

Special Publication No. 07-08

**Catalog of Waters Important for Spawning, Rearing,
or Migration of Anadromous Fishes – Western
Region, Effective June 01, 2007**

by

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and

Ed Weiss

March 2007

Alaska Department of Fish and Game

Alaska Department of Natural Resources



Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative Code	AAC	fork length	FL
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mid-eye-to-fork	MEF
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	mid-eye-to-tail-fork	METF
hectare	ha	at	@	standard length	SL
kilogram	kg	compass directions:		total length	TL
kilometer	km	east	E		
liter	L	north	N	Mathematics, statistics	
meter	m	south	S	<i>all standard mathematical signs, symbols and abbreviations</i>	
milliliter	mL	west	W	alternate hypothesis	H _A
millimeter	mm	copyright	©	base of natural logarithm	<i>e</i>
		corporate suffixes:		catch per unit effort	CPUE
Weights and measures (English)		Company	Co.	coefficient of variation	CV
cubic feet per second	ft ³ /s	Corporation	Corp.	common test statistics	(F, t, χ^2 , etc.)
foot	ft	Incorporated	Inc.	confidence interval	CI
gallon	gal	Limited	Ltd.	correlation coefficient (multiple)	R
inch	in	District of Columbia	D.C.	correlation coefficient (simple)	r
mile	mi	et alii (and others)	et al.	covariance	cov
nautical mile	nmi	et cetera (and so forth)	etc.	degree (angular)	°
ounce	oz	exempli gratia	e.g.	degrees of freedom	df
pound	lb	(for example)		expected value	<i>E</i>
quart	qt	Federal Information Code	FIC	greater than	>
yard	yd	id est (that is)	i.e.	greater than or equal to	≥
		latitude or longitude	lat. or long.	harvest per unit effort	HPUE
Time and temperature		monetary symbols		less than	<
day	d	(U.S.)	\$, ¢	less than or equal to	≤
degrees Celsius	°C	months (tables and figures): first three letters	Jan, ..., Dec	logarithm (natural)	ln
degrees Fahrenheit	°F	registered trademark	®	logarithm (base 10)	log
degrees kelvin	K	trademark	™	logarithm (specify base)	log ₂ , etc.
hour	h	United States (adjective)	U.S.	minute (angular)	'
minute	min	United States of America (noun)	USA	not significant	NS
second	s	U.S.C.	United States Code	null hypothesis	H ₀
		U.S. state	use two-letter abbreviations (e.g., AK, WA)	percent	%
Physics and chemistry				probability	P
all atomic symbols				probability of a type I error (rejection of the null hypothesis when true)	α
alternating current	AC			probability of a type II error (acceptance of the null hypothesis when false)	β
ampere	A			second (angular)	"
calorie	cal			standard deviation	SD
direct current	DC			standard error	SE
hertz	Hz			variance	
horsepower	hp			population	Var
hydrogen ion activity (negative log of)	pH			sample	var
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

SPECIAL PUBLICATION NO. 07-08

**CATALOG OF WATERS IMPORTANT FOR SPAWNING, REARING, OR
MIGRATION OF ANADROMOUS FISHES – WESTERN REGION,
EFFECTIVE JUNE 01, 2007**

by

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The Division of Sport Fish Special Publications series was established in 1991 for the publication of techniques and procedures manuals, informational pamphlets, special subject reports to decision-making bodies, symposia and workshop proceedings, application software documentation, in-house lectures, and other documents that do not fit in another publication series of the Division of Sport Fish. Since 2004, the Division of Commercial Fisheries has also used the same Special Publication series. Special Publications are intended for fishery and other technical professionals. Special Publications are available through the Alaska State Library and on the Internet: <http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm>. This publication has undergone editorial and peer review.

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For information concerning the Anadromous Waters Catalog and Atlas, please contact J Johnson, ADF&G Sport Fish Division Habitat Biologist at (907)267-2337.

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INTRODUCTION

PURPOSE AND AVAILABILITY OF THE ATLAS AND CATALOG

As of April 15, 2003, Executive Order 107 transferred functions related to protection of fish habitat in rivers, lakes, and streams under Alaska Statutes 16.05.840 - .860 and 16.05.870 - .890 from the Alaska Department of Fish and Game (ADF&G) to the Alaska Department of Natural Resources (ADNR). The authorities for fish habitat protection are now found in Alaska Statutes 41.14.840 - .860 and 41.14.870 - .890, respectively. Former 5 AAC 95.010 which adopts the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* and the *Atlas to the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* into regulation was relocated to 11 AAC 195.010, with conforming technical changes, to reflect Executive Order 107.

Alaska Statute 41.14.870(a) requires the ADNR to specify the various rivers, lakes, and streams, or parts of them, that are important for spawning, rearing, or migration of anadromous fishes. Adopted by reference under 11 AAC 195.010 of the Alaska Administrative Code, the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* (referred to as the "Catalog") and the *Atlas to the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* (referred to as the "Atlas") are used to make this specification. The Catalog is a numerically-ordered list of the water bodies with documented use by anadromous fish for these purposes. The Atlas shows cartographically the location, name and number of these specified water bodies, the anadromous fish species using these water bodies, and the fish life history phases for which the water bodies are used (to the extent known).

ADF&G and ADNR work together to identify and map the water bodies specified under AS 41.14.870, and ADNR protects these habitats through implementation of their Fish Habitat Permitting program. Protection of these specified water bodies is addressed by other sections of AS 41.14.870, which requires persons or governmental agencies to submit plans and specifications to ADNR and receive written approval in the form of a Fish Habitat Permit prior to beginning the proposed use, construction or activity that would take place in specified water bodies. More detailed information about AS 41.14.870, the types of activities requiring permits, and the permit application procedures are found on subsequent pages of this document.

Copies of the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* for a specified region may be obtained by writing to the ADNR, Office of Habitat Management and Permitting (OHMP), Anchorage Regional Office at 550 West 7th Avenue, Suite 1420, Anchorage, AK 99501-3566 (phone 907-269-8690) or the ADF&G Sportfish Division at 333 Raspberry Road, Anchorage, AK 99518-1599 (phone 907-267-2342).

Copies of the entire *Atlas of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* are available for examination at the OHMP area offices in Juneau, Fairbanks, and Anchorage and the ADF&G Sport Fish Division offices in Anchorage and Juneau. Copies are also available for viewing at the Alaska State Library in Juneau and the Alaska Resources and Information Services (ARLIS) library in Anchorage. Copies of regional volumes of the Atlas for the region of the state in which they are located are available for inspection at OHMP offices in Craig, Palmer, Petersburg, and Soldotna and ADF&G offices in Anchorage, Bethel, Cold Bay, Cordova, Craig, Delta Junction, Dillingham, Douglas, Dutch Harbor, Fairbanks, Glennallen, Haines, Homer, Juneau, Ketchikan, King Salmon, Kodiak, Nome, Palmer, Petersburg, Sand Point, Sitka, Soldotna, Tok, Wrangell, and Yakutat.

STATUTES AND REGULATIONS

The Alaska laws summarized below form the basis for the ADNR, OHMP Fish Habitat Permitting program and OHMP's role in regulating activities in specified anadromous fish-bearing water bodies. Implementation of these laws is the purpose for which the Atlas and Catalog are developed and maintained. These statutes and regulations are subject to amendment or repeal and should be regularly reviewed for possible changes.

STATUTES

AS 41.14.870 requires ADNR to “specify” or list, “the various rivers, lakes, and streams or parts of them that are important for the spawning, rearing, or migration of anadromous fish.” It also requires anyone wanting to construct a hydraulic project, or use, divert, obstruct, pollute, or change the natural flow or bed of a specified water body, or operate a vehicle in these specified water bodies to contact ADNR for written approval before beginning the construction, activity, or use. The department may require additional information in order to fully evaluate potential impacts to fish and game resources. Required information includes full plans and specifications for the proposed construction, activity, or use and a list of measures for protecting fish and game resources affected by the proposed activity.

If the deputy commissioner (or deputy commissioner's authorized representative) determines that the plans and specifications provide for the proper protection of fish and game, ADNR Office of Habitat Management & Permitting will issue written approval, in the form of a “Fish Habitat Permit,” authorizing the proposed use or activity. In the case of a denial, the applicant may seek a hearing under AS 44.62.370.

AS 41.14.880 establishes that any person or organization beginning a construction or use without the deputy commissioner's written approval is guilty of a misdemeanor. The statute also dictates that any cost associated with restoring the stream to its original condition is to be borne by the guilty party and is in addition to any penalty imposed by the court.

AS 41.14.890 authorizes OHMP employees to issue oral approvals to a riparian landowner for removing obstructions or repairing existing structures without reviewing prepared operating plans in the event of an emergency arising from weather or stream flow conditions.

AS 41.14.895 establishes the penalty for causing material damage to spawning beds or preventing or interfering with migration of anadromous fish as a misdemeanor. Causing material damage or interfering with migration can be a direct result of a project or use or can occur through negligence or non-compliance with the approved plans and specifications.

AS 41.14.900 specifies that anyone violating AS 41.14.870 – .895 is guilty of a Class A misdemeanor. It further dictates that any proceeds from fines are to be deposited in the general fund of the State of Alaska.

REGULATIONS

11 AAC 195.010: *The Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*, and its companion Atlas are the means by which ADNR specifies water bodies considered important for use by anadromous fish in accordance with AS 41.14.870. The Atlas and Catalog are adopted by reference under 11 AAC 195.010(a) of the Alaska Administrative Code. Permit application procedures, definitions, and other information contained in the introductions of the Atlas and Catalog are also adopted by reference under 11 AAC 195.010(b).

PENALTIES

AS 12.55.035 specifies the fines for various offenses. Possible fines for a Class A misdemeanor resulting from a conviction for violating AS 41.14.870 - .895 include:

- ⇒ If a defendant is not an organization: A fine of up to \$10,000.
- ⇒ If the defendant is an organization: Maximum fines of up to \$200,000; or three times the pecuniary gain realized by the defendant; or three times the pecuniary damage or loss caused by the defendant to another, or to the property of another, as a result of the offense.

In addition to these fines, convicted defendants are liable for the cost of restoring the stream to its original condition (AS 41.14.880), may receive up to one year in prison, and may be subject to civil fines or penalties. Please refer to the complete current text of AS 41.14.870 - .900, AS 12.55.035 and 12.55.135 and 11 AAC 195.010 for detailed information.

OTHER FISH HABITAT PROTECTION STATUTES

AS 41.14.840 requires construction and maintenance of a fishway and a device for efficient passage of downstream migrants for any dam or other obstruction built across a stream frequented by salmon or other fish, the submission of plans and specifications for review and approval by ADNR and that the structure be kept open, unobstructed, and supplied with enough water to maintain the free and efficient passage of fish through it.

If a fishway is determined by the deputy commissioner to be impractical, *AS 41.14.850* allows for the owner/applicant to compensate for the loss resulting from the dam or obstruction by paying a lump sum acceptable to the deputy commissioner to the fish and game fund; convey a site and construct a new hatchery and all related facilities; or fund the expansion, maintenance, and operation of an existing hatchery.

AS 41.14.860 sets penalties or fines for violating AS 41.14.840 and 41.14.850 and any regulations adopted under them. Owners of dams or obstructions who fail to comply with AS 41.14.840 or 41.14.850 within a reasonable time designated in a notice from the deputy commissioner are guilty of a misdemeanor and subject to a fine of up to \$1,000. The statute further notes that each day the owner fails to comply is a separate offense and that the dam or obstruction is a public nuisance and subject to abatement.

PERMIT APPLICATION PROCEDURES

PERMITS FOR SPECIFIED STREAMS

As outlined in preceding pages, a Fish Habitat Permit is required *before* any action is taken "to construct a hydraulic project, or use, divert, obstruct, pollute, or change the natural flow or bed of a specified river, lake, or stream . . ." or ". . . to use wheeled, tracked, or excavating equipment or log-dragging equipment in the bed of a specified river, lake, or stream . . ." [quoted portions from AS 41.14.870(b)]. This requirement includes, but is not limited to, construction, maintenance, repairs, or placement of structures, docks, bulkheads, road crossings (culverts, bridges, fords), stream diversions and bank stabilization projects; gravel removal; dumping any material into (or onto ice over) a water body; placer mining; water withdrawals or appropriations; the use of vehicles or equipment in the water body; and the use of explosives in or near the water body. Recreational boating and fishing activities do not require a Fish Habitat Permit.

To apply for a Fish Habitat Permit, the applicant must submit a completed application package to the appropriate ADNR, OHMP office (see Contacts section below) at least 30 days prior to the proposed start date. Technical assistance is available in many instances. By consulting with ADNR early in the planning process, strategies for protecting fish resources can be included in submitted plans, thereby reducing permit review time and the need for project changes. The package must include a written, signed request, a completed Fish Habitat Permit Application, and any other necessary materials, including any relevant "other-agency" permit authorizations such as a U.S. Army Corps of Engineers permit application or an Alaska Coastal Project Questionnaire (see "Other Permittee Responsibilities" section below).

Information submitted with the application should be sufficiently detailed to fully describe the proposed activity and its possible effects on the specified water body and its fish resources. The following types of information should accompany the application where applicable:

- name and location of the water body;
- type of project (e.g., bridge, culvert, utility line placement, erosion control, water withdrawal, gravel removal, placer mining, etc.);
- project plans and description including drawings, description of methods, and list of equipment (i.e. design blueprints or plan view drawings, survey data, description of water body at project site, description of planned work, erosion / sedimentation control methods, etc.);
- description of in-water use of wheeled or tracked vehicle (i.e. type and size of vehicle, surface bearing pressure, dates and frequency of use, etc.);
- description of proposed or anticipated stream diversions, channelization, or bank alterations including sequence of proposed work and any dewatering actions;
- description of any material removal from or material deposition into the water body including type and amount of material;
- description of proposed blasting or use of explosives including charge size, distance to water body and impact pressures;
- dates of the proposed work or use;
- other contractors or parties involved in the project; and
- proposed mitigation measures.

OHMP personnel will review the application materials and, where appropriate, issues permit approval for plans and procedures that have minimal or no harmful effects, including cumulative effects, on anadromous fish or their habitats.

If the deputy commissioner determines that the proposed use or activity may have an adverse impact on fish or fish habitat, applicants may be required to employ appropriate measures to mitigate the adverse impacts in order to obtain a permit. For example, the department may require the applicant to utilize methods of operation or construction sequencing of a project that minimize the effects on fish migration, spawning, or rearing, or restrict work in the impacted area to certain “seasonal windows” when fish are less likely to be adversely impacted. Compensatory mitigation shall be considered only if all other mitigation measures do not adequately mitigate such adverse impacts. In those instances where the adverse impact to fish or fish habitat is unavoidable, the department, in its discretion, may withhold permit authorization.

The mitigation measures may include one or more of the actions listed below:

1. Avoid the impact altogether by not taking a certain action or parts of an action.
2. Minimize the impact by limiting the degree or magnitude of the action and its implementation.
3. Rectify the impact by repairing, rehabilitating, or restoring the impacted environment.
4. Reduce or eliminate the impact over time by preservation and maintenance operations during the life of the proposed use or activity.
5. Compensate for the impact by replacing or providing substitute resources or environments.

PERMITS FOR UNSPECIFIED STREAMS

In addition, a Fish Habitat Permit may be required under AS 41.14.840 for activities occurring in a water body or portions of a water body that are not specified in the Atlas and Catalog, but are frequented by anadromous or resident fish species. Specifically, a Fish Habitat Permit is required before a dam or other obstruction is built across a stream used by fish. Procedures for obtaining a Fish Habitat Permit under, AS 41.14.840 are the same as those outlined above for AS 41.14.870. The ADNR recommends contacting the appropriate OHMP office if there is any question about whether the project requires a Fish Habitat Permit.

OTHER PERMITTEE RESPONSIBILITIES

A copy of the Fish Habitat Permit, including any permit amendments, must be retained on site during the permitted activity. The permittee is responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved plan. The permittee shall notify OHMP and obtain written approval in the form of a permit amendment prior to beginning any activity that deviates from the approved plan. Final determination as to the significance of any deviation from, or modification to, the approved plan and the need for a permit amendment is OHMP’s responsibility. Therefore, a permittee should promptly consult the OHMP when considering a deviation from the approved plan.

Depending on the types of activities or work proposed to occur in a particular water body, additional permits or authorizations may be needed from other state or federal agencies, local governments, or

applicable land managers. The applicant is responsible for ensuring that all necessary permits are obtained prior to starting work. Other entities that may require a permit include but are not limited to the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Alaska Department of Environmental Conservation, other divisions of the Department of Natural Resources, ADF&G, the Office of Project Management and Permitting and private land owners.

CONTACTS

Completed permit applications and requests for information or blank permit applications should be submitted to the appropriate OHMP office for the area in which the project is located, as noted in Table 1 on the following page.

OHMP Area Offices	Area of Responsibility
<p>Juneau Area Office (I) 400 Willoughby Avenue, 4th Floor Juneau, AK 99801-1796 465-4105 phone 465-4759 fax Jackie Timothy, Area Office Manager jackie_timothy@dnr.state.ak.us</p>	<p>Northern Southeast - Juneau, Douglas, Gustavus, Haines, Skagway, Hoonah, Sitka, Yakutat, Icy Bay</p> <p>Game Management Units (GMUs; designations are approximate) 1C & 1D; 4 (most); 5</p>
<p>Anchorage Area Office (II) 550 West 7th Avenue Anchorage, AK 99501 269-8690 phone 269-5673 fax _____, Area Office Manager _____@dnr.state.ak.us</p>	<p>Municipality of Anchorage, Prince William Sound, Copper River Delta, Alaska Peninsula, Aleutian Islands, Bristol Bay, Southwest and Western Alaska, Yukon and Kuskokwim Delta, - Anchorage, Whittier, Valdez, Cordova, Kodiak, Dillingham, Togiak, Bethel, Unalaska</p> <p>GMUs: 6 (west of Cape Suckling); 8; 9; 10; 11 (south of Haley Cr.); 13D (south of Haley Cr.); 14C; 16B (south half); 17; 18; west portions of 19A & 19B</p>
<p>Fairbanks Area Office (III) 1300 College Road Fairbanks, AK 99701-1551 459-7289 phone 456-3091 fax Mac McLean, Area Office Manager mac_mclean@dnr.state.ak.us</p>	<p>Interior and Northern Alaska; North Slope, Yukon River Basin upstream of Paimiut and Kuskokwim River Basin upstream of the Holitna River., Copper River basin north of the Chugach Mountains - Fairbanks, Delta Junction, Glennallen, Chitna, Nome, Kotzebue, Barrow</p> <p>GMUs: 11 (north of Haley Cr.); 12; east portions of 13A, 13B, & 13D; 13C; 13E (Cantwell and upper Nenana River only); east portions of 19A & 19B; 19C & 19D; 20; 21; 22; 23; 24; 25; 26</p>
<p>Mat-Su Area (IV) Office 1800 Glenn Highway, Suite 12 Palmer, AK 99645-6736 745-7363 phone 745-7369 fax Mike Bethe, Area Office Manager mike_bethe@dnr.state.ak.us</p>	<p>Matanuska/Susitna Basin, Talkeetna Mountains - Palmer, Wasilla, Big Lake, Talkeetna, Trapper Creek</p> <p>GMUs: W portion of 13A, 13B, & 13D; 13E (except Cantwell and upper Nenana River); 14A & 14B; 16A & 16B (north half)</p>
<p>Kenai Area Office (V) 514 Funny River Road Soldotna, AK 99669-8255 260-4882 phone 260-5992 fax Lee McKinley, Area Office Manager lee_mckinley@dnr.state.ak.us</p>	<p>Kenai Peninsula - Kenai, Soldotna, Homer, Seldovia, Portage, Cooper Landing, Seward</p> <p>GMUs: 7; 15</p>
<p>Petersburg Area Office (VI) P.O. Box 667 Petersburg, AK 99833-0667 772-5224 phone 772-9336 fax Jim Cariello, Area Office Manager jim_cariello@dnr.state.ak.us</p>	<p>Southern Southeast - Petersburg, Kake, Wrangell, Angoon</p> <p>GMUs: 1A (most) & 1B; 3; 4 (Admiralty Island from Angoon south)</p>
<p>Prince of Wales Area Office (VII) P.O. Box 668 Craig, AK 99921-0668 826-2560 phone 826-2562 fax Mark Minnillo, Area Office Manager mark_minnillo@dnr.state.ak.us</p>	<p>Prince of Wales, Dall, Long, Revillagigedo, and Gravina islands - Craig, Klawock, Hydaburg, Thorne Bay, Coffman Cove, Ketchikan</p> <p>GMU: 1A (Revillagigedo and Gravina islands); 2</p>

Table 1.—OHMP area offices and contacts.

ATLAS AND CATALOG USERS' GUIDE

FORMAT

The Atlas and Catalog are divided into six volumes corresponding to Alaska's six fish and game resource management regions (Arctic, Interior, Western, Southwest, Southcentral, Southeast) established in 1982 by the Joint Boards of Fisheries and Game (see Figure 1). A figure on the front cover of each Catalog and Atlas shows the geographic area covered in that volume.

The Catalog is a numerically-ordered list of the water bodies documented as being used by anadromous fish. Also listed are the U.S. Geological Survey (USGS) quadrangle (quad) map, latitude, longitude, anadromous fish documented in the water body and a legal description for the mouth and upper known extent of anadromous fish use for each specified water body.

The Atlas to the Catalog is a compilation of topographic maps that cartographically shows the location, name, and number of these specified anadromous fish-bearing water bodies, the anadromous fish species using these water bodies, and the fish life history phases for which the water bodies are used (to the extent known).

LIMITATIONS

Location information (latitude/longitudes, legal descriptions) and graphic representations used in the Atlas and Catalog are primarily derived from USGS quad maps, from field observations, and in some cases from aerial photos. ADF&G and ADNR use the most recent editions of these quad maps, when possible, to depict as accurately as possible the locations of water bodies found in the Atlas and Catalog. The intent is to avoid any confusion when referring to a specific water body. In some parts of Alaska, however, channel and coastline configurations have changed since the relevant USGS quad map was published, making it not entirely accurate for on-the-ground use. Locations listed in the catalog should be compared to the water body locations depicted on Atlas maps, not to field-surveyed or photo-extracted locations.

In some instances, polygons are used to specify areas containing a number of water bodies supporting anadromous fish that are impossible to depict legibly and accurately on 1:63,360-scale maps. Generally used by juvenile anadromous fish for rearing, water bodies in these polygons are highly productive and are considered important for anadromous fishes.

Fisheries surveys are important tools protecting anadromous fish habitat, and for managing sport, personal use, subsistence and commercial fisheries. Data are collected by various methods including aircraft, boat, and foot. Due to timing, water clarity, temperature, survey method or other factors, a survey for a particular species may fail to gather complete life-phase information, or observe juvenile fish, non-targeted anadromous fish species, or the actual upper limit of anadromous fish use. Therefore, the upper points of stream reaches listed in the Catalog and shown in the Atlas usually reflect the extent of fish surveys or known anadromous fish use in a particular water body rather than the *actual* limits of anadromous fish occurrence or of habitat use.

In addition, only a limited number of the water bodies in Alaska have actually been surveyed. Virtually all-coastal water bodies in the state provide important habitat for anadromous fish, as do many unsurveyed tributaries to known anadromous fish-bearing water bodies. Anadromous fish often rear in small tributaries, flood channels, intermittent streams, and beaver ponds. Due to the remote location, small size, or ephemeral nature of these systems, most have not been surveyed and are not included in the Catalog or Atlas.

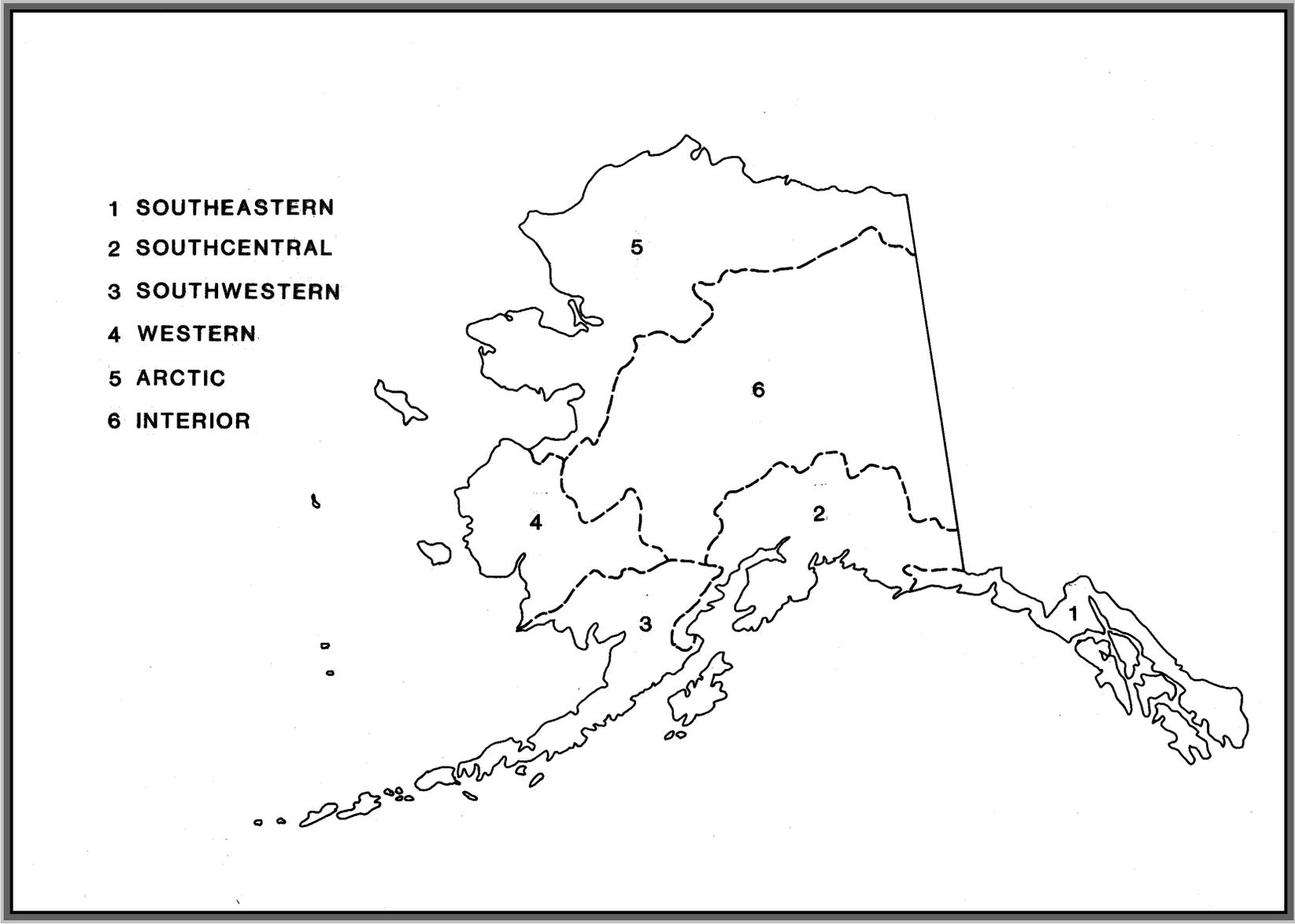


Figure 1.—Atlas and Catalog Regional Boundaries

INTERPRETATION OF THE ATLAS

Alaska is depicted by 153 1:250,000-scale USGS quadrangles (see Figure 2). Most quadrangles of this scale are further divided into 1:63,360-scale inch-to-the-mile maps (*also* known as quadrangles). The Atlas contains the 1:250,000-scale quadrangles to help users locate anadromous water body information on the more detailed 1:63,360-scale map(s), if any exist for an area. Where inch-to-the-mile USGS maps do not yet exist (e.g., in parts of the Interior, Arctic, Western, and Southwest regions), specified water bodies are drawn on the 1:250,000-scale quadrangles.

Numbering of Specified Water Bodies

Note: Examples given below refer to Figure 3.

All streams, rivers, and lakes specified in the Atlas and Catalog have a unique identifying number. The first six digits consist of a three-digit number and a two-digit number, separated by a hyphen. This number set is derived from the 1982 ADF&G statistical fishing district number identifying the body of salt water to which the system drains. Although fishing district numbers used by the ADF&G Commercial Fisheries Division have changed periodically since 1982, the numbering system in the Atlas and Catalog remains based on the 1982 statistical area boundaries in order to maintain a unique number for each specified water body through time.

First-order streams (which flow directly into salt water) are identified by a five-digit suffix added to the two-part fish district number into which the stream flows. For each first-order stream, this five-digit suffix begins with the number 1. For example, Big River (at the top of Figure 3) is “101-52-10100” (where “101-52” identifies the statistical fishing district and “10100” is a first-order stream in that district).

A stream branching from a first-order stream (i.e., second-order) carries the same base number (e.g., 101-52-10100) plus a four-digit number indicating that specific tributary. In the example, “2021” denotes the tributary that branches to the left (heading upstream) on Big River, making the entire number for this second-order stream 101-52-10100-2021. Third-, fourth- and higher-order streams are numbered in the same way by adding a four-digit number for each branch. The first digit for each branch sequence always indicates the stream order.

By convention, the last digit of a number sequence used to identify second- and higher- order streams will be even if the tributary branches to the right (heading upstream) and odd if it branches to the left. Because of limited space on maps, often only the number sequence of a specific tributary appears next to that tributary; however, the entire number sequence down to the statistical fishing district number can be determined by following the waterway downstream. The Catalog lists the entire number sequence.

The number assigned to a lake begins with the number of the stream that drains from it, plus a four-digit number beginning with a zero. In Figure 3, a lake occurs along a third-order stream in the Blue Creek drainage. Its unique identification number, 101-53-10100-2010-3005-0010, consists of the third-order stream number (101-53-10100-2010-3005) plus the four-digit lake identifier (0010).

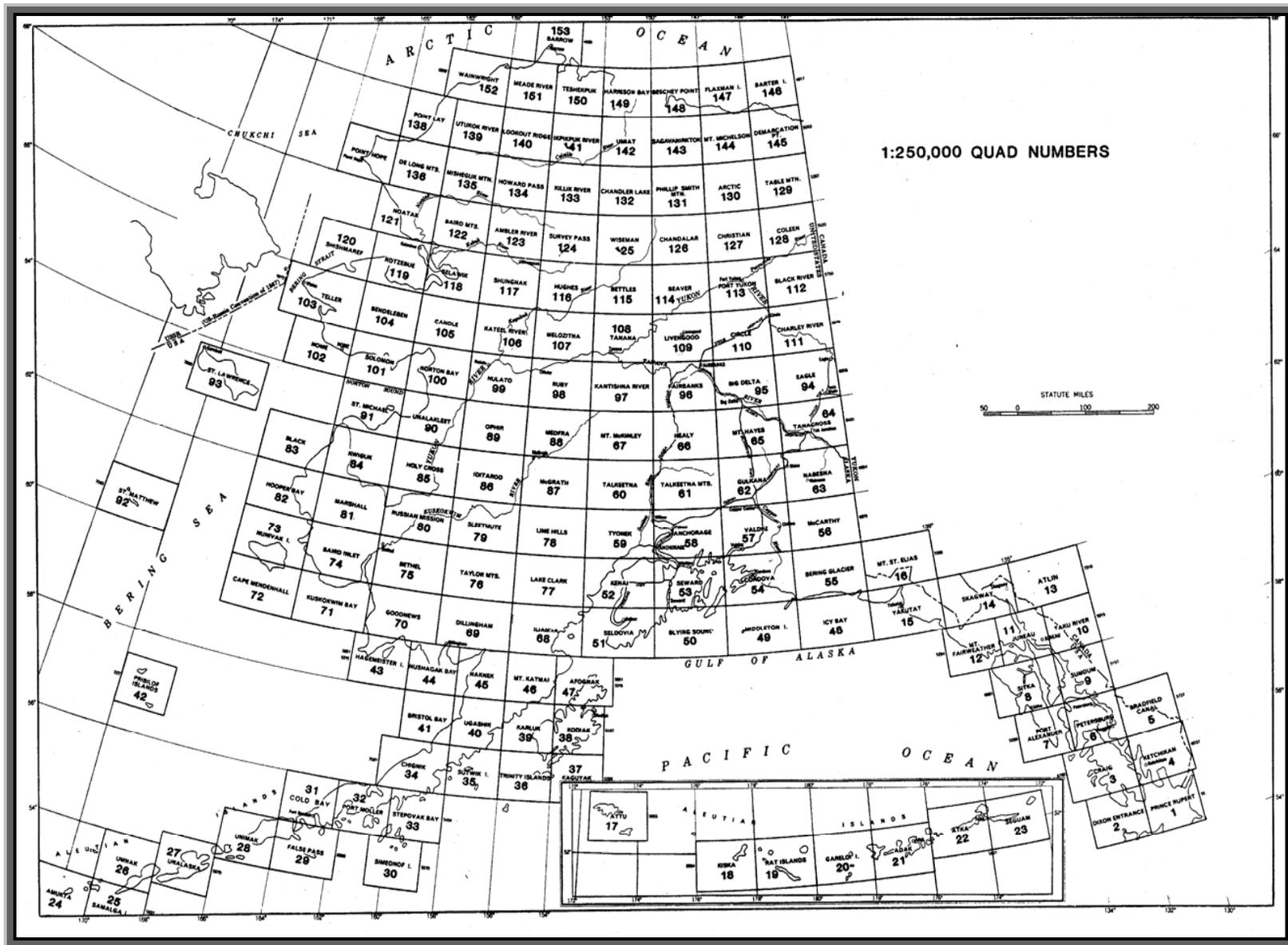


Figure 2.—1:250,000-scale quad names and numbers

A four-digit number sequence beginning with 09 designates polygons. Used only in special cases, polygons will be numbered, whenever possible, with the stream number on which the polygon is located, followed by a 09xx polygon designation. In the example, a polygon adjoins a tributary to the Kleen River. The polygon's unique identification number would be 101-53-10200-2016-3011-0910, which is the stream number (101-53-10200-2016-3011) plus the polygon designator "0910."

Figure 3 shows four watersheds having multiple lakes and flowing to Inoue Passage. Each illustrates a different aspect of the water body numbering system. In the first example, a first-order stream is named "Kleen River," but the named river does not continue above the first lake. Kleen River is numbered 101-53-10200, for statistical fishing district "101-53" and first-order stream "10200." A lake identifier "0010" is added to denote the first lake upstream of Kleen River. Because all tributaries flowing into a lake retain the base number of the lake's outlet stream but add a *next*-higher-order stream identifier, the tributary to the first lake above Kleen River is numbered 101-53-10200-2012. Meanwhile, the headwater lake that drains into second-order tributary "2016" reflects that in its last two suffixes: 101-53-10200-2016-0010. Any streams flowing into this lake would be third order and numbered accordingly.

In the second multi-lake example, Rain Creek passes through a series of lakes. Each lake is assigned the first-order stream number 101-53-10300, followed by a sequential and unique lake number, 0010 for the first lake, 0020 for the second. Tributaries to either Rain Creek or the lakes (none shown) would bear a second-order number after the base number.

The same numbering conventions apply to the third case, a system with unnamed streams (see left side of Inoue Passage). Each lake is numbered from the main channel, with an added lake number (101-53-10400-0010, for the first lake, 101-53-10400-0020 for the second lake).

In the fourth example, Great River, Little River, and Small Creek are first-, second-, and third order streams, respectively. Each named stream is separated by a lake, to which it is a tributary. The lake above each tributary has the same number as its outlet stream but with an added lake identifier. In this example, the first lake (above first-order stream Great River) is 101-54-10100-0010; the second lake (above second-order tributary Little River) is 101-54-10100-2014-0010; and the third lake (above third-order tributary Small Creek) is 101-54-10100-2014-3005-0010. Alone, the lake identifiers for these three lakes appears to be the same, however, when combined with the outlet stream number, a unique number for each stream is formed.

Symbols

The alphanumeric map number in the lower left corner of the maps identifies the 1:63,360-scale quadrangle of the 1:250,000-scale quadrangle (Numbers for the 1:250,000-scale quadrangles are identified on Figure 3). The legend beneath each map lists letter symbols for each fish species and life activity. Some maps also include the symbol (◆) to depict streams for which the length of documented fish habitat is too short (less than 660 feet) to accurately map at the 1:63,360-scale. In most cases, barriers to fish passage or limits of fish survey efforts account for the short terminus. Locations where barriers are known to exist are denoted by the (▲) symbol.

Arrows on the maps delineate the distribution of fish in a water body, where known. A single arrow drawn at the mouth of a stream or stream reach shows which fish species migrate upstream. Downstream-pointing arrows farther upstream indicate the highest point at which a fish species is currently known to occur (see symbols for king salmon spawning on Chance Creek, Figure 3).

A double-headed arrow is usually added to show that the range of a listed species continues onto adjacent maps (see notation for king, chum, and coho salmon, and sheefish migrating on Main

River). While this convention has been utilized on Atlas maps produced in the past, Atlas maps produced during and after the 2004 update will use the anadromous waters number and species string to indicate the range of anadromous fish species that continues onto adjacent Atlas maps.

INTERPRETATION OF THE CATALOG

Water Bodies by Number

Each water body in the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* is listed on two lines. The first line contains the water body number, information about the location of the mouth of the water body, and the known anadromous fish species and life stages present at the mouth of water body. The second line lists the water body name (if known) and location information for the upper point, and the known anadromous fish species and life stages present at the upper point. Column headings occur at the top of each page. For example, Grant Creek would be listed as follows:

WATER BODY NUMBER / NAME	MAP SHEET	LAT.	LONG.	LEGAL	SPECIES
101-75-10100	Bradfield Canal A-4	56.03889 N	131.21270 W	C 67S 92E 29	Kp,COp,Ps,CHs,SHp
Grant Creek	Bradfield Canal A-5	56.10856 N	131.34453 W	C 66S 91E 33	Ks,COs,Ps,CHs

In this example, the first line lists:

1. the water body number (101-75-10100);
2. the USGS map quadrangle containing the mouth of the water body (Bradfield Canal A-4);
3. the latitude-longitude of the mouth of the water body in decimal degrees (56.03889 latitude North; 131.21270 West);
4. the legal description of the water body mouth, given by meridian (*Copper River*), township (67 South), range (92 East), and section (29); and
5. the species string for the species and life stages present or entering at the mouth.

The second line lists:

1. the water body name, if known (Grant Creek);
2. the USGS map quadrangle containing the water body's upper point, if different from the quadrangle containing the mouth (Bradfield Canal A-5);
3. the latitude-longitude of the upper point in decimal degrees;
4. the legal description of the upper point; and
5. the species string for the species and life stages present or at the upper extent of the water body.

For purposes of data presentation in the catalog, lakes and polygons do not have mouths or upper points. Instead the location information contained in the first line reflects a point near the middle of the lake or polygon on the cited quadrangle map. If any portion of a lake occurs on several quadrangle maps, only one quad will appear in the first line. The lake or polygon name will appear on the second line if known.

Annotation Codes

Species, life stage, and meridian codes as presented in the Atlas and Catalog are described below.

<u>SPECIES CODES</u>	<u>LIFE STAGE CODES</u>	<u>MERIDIAN CODES</u>
AC = Arctic Char	m = migration	C = Copper River Meridian
AL = Arctic Lamprey	p = present	F = Fairbanks Meridian
K = Chinook Salmon	r = rearing	K= Kuskokwim Meridian
CH = Chum Salmon	s = spawning	S = Seward Meridian
CO = Coho Salmon		U = Umiat Meridian
CT = Cutthroat Trout		
DV = Dolly Varden		
OU = Eulachon		
SF = Sheefish		
LP = Lamprey, undifferentiated		
PC = Pacific lamprey		
P = Pink Salmon		
LV = River lamprey		
SM = Smelts, undifferentiated		
OM = Rainbow Smelt		
OL = Long fin smelt		
S = Sockeye Salmon		
SH = Steelhead Trout		
ST = Sturgeon, undifferentiated		
W = Whitefishes, undifferentiated		

Table 2.–List of Annotation Codes

Water Bodies by Name

To reference anadromous water bodies by name, use the alphabetical listing of known named water bodies in the second part of the catalog. Local names are denoted by an * that appears in the front of the name and appears first in the alphabetical listing.

SOURCES

Sources of information for the 1982 revision of the *Atlas and Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* were the following:

ADF&G "Alaska's Fisheries Atlas" (1978);

ADF&G field notes from area and regional offices and various;

ADF&G individual reports;

U.S. Forest Service;

U.S. Fish and Wildlife Service;

Revised Anadromous Fish Stream Catalog of Southeastern Alaska (1977) by John Edgington, Robert Larson, Jim Eastwood and Paul Novak;

Bureau of Land Management survey notes; and

Index to North Slope Stream and Lake Surveys (1982) by Terry Bendock and John Burr.

Since the 1982 revision, the Atlas and Catalog have been revised periodically with information on anadromous water bodies being provided by various state and federal agencies, private companies, and individuals.

UPDATE PROCEDURES

Procedures are in place that provide for regular updating of the Atlas and Catalog. Water bodies, or particular stream reaches, can be added or deleted and the upper range of anadromous water bodies changed as more current surveys document the presence or absence of anadromous fish. Anyone can submit a proposal for additions or changes to the Atlas and Catalog. However, proposals from other than ADF&G staff may be subject to field verification prior to approval by ADF&G.

Proposals for revisions to the Atlas and Catalog should be submitted to the Anchorage ADF&G, Sport Fish Division office. The proposed revision must include a nomination form, available through Sport Fish Division regional offices, which lists the name and location of the water body, the fish species observed using the water body, the date fish were observed; the life stages (migration, spawning, or rearing) for which the water body is being used, if known; and any other clarifying information. The person submitting the proposed revision must sign the nomination form.

The location of the water body and the upper known extent of anadromous fish use should be marked on a 1:63,360-scale USGS map or better. Field sketches or aerial photography are also helpful.

It is anticipated that the Atlas and Catalog will be revised approximately every 12 months.

ACKNOWLEDGMENTS

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DEFINITIONS

1. **“Area Office”** means the local area office of the Alaska Department of Natural Resources, Office of Habitat Management and Permitting. (Refer to the Contacts section of the introduction for office locations)
2. **“Anadromous Fish”** means a fish or fish species that spends portions of its life cycle in both fresh and salt waters, entering fresh water from the sea to spawn and includes the anadromous forms of pacific trout and salmon of the genus *Oncorhynchus* (rainbow and cutthroat trout and chinook, coho, sockeye, chum and pink salmon), Arctic char, Dolly Varden, sheefish, smelts, lamprey, whitefish, and sturgeon.
3. **“Atlas”** means *An Atlas to the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*.
4. **“Backwaters”** means a portion of the water body formed by an eddy along channel margins downstream from obstructions such as bars, root wads, or boulders, or as the result of back-flooding upstream from an obstruction sometimes separated from the channel by sand or gravel bars.
5. **“Banks”** means the portion of the stream channel cross section that restricts the lateral movement of water at normal bank-full levels often exhibiting a distinct break in slope from the stream bottom.
6. **“Bed”** means the substrate, bounded by the stream banks, over or through which the water column flows.
7. **“Braided channels”** means the intertwined branches or secondary channels of a river or stream and characterized by the separation and rejoining of two or more channels separated by bars or islands.
8. **“Catalog”** means the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*.
9. **“Distributary”** means a stream that flows away from, and does not rejoin, the main channel, and which usually flows to a sea, lake, stream, or other body of water.
10. **“Estuary”** means a semi-enclosed coastal body of water with a free connection to the sea and in which seawater is measurably diluted with freshwater derived from land drainage.
11. **“Fish”** means any species of aquatic finfish, invertebrate, or amphibian, in any stage of its life cycle, found in or introduced into the state, and includes any part of such aquatic finfish, invertebrate, or amphibian;
12. **“Fish Habitat”** means any area on which fish depend, directly or indirectly, during any stage of their life cycle, including but not limited to areas of spawning, rearing, food supply, overwintering, or migration.
13. **“Lake”** means an inland water body, permanent or seasonal, occupying a basin or hollow in the earth's surface, which may or may not have a current or single direction of flow.
14. **“Mean high water”** means a tidal datum used in referring to tidelands or the tidally affected portion of the stream, that is equal to the average of all high tides over a 19-year Metonic cycle, as

established by the National Ocean Service of the National Oceanic and Atmospheric Administration.

15. **“Mean lower low water”** means a tidal datum used in referring to tidelands or the tidally affected portion of the stream, that is equal to the average of the lower of the two low tides of each day over a 19-year Metonic cycle, as established by the National Ocean Service of the National Oceanic and Atmospheric Administration.
16. **“Migration”** means the predictable, purposeful, or seasonal movement of fish, unrestricted by other than natural influences.
17. **“Mitigation”** means measures which must be undertaken by an applicant to avoid, minimize, rectify, reduce, or compensate for potential adverse impacts to fish or fish habitat resulting from a proposed use or activity
18. **“Mouth”** means a line drawn between the seaward extremities of the exposed tideland banks of any stream channel(s) at mean lower low water; a stream or river may have more than one mouth by virtue of having more than one channel that empties into a receiving body of water.
19. **“Permit”** means the written approval by the deputy commissioner of ADNR or the deputy commissioner’s authorized representative, in the form of a Fish Habitat Permit issued through an area office of the ADNR, Office of Habitat Management and Permitting (OHMP), based on plans and specifications as required by either AS 41.14.840 or AS 41.14.870.
20. **“Pollute”** means altering the physical, chemical or biological properties of a stream, river, or lake to the extent that the water fails to meet the Alaska Water Quality Standards for the “Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife” set forth in 18 AAC 70.010 - .990.
21. **“Polygon”** means a geographic area of numerous water bodies or wetland areas that cannot be accurately mapped at the 1:63,360-scale and which are important for the spawning rearing or migration of anadromous fish. These polygons are listed in the Catalog with single point identifiers and delineated on the Atlas maps by a dashed line boundary. All waters within these polygons are considered specified anadromous fish bearing water bodies.
22. **“Portion of the bed(s) and banks, up to the ordinary high water mark (OHW)”** means (A) in the non-tidal portion of a river, lake, or stream: the portion of the bed(s) and banks up to which the presence and action of the non-tidal water is so common and usual, and so long continued in all ordinary years, as to leave a natural line or "mark" impressed on the bank or shore as indicated by erosion, shelving, changes in soil characteristics, destruction of terrestrial vegetation, or other distinctive physical characteristics; (B) in a braided river, lake, or stream: the area delimited by the natural line or "mark," as defined in Part A above, impressed on the bank or shore of the outside margin of the most distant channels; or (C) in the tidally influenced portion of a river, lake, or stream: the portion of the bed(s) and banks below the (1) OHW as described in A or B above, or (2) mean high water elevation; whichever is higher at the project site.
23. **“Rearing”** means the developmental life phase of a fish from fertilization of eggs to adult.
24. **“River”** means a stream of fairly large size flowing in a definite course or channel, or a series of diverging and converging channels.
25. **“Slough”** means (A) a low, swampy ground or overflow channels where water flows sluggishly for considerable distances; (B) a side channel slough formed by channelization; (C) a sluggish

channel of water, such as a side channel of a stream, in which water flows slowly through low, swampy ground, or a section of an abandoned stream channel containing water most or all of the year, but with flow only at high water, and occurring in a flood plain or delta; (D) a marsh tract lying in a shallow, undrained depression on a piece of dry ground; (E) term used for a creek or sluggish body of water in a bottomland.

26. **“Spawning”** means the deposition or fertilization of fish eggs, including preparation for deposition or fertilization.
27. **“Specified upper limit”** means the documented upstream limit of anadromous fish use as depicted in *An Atlas to the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* or listed in the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*.
28. **“Specified Water Body”** means a river, stream, or lake, in its liquid or frozen state, its braided channels, distributaries, sloughs, backwaters, and estuaries, including the portion of the bed(s) and banks up to the ordinary high water mark, from its mouth to its specified upper limit as depicted in *An Atlas to the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* or listed in the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*.
29. **“Stream”** means a natural or artificial watercourse containing flowing water at least part of the year including a river, creek or tributary.