.00
Middle Iron Creek	**12**	190205030302	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Middle Little Willow Creek	**12**	190205050502	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.98	0.00
Middle Sheep Creek	**12**	190205050202	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Middle Skwentna River	**10**	190205041100	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Middle Talkeetna River - Grebe	**12**	190205030205	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Middle Talkeetna River - Jaina East	**12**	190205030201	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Middle Talkeetna River - Remus West	**12**	190205030203	0.00	0.00	0.00	0.00	0.20	0.00	1.00	1	2.20	0.20
Middle Talkeetna River - Tafia North	**12**	190205030207	0.00	0.00	0.00	0.00	0.20	0.00	1.00	1	2.20	0.20
Middle Tokositna River	**12**	190205020904	0.00	0.00	0.00	0.00	0.00	0.00	0.33	1	1.33	0.00
Montana Creek	**12**	190205050105	0.31	0.00	0.12	0.67	0.20	0.00	1.00	1	3.30	0.63
Monument Creek	**12**	190204020403	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Moose Creek (East Matanuska River)	**12**	190204020706	0.04	0.00	0.01	0.02	0.00	0.00	0.96	1	2.03	0.05
Moose Creek (Happy River)	**12**	190205041004	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Moose Creek Headwaters	**12**	190205050702	0.05	0.02	0.04	0.07	0.00	0.00	0.90	1	2.08	0.11
Moose Creek Mouth	**12**	190205050706	0.01	0.00	0.01	0.05	0.00	0.00	0.85	1	1.92	0.02
Moss Creek	**12**	190204020504	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Nakochna River	**12**	190205040602	0.00	0.00	0.00	0.00	0.00	0.00	0.78	1	1.78	0.00
Nancy Lake	**12**	190205051305	0.15	0.08	0.12	0.06	0.20	1.00	1.00	1	3.61	0.55
Ninemile Creek	**12**	190205050705	0.03	0.02	0.04	0.07	0.00	0.00	0.85	1	2.01	0.09
Ninemile Creek (Matanuska River)	**12**	190204020406	0.06	0.06	0.03	0.03	0.80	0.00	1.00	1	2.97	0.94
North Chulitna River	**12**	190205020606	0.04	0.00	0.01	0.00	0.00	0.00	0.00	1	1.06	0.05
North Elmendorf Moraine	**12**	190205051407	0.49	0.04	0.24	0.51	0.00	1.00	0.94	1	4.20	0.76
North Fork Kashwitna River	**12**	190205050406	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
North Fork Montana Creek	**12**	190205050101	0.00	0.00	0.00	0.17	0.00	0.00	1.00	1	2.17	0.00
North Kings River	**12**	190204020601	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1	1.99	0.00
North Kroto Creek	**12**	190205050903	0.02	0.00	0.00	0.19	0.20	1.00	0.93	1	3.34	0.22
North Maclaren River	**10**	190205010600	0.01	0.00	0.01	0.00	0.00	0.00	1.00	1	2.01	0.01
North Skwentna River	**12**	190205041503	0.00	0.00	0.00	0.04	0.00	0.00	1.00	1	2.04	0.00
North Talachulitna River	**12**	190205041408	0.00	0.00	0.00	0.10	0.00	0.00	0.98	1	2.08	0.00
North Wells Mountain	**12**	190205030603	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1	1.99	0.00

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Watershed Name	HUC Level	HUC 10 Number	Road Density (1)	Culverts (2)	Converted & Impervious Land Cover (3)	Platted Subdivisions (4)	Water Quality	Invasieve Northern Pike	Conservation Management Status (5)	Instream Flow Reservations	Vulneability Scenario V1 (6)	Vulneability Scenario V2 (6)
North Yentna River	12	190205040404	0.00	0.00	0.00	0.06	0.00	0.00	1.00	1	2.06	0.00
Northeast Portage Creek	12	190205012201	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Ohio Creek	12	190205020406	0.00	0.00	0.00	0.00	0.00	0.00	0.05	1	1.05	0.00
Oshetna River	10	190205011400	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Papa Bear Lake	12	190205030506	0.00	0.00	0.00	0.37	0.00	0.00	1.00	1	2.37	0.00
Pass Creek	12	190205020407	0.02	0.06	0.01	0.10	0.00	0.00	0.57	1	1.76	0.09
Peters Creek (South Kahiltna River)	12	190205041907	0.05	0.06	0.00	0.06	0.20	0.00	0.96	1	2.33	0.31
Peters Creek (Willow Creek)	12	190205050603	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1	1.99	0.00
Pickle Creek	12	190205041902	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Pinnacle Mountain (Matanuska River)	12	190204020703	0.09	0.00	0.05	0.03	0.80	0.00	1.00	1	2.96	0.94
Portage Creek	12	190205012202	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Prairie Creek Headwaters	12	190205030204	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Prairie Creek Mouth	12	190205030206	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Puntilla Creek	12	190205041001	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Purches Creek	12	190205050601	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Purinton Creek	12	190204020404	0.04	0.00	0.03	0.01	0.00	0.00	1.00	1	2.08	0.07
Queer Creek	12	190205050305	0.01	0.04	0.01	0.01	0.00	0.00	1.00	1	2.07	0.06
Rabideux Creek	12	190205050306	0.08	0.11	0.11	0.11	0.00	0.00	1.00	1	2.41	0.30
Rainbow Lake (Sheep River)	12	190205030407	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Red Creek	12	190205040702	0.00	0.00	0.00	0.06	0.00	0.00	1.00	1	2.06	0.00
Red Salmon Lake	12	190205041501	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Red Shirt Lake	12	190205051202	0.05	0.00	0.00	0.05	0.00	1.00	0.60	1	2.71	0.06
Rolly Creek	12	190205051003	0.02	0.00	0.01	0.05	0.00	1.00	0.94	1	3.01	0.03
Ruth Glacier River	10	190205020800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	1.00	0.00
Sanona Creek	10	190205011000	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Saturday Creek	12	190205041406	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Sawmill Creek	12	190204020508	0.01	0.00	0.00	0.00	0.00	0.00	0.57	1	1.59	0.01
Sheep Creek Slough	12	190205050309	0.11	0.06	0.10	0.05	0.20	0.00	1.00	1	2.51	0.47
Sheep River	12	190205030404	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Sheep River Headwaters	12	190205030402	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Sheep River Mouth	12	190205030408	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Shell Creek	12	190205041506	0.00	0.00	0.00	0.49	0.00	1.00	1.00	1	3.49	0.00
Sherman	12	190205012403	0.00	0.00	0.00	0.02	0.00	0.00	0.56	1	1.58	0.00
Shotgun Creek	12	190205020404	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Shulin Lake (Kahiltna River)	12	190205041908	0.00	0.00	0.00	0.08	0.00	0.00	0.94	1	2.02	0.00

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Watershed Name	HUC Level	HUC 10 Number	Road Density (1)	Culverts (2)	Converted & Impervious Land Cover (3)	Platted Subdivisions (4)	Water Quality	Invasieve Northern Pike	Conservation Management Status (5)	Instream Flow Reservations	Vulneability Scenario V1 (6)	Vulneability Scenario V2 (6)
Skwentna River Mouth	12	190205041508	0.00	0.00	0.03	0.11	0.00	0.00	0.98	1	2.12	0.03
South Chulitna River	12	190205021002	0.04	0.11	0.04	0.03	0.00	0.00	0.04	1	1.27	0.20
South Fork Montana Creek	12	190205050103	0.01	0.00	0.00	0.01	0.00	0.00	1.00	1	2.02	0.01
South Kichatna River	12	190205040601	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
South Kings River	12	190204020604	0.00	0.00	0.00	0.00	0.00	0.00	0.97	1	1.98	0.00
South Kroto Creek	12	190205050904	0.01	0.00	0.00	0.47	0.20	1.00	0.95	0	2.63	0.21
South Maclaren River	10	190205010700	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
South Sheep River	12	190205030403	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
South Talachulitna River	12	190205041405	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.98	0.00
South Yentna River	12	190205042007	0.00	0.00	0.00	0.06	0.00	0.00	1.00	0	1.06	0.00
Southwest Chunilna Creek	12	190205030502	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Southwest Portage Creek	12	190205012204	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Sovereign Mountain	12	190205030401	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Squaw Creek	12	190205041006	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Sunflower Creek	12	190205041602	0.00	0.00	0.00	0.00	0.00	0.00	0.59	1	1.59	0.00
Susitna	12	190205051006	0.00	0.00	0.00	0.01	0.00	0.00	1.00	0	1.01	0.00
Susitna Glacier	10	190205010100	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Susitna River Mouth	12	190205051204	0.00	0.00	0.00	0.01	0.00	1.00	0.90	1	2.90	0.00
Talachulitna River Headwaters	12	190205041404	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.99	0.00
Talachulitna River Mouth	12	190205041411	0.00	0.00	0.00	0.03	0.00	0.00	0.98	1	2.01	0.00
Talkeetna	12	190205050304	0.14	0.02	0.12	0.14	0.20	0.00	1.00	0	1.62	0.48
Talkeetna River Mouth	12	190205030609	0.02	0.00	0.00	0.88	0.20	0.00	0.99	0	2.09	0.22
Texas Creek	12	190205051104	0.00	0.00	0.00	0.04	0.00	0.00	1.00	1	2.04	0.00
Thoroughfare Creek	12	190205012203	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Threemile Creek	12	190205041003	0.00	0.00	0.00	0.00	0.00	0.00	0.95	1	1.95	0.00
Thunder Bird Creek	12	190204010104	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0	0.15	0.00
Thunder Bird Creek (Eklutna River)	12	190204010102	0.00	0.00	0.00	0.00	0.00	0.00	0.96	1	1.96	0.00
Thursday Creek	12	190205041410	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.99	0.00
Tokositna Glacier	10	190205020700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	1.00	0.00
Toms Creek	12	190205051103	0.00	0.00	0.00	0.01	0.00	0.00	1.00	1	2.01	0.00
Trail Creek	12	190205051110	0.00	0.00	0.00	0.08	0.00	0.00	0.99	1	2.07	0.00
Trapper Creek (Kroto Creek)	12	190205050906	0.00	0.00	0.00	0.01	0.20	0.00	0.97	1	2.18	0.20
Trapper Creek (Talkeetna to Caswell)	12	190205050301	0.08	0.15	0.24	0.38	0.00	0.00	0.71	1	2.56	0.47
Trapper Lake	12	190205050905	0.00	0.00	0.00	0.10	0.00	1.00	1.00	1	3.10	0.00
Treasure Creek (North Kahiltna River)	12	190205041803	0.00	0.00	0.00	0.00	0.00	0.00	0.35	1	1.35	0.00

Normalized scores are based on maximum values for each factor: (1) unitless (2) 36 (3) 13% total area (4) 54% (5) 100%
(6) Additive score of Vulnerability factors (Maps 20 and 21).

Appendix B. Normalized Scores for Vulnerability Factors

Watershed Name	HUC Level	HUC 10 Number	Road Density (1)	Culverts (2)	Converted & Impervious Land Cover (3)	Platted Subdivisions (4)	Water Quality	Invasieve Northern Pike	Conservation Management Status (5)	Instream Flow Reservations	Vulneability Scenario V1 (6)	Vulneability Scenario V2 (6)
Treasure Creek (South Kahiltna River)	12	190205041903	0.00	0.00	0.00	0.00	0.00	0.00	0.95	1	1.95	0.00
Trimble Glacier	10	190205041200	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Troublesome Creek	12	190205021001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	1.00	0.00
Tsusena Creek	10	190205011900	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Twentymile Creek	12	190205050901	0.11	0.04	0.00	0.46	0.20	0.00	0.99	1	2.79	0.34
Tyone Creek	10	190205011100	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Tyone Lake	10	190205010900	0.01	0.06	0.01	0.00	0.20	0.00	1.00	1	2.27	0.27
Tyone River	10	190205011200	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Upper Chickaloon River	12	190204020503	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Upper Chunilna Creek	12	190205030501	0.00	0.00	0.00	0.00	0.20	0.00	1.00	1	2.20	0.20
Upper Iron Creek	12	190205030301	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Upper Little Willow Creek	12	190205050501	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1	1.99	0.00
Upper Sheep Creek	12	190205050201	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Upper Skwentna River	10	190205040900	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1	1.99	0.00
Upper Sucker Creek	12	190205051107	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1	3.00	0.00
Upper Talkeetna River	10	190205030100	0.00	0.00	0.00	0.00	0.20	0.00	1.00	1	2.20	0.20
Upper Tokositna River	12	190205020903	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1	1.02	0.00
Wasilla Creek	12	190204021304	0.54	0.70	0.64	0.47	0.20	0.00	0.79	1	4.34	2.08
Watana Creek	10	190205011700	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Watana Lake (Susitna River)	12	190205012102	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Watana Mountain (Susitna River) A	12	190205012101	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Watana Mountain (Susitna River)	12	190205012106	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Watana Mountain (Susitna River) D	12	190205012104	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Watana Mountain (Susitna River) G	12	190205012103	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Wells Mountain (Talkeetna River)	12	190205030604	0.00	0.00	0.00	0.00	0.20	0.00	0.98	1	2.18	0.20
West Devils Canyon	12	190205012305	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
West Fork Chulitna River	10	190205020300	0.00	0.00	0.00	0.00	0.00	0.00	0.05	1	1.05	0.00
West Fork Moose Creek	12	190205050701	0.00	0.00	0.00	0.12	0.00	0.00	0.90	1	2.02	0.00
West Fork Susitna Glacier-River	10	190205010300	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
West Fork Yentna River	10	190205040100	0.00	0.00	0.00	0.00	0.00	0.00	0.78	1	1.78	0.00
West Kashwitna River	12	190205050405	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1	1.99	0.00
West Kichatna River	10	190205040500	0.00	0.00	0.00	0.00	0.00	0.00	0.78	1	1.78	0.00
West Talachulitna Creek	12	190205041403	0.00	0.00	0.00	0.02	0.00	0.00	0.98	1	2.00	0.00
West Talkeetna River	12	190205030606	0.00	0.00	0.00	0.01	0.20	0.00	0.98	1	2.19	0.20
Wetbutt Creek (Kahiltna River)	12	190205041805	0.00	0.00	0.00	0.00	0.20	0.00	0.35	1	1.55	0.20

Normalized scores are based on maximum values for each factor: (1) unitless (2) 36 (3) 13% total area (4) 54% (5) 100%
(6) Additive score of Vulnerability factors (Maps 20 and 21).

Appendix B. Normalized Scores for Vulnerability Factors

Watershed Name	HUC Level	HUC 10 Number	Road Density (1)	Culverts (2)	Converted & Impervious Land Cover (3)	Platted Subdivisions (4)	Water Quality	Invasieve Northern Pike	Conservation Management Status (5)	Instream Flow Reservations	Vulneability Scenario V1 (6)	Vulneability Scenario V2 (6)
Whiskers Creek	**12**	190205012406	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Whistling Lake	**12**	190205050704	0.03	0.02	0.00	0.17	0.00	0.00	0.74	1	1.95	0.04
Wiggle Creek	**12**	190205030608	0.05	0.00	0.00	0.15	0.00	0.00	0.99	1	2.19	0.05
Wildhorse Creek	**12**	190205020902	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1	1.02	0.00
Willow Creek Headwaters	**12**	190205050604	0.05	0.00	0.01	0.00	0.00	0.00	1.00	1	2.06	0.06
Willow Creek Mouth	**12**	190205050606	0.31	0.00	0.24	0.19	0.20	1.00	0.91	0	2.85	0.75
Willow Mountain	**12**	190205041605	0.00	0.00	0.00	0.01	0.00	0.00	0.99	1	2.00	0.00
Wolverine Creek (East Matanuska River)	**12**	190204020707	0.02	0.00	0.10	0.00	0.00	0.00	1.00	1	2.12	0.12
Wolverine Creek (Alexander Creek)	**12**	190205051108	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Yenlo Creek	**12**	190205041606	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1	2.00	0.00
Yentna Glacier	**10**	190205040200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	1.00	0.00
Yentna River Headwaters	**12**	190205040402	0.00	0.00	0.00	0.00	0.00	0.00	0.78	1	1.78	0.00
Yentna River Mouth	**12**	190205042008	0.00	0.00	0.00	0.18	0.00	0.00	1.00	0	1.18	0.00
Young Creek	**12**	190204020603	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1	1.98	0.00

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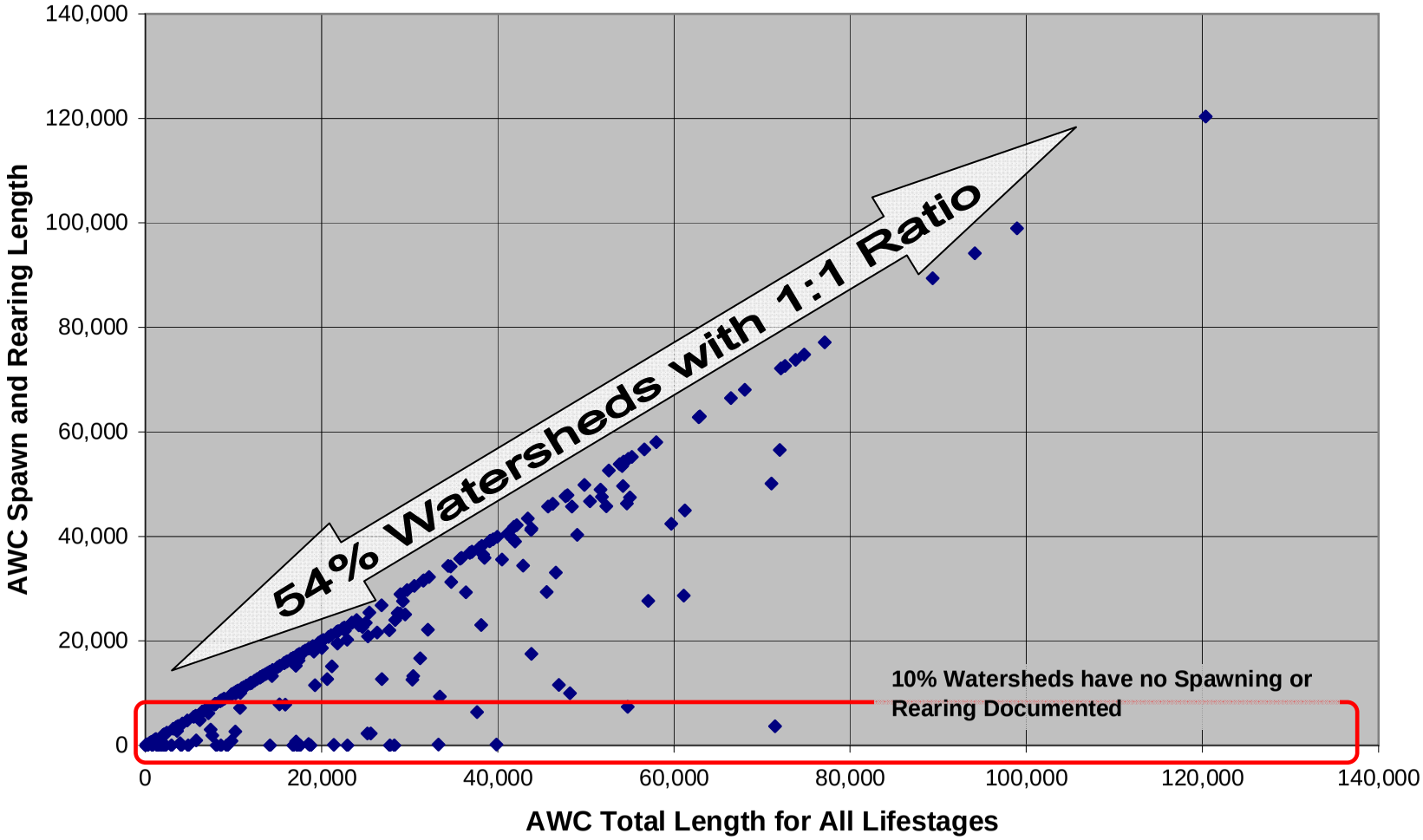
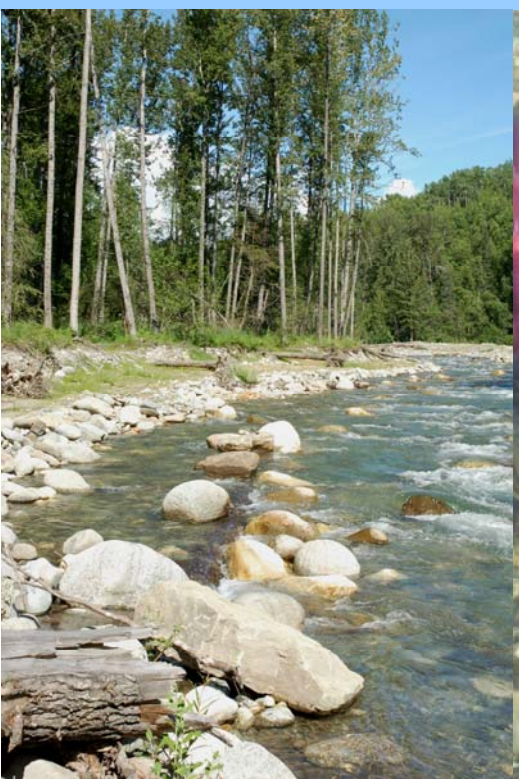
(6) Additive score of Vulnerability factors (Maps 20 and 21).

Appendix C. Spatial Data Sources

Factor	Data Source	Maps
Subbasins, Watersheds & Subwatersheds	National Hydrography Dataset 2006-2008 (US Geological Survey)	1
Biological Value		
Salmon spawning and rearing & all life stages	Anadromous Waters Catalog 2008 (Alaska Dept of Fish and Game)	2, 3
Chinook Salmon spawning	King Salmon Index Count Reaches 2008 (Alaska Dept of Fish and Game)	4
Coho Salmon Rearing	Anadromous Waters Catalog 2008 (Alaska Dept of Fish and Game)	5
Sockeye Salmon Spawning	Anadromous Waters Catalog 2008 (Alaska Dept of Fish and Game) Locations of Sockeye Salmon Study Lakes by Cook Inlet Aquaculture Association, 2008	6
Chum Salmon Spawning	Anadromous Waters Catalog 2008 (Alaska Dept of Fish and Game)	7
Salmon Species Richness	Anadromous Waters Catalog 2008 (Alaska Dept of Fish and Game)	8
Wetlands and Lakes	National Land Cover Database 2000 (US Geological Survey)	9
Vulnerability		
Roads Density	Roads 2008 (Mat-Su Borough)	12
Culverts that Impede Fish Passage	Fish Passage Inventory 2008 (Alaska Dept of Fish and Game)	13
Converted and Impervious Land Cover	National Land Cover Database 2000 (US Geological Survey)	14
Platted Subdivisions	Subdivisions 2008 (Mat-Su Borough)	15
Water Quality	Alaska Clean Waters Action 2008 (Alaska Dept of Environmental Conservation)	16
Invasive Northern pike	Locations of waterbodies with Northern pike 2009 (Alaska Dept of Fish and Game)	17
Conservation Management Status	The Nature Conservancy 2005	18
Instream Flow Reservations	Location of Reservations 2009 (Alaska Dept of Fish and Game, Alaska Dept of Natural Resources)	19

Appendix D. Comparison of Total Length for All Lifestages and Length of Spawning and Rearing in the Anadromous Waters Catalog (AWC) by Watershed





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

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