Association of Western State Engineers 90th Fall Meeting

" Water Resources Section"

An Alaskan Perspective on Water Management

August 28, 2017

STATE OF ALASKA BILL WALKER, GOVERNOR

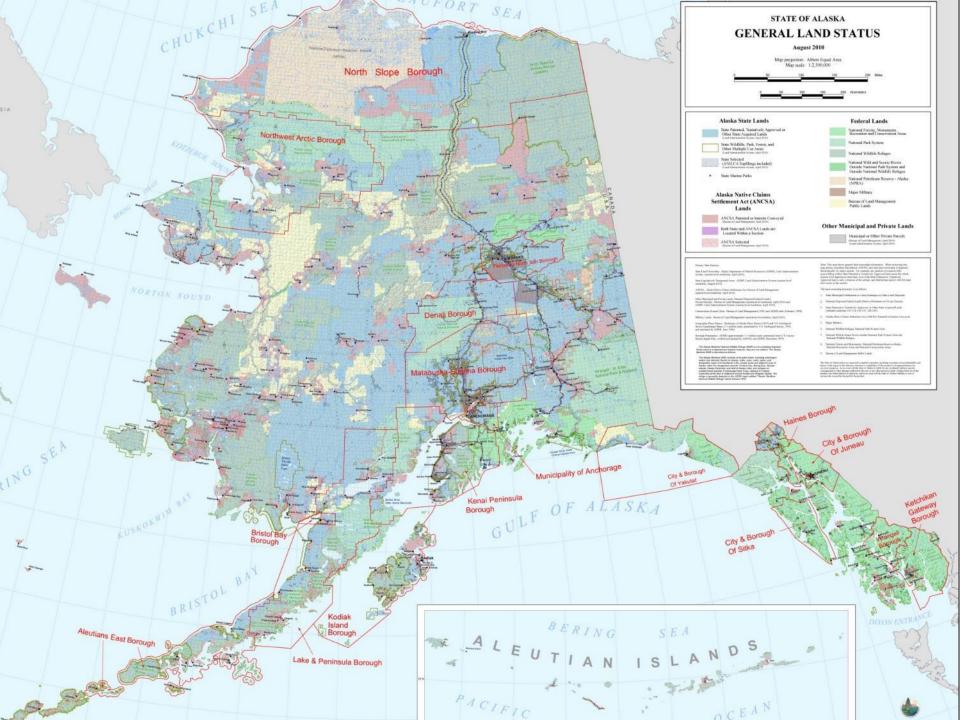
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINING, LAND & WATER Water Resources Section



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- Land Area 586,412 Square Miles or 375 Million Acres
 - Alaska State Land 103 million acres
 - National Wildlife Refuges 76 million acres
 - National Parks 52 million acres
 - BLM other 49 million acres
 - Native Corporation Land 44 million acres
 - BLM NPRA 23 million acres
 - National Forests 22 million acres
 - Private 4 million acres
 - Military 2 million acres

Note: This does not include 60 million acres of submerged lands, tidelands, and shorelands

Water Resource Management Staff

David W. Schade, MPA NRM III Section Chief 269-8645

Alaska Hydrologic Survey Unit Manager:

Jim Vohden, Acting Hydrologist V 451-2772

Water Resources Management Unit Manager:

Mike Walton NRM II 269-8609

Dam Safety and Construction Unit Manager

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Reservation of Water Program Manager

Kim Sager, NRSIII 269-2033

Water Resources:

 Staff of 20: Responsible for all Water Quantity Studies and Management of Use Statewide / Dam Safety of all non Federal owned/regulated Dams

- Water Management:
 - Anchorage office leads Reservation of Water, Oil and Gas Water Issues.
 - Fairbanks Office leads Mining Water Related Issues.
 - Juneau Office leads Hydro-power related issues.
- Alaska Hydro Survey in all three offices.
 - Anchorage has lead in groundwater issues.
 - Fairbanks office has lead in water chemistry issues.
 - Juneau has lead in surface water issues.
- Dam Safety Program in Anchorage Office.
- BPM Process being developed for Water Rights.

WATER RESOURCES SECTION UNITS

ALASKA HYDROLOGIC SURVEY: Responsible for the collection, storage, and dissemination of hydrologic information and data.

DAM SAFETY & CONSTRUCTION: Responsible for the safe construction and operation of jurisdictional dams.

WATER MANAGEMENT: Responsible for the management of the State's water resources and the enforcement of the Alaska Water Use Act. Adjudication of water rights and temporary water use authorizations.

RESERVATION OF WATER: Responsible for accepting and adjudicating Reservation of Water Applications for in instream flows and lake levels.

Alaska Hydrologic Survey

Under AS 41.08 the Alaska Hydrologic Survey is charged with the systemic collection, recording, evaluation, and distribution of data on the quantity, location, and quality of water of the state.





















Dam Safety & Construction

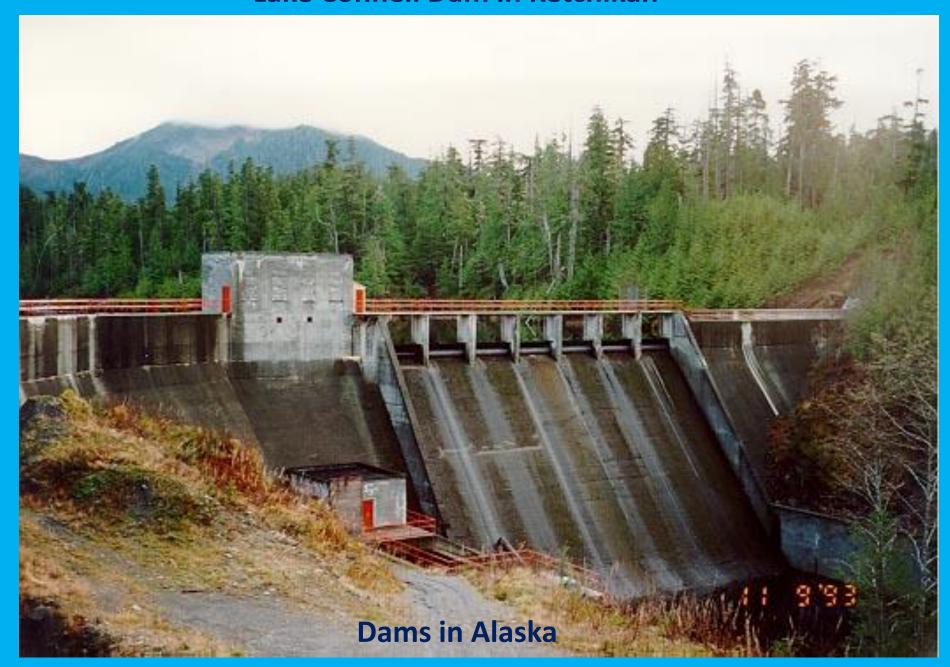
Under AS 46.17 this unit is charged with the safe construction and operation of jurisdictional dams. Any non-federal (owned or operated) dams or non-FERC regulated dam that impounds 50 acrefeet of water and is 10 feet high; or any dam 20 feet high; or any dam that would threaten lives and property if it fails.

Bridge Creek Dam in Homer



Dams in Alaska

Lake Connell Dam in Ketchikan



Ft. Knox Tailings Dam near Fairbanks



Dams in Alaska

Lake of the Hills Dam in Anchorage

Failed in 1972 1 killed



Why dam safety is important.



§ 13. Water Rights

All surface and subsurface waters reserved to the people for common use, except mineral and medicinal waters, are subject to appropriation.

Priority of appropriation shall give prior right. Except for public water supply, an appropriation of water shall be limited to stated purposes and subject to preferences among beneficial uses, concurrent or otherwise, as prescribed by law, and to the general reservation of fish and wildlife.

Chapter 46.15. WATER USE ACT

Article 01. ADMINISTRATION

Sec. 46.15.010 . Determination of water rights.

The Department of Natural Resources shall determine and adjudicate rights in the water of the state, and in its appropriation and distribution.

Sec. 46.15.030. Water reserved to the people.

Wherever occurring in a natural state, the water is reserved to the people for common use and is subject to appropriation and beneficial use and to reservation of instream flows and levels of water, as provided in this chapter.

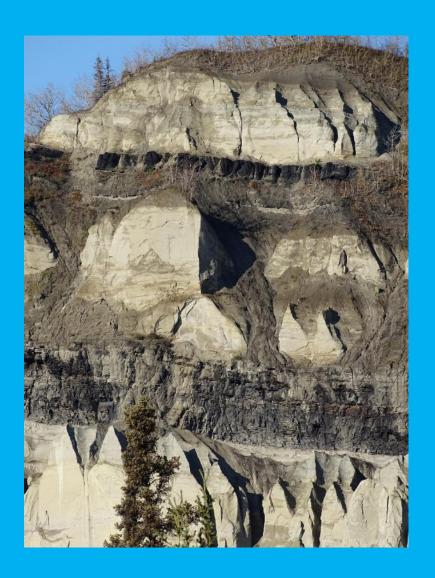
- Sec. 46.15.080. Criteria for issuance of permit.
- (b) In determining the public interest, the commissioner shall consider
- (1) the benefit to the applicant resulting from the proposed appropriation;
- (2) the effect of the economic activity resulting from the proposed appropriation;
- (3) the effect on fish and game resources and on public recreational opportunities;
- (4) the effect on public health;
- (5) the effect of loss of alternate uses of water that might be made within a reasonable time if not precluded or hindered by the proposed appropriation;
- (6) harm to other persons resulting from the proposed appropriation;
- (7) the intent and ability of the applicant to complete the appropriation; and
- (8) the effect upon access to navigable or public water.





Large Mines In Alaska

- Usibelli Coal Mine.
- Fort Knox Gold Mine.
- Pogo Mine.
- Red Dog Mine.
- Kensington Mine.
- Greens Creek Mine.





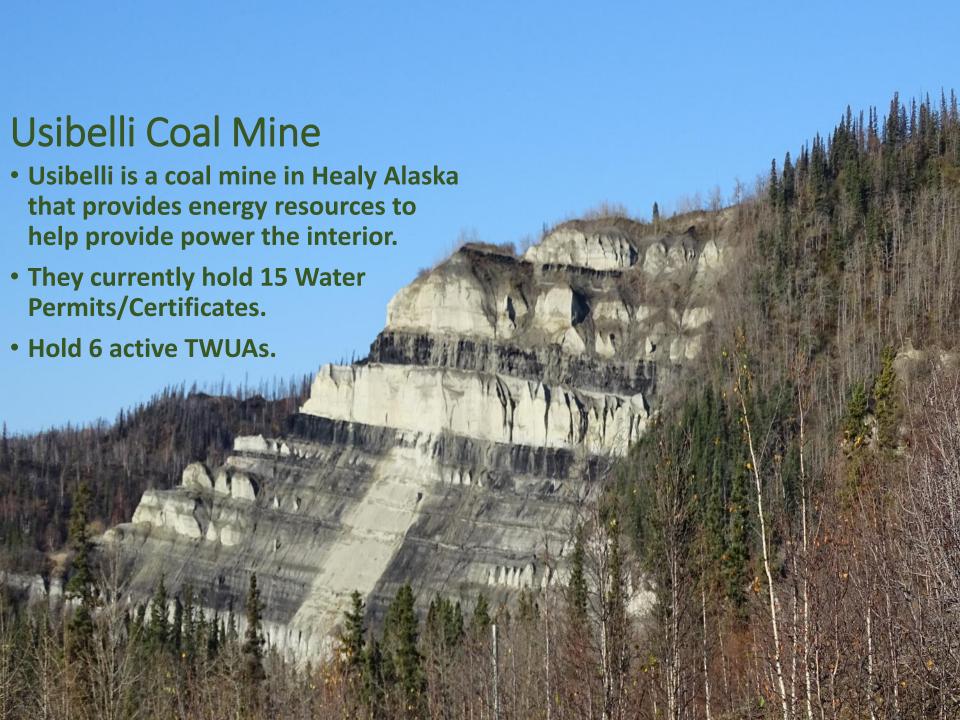


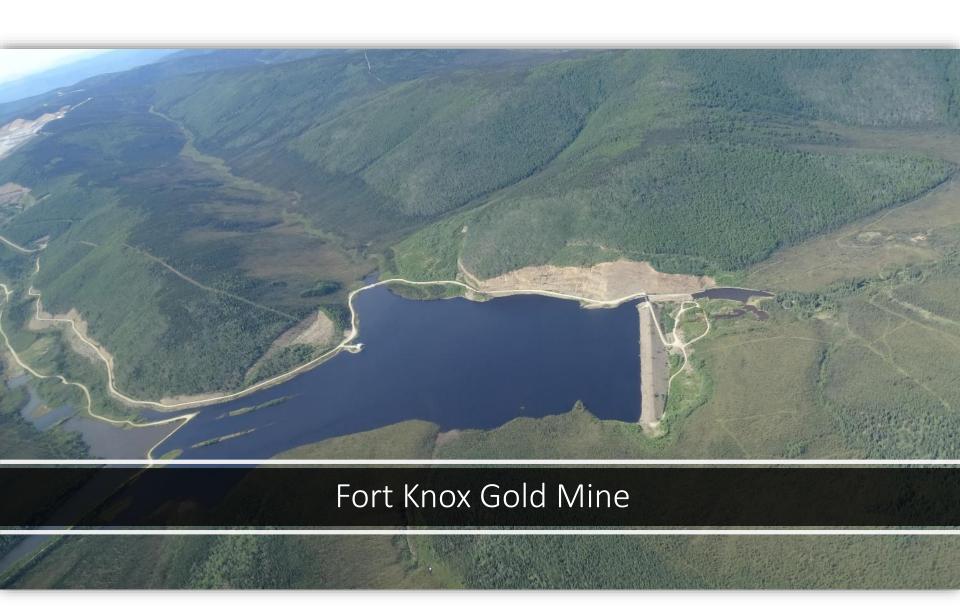


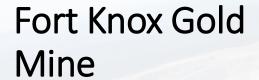












- Hold 6 TWUAs
- Currently have 10 water permits/certificates











Pogo Mine

The Pogo Mine is an underground cut-and-fill operation using gravity, flotation, and cyanide leaching processes to recover gold.

- Pogo is an underground mine operation
- They Currently hold 7 water permits/certificates.
- Hold 8 TWUAs

Just a side note: the access road to Pogo is one of the most beautiful Alaskan drives. They have sand dunes!!















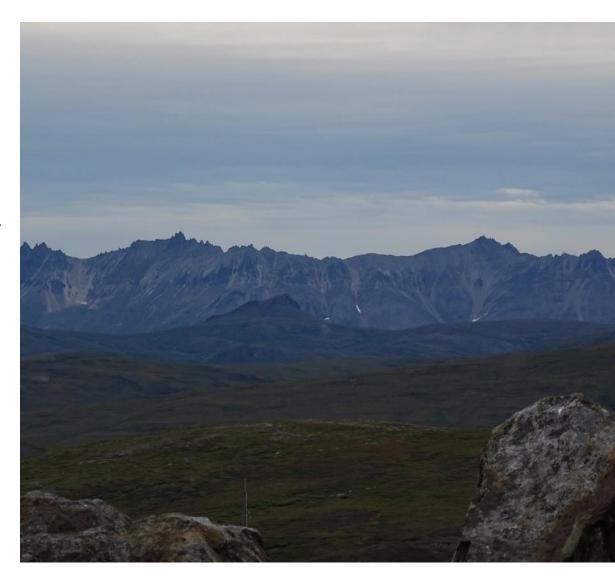




Red Dog Mine

The Red Dog Mine is an open pit, truck-and-loader operation using grinding and flotation processes to recover zinc and lead.

- Currently hold 4 TWUAs.
- Hold 3 water permits/certificates.

















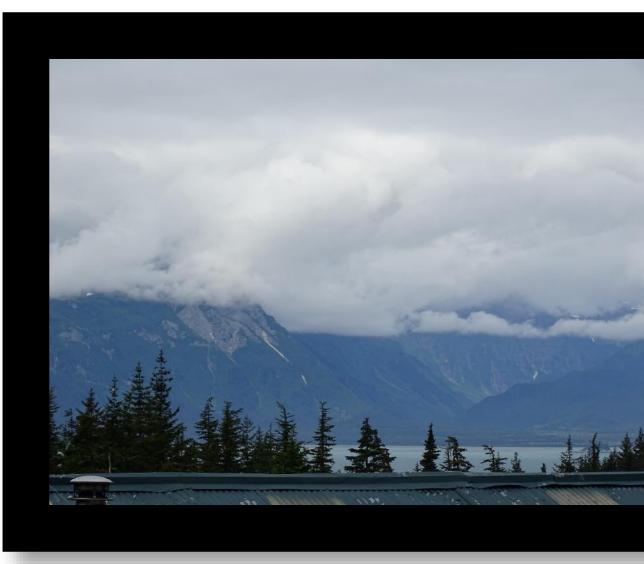




Kensington Mine

The Kensington Gold Mine is an underground long hole stoping and drift-and-fill operation using flotation processes to recover gold.

- They hold 6 permits/certificates.
- They hold 2 TWUAs



























Greens Creek Mine

- The Greens Creek Mine is an underground cut-and-fill and long hole stoping operation using grinding and flotation processes to recover zinc and lead, and gravity processes to recover silver and gold.
- They currently hold 8 permits/certificates.
- They currently hold 6 TWUAs

























































































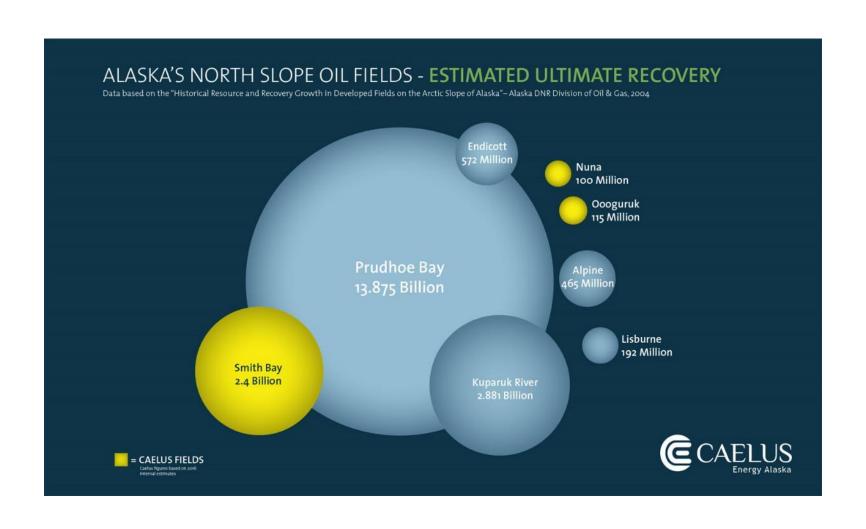




Oil and Gas Construction



Kenai Peninsula / North Slope Production



NPRA – CD5 / Greater Mooses Tooth



Caelus North Slope Map



Alaska North Slope Reduced Footprint* 65 Acre **Gravel Pad** 12 Acre 12 Acre (1970)** **Gravel Pad Gravel Pad** (2016)** (Future ERD)** **Drilling Area** Accessible from Pads ~ 3 sq. miles ~ 55 sq. miles ~ 125 sq. miles * Assumes similar reservoir depth ** 1970 Drilling Radius ~ 5,000 ft vs 2016 Drilling Radius ~ 22,000 ft vs Future Extended Reach Drilling (ERD) drilling radius ~ 33,000 ft

Building an ice road is somewhat like building an asphalt road, with an underlay of crushed aggregate. But in this case, the aggregate is crushed ice instead of rocks, said Cruz.

Water from tundra lakes is then pumped into the mix to bind the chips together, creating a corridor that's initially as smooth as an ice rink and requires scarring to give it traction. Drawing water from lakes requires state permits, too, to protect fish. Screens make sure those fish aren't sucked near the pump, he said.



Ice Road Construction: 1 Million Gallons/Mile





Caelus Smith Bay Road and Rig



Largely Done in the Dark!!!



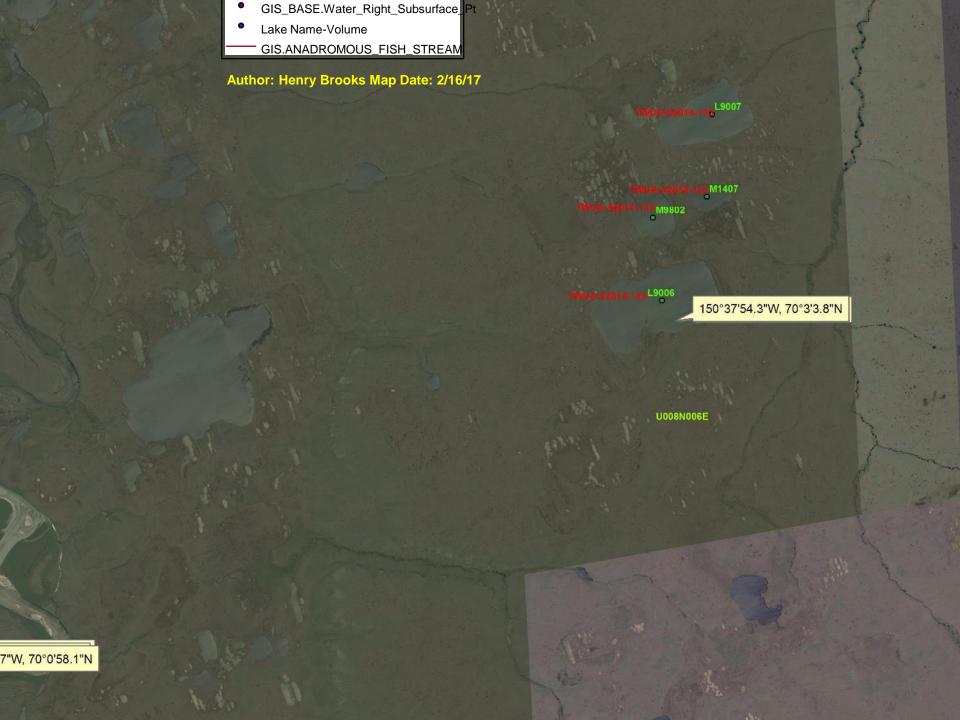
DMLW Northern Region Oil and Gas Team

According Alaska's Department of Natural Resources, the length of tundra travel seasons decreased between 1970 and 2000. In the 1970s and 1980s, it was common for tundra travel season to begin as early as November. But by the mid-1990s and early 2000s, tundra travel season was commonly beginning in January. In 2003, the state adopted new technology and techniques, like temperature monitoring stations and pre-packing snow over the tundra. As a result, "ice road season has actually increased quite considerably because of the pre-packing techniques and new vehicles that are being used," said Melissa Head of the Alaska Department of Natural Resources' Northern Oil and Gas Team. Head said the state is not studying the longterm effects of a changing climate on ice roads, and does not have data proving the shift was due to climate change.

"There was a recognition that the off-road travel season was changing and was decreasing, but no one attributed that to any specific thing," said Head.

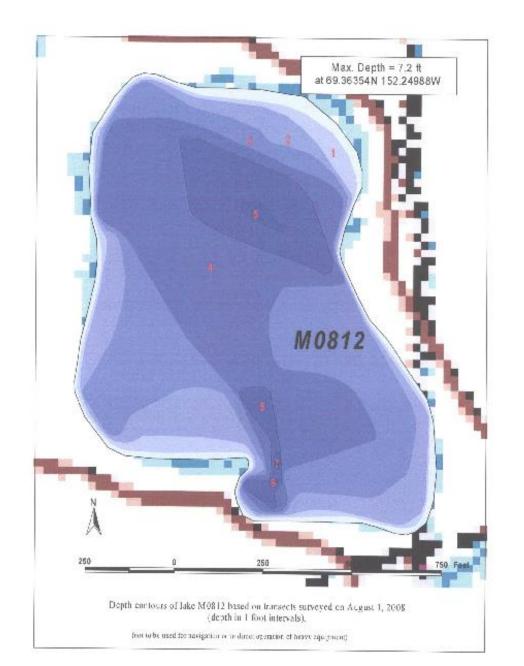
Winter Permitable Volume of Water Limitations

- Fish Bearing Lakes
 - 15 percent of the calculated volume of water under seven feet of ice for lakes deeper than 7 feet that contain species sensitive fish.
 - 30 percent of the calculated volume of water under five feet of ice for those lakes with depths between five and seven feet deep that contain only ninespine stickleback and Alaska blackfish.
- Non-Fish Bearing Lakes/Non-Fish Bearing Reservoirs
 - 20 percent total volume (lake recharge considerations).
 - Up to 100 percent of mine site reservoirs without fish.



Bathymetry Studies are important for determining water quantities and available water under ice.

Simple cone method for calculating volume will be used if don't have bathymetry study for a lake source (requires lake surface area and maximum depth).



Competing Uses of Water

- Dewatering mine site without fish for gravel extraction.
- Withdrawal of water for beneficial uses, e.g., ice road/pad construction/maintenance, camp supply, etc.



- (a) The state, an agency or a political subdivision of the state, an agency of the United States or a person *may apply to the commissioner* to reserve sufficient water to maintain a <u>specified instream</u> <u>flow</u> or <u>level of water</u> at a specified point on a stream or body of water, or in a specified part of a stream, throughout a year or for specified times, for
- (1) protection of fish and wildlife habitat, migration, and propagation;
- (2) recreation and park purposes;
- (3) navigation and transportation purposes; and
- (4) sanitary and water quality purposes.
 - (b) Upon receiving an application for a reservation under this section, the commissioner shall proceed in accordance with AS 46.15.133.

- (c) *The commissioner shall issue a certificate* reserving the water applied for under this section *if* the commissioner finds that
 - (1) the rights of prior appropriators will not be affected by the reservation;
 - (2) the applicant has demonstrated that a need exists for the reservation;
 - (3) there is unappropriated water in the stream or body of water sufficient for the reservation; and
 - (4) the proposed reservation is in the public interest.

- (d) **After the issuance** of a certificate reserving water, **the water** specified in the certificate **shall be withdrawn from appropriation** and the commissioner shall reject an application for a permit to appropriate the reserved water.
- (e) A reservation under this section does not affect rights in existence on the date the certificate reserving water is issued.

(f) At least once each 10 years the commissioner shall review each reservation under this section to determine whether the purpose described in (a) of this section for which the certificate reserving water was issued and the findings described in (c) of this section still apply to the reservation. If the commissioner determines that the purpose, or part or all of the findings, no longer apply to the reservation, the commissioner may revoke or modify the certificate reserving the water after notice, hearing when appropriate, and a written determination that the revocation or modification is in the best interests of the state.















