Alaska's Prioritization Framework 2022-2032 Clean Water Act Vision for Section 303(d)

FINAL January 2024

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Division of Water
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Cover photo: Kenai River, Alaska. Photo courtesy of Ashley Oleksiak.

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Acronyms

ACWA	Alaska Clean Water Actions
ACOE	U.S. Army Corps of Engineers
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
APDES	Alaska Pollutant Discharge Elimination System
ARP	Advanced Restoration Plan
BLM	U.S. Bureau of Land Management
CWA	Clean Water Act
DEC	Department of Environmental Conservation
GIS	Geographic Information System
EPA	U.S. Environmental Protection Agency
NPS	Nonpoint source pollution
TMDL	Total Maximum Daily Load
UAA-ACCS	University of Alaska Anchorage-Alaska Center for Conservation Science
USGS	U.S. Geological Survey
U.S. NPS	U.S. National Park Service

Introduction

Alaska is truly unique. Among all states in the U.S., Alaska places highest in almost every category related to water. Alaska has more than 40% of the entire nation's surface water resources including over three million lakes, over 714,000 miles of rivers and streams, and more coastline than the rest of the U.S. put together. Nearly half of Alaska is considered wetlands. Much of Alaska is not on a connected highway system and is considered rural. The tremendous water resources, limited population centers, primarily rural nature of Alaska, and minimal number of impaired waters compared to other states, gives the Department of Environmental Conservation (DEC) an opportunity to focus on watershed protection to a higher degree than other states.

The U.S. Environmental Protection Agency's (EPA) *2022 - 2032 Vision for the Clean Water Act Section 303(d) Program* ("2022 Vision") identifies opportunities to effectively manage Clean Water Act (CWA) Section 303(d) program activities to achieve water quality goals for the Nation's aquatic resources such as streams, rivers, lakes, estuaries, and wetlands. The 2022 Vision goals outline aspirations and highlight opportunities to implement CWA Section 303(d) program activities in the following categories – Planning and Prioritization, Restoration, Protection, Data and Analysis, and Partnerships. The 2022 Vision outlines a framework to organize program activities; it does not constitute regulation, policy or new mandates.

Alaska's 2022-2032 Vision builds on the experience gained from implementing the 10-year 2013 Vision. Alaska's 2022 Vision encourages flexible and innovative approaches to implement CWA Section 303(d) program work, as well as to identify ways to use limited resources to leverage partnerships, restore and protect water quality, and encourage development of solutions to emerging and difficult water quality challenges. Alaska's prioritization framework focuses on two primary approaches 1) restoration of impaired waters and 2) protection of unimpaired waters or unimpaired pollutants in impaired waters.

DEC will track water quality improvement progress through the Integrated Report process and information will be available on DEC's webpages as well as EPA's How's My Waterway.

Restoration of Impaired Watersheds

Restoring water quality in impaired waters is the primary function of Alaska's CWA 303(d) program. This is accomplished through developing and implementing restoration plans and then measuring water quality improvements. Alaska uses three different types of water quality restoration plans: 1) Total Maximum Daily Load (TMDL), 2) Category 4b alternative to a TMDL restoration plan, or 3) Category 5 Advanced Restoration Plan (ARP). Determining which planning process to use depends on the source(s) of the impairment, resources available, and level of community interest and involvement.

TMDLs and Alternatives to a TMDL (Category 4b)

The main tools for implementing actions identified in TMDL plans, or ARPs, are wastewater discharge authorizations including the Alaska Pollutant Discharge Elimination System (APDES) for permitted discharges and the Alaska Clean Water Actions (ACWA) program for nonpoint source pollution (NPS) sources. Many actions identified in these plans also require local community involvement and commitment towards implementation to improve water quality. Funding may be available from DEC's ACWA grant program or through Alaska's Clean Water State Revolving Fund (CWSRF) in eligible communities.

Alaska's Category 4b plans are typically implemented through permit activities or contaminated sites remediation plans. Category 4b plans include timelines for implementation and when water quality criteria are expected to be met. These types of plans also require commitments for additional actions if water quality is not improving. DEC reviews Category 4b alternative plans with each Integrated Report cycle for progress towards meeting water quality criteria.

Examining Older Recovery Plans

Several of Alaska's TMDLs were developed 20 or more years ago and may not represent current discharges or water quality conditions. Part of Alaska's 2022 Vision includes reviewing older TMDLs to determine if they are still protective of water quality or if they need revision. Identifying funding for data review, loading analysis and modeling, and TMDL revision will be balanced with other Department priorities and resources.

In addition to reviewing and potentially revising older TMDLs, there are some waters with TMDLs that have been restored, now meet water quality criteria, and are in Category 2 in the Integrated Report. Alaska has determined that if a previously impaired water has been moved to Category 2 and other pollution controls are in place to maintain water quality, the TMDL will be removed.

Protection of Unimpaired Watersheds or Pollutants

The DEC Division of Water's mission is to protect and improve Alaska's water quality. While the main function of the 303(d) program is to improve and restore impaired water quality, there is also an opportunity to protect waters from pollution making this the other focus of Alaska's 303(d) program.

Protecting water quality is a multidimensional effort requiring protection of complex natural systems and the coordination of many interrelated programs (federal, state, tribal, local, nonprofit, etc.) within watersheds. Protection efforts can seek to maintain high water quality to prevent impairment, or it can strive to protect impaired waters from worsening while at the same time working to restore them. Protection work can also focus on maintaining water quality for other pollutants that presently meet standards in a waterbody impaired for a different pollutant. TMDLs may include protection actions for additional pollutants. It is not uncommon for protection and restoration to be viewed as interrelated with similar efforts being implemented to address both protection and restoration.

Implementing best management practices that span multiple parameters also can provide protection in addition to restoration. For example, in Lake Lucile, the sediments are impaired for the metals lead and zinc but the TMDL includes information on copper that was found to be elevated but not to the point of impairing designated uses. Implementing actions to reduce lead and zinc are also expected to reduce copper levels.

For unimpaired waters, DEC encourages developing watershed protection-based plans that: evaluate watershed threats, identify protection priority areas, incorporate protection-based management strategies, and include protection-based measures of success. DEC has developed an easy to follow protection-based watershed planning checklist that is available on our website and that we share with interested stakeholders.

Protection work is a continuous process meaning it never reaches an endpoint. Determining where to focus limited funding and staff resources is critical to program success.

Alaska Clean Water Actions

DEC estimates that less than 10 percent of Alaska's surface waters have been monitored. Much of the state's urban development is centered in communities on the main highway system or other rural community hubs. Many of the water quality impairments occur in these more urbanized centers or in areas of historic and current resource extraction. This provides a vast opportunity for protection efforts on the thousands of watersheds outside of these areas and even within the urbanized areas for unimpaired waters or pollutants.

Alaska recognizes the difficulty in achieving statewide coverage in monitoring, protection, or restoration. Watershed prioritization becomes critical as Alaska strives to keep its clean waters clean and restore waters that have become polluted. As a result of this recognition, the Alaska Clean Water Actions (ACWA) program was created through Administrative Order 200 in 2001. This directive instructed Alaska's resource agencies (Departments of Environmental Conservation, Fish and Game, and Natural Resources) to work together to characterize Alaska's waters in a holistic manner; sharing data, expertise, and other information. ACWA creates a cooperative method to collect information and direct resources to prevent or correct water quality problems. It also provides an avenue to identify areas where pollution prevention and watershed planning efforts are encouraged to protect or improve water quality.

ACWA includes a request for proposals (RFP) every other year for projects using funds that are passed through from federal monies. Local governments, citizen groups, tribes, and education facilities are often the recipients of these awards. Community partners are key to having successful projects that improve or protect water quality. Each grant cycle the ACWA agency partners identify water quality protection and restoration activities on the highest priority watersheds (described below) to highlight in the RFP.

Alaska's 303(d) and nonpoint source pollution prevention programs are coordinated by the same DEC team and Alaska's 2022 Vision Prioritization Framework and Alaska's Nonpoint Source Water Pollution Prevention and Restoration Strategy work hand-in-hand making for more efficient planning and implementation of activities.

ACWA Watershed Prioritization Model

In 2019 the ACWA agency partners embarked on a project to update the ACWA prioritization process from a time-consuming by-hand ranking process that was only able to focus on a few dozen watersheds in the state to a more objective, data-driven, automated process that can be equally applied across the entire state. The goal was to have an accurate, inclusive, and simple Geographic Information Systems (GIS) based model that uses readily available statewide data layers. The GIS model is based on the previous ranking criteria the ACWA partners used to do by hand. The ACWA prioritization GIS model ranks Hydrologic Unit Code (HUC) 12 watersheds, 14,143 statewide, based on watershed stressor and watershed value indices (Figure 1). The model includes both impaired and unimpaired watersheds and is used throughout DEC's water quality program and especially in the ACWA RFP to highlight priority watersheds and requested work each grant cycle.

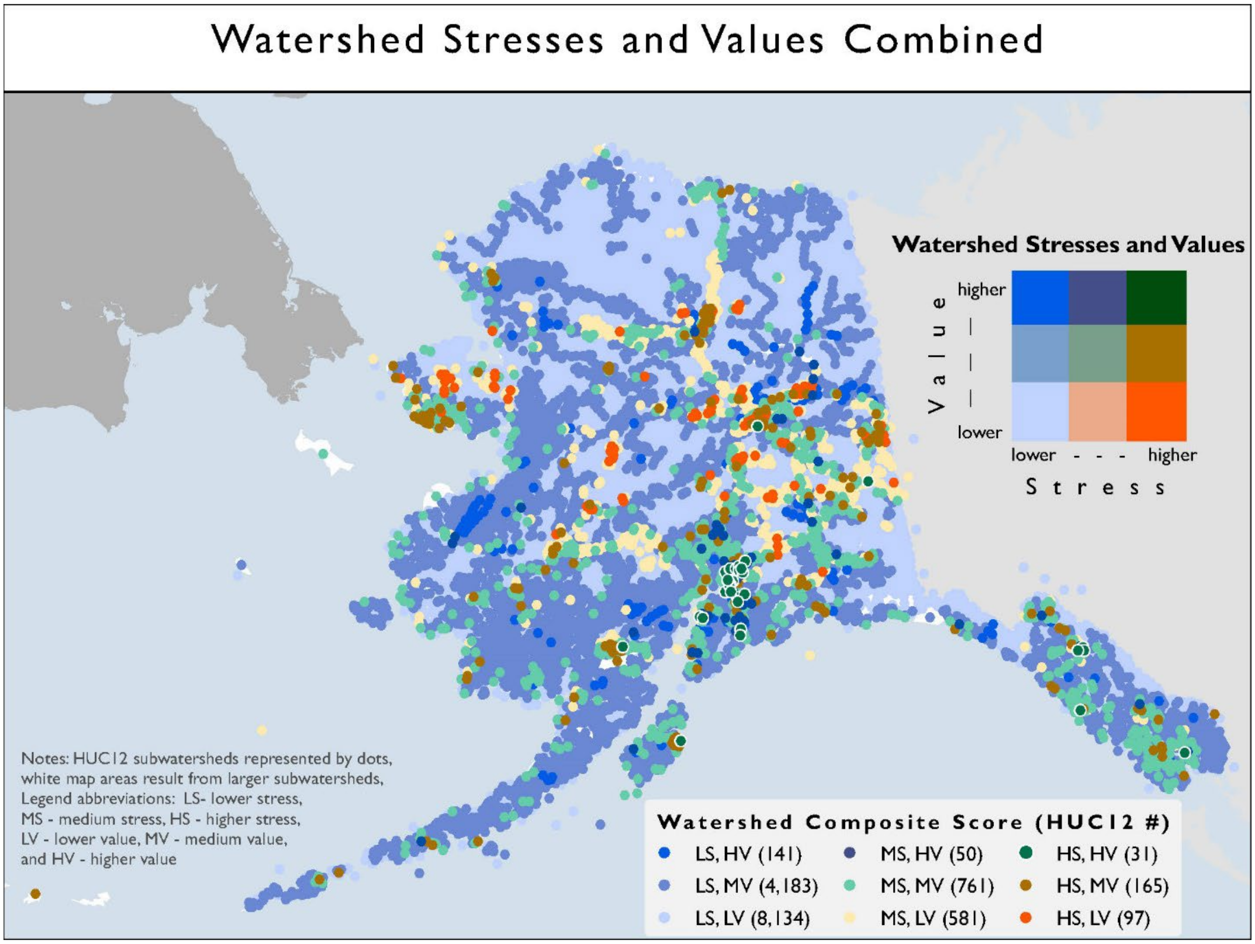

Figure 1. Example statewide map showing color coded watershed rankings. DEC's website has the live map to zoom in to a particular watershed and view the scoring to determine what the water quality stressors and values are.

The model uses 17 GIS data layers that are available statewide (Table 1). Each data layer is assigned a weight that is applied to each watershed (Appendix A). The model output places each HUC12 watershed statewide in a category based on the watershed stressor and value scores (Figure 2). In addition, DEC overlayed 2020 census demographic data to better understand which communities and sub-populations may be rural or underserved. The watershed model is available on the DEC website as a GIS map. Users can zoom in to a watershed they are interested in and open an informational box that provides the scores for each of the data layers that led to the watershed ranking. This helps to inform what actions may be most appropriate for that watershed, whether they be protection activities like watershed planning and education/outreach or restoration activities like green infrastructure.

Alaska's available GIS data continues to expand and grow. Because of this, the watershed prioritization model will be reviewed, and GIS layers updated and/or added every 5 years or sooner as needed. This will ensure that the model remains as representative of actual watershed conditions as possible.

Table 1. The statewide GIS data layers used in the ACWA prioritization model.

Scoring Acronym	Definition	Data Source
CMS	Conservation Management Services	USGS
IFR	Instream Flow Reservation	ADF&G, UAA-ACCS, with ADNR data support
PopDens_Val	Population Density-Value	U.S. Census Bureau
AWC	Anadromous Waters Catalog	ADF&G
Spawn	Spawning habitat-from AWC	ADF&G
WSR	Wild and Scenic River	U.S. BLM/U.S. NPS
CS	Contaminated sites	DEC
Discharge	Water discharge permits	DEC
FishPass	Fish passage	ADF&G
Impaired	Impaired waters	DEC
LargeProject	Large Project Planned	ADNR, U.S. BLM, USACE
MineClaims	Mining claims – current	ADNR, BLM
MiningFprint_historic	Mining footprint – historic	UAA-ACCS
HistMineDensity	Mine density – historic	USGS
PopDen1	Population density	U.S. Census Bureau
StreamXing	Road- Stream crossings	ADOT
WQMonitor	Water quality monitoring data- absence	DEC

There are more high stress, high value watersheds than resources can currently address. As part of the ACWA RFP, the ACWA partners review the list of high priority watersheds and narrow it down to a handful to focus on in the solicitation – while not excluding work in other priority watersheds if an application is received.

Because the model includes both impaired and unimpaired watersheds, it is an ideal resource to prioritize restoration and protection work over the next 10 years as part of the 2022-2032 Vision. Alaska will primarily focus work on watersheds with High Stress/High Value, High Stress/Medium Value, Medium Stress/High Value, and Medium Stress/Medium Value ranks. Other watersheds may be worked on as well depending on community-driven interest and regional knowledge and expertise.

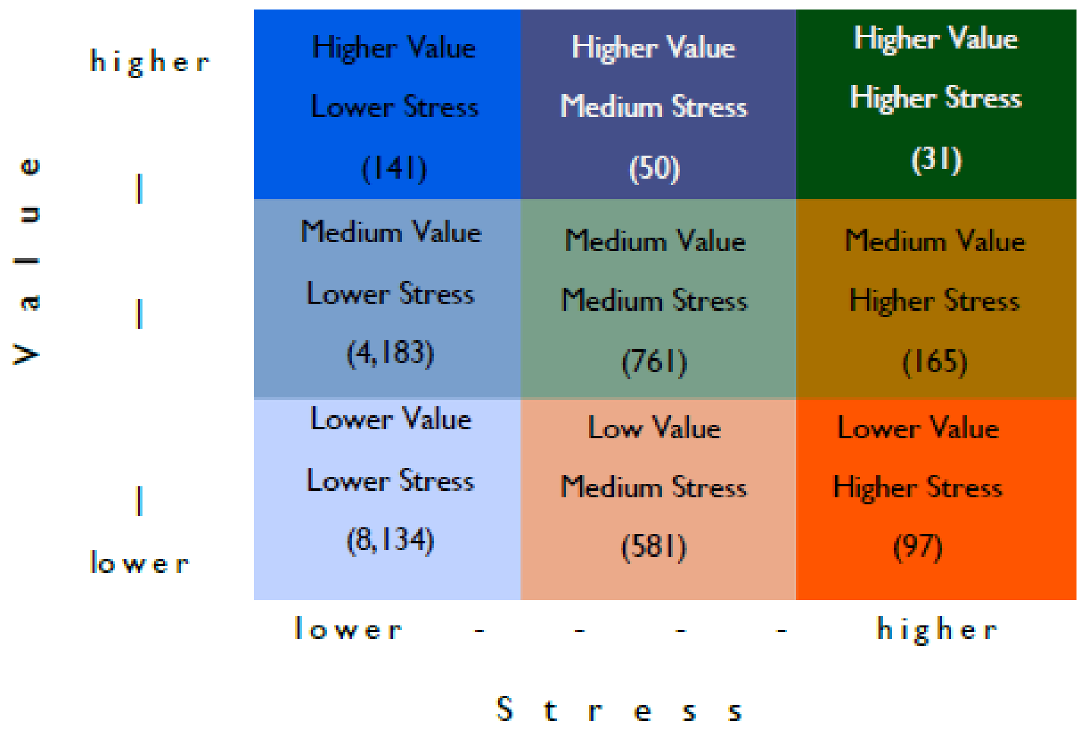

Figure 2. HUC12 statewide watershed rankings based on stressors and values. The number in parenthesis indicates the number of HUC12 watersheds with that rank.

Summary

Alaska's 2022-2032 Vision encourages flexible and innovative approaches to implement the CWA Section 303(d) activities, as well as to identify ways to use limited resources to leverage partnerships, restore and protect water quality, and encourage development of solutions to emerging and difficult water quality challenges. Alaska's prioritization framework focuses on two primary approaches: 1) restoration of impaired waters, and 2) protection of unimpaired waters or unimpaired pollutants in impaired waters.

For impaired waters, Alaska will develop and implement restoration plans. Alaska uses three different types of water quality restoration plans: 1) Total Maximum Daily Load (TMDL), 2) Category 4b alternative to a TMDL restoration plan, or 3) Category 5 Advanced Restoration Plan (ARP). Determining which planning process to use depends on the source(s) of the impairment, resources available, and level of community interest and involvement.

The second approach in the prioritization framework focuses on unimpaired watersheds or unimpaired pollutants within an impaired watershed. This approach uses the Alaska Clean Water Actions program for watershed prioritization, agency coordination, watershed planning, and awarding community grants.

Appendix A. Weighted scores used as part of the watershed prioritization model

Table A.1. Conservation Values Criteria

DATASET	Source	Scoring Format	Scoring Details	Methods and Notes
Conservation Management Status (PADUS - Protected Area Dataset)	USGS	proportional	• **3** 67-100% of shed area (Cat 1 or Cat 2 in PADUS) • **2** 34-66% of shed area (Cat 1 or Cat 2 in PADUS) • **1** 1-33% of shed area (Cat 1 or Cat 2 in PADUS)	PADUS - Protected Area Dataset - GAP Status category 1 and 2 lands added together and then divided by total HUC12 area for percent of watershed managed for conservation. PADUS is a statewide coverage of areas managed primarily for conservation: national parks, national wildlife refuges, wilderness areas, state game refuges, state parks Source: USGS Link
Instream Flow Reservation	ADF&G, UAA-ACCS, with ADNR data support	binary	• **3** one or more Instream Flow Reservations (IFRs) in watershed (granted or applied) • **0** no Instream Flow Reservations (IFRs) in watershed	ADF&G maintains a dataset for Instream Flow Reservations (updated in 2017), using an Excel file sent by ADF&G, UAA added another 60 IFRs to the spatial dataset. The ADNR Land Administration System (LAS) provided an authoritative means to check the IFR's extent and status

Population Density (surrogate for Drinking Water Sources)	US Census Bureau	proportional, relative	Population Density calculated for each sub-watershed then grouped according to Natural Breaks data classification • **3** population density is 351-2800 people per square mile • **2** population density is 51-350 people per square mile • **1** population density is 1-50 people per square mile	Intersected census blocks with HUC12s, then allocated population according to a block's proportion within each HUC12. If a census block was entirely contained with the watershed then 100% of the block's population was added to the watershed's population total. If half of a block was contained within the HUC then 50% of its population was adding to the watershed's total. These data were normalized by dividing the total population of a HUC12 by its area in square miles to create population density. Source: Census Link
Salmon Habitat Anadromous Waters Catalog (AWC)	ADF&G	binary	• **3** one or more AWC waters in watershed • **0** no AWC waters in watershed	Intersected known anadromous fish bearing waters as represented by ADF&G's AWC datasets for flowing waters and lakes and ponds with HUC12 sub-watersheds Source: AWC Link
Salmon Spawning Anadromous Waters Catalog (AWC)	ADF&G	binary	• **3** one or more AWC waters with spawning life stage attribute in watershed • **0** no AWC waters with spawning life stage attribute in watershed	ADF&G's Anadromous Waters Catalog includes fish life stage information. Subset of the AWC limited to spawning life stage features was intersected with HUC12 sub-watersheds Source: AWC Link
Wild and Scenic Rivers	BLM /U.S. NPS	binary	• **3** one or more federally designated Wild and Scenic Rivers in watershed • **0** no federally designated Wild and Scenic Rivers in watershed	Intersected federally designated Wild and Scenic Rivers with HUC12 sub-watersheds Source: Wild & Scenic Rivers

*note: the following terms: sub-watershed, watershed, shed, and HUC all used interchangeably to reference US Geologic Survey's twelve-digit Hydrologic Unit Code or HUC12 which is the common geographic unit of measure used throughout this analysis.

Table A.2. Watershed Stress Criteria

DATASET	Source	Scoring Format	Scoring Details	Methods and Notes
Contaminated Sites	DEC	proportional, relative	• **3** cumulative total of contaminated sites weighted by status is between 301-834 • **2** cumulative total of contaminated sites weighted by status is between 31-300 • **1** cumulative total of contaminated sites weighted by status is between 1-30	Sites were given numeric values according to DEC's site status attribute: Active sites were coded as a value of 3 while all other sites (Institutional Controls, Cleanup Complete, and Informational) were coded as 1's. Sites values were summed by sub-watershed. A shed with three Active sites and one Cleanup Complete site would have a cumulative score (3x3 + 1x1 = 10) of ten. The cumulative contaminated sites scores were grouped into three categories using the Natural Breaks data classification to proportion the sub-watersheds. Source: ADEC CS Link
Discharge Permits	DEC	proportional, relative	• **3** cumulative total of discharge permit values between 41-122 • **2** cumulative total of discharge permit values between 11-40 • **1** cumulative total of discharge permit values between 1-10	DEC staff provided a table of permitted water discharges (source ADEC and USEPA) which had been assigned scores of 3,2, or 1 in descending order of size or concern. These discharge values were summed by HUC12 and grouped into three categories using the Natural Breaks data classification to proportion the sub-watersheds.

Fish Passage Culverts	ADF&G	proportional, relative	• **3** cumulative total of fish passage values between 41-165 • **2** cumulative total of discharge permit values between 13-40 • **1** cumulative total of discharge permit values between 1-12	Converted ADF&G's Fish Passage RGG classification into a numeric scale: RGG Rating: 1 = Green, 2=Gray or Black, 3=Red Summed culvert rating scores by HUC12. A shed with three Red culverts and one Green culvert would have a cumulative score (3x3 + 1x1 = 10) of ten. Fish Passage summaries were grouped into three categories using the Natural Breaks data classification to proportion the sub-watersheds. Source: Fish Passage Link
Impaired Waters	DEC	binary	• **3 one or more Impaired waters in watershed** • **0 no Impaired waters in watershed**	Intersected HUC12 sub-watersheds with Impaired Waters as represented by DEC list of Category 4 or 5 waters defined by 2016 Alaska Biennial Integrated Water Quality Report for lakes and ponds, flowing waters, marine waters, and beaches.
Large Planned Projects	ADNR, BLM, USACE	binary	• **3 planned project infrastructure footprint in watershed** • **0 no planned project infrastructure footprint watershed**	Assembled a composite dataset of large, planned landscape scale industrial projects across Alaska: Ambler Mine Road to Resources, Donlin Mine, and Pebble Mine. Dataset includes best available spatial data representing project infrastructure including roads, mine pits, pipelines, and ports.

Mining Claims, Current	ADNR, BLM	proportional	• **3 cumulative mining claims area: 16,001 – 38,000 acres** • **2 cumulative mining claims area: 4,001 – 16,000 acres** • **1 cumulative mining claims area: 1 – 4,000 acres**	Merged current state (ADNR) and federal (BLM) mining claims into a single dataset and intersected with HUC12 sub-watersheds. Mining claims areas were grouped into three categories using the Natural Breaks data classification to proportion the sub-watersheds. Sources: Federal - BLM Link State - ADNR Link
Mining, Historic Footprint	UAA-ACCS	binary	• **3 one or more historic mining footprints in watershed** • **0 no historic mining footprints delineated in watershed**	UAA's Alaska Center for Conservation Science mapped historic mining footprints by digitizing the visible ground disturbance related to mining using current imagery. The footprint dataset was intersected with the HUC12s. Source: Mining Footprint Link
Mining, Historic Density	USGS	proportional, relative	• **3 cumulative total of known historic mines 17 - 37** • **2 cumulative total of known historic mines 5 - 16** • **1 cumulative total of known historic mines 1 - 4**	Due to the limitations of the historic mining footprint dataset resulting from poor imagery obscuring the site, revegetated site, or underground mines with unknown potential impacts such as offsite drainage; an additional historic mining data source is included. The USGS Alaska Resource Data File (ARDF) which has point locations for over 1600 historic mine sites. The historic mine locations were intersected with the sub-watersheds and then summed by HUC12 and grouped into three categories using the Natural Breaks data classification to proportion the sub-watersheds. Source: USGS ARDF Historic Mines Link

Population Density (surrogate for Drinking Water Sources)	US Census Bureau	proportional, relative	**Population Density calculated for each sub-watershed then grouped according to Natural Breaks data classification** • **3 population density is 351-2800 people per square mile** • **2 population density is 51-350 people per square mile** • **1 population density is 1-50 people per square mile**	Intersected census blocks with HUC12s, then allocated population according to a block's proportion within each HUC12. If a census block was entirely contained with the watershed then 100% of the block's population was added to the watershed's population total. If half of a block was contained within the HUC then 50% of its population was adding to the watershed's total. These data were normalized by dividing the total population of a HUC12 by its area in square miles to create population density. Source: Census Link
Stream Road Crossings	ADOT&PF, USGS	proportional, relative	• **3 total of stream road crossings within sub-watershed 51 – 104** • **2 total of stream road crossings within sub-watershed 16 – 50** • **1 total of stream road crossings within sub-watershed 1 - 15**	Intersected current stream network from USGS National Hydrographic Dataset (NHD) with Alaska Department of Transportation and Public Facilities most current roads database to create stream road crossings and then summed total number of crossings per HUC12. Grouped HUC12s into three categories using the Natural Breaks data classification to proportion the sub-watersheds.
Water Quality Monitoring	DEC	binary	• **3 sub-watershed does not have AKMAP water quality monitoring data** • **0 sub-watershed does have AKMAP water quality monitoring data**	Water quality monitoring sites from DEC's Alaska Monitoring & Assessment Program (AKMAP). With an aim to gathering more baseline data across Alaska, HUC12s with monitoring sites are scored with zero (0) and HUC12s without monitoring are scored three (3). Source: ADEC Water Quality Link