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Mapping Human Activities and Designing an Index of Cumulative Use within Estuarine and Nearshore Marine Ecosystems in Southeast Alaska



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Table of Contents

Introduction	4
Objectives	4
Background	4
Mapping Human Activities in Southeast Alaska	6
Developing a Cumulative Index of Human Activity	7
Database User’s Guide	10
Marine Activities	11
Ship Traffic Patterns.....	11
Vessel Oil Spill Locations	12
Whale Strike Locations.....	13
Ship Discharge Patterns	13
Shellfish Harvest Areas.....	14
Salmon Harvest Areas	15
Herring Harvest Areas	16
Halibut Harvest Areas	16
Groundfish Harvest Areas	16
Charter Fishing Survey	17
Mariculture Sites.....	17
Hatcheries	18
Aquaculture Sites - ESI	19
Coastal Activities.....	19
Tideland Leases	19
Water Use Permits	20
Contaminated Sites.....	21
Permitted Impacts to Fish Habitat (Title 16 Permits)	22
Leaking Underground Tanks	23
Recreation Facilities	23
Log Transfer Facilities.....	23
Boat Ramps and Marinas	24
Watershed Activities	25

Roads.....	25
Population Blocks.....	25
Impaired Water Bodies	26
Active Federal Mining Claims.....	27
State Mining Claims	28
State Mining Leases	28
Hydropower	29
Dams	30
Climate Change	30
Annual Precipitation Change	30
Coldest Month Temperature Change	30
Annual Temperature Change	31
Warmest Month Temperature Change	31
Precipitation as Snow Change.....	31
Sea Surface Temperature Presently.....	32
Land Cover	33
Appendix	34
Appendix A- ADF&G SE Fish Harvest Metadata	34
References	35

Introduction

Estuaries and nearshore marine systems are foundational habitats for the ecological, cultural, and economic vitality of southeast Alaska. These nutrient rich systems provide forage for a multitude of fish and wildlife species – and as a result, economic opportunities for coastal communities — such as commercial fishing, mariculture, subsistence, recreation and tourism. To improve understanding of the diversity and spatial distribution of human activities in the region, The Nature Conservancy (TNC) undertook a compilation of the best available spatial datasets, and developed a cumulative index to inform future conservation, management and research opportunities. This project report outlines: (1) objectives, (2) background information, and (3) a Database User’s Guide with a data-dictionary.

Objectives

The objectives of this project were to:

- Assemble best available spatial data on human activities associated with coastal, estuarine and nearshore marine ecological systems. The purpose of this objective is to provide an integrated GIS to support coastal planning, permitting and decision-making.
- Review the science literature and develop a preliminary index of the cumulative distribution of human activity as a framework for better understanding the scope and severity of potential effects of human activities on ecological systems.

Background

Coastal communities around the globe utilize productive estuarine and nearshore marine ecosystems with varying degrees of effect (Edgar et al. 2000, Beck et al. 2001, Halpern et al. 2008). These effects can take the form of direct effects, such as resource harvest, or indirect, such as non-point source pollution—which may originate from upland activities or historical land-use practices (Tallis et al. 2003, Diaz and Rosenberg 2008). The intensity of effects can also vary, for example coastal development may permanently eliminate habitat while recreation may have a temporary effect. In many cases, it is not any one activity that poses a risk to biological resources, rather, it is the combined or cumulative effect of activities that cause resource degradation and may result in the eventual loss of ecosystem functions (Halpern et al. 2007). Improved management and conservation for enduring resource use will undoubtedly require place-based studies and toolsets for evaluating trade-offs associated with regional patterns of human activity (McPherson et al. 2008, Halpern et al. 2009).

In 2008, in the journal *Science*, Halpern et al. developed the first global map of human impact on marine ecosystems, and laid out a framework for thinking about indices of human activity in the marine and nearshore marine environment. In general, the approach incorporates spatial data on: (1) the distribution of habitats and associated habitat values, and (2) the distribution of human activities with an associated impact score. Through expert review of habitat values and impact scores, human activities can be translated into ecosystem-specific impacts, and ultimately summed across habitats to derive a comparable estimate of cumulative effect across the study area. The results of the process will allow a number of questions to be asked:

- What is the relative distribution of human activities?
- What are the most and least impacted habitats?
- What are the top threats?
- What is the relative distribution of different sets of threats?
- What species assemblages are most and least impacted?

For example, a regional study applied the global framework to the marine and nearshore marine systems spanned by the California Current (Halpern et al. 2009). This study (Fig. 1) showed how four broad areas of human activities could be analyzed and categorized: climate, land, fishing and other commercial activity.

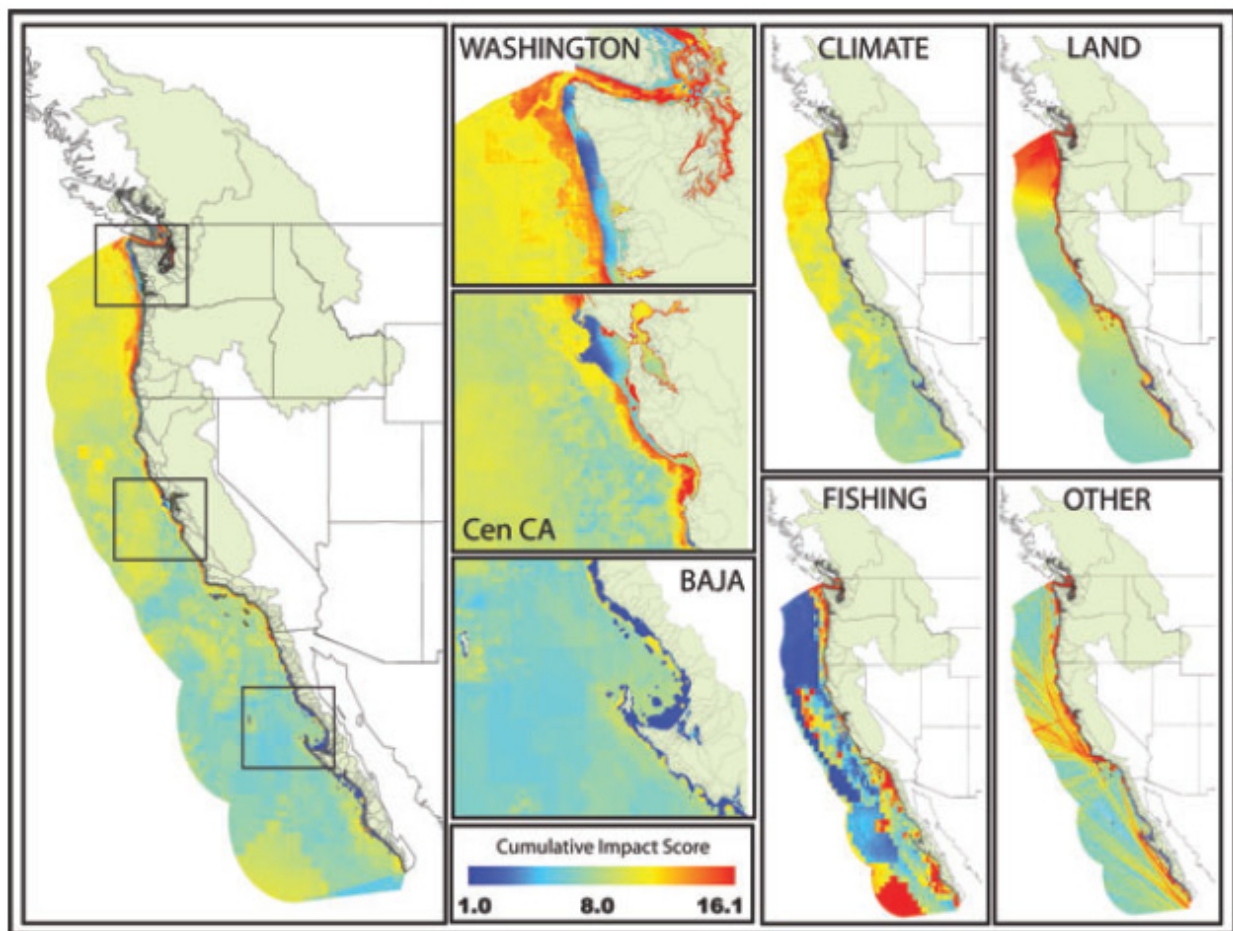


Figure 1. A cumulative impact map of human activities in the marine and nearshore marine environment for the California Current (Halpern et al. 2009). The human activities were analyzed in four broad categories: climate, land, fishing and other commercial activities.

Southeast Alaska's estuarine and nearshore marine ecosystems have been characterized as relatively intact, with most human activities centered around coastal communities (Baker et al. 2011). However, it is also understood there are many remote and dispersed activities, such as marine ship traffic, as well as residual impacts from historical land-use practices (Albert and Schoen 2007). To date, there has never

been a synthesis of spatial information on human activities in the estuarine and nearshore marine environment of southeast, Alaska. Therefore, TNC initiated a systematic process of soliciting the best available spatial datasets from state and federal agencies and other sources to construct a user-friendly geodatabase and ArcReader application.

Mapping Human Activities in Southeast Alaska

The enclosed geodatabase on human activities is organized around three ecological associations. While a range of other data sources exist on human activities in the region, we selected this subset as relatively comprehensive and representative of all such activities.

- (1) **Marine-based activities:** These activities are primarily water-based and include nearshore to deep water. To broadly characterize ship traffic patterns, vessel tracking data from the Marine Exchange of Alaska (MXAK) was obtained and analyzed to produce relative density maps. This was supplemented with data on three potential impact types: (a) vessel groundings and oil spill location data from the Southeast Alaska Petroleum Resource Organization (SEAPRO), (b) cruise ship discharge patterns obtained from the Alaska Department of Environmental Conservation (DEC), and (c) vessel whale strike location data from the National Atmospheric and Oceanic Administration (NOAA). To characterize the distribution of fisheries activities, we mapped a number of data sources from the Alaska Department of Fish and Game (ADF&G), including commercial salmon and groundfish harvest by statistical area, charter fishing effort by statistical area, mariculture sites, and salmon hatcheries.
- (2) **Coastal activities:** Activities associated with shoreline habitats are generally characterized by high concentrations of human activity near communities with more dispersed activity in remote locations scattered widely throughout the region. Starting with those activities that take place directly in the tidelands, we collected permitted dredge and fill data from U.S. Army Core of Engineers (COE), location data for tideland leases from the Alaska Department of Natural Resources (DNR), and location of docks, harbors and boat ramps from NOAA. Tideland-related activities monitored by the USDA Forest Service (USFS) included log transfer facilities and recreation sites (e.g., cabins). A suite of coastal development activities monitored by DEC, include water-use permits (e.g., treatment facility) and known sources of pollution (i.e., contaminated sites and leaking underground storage tanks). Lastly, data on permitted impacts to fish habitat (Title 16 Permits) administered by ADF&G, were collected and mapped.
- (3) **Land-based activities:** We included human activities that occur on land but potentially affect downstream estuarine and nearshore marine habitats through runoff and other watershed processes. A basic indicator of human activity was population density (# of people per km²) from the 2010 U.S. Census. These were mapped by Census Blocks to show the highest resolution on distribution of population across the region. The most current road inventory from the 2010 U.S. Census dataset was also collected from each borough and merged into one combined layer for the region. Data on active mining claims was collected from both DNR and the Bureau of Land Management (BLM), representing both state and federal mining claims and leases. Hydro power sites and power lines, both existing and proposed, were collected from Alaska Industrial Development and Export Authority (AIDEA). Dam site data was collected from the COE. Regional land cover information was based on a previous compilation conducted by The Nature Conservancy using data from the Tongass National Forest, Haines State Forest and USGS.

Table 1. A summary of data sets and sources that reflect the distribution of human activities associated with marine, shoreline and watershed-based ecological systems.

System	Human Activities	Data Source
Marine	Ship Traffic	Marine Exchange of Alaska (MXAK)
	Ship Discharge	Alaska Department of Environmental Conservation (ADEC)
	Vessel Oil Spills	Southeast Alaska Petroleum Resource Organization (SEAPRO)
	Whale Strikes	National Atmospheric and Oceanic Administration (NOAA)
	Commercial Fishing	Alaska Department of Fish & Game (ADF&G)
Coastal	Charter Fishing	Alaska Department of Fish & Game (ADF&G)
	Mariculture	Alaska Department of Fish & Game (ADF&G)
	Aquaculture	National Atmospheric and Oceanic Administration (NOAA/ESI)
	Tideland Leases	Alaska Department of Natural Resources (DNR)
	Log Transfer Facilities	U.S. Forest Service (USFS)
Watershed / Land	Docks and Harbors	National Atmospheric and Oceanic Administration (NOAA/ESI)
	Hatcheries	Ecotrust
	Roads and Trails	U.S. Census 2010
	Roads	U.S. Forest Service (USFS)
	Population Blocks	U.S. Census 2010
	Impaired Waterbodies	Alaska Department of Environmental Conservation (ADEC)
	Mining	Alaska Department of Natural Resources (DNR)
	Hydro Power	Alaska Industrial Development and Export Authority (AIDEA)
	Dams	U.S. Army Core of Engineers (COE)
	Title 16 Permits	Alaska Department of Fish & Game (ADF&G)
	Water Use Permits	Alaska Department of Environmental Conservation (ADEC)
	Recreation Facilities	U.S. Forest Service (USFS)
	Leaking Underground Tanks	Alaska Department of Environmental Conservation (ADEC)
Permitted Dredge and Fill	U.S. Army Core of Engineers (COE)	
Contaminated Sites	Alaska Department of Environmental Conservation (ADEC)	
Land Cover	The Nature Conservancy (TNC)	

Developing a Cumulative Index of Human Activity

Methods

Following a similar process (outlined below) to Halpern et al. (2009), we developed a cumulative index equation for Southeast Alaska:

$$CI = \sum_{i=1}^n T_i + \sum_{i=1}^n C_i + \sum_{i=1}^n M_i$$

Where T_i = Terrestrial, C_i = Coastal, M_i = Marine standardized activity index at location i . This essentially means individual activity values were summarized across a uniform grid (100m), scaled between 0 and 1 (i.e., all values divided by the largest value), log transformed (except point locations) to normalize their distribution, and summed across the three ecological associations (terrestrial, coastal, and marine). The window of analysis was standardized using a 1 km moving widow (circular). Point, line, and polygon features were summarized with a moving window analyses as follows:

- **Lines:** were summarized with a line density function (1km radius) and log transformed before being scaled between 0 and 1 (e.g., power transmission lines).

- **Points:** were summarized with a point density function (1km radius) and scaled between 0 and 1 (e.g., log transfer facilities).
- **Polygons:** were converted to presence/absence grids and summarized with a zonal statistics (1km radius) sum (e.g., tideland leases). The density results were log transformed before being scaled between 0 and 1.

Population density and ship discharge were summarized with weighting factors to better reflect distribution patterns:

- **Population density:** to better reflect the distribution and density of people, the 2010 U.S. Census population data was first converted into density by dividing the population count by census block area (people per unit area). Next, the population density values were coded into the overlapping 2010 U.S. Census roads data to reflect the distribution of the population within the census blocks. Lastly, a line density (1km radius) analysis was conducted on the census roads data, weighted by the population density information. The density results were log transformed and scaled between 0 and 1 for inclusion in the cumulative index.
- **Ship discharge:** ship discharge starting and stopping points do not necessary reflect the amount of effluent discharged. Therefore, we weighted the line density function (1km radius) by the cubic meters per second of effluent discharged. The density results were log transformed and scaled between 0 and 1 for inclusion in the cumulative index.

A select set of data sources in the human activities database were used in the development of the cumulative index. These data sources were chosen using the following criteria: (1) accurately characterized the distribution of human activities in the region, (2) relatively complete coverage, i.e., no data gaps, and (3) are not captured in one or more other datasets to avoid double-counting. Future work could refine the assessment of potential risks to specific ecological systems.

Results

The results of the data selection and final analyses can be seen in Figure 2: “A Cumulative Index of Human Activity in Southeast Alaska—Integrating Coastal Marine and Land-based Activities”. A relative index assignment was derived using standard deviations (1/3) from the mean to create the first 9 categories. A 10th category was added to split the highest percentile with the largest distribution.

The pattern displayed on the map can be characterized by roughly five descriptive categories from Very Low to Very High (Table 2). The highest levels of activity shown in red can be generally characterized as urban and community centers. The next highest level of activity displayed in orange can be roughly characterized by transportation “hotspots”, such as concentrated road networks, or shipping traffic hotspots. These high use areas are then connected with dispersed road networks, shipping channels, and relatively moderate levels of use and development activity in general. The cooler colors in green and finally blue represent a gradient of activity from dispersed to remote, residual impacts from historical land-use, and areas with relatively infrequent use.

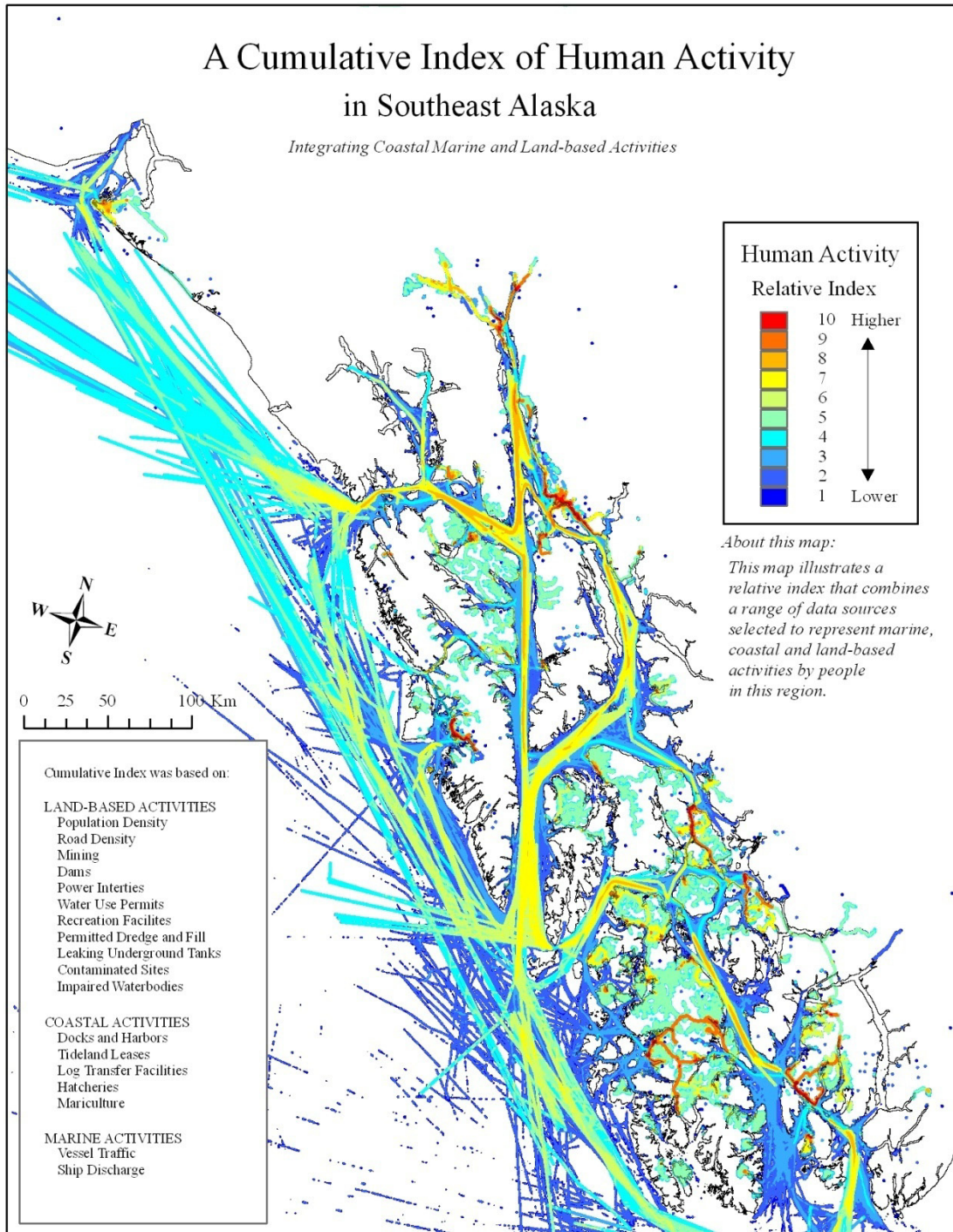


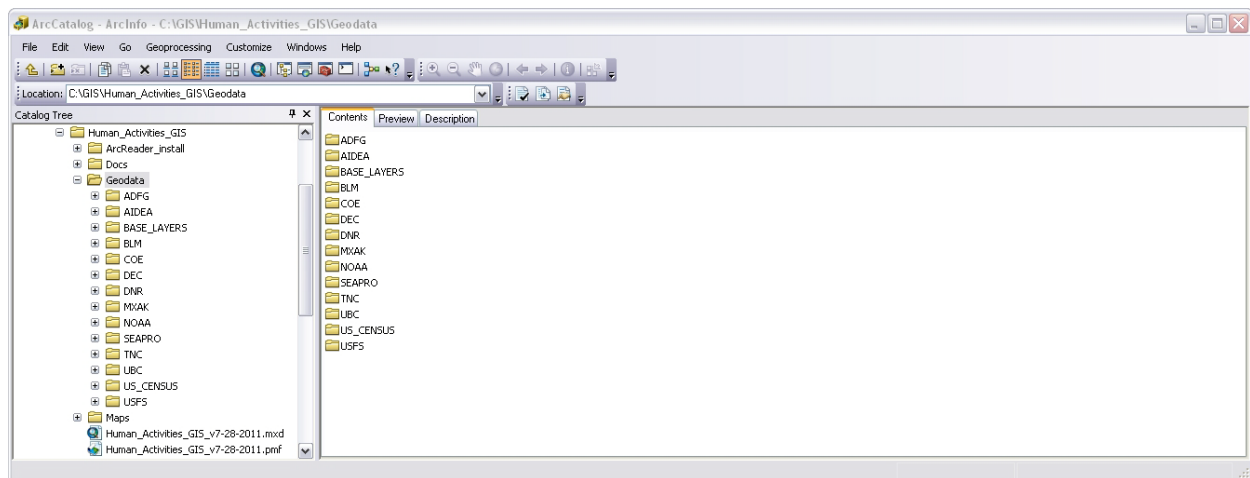
Figure 2. A cumulative index of human activity in Southeast Alaska—integrating coastal marine and land-based activities.

Table 2. Relative index categories, mapped colors, and general description.

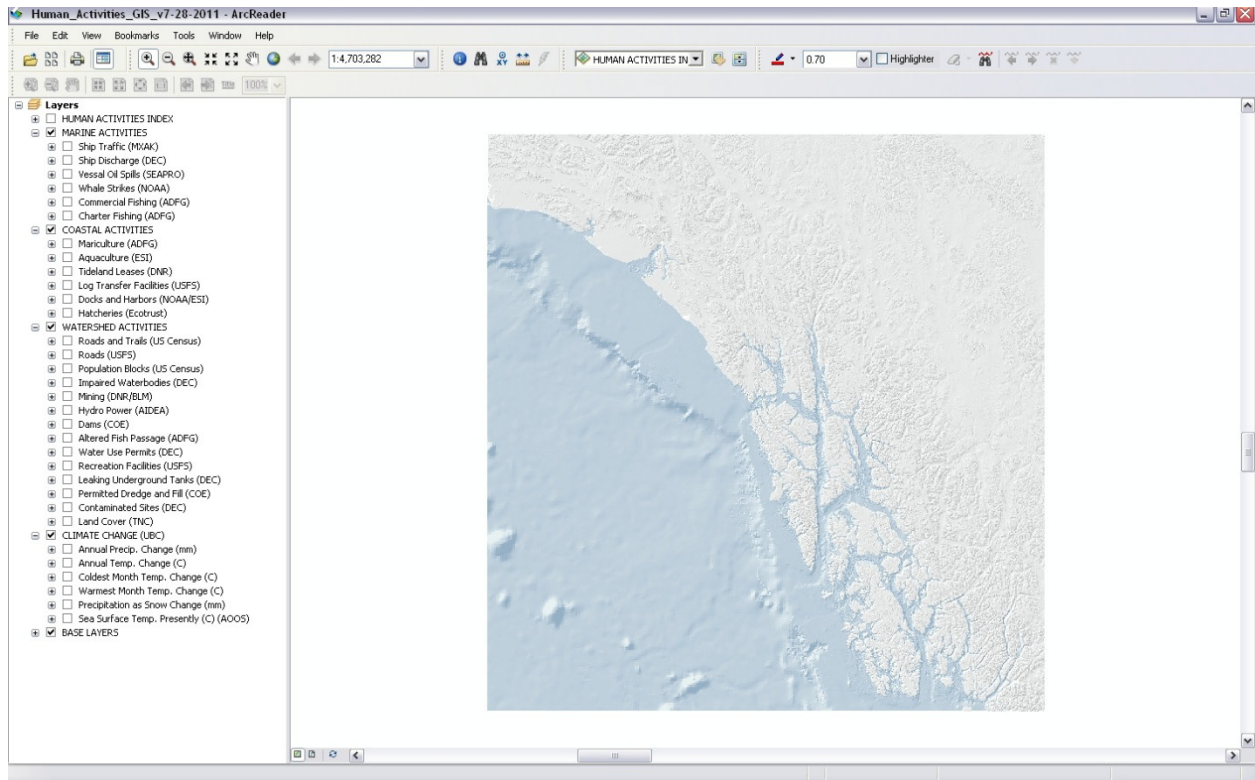
Relative Index	Values	Color		Description
Very High	10	Red	=	Urban & Community Centers
High	9,8	Orange	=	Connectivity Hotspots & Concentrated Activity
Medium	7,6	Yellow	=	Transportation Corridors & Moderate Activity
Low	5,4	Green	=	Dispersed Activity & Historical Land-use
Very Low	3,2,1	Blue	=	Remote Activities & Lower Frequency

Database User’s Guide

The enclosed geodatabase is contained in one folder for easy portability. Subfolders within the main folder are organized by agency data source. For example, ship traffic data was obtained from the Marine Exchange of Alaska and can be found in the folder “MXAK”. A screenshot of the folder structure can be seen below.



The ArcReader version 10 is a free GIS software application available from ESRI (www.esri.com/software/arcgis/arcreader/) where spatial data can be viewed and maps can be printed. The layers can be turned on and off by clicking the boxes along the left-hand side Table of Contents. Layers can be “zoomed” in on with the magnifying tool in the toolbar above. The human activities database is organized by the three ecological associations: marine, coastal, and land / watershed-based activities. A screenshot of the ArcReader database can be seen below.



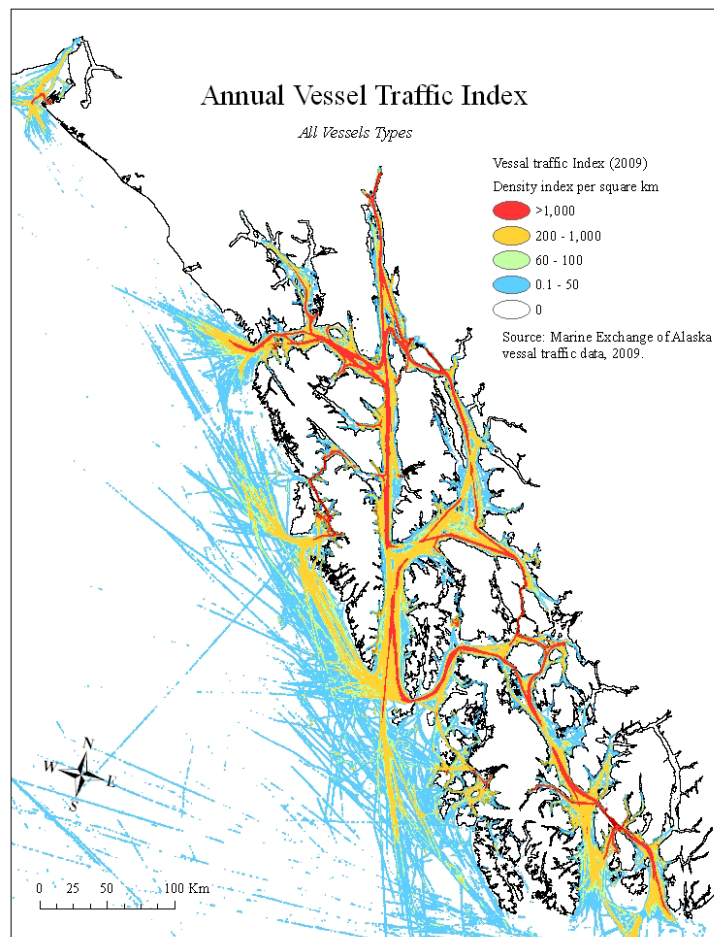
The following sections provide general background information on the suite of themes compiled within this database. Each theme includes an abstract, source and contact information, and whether FGDC metadata is available. The Nature Conservancy makes not express or implied warranty as to the quality or reliability of these data, and encourages users to contact source agencies for specific restrictions or appropriate uses of these data.

Marine Activities

Ship Traffic Patterns

Abstract: Data on marine vessel traffic for 2009 from the Marine Exchange of Alaska (<http://www.mxak.org>). These data record locations for all tracked vessels at 6 second intervals, and include vessel name, vessel type, speed, maritime mobile service identity (MMSI), and destination. While these data potentially provide utility for a wide range of applications, and our purpose was to represent the general pattern of traffic throughout the region and seasonal patterns during Spring (March – April), Summer (May – August), Autumn (Sept – Oct), Winter (Nov – Feb), as well as annually. Patterns of ship traffic by vessel type were analyzed for the 2 week summer peak of ship traffic, July 22-31, 2009. Ship types were determined with their Marine Mobile Service Identity (MMSI) codes and grouped into 5 general categories: Fishing Vessels, Cargo Ships, Large Passenger Ships (>100m), Small Passenger Ships (<100m), Pleasure Crafts, and Search and Rescue. For each of these periods and vessel types, we extracted all vessel locations, screened and conducted a point density analysis (1km radius) of ship locations.

- Source and contact information: Marine Exchange of Alaska. Brett Farrell. brettfarrell@mxak.org. Assistant Director. 907-463-4640
- Date received: December, 2010.
- Metadata: No
- Permissions: Raw data is not permitted for release; summarizations provided are permissible for distribution.
- Background information: http://www.mxak.org/vtrack/vtrack_intro.html



Vessel Oil Spill Locations

Abstract: Point locations of vessel oil spills from the Southeast Alaska Petroleum Resources Organization (SEAPRO). There are 38 records that include gallons discharged, fuel type, vessel name, and a location description. The records span from 1952 until present. The dataset is not considered comprehensive.

- Source and contact information: Jim Pomplun, Ketchikan Gateway Borough GIS Analyst and Southeast Alaska Petroleum Resources Organization analyst. jimp@borough.ketchikan.ak.us. (907) 228-6647

- Date Received: April 2011.
- Metadata: No
- Permissions: N/A
- Background information: <http://www.seapro.org/>

Whale Strike Locations

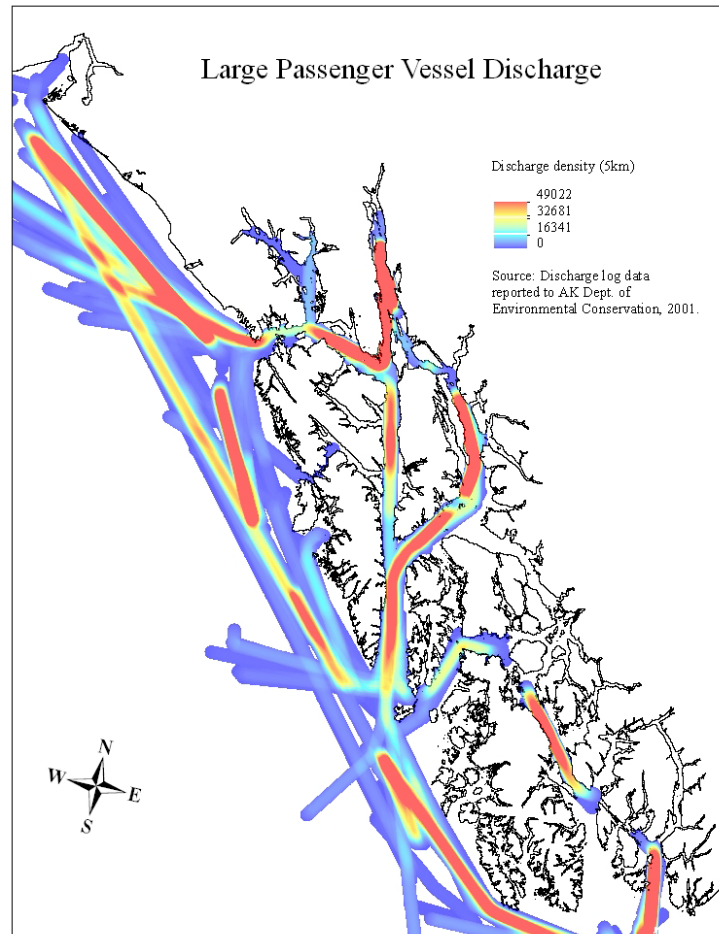
Abstract: Location of whale strikes collected by NOAA. There are 75 records in the database that include species information. The records span from 1978 to 2008. The dataset is not considered a systematic survey of southeastern Alaska. Northern southeast Alaska has been surveyed more extensively. A useful application of such data can be seen in Gende et al, (*in press*): A Bayesian approach for understanding the role of ship speed in whale-ship encounters, *Ecological Applications*.

- Source and contact information: Aleria Jensen. Aleria.Jensen@noaa.gov. 907-586-7248 NMFS Alaska Region. Protected Resources Division.
- Date received: August 2010.
- Metadata: No
- Permissions: N/A

Ship Discharge Patterns

Abstract: Logbook data from 2001 collected by the Alaska Department of Environmental Conservation (DEC). We conducted a line density analysis (5km radius) of ship discharge events, weighted by volume of discharge, using large ships (n=14) and small ships (n=11) as defined by DEC, and analyzed separately.

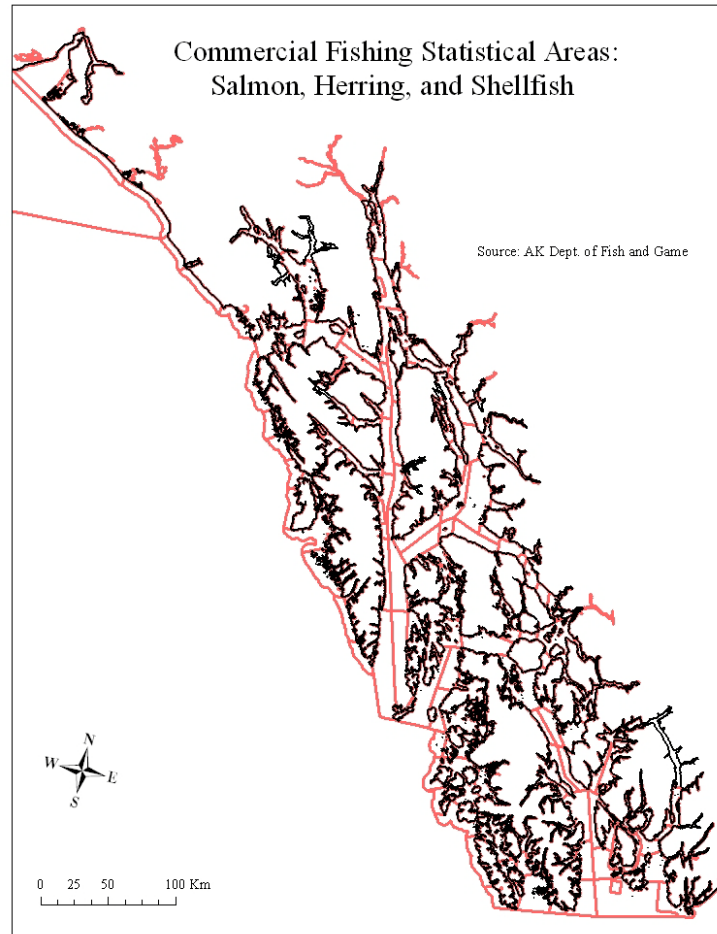
- Source and contact information: Alaska DEC Division of Water, Cruise Ship Program. albert.faure@alaska.gov. (907)465-5279 or Ed White 907-465-5138, edward.white@alaska.gov.
- Metadata: No
- Permissions: N/A



Shellfish Harvest Areas

Abstract: The 10-year average (2000-2009) of ADF&G shellfish catch (pounds) records by statistical area. Catch records for the period were averaged to show the relative distribution of harvest in recent history, and areas that have received the highest concentration of harvest.

- Source and contact information: Alaska Department of Fish and Game, Commercial Fisheries Division. Cathy Tide, cathy.tide@alaska.gov
- Date received: 01/31/11
- Metadata: Yes
- Permissions: N/A
- ADF&G Notes: Data was masked where fewer than 3 permits, vessels, or processors because of confidentiality standards. The shellfish summary reflects directed shellfish harvest as well as shellfish bycatch in the groundfish fishery. The directed shellfish and bycatch harvest are reported in different statistical areas. Sometimes octopus and squid are classified as groundfish, but in this analysis they are classified as shellfish. See Appendix A for additional information.



Salmon Harvest Areas

Abstract: The 10-year average (2000-2009) of ADF&G salmon catch (pounds) records by statistical area. Catch records for the period were averaged to show the relative distribution of harvest in recent history, and areas that have received the highest concentration of harvest.

- Source and contact information: Alaska Department of Fish and Game, Commercial Fisheries Division. Cathy Tide, cathy.tide@alaska.gov
- Date received: 01/31/11
- Metadata: Yes
- Permissions: N/A
- ADF&G Notes: Data was masked where fewer than 3 permits, vessels, or processors because of confidentiality standards. An exception to this rule occurs in the Yakutat setnet fishery. Vessels used in the Yakutat setnet fishery are not required to be licensed – so they aren't assigned an ADF&G number - so confidentiality screening is based on the number of permits and the number of processors. Also because any vessel or skiff used in the setnet fishery doesn't have to be licensed, there's a bit of an anomaly in the Yakutat setnet summary data. The number of vessels reported in the Yakutat area statistical areas tends to be 1. This 1 actually reflects the filler value ('99999') reported on a fish ticket where a vessel ADF&G number is not available. In

reality there may have been skiffs, etc., in use in the statistical area during the fishery. See Appendix A for additional information.

Herring Harvest Areas

Abstract: The 10-year average (2000-2009) of ADF&G herring catch (pounds) records by statistical area. Catch records for the period were averaged to show the relative distribution of harvest in recent history, and areas that have received the highest concentration of harvest.

- Source and contact information: Alaska Department of Fish and Game, Commercial Fisheries Division. Cathy Tide, cathy.tide@alaska.gov
- Date received: 01/31/11
- Metadata: Yes
- Permissions: N/A
- ADF&G Notes: The herring summary reflects directed herring harvest. Herring data are reported in the same statistical areas as the salmon and shellfish fisheries. See Appendix A for additional information.

Halibut Harvest Areas

Abstract: The 3-year average (2007-2009) of ADF&G halibut catch (pounds) records by statistical area. Catch records for the period were averaged to show the relative distribution of harvest in recent history, and areas that have received the highest concentration of harvest.

- Source and contact information: Alaska Department of Fish and Game, Commercial Fisheries Division. Cathy Tide, cathy.tide@alaska.gov
- Date received: 01/31/11
- Metadata: Yes
- Permissions: N/A
- ADF&G Notes: Traditionally, ADF&G only recorded halibut bycatch in their fish ticket databases. In the middle of the 2006 season, ADF&G began capturing directed halibut harvest in their databases through the eLandings system. The halibut summary only reflects halibut harvest (both directed and bycatch) from 2007 through 2009. Please note that halibut harvested in Alaska but landed out-of-state are not reflected in our data. See Appendix A for additional information.

Groundfish Harvest Areas

Abstract: The 10-year average (2000-2009) of ADF&G groundfish catch (pounds) records by statistical area. Catch records for the period were averaged to show the relative distribution of harvest in recent history, and areas that have received the highest concentration of harvest.

- Source and contact information: Alaska Department of Fish and Game, Commercial Fisheries Division. Cathy Tide, cathy.tide@alaska.gov
- Date received: 01/31/11
- Metadata: Yes
- Permissions: N/A

- ADF&G Notes: The groundfish summary contains directed groundfish harvest as well as groundfish bycatch in the shellfish and salmon fisheries. Please note the differences in statistical areas used in the groundfish fishery (i.e., 305431, 415931) and in the salmon or shellfish fisheries (i.e., 11121, 18100). Even by lumping groundfish species, much of the data are masked as confidential. The groundfish summary does not include halibut harvest. See Appendix A for additional information.

Charter Fishing Survey

Abstract: Charter fishing data from the ADF&G saltwater sport fishing charter trip logbooks by statistical area for 2005. These data were collected for a study by the Institute of Social and Economic Research (ISER), "Testing a methodology for estimating the economic significance of saltwater charter fishing in southeast Alaska." There are 187 records in the database with location names, number of vessels, trips, and clients.

- Source and contact information: Ginny Fay, Institute for Social and Economic Research. 907-786-5402; University of Alaska Anchorage, vfay@alaska.edu
- Date received: March, 2011.
- Metadata: No
- Permissions: N/A
- Description and Methods: http://www.iser.uaa.alaska.edu/publications/EconSE_Saltwater_Charter_Fish_070530.pdf

Mariculture Sites

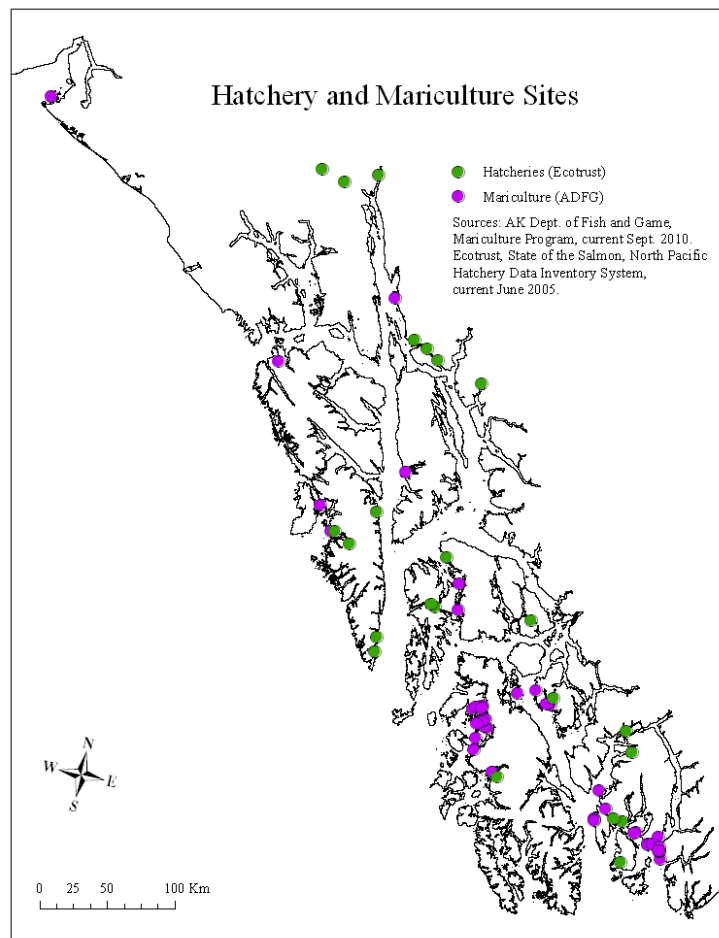
Abstract: Point locations of mariculture sites collected by the ADF&G. There are 70 records in the database (as of September 2010). Each record includes species grown, site type, applicant, and start date. Site types are indicated as aquatic farms, hatchery, or nursery.

- Source and contact information: Alaska Department of Fish and Game (ADF&G), Division of Commercial Fisheries, Mariculture Program Coordinator, (907) 465-6150 or Lorraine Vercessi. Assistant Mariculture Coordinator. AK Dept. of Fish & Game. Division of Commercial Fisheries. P.O. Box 115526, Juneau, AK 99811. lorraine.vercessi@alaska.gov
- Metadata: No. Reference: Current ADF&G Permitted Aquatic Farm Sites http://www.adfg.alaska.gov/static/fishing/PDFs/aquaticfarming/web_contact_permit_statuses.pdf
- Permissions: N/A
- Description and Methods: All site-specific production data is confidential. It has to be grouped (typically as three or more) to provide individual confidentiality, per our regulations and statutes. Annual regional and species specific production is value data available for the public: <http://www.cf.adfg.state.ak.us/geninfo/enhance/maricult/maricult.php#overview>

Hatcheries

Abstract: These data are a spatial representation of hatchery facilities and release sites that were collected by the State of the Salmon, Ecotrust (www.stateofthesalmon.org). These data are a subset of hatchery locations from the North Pacific Hatchery Data Inventory System, current June 2005. There are 24 records in the database that include species, facility name, and ownership (state, federal, or private).

- Date Received: October, 2010.
- Source and contact information: Ecotrust - State of the Salmon. Jon Bonkoski, GIS Analyst. 721 NW 9th Ave., Suite 200. Portland, OR 97205; 503-467-0804;jbonkoski@ecotrust.org
- Metadata: http://www.stateofthesalmon.org/resources/downloads/Hatchery_NP_release.htm
- Permissions: N/A



Aquaculture Sites - ESI

Abstract: Point locations of aquaculture sites compiled by NOAA for the Environmental Sensitivity Index (ESI) Socioeconomic Resource Points (SOCECON). There are 64 records in the database published in 2002. The ADF&G "Mariculture Sites" dataset detailed above is similar and more up-to-date.

- Source and contact information: Jill Peterson. NOAA, Office of Response and Restoration. 7600 Sand Point Way, N.E. Seattle, WA. (206) 526-6944 Jill.Peterson@noaa.gov
- Metadata: http://response.restoration.noaa.gov/book_shelf/833_SE_ALASK.pdf
- Permissions: N/A

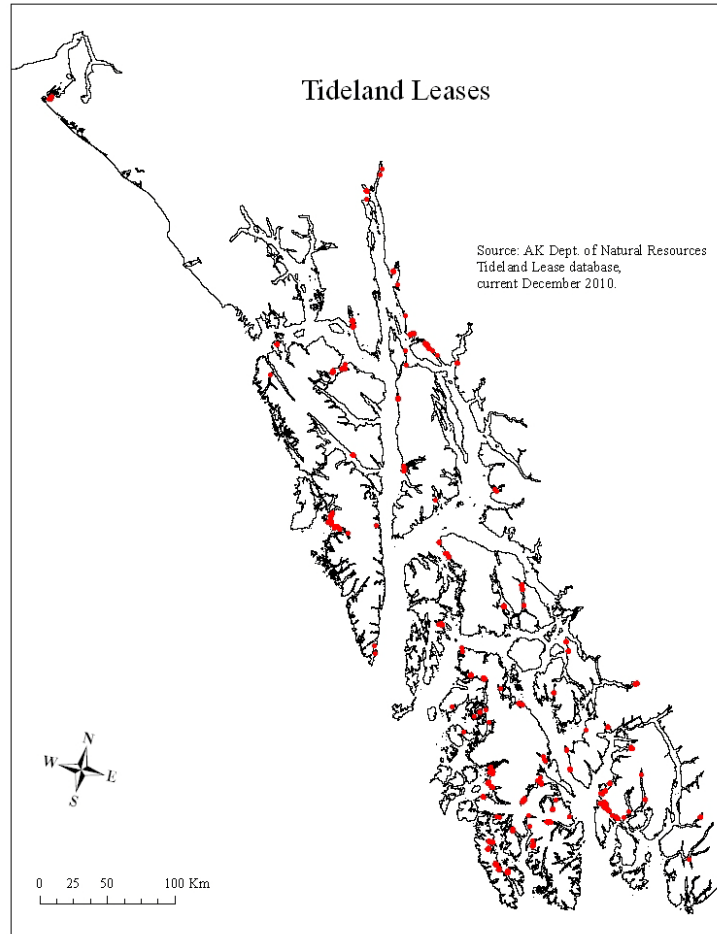
Coastal Activities

Tideland Leases

Abstract: This shape file depicts the location of current tidelands leases issued by the State of Alaska. Each location is represented as a linear feature and has an associated Land Administration System (LAS) file-type and file-number which serves as an index to associated LAS case-file information. Tidal lease features were converted from the digital (ArcInfo) files used to produce the state status plats. Additional LAS case-file and customer information may be obtained at:

[<http://www.dnr.state.ak.us/las/LASMenu.cfm.>](http://www.dnr.state.ak.us/las/LASMenu.cfm) Those requiring more information regarding tidelands leases should contact the Alaska Department of Natural Resources Public Information Center directly.

- Date Received: December 2010
- Source and contact information: AK Department of Natural Resources - Information Resource Management Section. GIS Public Access Coordinator. 550 W. 7th Suite 706, Anchorage, AK 99501. 907-269-8833
- Metadata: <http://dnr.alaska.gov/SpatialUtility/SUC?cmd=vmd&layerid=169>



Water Use Permits

Abstract: Point locations of water use permits, by type, issued by DEC. There are 7 record types in the database:

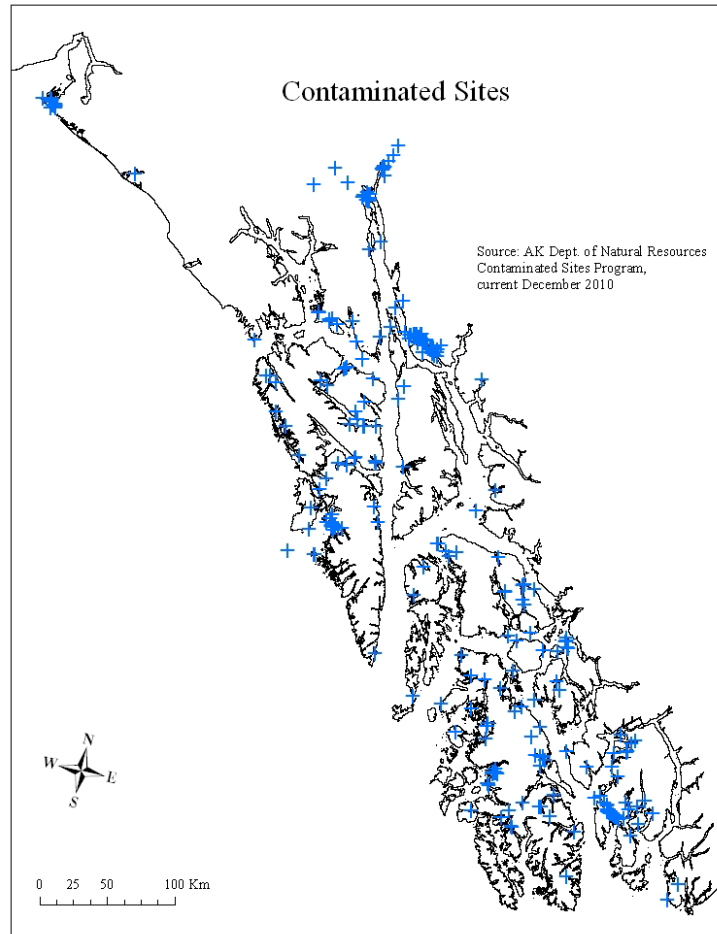
1. Domestic and Municipal Wastewater - is water-borne human wastes or graywater from dwellings, commercial buildings, institutions, or similar structures. Domestic wastewater includes the contents of individual removable containers used to collect and temporarily store human wastes.
2. Industrial Wastewater - is a discharge from industrial or nondomestic activities.
3. Storm Water - information and applications for storm water discharges from construction activities, industrial activities, and municipal separate storm sewer systems (MS4s).
4. On-Site Disposal Systems - information regarding on-site wastewater treatment and disposal systems.
5. Wastewater Plan Review Checklists - wastewater engineering plan submittal checklist.
6. Temporary Camps - consolidated application for drinking water, food service, solid waste disposal, and domestic wastewater treatment and disposal.
7. Name Change/Permit Transfer for Wastewater Discharge Permit - Use this form to notify DEC if the name of a facility has changed or if ownership has transferred to another party.

- Source and contact information: Janice McLean Division of Water: Water Quality Standards, Assessment & Restoration. Acting Data Processing Manager, Alaska Dept Environmental Conservation, Division of Water. 907-465-5282
- Metadata: No
- Permissions: DEC warns some records have data entry issues and inaccuracies.
- Description and Methods:
http://www.dec.state.ak.us/water/wwdp/online_permitting/permitentry.htm
- DEC notes: This spreadsheet shows all the permits displayed as of March 22, 2011 in the publically accessible water permit search system at:
<http://www.dec.state.ak.us/water/WaterPermitSearch/Search.aspx> with the addition of latitude and longitude data not normally displayed online. Data may be incomplete and contain data entry errors.

Contaminated Sites

Abstract: Point locations of ADEC Contaminated Sites Program Database. There are 4,483 records in the statewide database that include attribute information on site name, owner, clean-up status, and spill date.

- Date Received: December 2010
- Source and contact information: URL: <http://www.dec.state.ak.us/spar/csp/search/default.asp>; Email: DEC-SPAR-IT@alaska.gov; Alaska DEC, Division of Spill Prevention and Response, Contaminated Sites Program Database Search.
- Metadata: No
- Permissions: N/A
- DEC Notes: Information on contaminated sites and leaking underground storage tanks, past and current. DEC's Contaminated Sites program has changed the terms used to describe closure, replacing 'closed' and 'conditionally closed' with 'Cleanup Complete' and 'Cleanup Complete - Institutional Controls'. DEC gives 'Cleanup Complete' status when efforts to reduce hazardous substance contamination have achieved the most stringent levels established in state regulation, or the possibility of human exposure to any residual contamination is highly unlikely. The Department may allow hazardous substances to remain in the environment at a site if the contamination does not pose a risk to human health or the environment, but there may be conditions or restrictions associated with the site that require compliance by current or future owners/operators. Those conditions or restrictions require follow-up reporting; the department would then grant a 'Cleanup Complete - Institutional Controls' status (See 'Institutional Controls.'). Details on closure of any site are viewable on the Contaminated Sites database. A special report on Institutional Controls is available for sites with that designation.



Permitted Impacts to Fish Habitat (Title 16 Permits)

Abstract: Location of ADF&G Title 16 Permits. ADF&G has the statutory responsibility for protecting freshwater anadromous fish habitat and providing free passage for anadromous and resident fish in fresh water bodies (AS 16.05.841-871). Any activity or project that is conducted below the ordinary high water mark of an anadromous stream requires a Fish Habitat Permit. A Fish Habitat Permit is required before any action is taken to: (1) construct a hydraulic project, or; (2) use, divert, obstruct, pollute, or change the natural flow or bed of a specified river, lake, or stream, or; (3) use wheeled, tracked, or excavating equipment or log-dragging equipment in the bed of a specified river, lake, or stream. Not all permits in the database contain coordinates, notably for Prince of Wales Island.

- Source and contact information: ADF&G Habitat Division. Contact Sheila Cameron at sheila.cameron@alaska.gov or Jackie Timothy at jackie.timothy@alaska.gov.
- Metadata: No
- Permissions: N/A
- Background Information: <http://www.adfg.alaska.gov/index.cfm?adfg=uselicense.main>

Leaking Underground Tanks

Abstract: Point locations of ADEC Leaking Underground Storage Tanks Database. There are 2,313 records in the database that include attribute information on facility name, address, clean-up status and spill date.

- Source and contact information: URL: <http://www.dec.state.ak.us/spar/csp/search/default.asp>; Email: DEC-SPAR-IT@alaska.gov; Alaska DEC, Division of Spill Prevention and Response, Contaminated Sites Program Database Search.
- Metadata: No
- DEC Notes: Information on contaminated sites and leaking underground storage tanks, past and current. DEC's Contaminated Sites program has changed the terms used to describe closure, replacing 'closed' and 'conditionally closed' with 'Cleanup Complete' and 'Cleanup Complete - Institutional Controls'. DEC gives 'Cleanup Complete' status when efforts to reduce hazardous substance contamination have achieved the most stringent levels established in state regulation, or the possibility of human exposure to any residual contamination is highly unlikely. The Department may allow hazardous substances to remain in the environment at a site if the contamination does not pose a risk to human health or the environment, but there may be conditions or restrictions associated with the site that require compliance by current or future owners/operators. Those conditions or restrictions require follow-up reporting; the department would then grant a 'Cleanup Complete - Institutional Controls' status (See 'Institutional Controls.'). Details on closure of any site are viewable on the Contaminated Sites database. A special report on Institutional Controls is available for sites with that designation.

Recreation Facilities

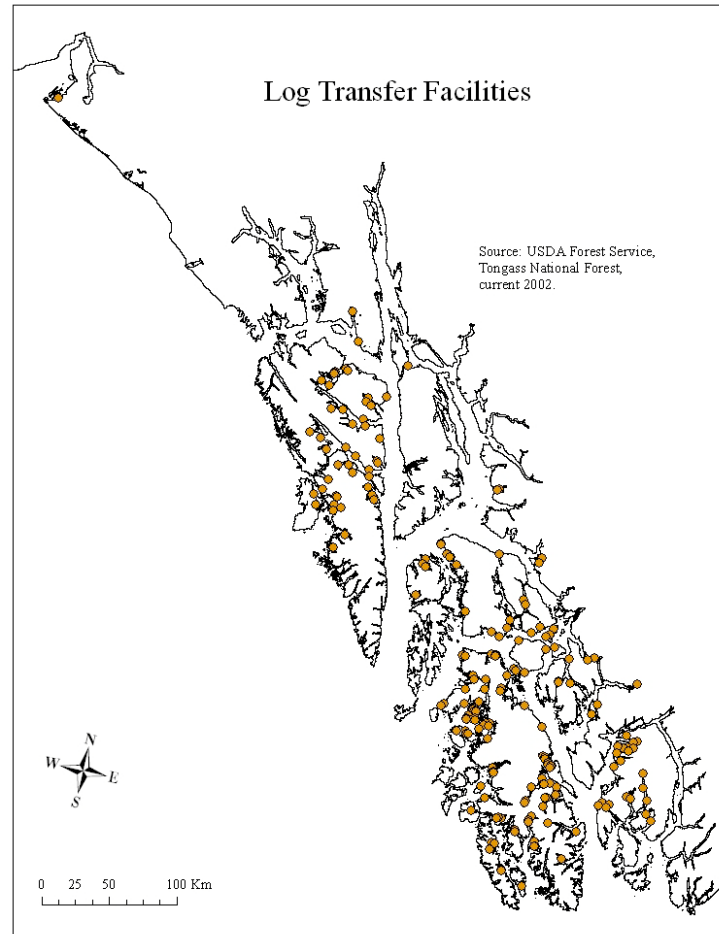
Abstract: This dataset was developed by the USFS and contains point locations showing recreation facilities such as cabins, shelters, and picnic areas. There are 284 records in the database that include attribute information such as facility name and ranger district.

- Source and contact information: <http://seakgis.alaska.edu/data/facility.zip> Gabi Bosch. USFS, Tongass National Forest. POB 309 Petersburg, Alaska 99833. 907-772-3841 gbosch@fs.fed.us
- Metadata: <http://seakgis.alaska.edu:8080/geoportal/rest/document?id={19FC5733-7B98-4B6D-AAAB-84AC3129CD58}>

Log Transfer Facilities

Abstract: This dataset represents the Marine Access Log Transfer Facility sites on the Tongass National Forest. The points were digitized directly into GIS from known coordinates or using digital ortho photographs as backdrops for location of features. Points are included for historical LTFs that are no longer in existence.

- Source and contact information: <http://seakgis.alaska.edu/data/ltf.zip> Pete Klein, USFS, Tongass National Forest. Federal Building, Ketchikan AK 99835 907-228-6307 pklein@fs.fed.us
- Metadata: <http://seakgis.alaska.edu:8080/geoportal/rest/document?id={498B092A-E15E-40A9-B063-6DCBA0EFB03C}>



Boat Ramps and Marinas

Abstract: Point locations of boat ramps and marinas compiled by NOAA for the Environmental Sensitivity Index (ESI) Socioeconomic Resource Points (SOCECON). There are 103 records that include type and harbor ID.

- Source and contact information: Jill Peterson. NOAA, Office of Response and Restoration. 7600 Sand Point Way, N.E. Seattle, WA. (206) 526-6944 Jill.Peterson@noaa.gov
- Metadata: http://response.restoration.noaa.gov/book_shelf/833_SE_ALASK.pdf
- Permissions: N/A

Watershed Activities

Roads

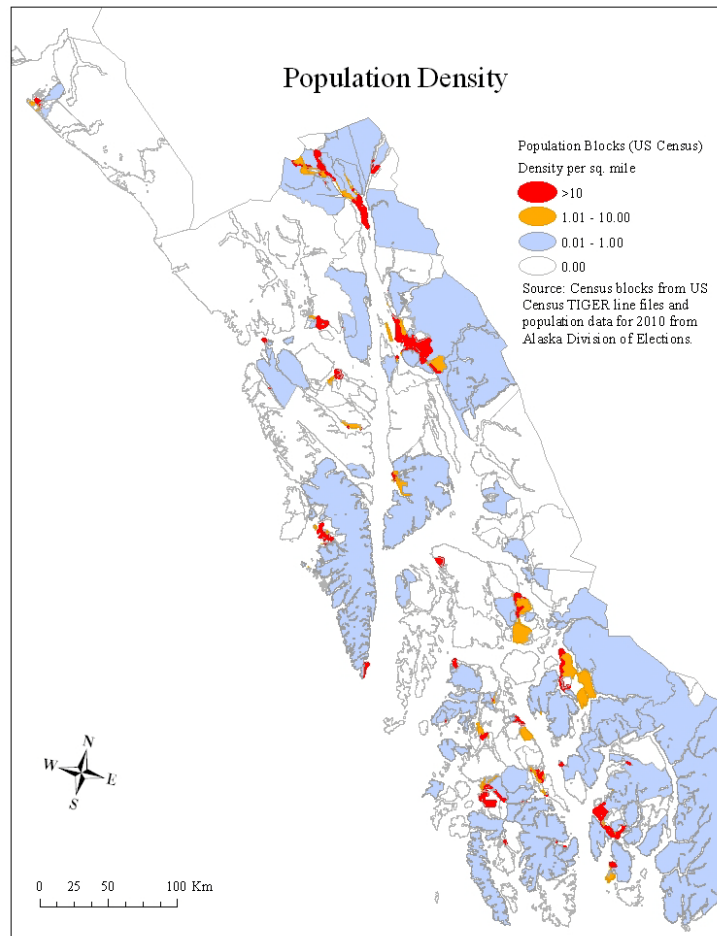
Abstract: A merged layer of southeast Alaska roads from 2010 US Census block data. The TIGER/Line Files are shapefiles and related database files (.dbf) that are an extract of selected geographic and cartographic information from the U.S. Census Bureau's Master Address File / Topologically Integrated Geographic Encoding and Referencing (MAF/TIGER) Database (MTDB). The MTDB represents a seamless national file with no overlaps or gaps between parts, however, each TIGER/Line File is designed to stand alone as an independent data set, or they can be combined to cover the entire nation. The All Roads Shapefile includes all features within the MTDB Super Class "Road/Path Features" distinguished where the MAF/TIGER Feature Classification Code (MTFCC) for the feature in MTDB that begin with "S". This includes all primary, secondary, local neighborhood, and rural roads, city streets, vehicular trails (4wd), ramps, service drives, alleys, parking lot roads, private roads for service vehicles (logging, oil fields, ranches, etc.), bike paths or trails, bridle/horse paths, walkways/pedestrian trails, and stairways.

- Source and contact information: U.S. Census Bureau
<http://www.census.gov/geo/www/tiger/tgrshp2010/tgrshp2010.html>
- Metadata: <http://www.census.gov/geo/www/tiger/tgrshp2010/tgrshp2010.html>

Population Blocks

Abstract: Population density (people per square mile) from the 2010 US Census and the Alaska Division of Elections. The TIGER/Line Files are shapefiles and related database files (.dbf) that are an extract of selected geographic and cartographic information from the U.S. Census Bureau's Master Address File / Topologically Integrated Geographic Encoding and Referencing (MAF/TIGER) Database (MTDB). The MTDB represents a seamless national file with no overlaps or gaps between parts, however, each TIGER/Line File is designed to stand alone as an independent data set, or they can be combined to cover the entire nation. Census Blocks are statistical areas bounded on all sides by visible features, such as streets, roads, streams, and railroad tracks, and/or by nonvisible boundaries such as city, town, township, and county limits, and short line-of-sight extensions of streets and roads. Census blocks are relatively small in area; for example, a block in a city bounded by streets. However, census blocks in remote areas are often large and irregular and may even be many square miles in area. A common misunderstanding is that data users think census blocks are used geographically to build all other census geographic areas, rather all other census geographic areas are updated and then used as the primary constraints, along with roads and water features, to delineate the tabulation blocks. As a result, all 2010 Census blocks nest within every other 2010 Census geographic area, so that Census Bureau statistical data can be tabulated at the block level and aggregated up to the appropriate geographic areas. Census blocks cover all territory in the United States, Puerto Rico, and the Island Areas (American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, and the U.S. Virgin Islands). Blocks are the smallest geographic areas for which the Census Bureau publishes data from the decennial census. A block may consist of one or more faces.

- Source and contact information: U.S. Census Bureau and Alaska Division of Elections: <http://www.census.gov/geo/www/tiger/tgrshp2010/tgrshp2010.html>
- Metadata: <http://www.census.gov/geo/www/tiger/tgrshp2010/tgrshp2010.html>



Impaired Water Bodies

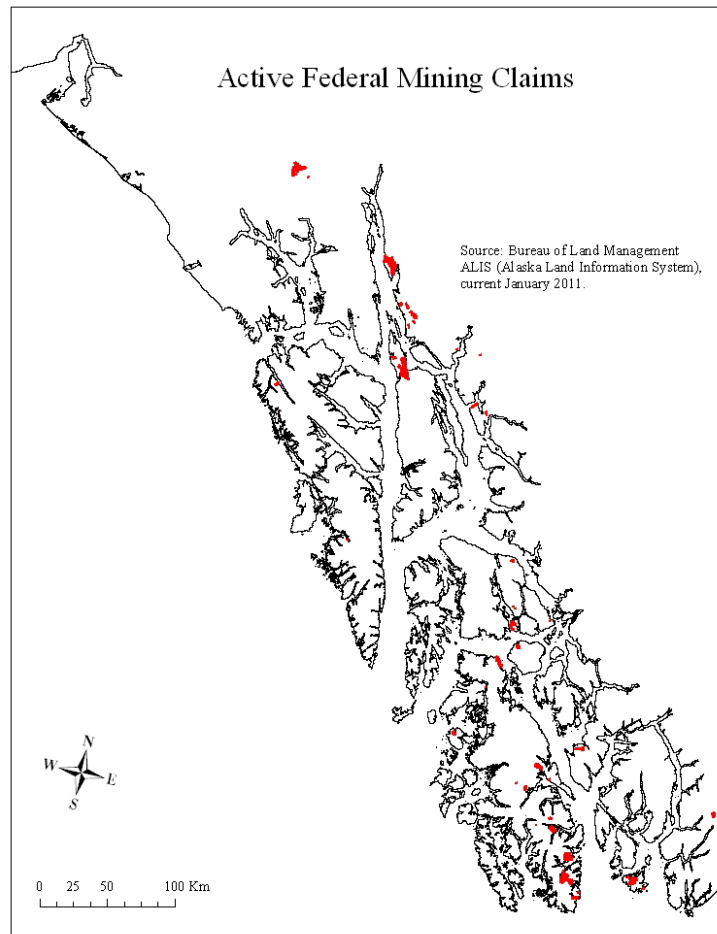
Abstract: This data set represents the complete list of impaired waters that are noted in the ADEC 2010 Integrated Report and are currently being actively monitored or have institutional controls (TMDLs) in place. This list contains those waters that are classified as Category 4a, 4b, or Category 5 under Section 303(d) of the Clean Water Act (1987).

- Source and contact information: Drew Grant, drew.grant@alaska.gov Alaska Dept. of Conservation and Brock Tabor, brock.tabor@alaska.gov; Division of Water: Water Quality Standards, Assessment & Restoration. (907) 465-5023. Received March 10, 2011
- Metadata: http://map.dec.state.ak.us/ArcGIS/rest/services/Water/Impaired_Waters/MapServer
- Permissions: N/A

Active Federal Mining Claims

Abstract: This coverage displays the non-surveyed boundaries of active (recorded or interim) federal mining claims within the State of Alaska. Each mining claim is represented as an individual region, identified by the casefile serial number which can be linked to background data via the ALIS (Alaska Land Information System). Mining claim boundaries were identified in location notices from the original casefiles. They were plotted on maps based on rough sketches, claimant maps or physical descriptions. The mining claim boundaries were transferred (when applicable) by use of a zoom-transfer scope and light table from claimant maps or estimated from land descriptions onto 1:63,360 quadrangle maps. Claims were then digitized into ArcInfo following statewide BLM standards.

- Date Received: January 2011
- Source and contact information: Tim Varner, Bureau of Land Management. 222 W. 7th Ave. #13, Anchorage, Alaska 99513, 907-271-5799, tvarner@blm.gov
- Metadata: <http://dnr.alaska.gov/SpatialUtility/SUC?cmd=vmd&layerid=77>



State Mining Claims

Abstract: Location of state mining claims from the Alaska Department of Natural Resources. Mining Claims are for acquiring locatable mineral rights which have been discovered. They may be 40 acres or 160 acres in size and remain "active" so long as rent is timely paid and annual labor requirements are met. Claims may be converted or required to be converted to Upland Mining Lease before minerals can be extracted if other resources are affected. Before locatable minerals can actually be mined, a mining permit application (APMA or plan of operation and reclamation plan) must be filed and approved. This shape file characterizes the geographic representation of land parcels within the State of Alaska contained by the State Mining Claim category. It has been extracted from data sets used to produce the State status plats. This data set includes cases noted on the digital status plats up to one day prior to data extraction. Each feature has an associated attribute record, including a Land Administration System (LAS) file-type and file-number which serves as an index to related LAS case-file information. Additional LAS case-file and customer information may be obtained at:

<http://www.dnr.state.ak.us/las/LASMenu.cfm> Those requiring more information regarding State land records should contact the Alaska Department of Natural Resources Public Information Center directly.

- Source and contact information: AK Department of Natural Resources. 550 W 7th Suite 706, Anchorage, Alaska 99501, 907-269-8833, gis_public_access@dnr.state.ak.us
- Metadata: <http://dnr.alaska.gov/SpatialUtility/SUC?cmd=vmd&layerid=173>

State Mining Leases

Abstract: Location of state mining leases from the Alaska Department of Natural Resources. Rights to locatable minerals on land owned by the State of Alaska are obtained by making a mineral discovery, staking the boundaries of the location, and recording a certificate of location within 90 days. In most areas, such a location is a "mining claim", which gives the owner an immediate property right to mine the deposits. However, in areas of the state that have been restricted to leasing, the location is a "leasehold location", not a mining claim. The leasehold location must be converted to an upland mining lease before mining begins. In unrestricted areas, locators may convert their mining claims to leases if they wish. This shape file characterizes the geographic representation of land parcels within the State of Alaska contained by the State Mining Lease category. It has been extracted from data sets used to produce the State status plats. This data set includes cases noted on the digital status plats up to one day prior to data extraction. Each feature has an associated attribute record, including a Land Administration System (LAS) file-type and file-number which serves as an index to related LAS case-file information. Additional LAS case-file and customer information may be obtained at:

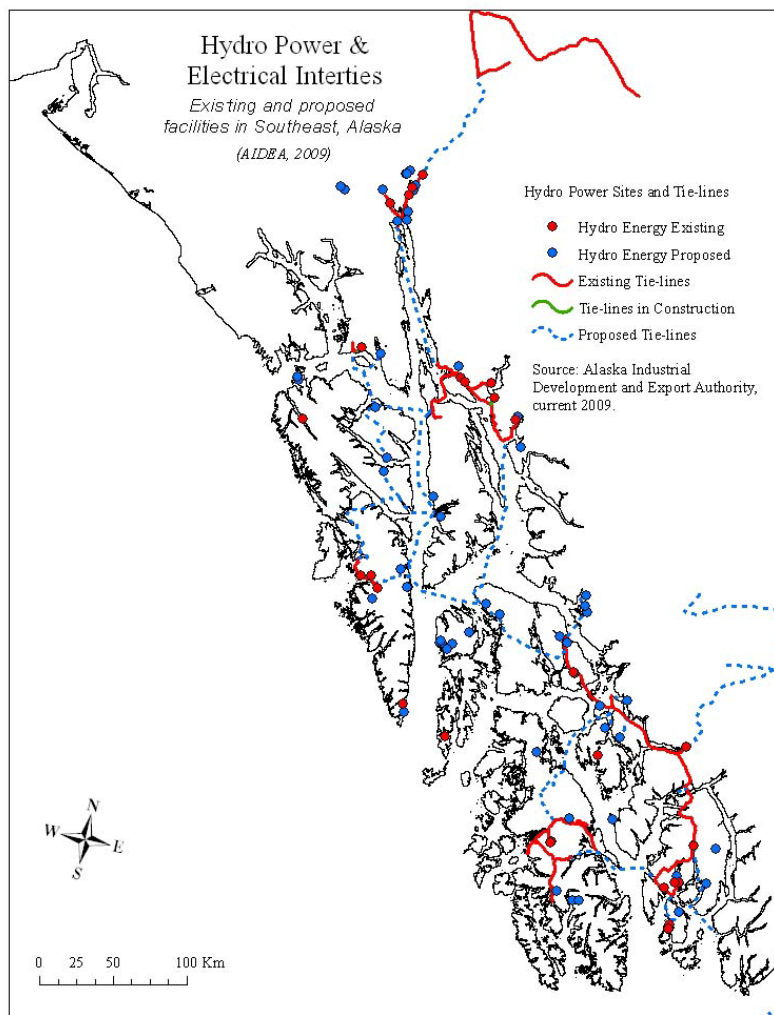
<http://www.dnr.state.ak.us/las/LASMenu.cfm> Those requiring more information regarding State land records should contact the Alaska Department of Natural Resources Public Information Center directly.

- Source and contact information: AK Department of Natural Resources. 550 W 7th Suite 706, Anchorage, Alaska 99501, 907-269-8833, gis_public_access@dnr.state.ak.us
- Metadata: <http://dnr.alaska.gov/SpatialUtility/SUC?cmd=vmd&layerid=174>

Hydropower

Abstract: Hydro power sites and ties-lines from the Alaska Industrial Development and Export Authority (www.aidea.org). State-wide point location dataset represents existing (n=44) and proposed (n=283) hydro energy projects. Line files delineate energy-tie routes that are existing (n=90), proposed (n=42), or under construction (n=3).

- Source and contact information: Emily Binnian of Alaska Industrial Development and Export Authority. 907-771-3049, ebinnian@aidea.org and Paula Hansen, contractor from WH Pacific PHansen@whpacific.com
- Date received: 9/17/10
- Metadata: No
- Permissions: The file has not been validated and is provided as is and as received from the contractor (Paula Hanson). Jim Strandberg is the Project Manager for SE Interties and Integrated Resource Planning.



Dams

Abstract: This dataset provides a location map of dams in southeast Alaska. The National Inventory of Dams was originally developed by the U.S. Army Corps of Engineers and the Federal Emergency Management Agency. It was developed to track dam related problem areas. This database shows the age of the dam, number of people living downstream, and some inspection information. The dam inspection data also includes location information (such as latitude, longitude and nearest town), a description of a dam's size, reservoir capacity, the owner and the regulatory oversight agency.

- Source and contact information: <http://seakgis.alaska.edu/data/facility.zip> Gabi Bosch. USFS, Tongass National Forest. POB 309 Petersburg, Alaska 99833. 907-772-3841 gbosch@fs.fed.us
- Metadata: <http://seakgis.alaska.edu:8080/geoportal/rest/document?id={FD493981-7289-4AB1-906B-4AE1D43458C9}>

Climate Change

Annual Precipitation Change

Abstract: The projected change in mean annual precipitation by 2080. These results were derived from the climate change software Climate WNA: "A program to generate climate normal data for genealogy and climate change studies in western North America." The AR4 UKMO HadCM3 climate model from the Intergovernmental Panel on Climate Change (IPCC), scenario A2 and run 1, were projected onto the GTOPO digital elevation model (30 arc seconds).

- Source and contact information: <http://www.genetics.forestry.ubc.ca/cfcg/ClimateWNA/ClimateWNA.html>
- Metadata: http://www.ales2.ualberta.ca/RR/people/hamann/publications/pdfs/Wang_et_al_2012b.pdf

Coldest Month Temperature Change

Abstract: The projected change in coldest month temperature by 2080. These results were derived from the climate change software Climate WNA: "A program to generate climate normal data for genealogy and climate change studies in western North America." The AR4 UKMO HadCM3 climate model from the Intergovernmental Panel on Climate Change (IPCC), scenario A2 and run 1, were projected onto the GTOPO digital elevation model (30 arc seconds).

- Source and contact information: <http://www.genetics.forestry.ubc.ca/cfcg/ClimateWNA/ClimateWNA.html>
- Metadata: http://www.ales2.ualberta.ca/RR/people/hamann/publications/pdfs/Wang_et_al_2012b.pdf

Annual Temperature Change

Abstract: The projected change in mean annual temperature by 2080. These results were derived from the climate change software Climate WNA: "A program to generate climate normal data for geneecology and climate change studies in western North America." The AR4 UKMO HadCM3 climate model from the Intergovernmental Panel on Climate Change (IPCC), scenario A2 and run 1, were projected onto the GTOPO digital elevation model (30 arc seconds).

- Source and contact information:
<http://www.genetics.forestry.ubc.ca/cfcg/ClimateWNA/ClimateWNA.html>
- Metadata:
http://www.ales2.ualberta.ca/RR/people/hamann/publications/pdfs/Wang_et_al_2012b.pdf

Warmest Month Temperature Change

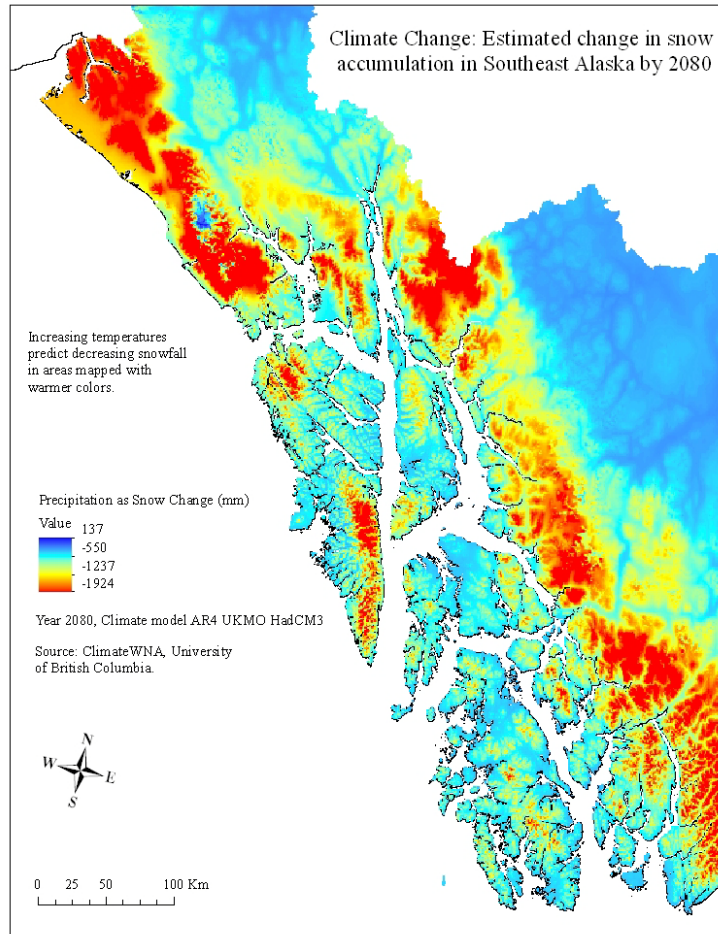
Abstract: The projected change in warmest month by 2080. These results were derived from the climate change software Climate WNA: "A program to generate climate normal data for geneecology and climate change studies in western North America." The AR4 UKMO HadCM3 climate model from the Intergovernmental Panel on Climate Change (IPCC), scenario A2 and run 1, were projected onto the GTOPO digital elevation model (30 arc seconds).

- Source and contact information:
<http://www.genetics.forestry.ubc.ca/cfcg/ClimateWNA/ClimateWNA.html>
- Metadata:
http://www.ales2.ualberta.ca/RR/people/hamann/publications/pdfs/Wang_et_al_2012b.pdf

Precipitation as Snow Change

Abstract: The projected change in precipitation as snow by 2080. These results were derived from the climate change software Climate WNA: "A program to generate climate normal data for geneecology and climate change studies in western North America." The AR4 UKMO HadCM3 climate model from the Intergovernmental Panel on Climate Change (IPCC), scenario A2 and run 1, were projected onto the GTOPO digital elevation model (30 arc seconds).

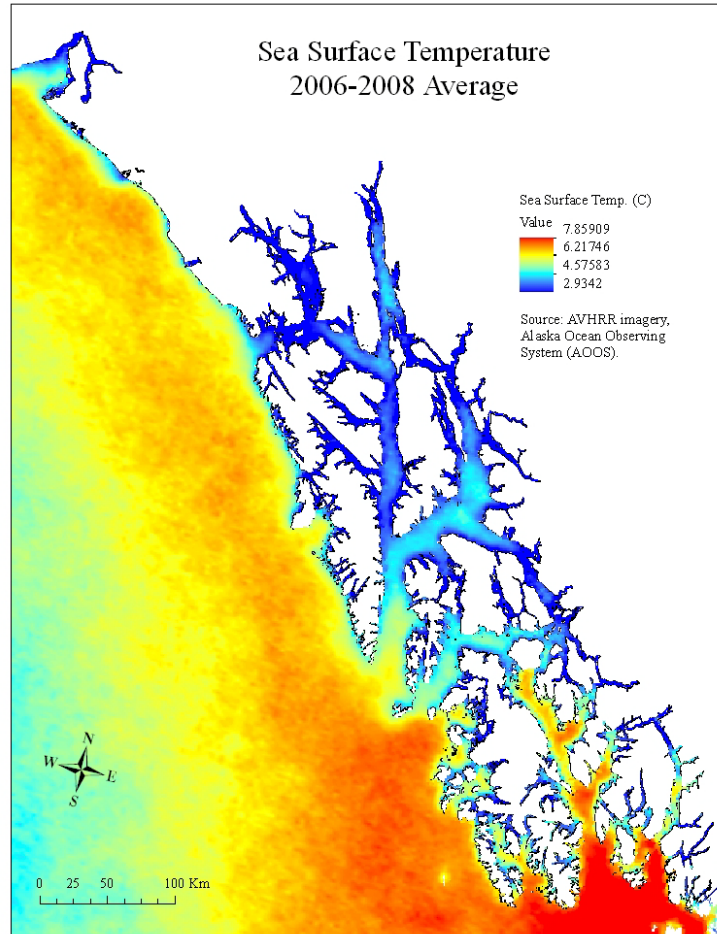
- Source and contact information:
<http://www.genetics.forestry.ubc.ca/cfcg/ClimateWNA/ClimateWNA.html>
- Metadata:
http://www.ales2.ualberta.ca/RR/people/hamann/publications/pdfs/Wang_et_al_2012b.pdf



Sea Surface Temperature Presently

Abstract: The 3-year average sea surface temperature (2006-2008) derived from AVHRR remote sensing imagery hosted by the Alaska Ocean Observing System (AOOS). Gaps in data coverage across months were patched with interpolation using Inverse Distance Weighting (IDW) at a distance of 1km, 5km, and 25km radius.

- Source and information: <http://data.aos.org/maps/sensors/>
- Metadata: http://mms.gina.alaska.edu/supp/AVHRR_template.xml



Land Cover

Abstract: The Preliminary Classification of Terrestrial Ecosystems in Southeast Alaska is based on 4 major data layers: USDA Forest Service Existing Vegetation database, the National Wetland Inventory, the USDA Forest Service Landforms and Karst from USFS soils and karst inventories. These layers were merged with auxiliary sources from Landsat Enhanced Thematic Mapper (ETM) and supplemented with aspect and elevation from the Shuttle Radar Topography Mission Digital Elevation Model (SRTM DEM) . This master database retains all of the detailed features from each of these datasets to allow maximum flexibility for future researchers to use unique combinations of habitat variables that suit their subject of interest.

- Source and information: David Albert, The Nature Conservancy, Juneau, Alaska; dalbert@tnc.org; 907-586-2301
- Metadata: http://home.gci.net/~tnc/HTML/Consv_assessment.html

Appendix

Appendix A- ADF&G SE Fish Harvest Metadata

Sources of the data:

- Neptune - ADF&G software application dedicated to data entry and retrieval of groundfish fish ticket harvest data.
- Triton - ADF&G software application dedicated to data entry and retrieval of herring fish ticket harvest data.
- Venus - ADF&G software application dedicated to data entry and retrieval of shellfish (invertebrate) fish ticket harvest data.
- Zephyr - ADF&G software application dedicated to data entry and retrieval of salmon fish ticket harvest data

Southeast Alaska – harvest for Southeast Alaska was identified as harvest in statistical areas translated to ADF&G Region I. Regions are the largest unit of ADF&G's management hierarchy. A region contains many management areas. There are four commercial fishing regions: Region I (Southeast Alaska), Region II (Central Alaska), Region III (Arctic-Yukon-Kuskokwim), and Region IV (Westward Alaska).

Species Group – a species or an aggregation of species based on ADF&G species codes (see Commercial_Harvest_Species_Code_Master_Table.xls):

- Salmon – ADF&G species codes 400, 401, 402, 403, 404, 405, 410, 411, 420, 430, 440 and 450.
- Groundfish – ADF&G species codes less than 810, excluding 200, 230, 400, 401, 402, 403, 404, 405, 410, 411, 420, 430, 440 and 450.
- Herring – ADF&G species code 230.
- Shellfish – ADF&G species codes greater than 809.
- Halibut – ADF&G species code 200.

Statistical area - The five or six-digit ADF&G statistical code denoting a specific area of catch. Statistical areas are unique to the fishery "type". For example, there are unique statistical areas for salmon, herring, and shellfish/groundfish harvests. Salmon and herring fisheries utilize a five-digit stat area number, which represents the district and subdistrict area of harvest. Groundfish and shellfish (except Southeast Alaska) utilize a six-digit stat area number loosely based on latitude and longitude. In Southeast Alaska, shellfish utilize a five-digit stat area.

Total pounds – a sum of the pounds field. The weight of the catch as indicated by the scale at the point the harvest is landed. Landed weight must be recorded in pounds on a fish ticket. Landed weight is often called scale weight and may also be called dressed weight. In cases other than fish delivered whole, this amount will be different from a round or whole weight.

Permit count – the number of distinct CFEC permit serial numbers. A permit issued to the vessel operator that allows participation in open access or limited entry fisheries managed by the state of Alaska. Any commercial activity in state waters requires the operator to obtain a CFEC permit, including harvesting, landing of catch, or transshipping of catch. Open access fishers obtain an interim use permit. Limited access fisheries such as salmon and herring require a limited entry permit. Most limited entry permits may be transferred.

Vessel count – the number of distinct ADF&G vessel numbers. ADF&G vessel numbers are unique, permanent identification number issued the first time a vessel is licensed in the State of Alaska. The ADF&G vessel number is printed on a triangular metal plate and affixed to the vessel. The ADF&G vessel number is permanent to a vessel regardless of a transfer or change of vessel ownership (Alaska Statute 16.05.520).

Processor count – the number of distinct ADF&G processor codes. The processor code is often referred to as an F-code and is a unique identification number for each processing facility or processing vessel.

References

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