



# City of Valdez

212 Chenega Ave.  
Valdez, AK 99686

## Meeting Agenda - Final-revised Flood Mitigation Task Force

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Tuesday, November 28, 2017

12:00 PM

Council Chambers

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### Regular Meeting

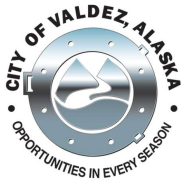
#### I. CALL TO ORDER

#### II. ROLL CALL

#### III. DISCUSSION ITEMS

1. [Flood Task Force Meeting Agenda 11/28/2017](#)

#### IV. ADJOURNMENT



## Agenda Statement

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**File #:** 17-0638      **Version:** 1

**Type:** Report      **Status:** Agenda Ready

**File created:** 11/27/2017      **In control:** Flood Mitigation Task Force

**On agenda:** 11/28/2017      **Final action:**

**Title:** Flood Task Force Meeting Agenda 11/28/2017

**Sponsors:**

**Indexes:**

**Code sections:**

**Attachments:** [State of Alaska Navigability Determination](#)

Date	Ver.	Action By	Action	Result
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### **ITEM TITLE:**

Flood Task Force Meeting Agenda 11/28/2017

**SUBMITTED BY:** AnnMarie Lain, Community Development Director

### **FISCAL NOTES:**

Expenditure Required: N/A  
Unencumbered Balance: N/A  
Funding Source: N/A

### **RECOMMENDATION:**

Receive and file.

### **SUMMARY STATEMENT:**

City staff provided City Council with an update report on the 2017 Flood Mitigation work on October 3, 2017. City Council has asked staff to bring back a 2018 Flood Mitigation Work Plan from the Task Force. The Task Force met on October 24, 2017 and discussed mitigation work plans for Mineral Creek. The Task Force met on November 20, 2017 and discussed mitigation work plans for the Lowe River.

The following outline and attachment are to help facilitate this discussion on the remaining area. Items attached are identified with a check mark.

DATE: November 27, 2017

Discussion Items

II. VALDEZ GLACIER STREAM

- ☒ State of Alaska Navigability Determination, Valdez Glacier Stream



THE STATE  
of **ALASKA**  
GOVERNOR SEAN PARNELL

## Department of Natural Resources

Division of Mining, Land & Water  
Public Access Assertion & Defense Unit

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Anchorage, Alaska 99501-3561  
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### STATE OF ALASKA NAVIGABILITY DETERMINATION

#### Valdez Glacier Stream

**Date of Determination:** April 6, 2017

**River:** Valdez Glacier Stream

**Determination:**

The Valdez Glacier Stream is navigable for title purposes the entire length of the river from tide water to Unnamed Pro-Glacial Lake.

**Date of Request:** February 6, 2017

**Requester:** Southcentral Regional Office Department of Natural Resources (DNR)

**Type of Request:** Navigability for title and navigable and public water.

**Location:**

The Valdez Glacier Stream from tidewater in Port of Valdez, within Sections 10 and 11, Township 9 South, Range 6 West, Copper River Meridian upstream to its source in the unnamed pro-glacial lake within Sections 20, 21, 28 and 29, Township 8 South, Range 5 West, Copper River Meridian.<sup>1</sup>

**Reason for Navigability Determination:**

The Southcentral Regional Office of the Division of Mining Land and Water, Department of Natural Resources requested the determination on the Valdez Glacier Stream. The City of Valdez is working with the USDA, NRCS and is proposing to construct a training dike and riprap revetment to protect a portion of Old Valdez area from erosion.

**Standards Used For Making Navigability Determination**

The question of navigability for the purpose of state ownership is decided according to federal law. *Ahtna, Inc.*, 891 F.2d at 1404 (citing *United States v. Holt State Bank*, 270 U.S. 49, 55-56 (1926)).

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<sup>1</sup> At the date of statehood the pro-glacial lake was located within Section 29 only, the glacier has melted to enlarge the lake.

The Supreme Court expressed the basic test for navigability in *The Daniel Ball*, 77 U.S. (19 Wall) 557, 563 (1870), as follows:

Those rivers must be regarded as public navigable rivers in law which are navigable in fact. And they are navigable in fact when they are used, or are susceptible of being used, in their ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water.

*Id.* This test is applied in multiple situations, including when answering questions of title to river or streambeds under the Equal Footing Doctrine. See *PPL Montana, LLC v. Montana*, 132 S. Ct. 1215, 1228 (2012).

Case law subsequent to *The Daniel Ball*, including *Ahtna, Inc.* and the U.S. Department of the Interior’s decision in *Appeal of Doyon, Ltd.*, 86 Interior Dec. 692, 698 (ANCAB 1979), explained the meaning of that basic test. The physical character of the waterway, and in particular its capacity to be navigated, is an important factor when considering navigability for title. In the Supreme Court’s most recent decision regarding navigability for title, *PPL Montana, LLC v. Montana*, it again emphasized that rivers and streams are not only navigable if they were *used* for commerce, but also if they were *susceptible* of being used as highways of commerce at the time of statehood. 132 S. Ct. at 1233. And, as previously stated by the Ninth Circuit in *Ahtna, Inc.*: “Although the river must be navigable at the time of statehood, *this only means* that, at the time of statehood, *regardless of the actual use of the river*, the river must have been *susceptible* to use as a highway of commerce. . . . [I]t is not even necessary that commerce be in fact conducted . . . ‘The extent of existing commerce is not the test.’” 891 F.2d at 1404 (emphasis added) (quoting *United States v. Utah*, 283 U.S. 64, 75, 82-83 (1931)). Rather, it is enough to show:

the capacity of the rivers in their ordinary condition to meet the needs of commerce as they may arise in connection with the growth of the population, the multiplication of activities, and the development of natural resources. And this capacity may be shown by physical characteristics and experimentation as well as by the uses to which the streams have been put.

*Utah*, 283 U.S. at 83. Present-day recreational use is relevant to determining whether a river was susceptible to commercial use at the time of statehood if: “(1) the watercraft are meaningfully similar to those in customary use for trade and travel at the time of statehood; and (2) the river’s post-statehood condition is not materially different from its physical condition at statehood.” *PPL Montana, LLC*, 132 S. Ct. at 1233.

Although portages—or the need to bypass a river segment—may defeat navigability for title for that particular river segment, *id.* at 1231–32, the presence of rapids, sandbars, and other obstructions, which may make navigation difficult, but not impossible, does not destroy title navigability, see *Utah*, 283 U.S. at 86. In *Utah*, a case addressing navigability for title, the Supreme Court stated “the mere fact of the presence of . . . sandbars causing impediments to navigation does not make a river

nonnavigable.” 283 U.S. at 86. Although “the presence of sandbars must be taken in connection with other factors making for navigability,” the “essential point is whether the natural navigation of the river is such that it affords a channel for useful commerce.” *Id.*; see also *Oregon v. Riverfront Protection Ass’n*, 672 F.2d 792, 795 (9th Cir. 1982), (relying on the use of the McKenzie River in Oregon for log drives to determine the river navigable for title and stating that the “use of the river need not be without difficulty, extensive, or long and continuous.”); *Doyon, Ltd.*, 86 Interior Dec. at 697 (“Although rapids, shallow waters, sweepers, and log jams make navigation difficult on both [the Kandik and Nation Rivers], the evidence shows that these impediments do not prevent navigation.”).

Boat use is not the only method for proving a river or stream’s ability to serve as a highway for useful commerce. In *Oregon v. Riverfront Protection Association*, the Ninth Circuit considered evidence of the transporting of logs on the McKenzie River relevant to determining the river’s potential use for commerce. 672 F.2d at 794–96. The court further found that the seasonal and sometimes difficult nature of these log drives did not destroy navigability. *Id.* at 795–96 (holding that “notwithstanding [the] difficulties, thousands of logs and millions of board feet of timber were driven down the river” and this use was not “occasional” as it occurred over a three-month period for over seventeen years).

Applying these standards to Alaska, the courts and Department of the Interior found waterways navigable for title based on their susceptibility to use for navigation by river boats, inflatable rafts, or canoes having a capacity for “commercial” loads of about 1000 lbs. of supplies or recreationists. *Ahtna Inc.*, 891 F.2d 1401 (Gulkana River); *Appeal of Doyon*, 86 Interior Dec. 692 (Kandik and Nation Rivers); Feb. 25, 1980 Memorandum from Regional DOI Solicitor John (“Jack”) Allen to BLM Alaska State Director re “Kandik, Nation Decision on Navigability”; see also *Alaska v. United States*, 201 F.3d 1154 (9th Cir. 2000); August 18, 1983 Recommended Decision by DOI Administrative Law Judge Luoma in *Appeal of Alaska*, Interior Board of Land Appeals No. 82-1133 (recommending that the Matanuska River be determined navigable) & July 19, 1990 Memorandum of BLM Alaska State Director E. Spang (Matanuska River is navigable), BLM Files AA-11153-23, -31; *Appeal of State of Alaska & Collier*, 168 IBLA 334 (2006) (noting navigability standards). Although a water body may be navigable in fact there may be one more question to resolve concerning whether or not the State received title from the United States to the submerged lands at statehood. The Supreme Court defined the principle that the United States holds the submerged lands of navigable waters in the territories in trust for the future state. See *Pollard’s Lessee v. Hagen*, 44 U. S. 212 (1845). The Court further clarified that the United States Congress, by virtue of the Property Clause of the U. S. Constitution, may make grants of the submerged lands on water bodies which are navigable-in-fact and had not yet conveyed to the State. See *Shivley v. Bowlby*, 152 U. S. 1 (1894). Recently the Court has further clarified by stating that the disposal of territorial submerged lands by the United States should not be inferred unless “the intention was definitely declared or otherwise made very plain”. See *United States v. Holt Bank*, 270 U. S. 49, 55 (1926). Referring particularly to reservations the Court announced a two part test for pre-statehood reservations of territorial submerged lands under navigable waters. The facts

must show that the Congress clearly intended to include the submerged lands in the reservation and that the Congress intended to defeat the future State's title. *See Utah Division of State Lands v. United States et. al.*, 482 U. S. 193, 209-10 (1987).

#### Pre-statehood Withdrawal:

There are no known pre-statehood withdrawals within the area.

#### Natural and ordinary condition:

To evaluate the ordinary and natural condition of the Valdez Glacier Stream aerial photography before and after statehood in 1950<sup>2</sup>, 57<sup>3</sup>, 64<sup>4 & 5</sup>, 73<sup>6</sup> and 74<sup>7</sup> were analyzed. An oblique photograph from 1940<sup>8</sup> of Old Valdez and the width of the Valdez Valley at tidewater and upstream about 2 miles was also analyzed.

1940: Artificial changes observed from the pre-statehood photographs are the Richardson Highway and a dike surrounding the entirety of Old Valdez. Portions of the dike surrounding Old Valdez are still in place. Much of the Richardson Highway in 1940 was on pilings and multiple bridges to allow the wide meandering flow of Valdez Glacier Stream flow to the ocean.



Figure 1. Valdez Glacier Stream. Crop of photo 3669, 1940, Source, Quantum Spatial.

<sup>2</sup> Photo BM04540340087, September 13, 1950, downloaded from USGS Earth Explorer.

<sup>3</sup> BM02310628139, July 29, 1957, downloaded from USGS Earth Explorer.

<sup>4</sup> H64WC01305422, April 10, 1964, downloaded from USGS Earth Explorer.

<sup>5</sup> H64S001906329, H64S001906364, H64S001906366, August 15, 1964, downloaded from USGS Earth Explorer.

<sup>6</sup> B7140B02H0088, June 15, 1973, downloaded from USGS Earth Explorer.

<sup>7</sup> 5740018099347, June 15, 1974, downloaded from USGS Earth Explorer.

<sup>8</sup> Quantum Spatial Valdez Photo 3669, date not determined 1940, purchased from Quantum Spatial, 2014 Merrill Field Drive, Anchorage, AK 99501-4116.

1950: The Valdez Glacier did not have a lake at its front in 1950. There were multiple locations of upwelling of meltwater and some indications of lateral melting; but overall the entire face of the glacier was releasing water. Leaving the area of the glacier there were two main channel areas one on the west side of the valley and another on the east. The west channel was entrenched and flowed to the west of Old Valdez. The east channel was entrenched from the glacier downstream to about river mile 3.5 (See Figure 2 and Figure 7).

On the east side of the valley between 1940 and 1950 a levee was constructed between the point of the hill with the United States Coast and Geodetic Survey (US C & GS), Monument Knife and the Richardson Highway. This levee blocked the river from flowing through the area that is now Corbin Creek Subdivision Phase I-IV. This levee is still in place. The Richardson Highway conversion from pilings to raised roadbed was slowly taking place. Three bridges are still visible within the area east of Old Valdez. There is one existing bridge in this photo between the current bridge and the levee. These areas of road construction are visible on the 1950 aerial photography.

Below the Richardson Highway west of Old Valdez the channel outside the Old Valdez dike was flowing strong. East of Old Valdez outside the dike the first few channels had clear water flowing in them while the last two bridges, the current location and the location near the levee had large amounts of water flowing through them. The channels below the current bridge location look remarkably similar to current conditions. The islands are in the same locations and many features in the 1950 photography can still be identified.

1957: The pro-glacial lake is forming at the front of the Valdez Glacier. There are still areas of upwelling and indications of lateral flow along the lower length of the glacier. The west valley channel has been abandoned in favor of the east valley channel. Visible plant growth is taking place in the abandoned west channel. The east channel has entrenched to and beyond the levee at US C & GS Knife (See Figure 3 and 7). In 1957 all water from Valdez Glacier was flowing under the Richardson Highway in the channel at the current bridge location. A levee extension and bridge removal appears to have been constructed between 1950 and 1957. There is no visible indication of gravel extraction in the east channels of Valdez Glacier Stream.

The single lane bridge from Old Valdez heading northwest was moved from Front Street and replaced by a bridge one block northeast on McKinley Street. Gravel mining in the now dry northeast channel of Valdez Glacier Stream appears to be taking place adjacent to Old Valdez. The airstrip has been moved from within the diked area of Old Valdez out to the North of town into the now dry bed of Valdez Glacier Stream.

Downstream of the Richardson Highway on the west side of Old Valdez, there is no flow from Valdez Glacier Stream, there is a small amount of clear water within the lower channels. On the East side of Old Valdez the river looks very much the same as it did in 1950 and to current conditions.

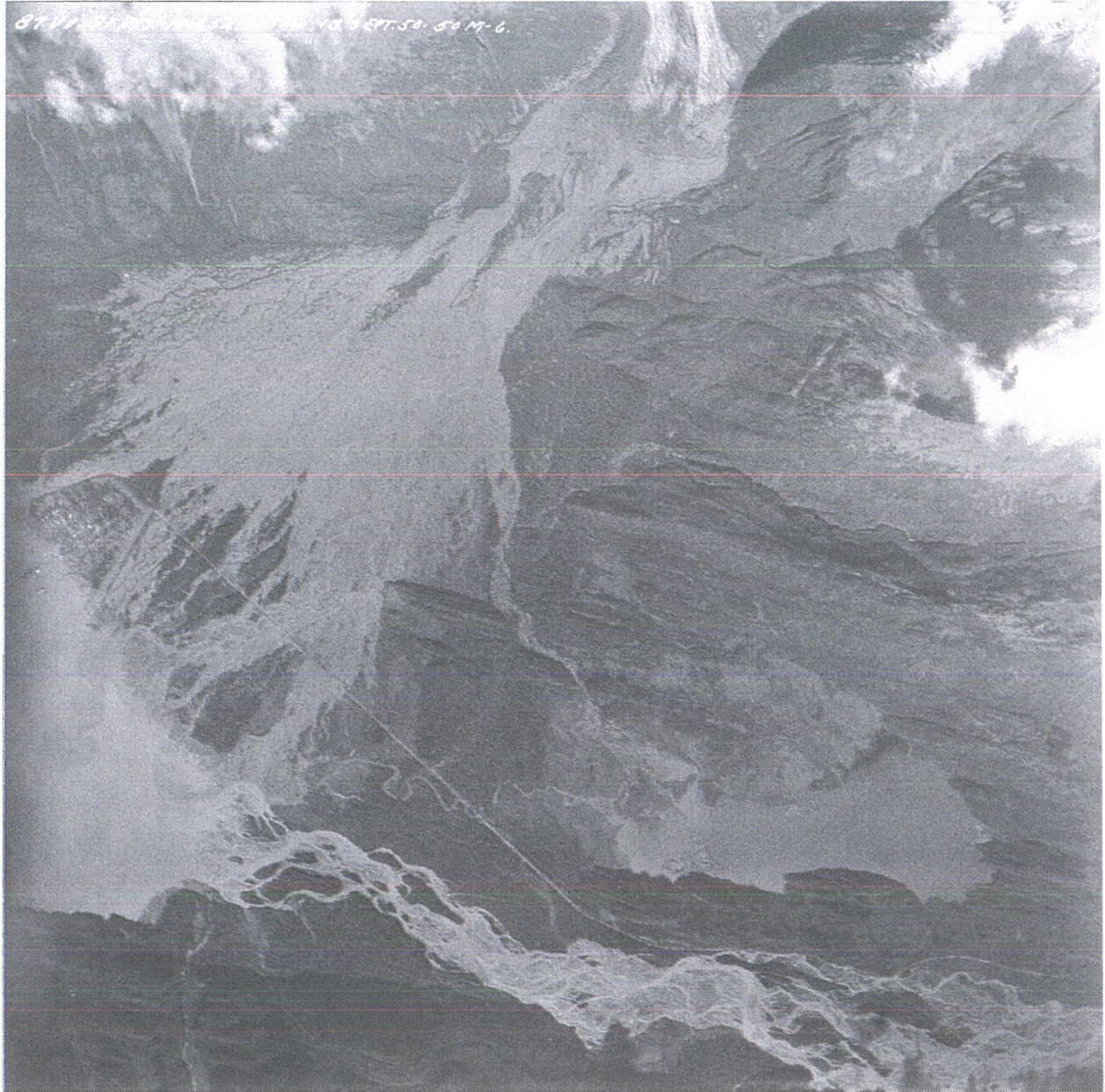


Figure 2. Valdez Glacier Stream. Crop of photo BM04540340087, September 13, 1950, downloaded from USGS Earth Explorer.

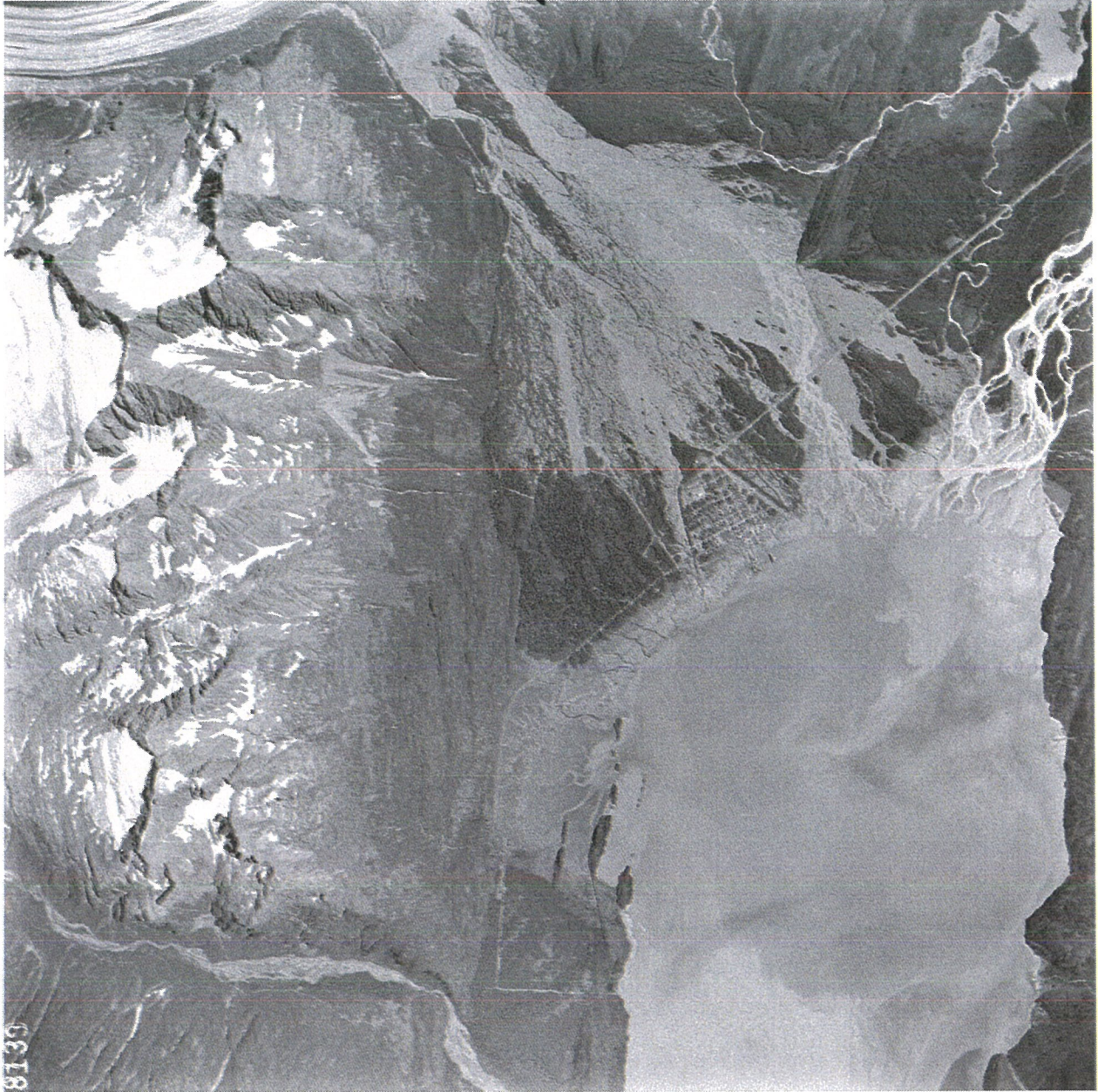


Figure 3. Valdez Glacier Stream. Crop of photo BM02310628139, July 29, 1957, downloaded from USGS Earth Explorer.

1964: March 27, 1964 Good Friday Earthquake. The Area of Valdez was essentially on the zero point of vertical displacement from the 1964 earthquake.<sup>9</sup> Small amounts of lateral displacement took place in association with the submarine landslide.<sup>10</sup> Although the impacts of the avulsive

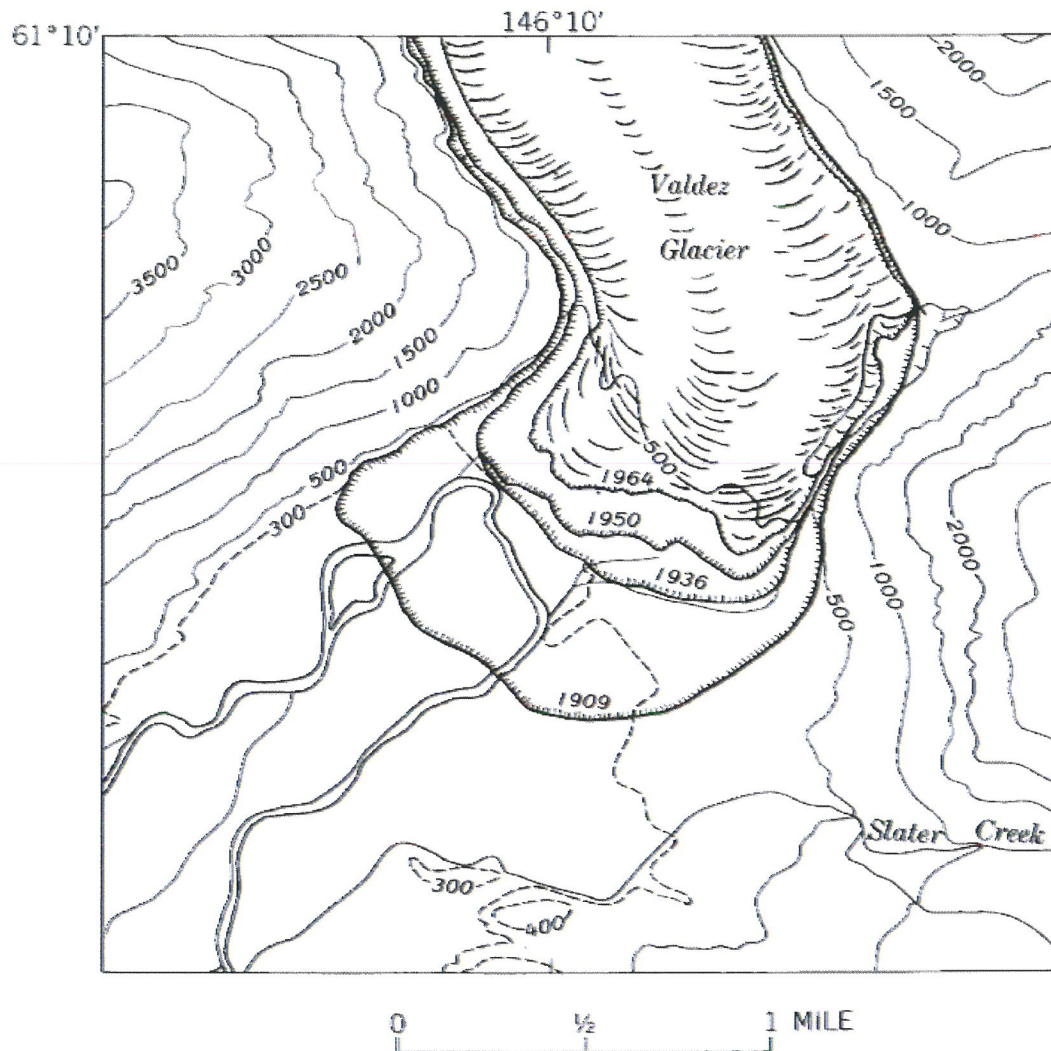
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<sup>9</sup> Coulter, H.W, and Migliaccio, R. R., Effects of the Earthquake of March 27, 1964 at Valdez, Alaska, USGS Professional Paper 542-C, US Government Printing Office, Washington, 1966, page C18.

<sup>10</sup> Id, C19.

nature of the Good Friday Earthquake are more of a question for the survey of boundaries, they are discussed here for the analysis of the natural and ordinary condition of the river.

The USGS engaged in intensive study of this earthquake and much information is available regarding conditions after the event. One such piece of information is the recorded positions of the terminus of Valdez Glacier since 1909, presented here as Figure 4. Unfortunately, the forming pro-glacial lake is not presented in this graphic.



**3.—Recorded positions of the terminus of Valdez Glacier since 1909.**

Figure 4. Valdez Glacier terminus positions, from USGS Professional Paper 542 C.<sup>11</sup>

Three different aerial photography collections took place post earthquake of Old Valdez and Valdez Glacier Stream area; April 4, April 10 and August 15 as presented on USGS Earth

<sup>11</sup> Id, C7.

Explorer. The photos reviewed were taken on April 10, with snow coverage; and on August 15. The August photography did not cover the area of the Richardson Highway and the mouth of Valdez Glacier Stream, so the April 10 photography was utilized.

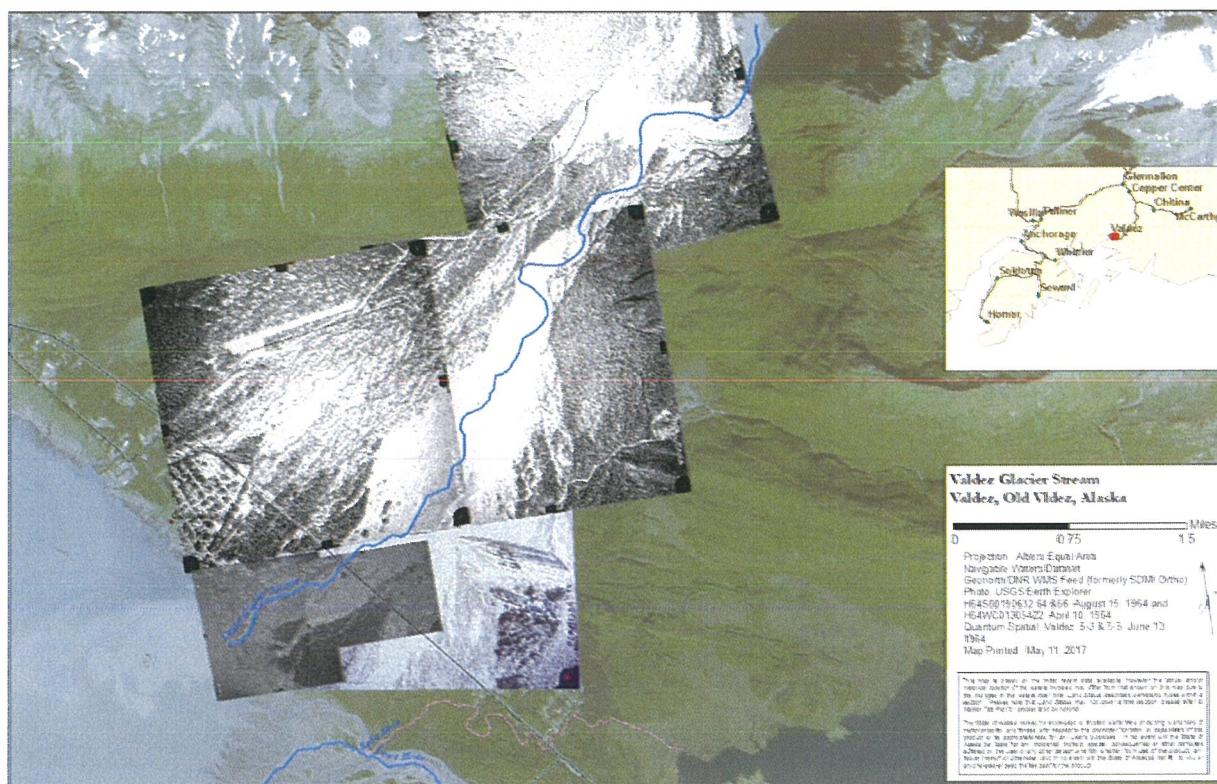


Figure 5. Valdez Glacier Stream. Georeferenced Photos H64S001906329, H64S001906364 and H64S001906366, August 15, 1964 and H64WC01305422, April 10, 1964, downloaded from USGS Earth Explorer.

USGS Professional Paper 542 C provided further photographs and mapping of the Valdez Glacier Valley. Specifically, the USGS presented a photo of an island within Section 11, Township 9 South, Range 6 West, Seward Meridian. As the photo is presented in the document Valdez Glacier Stream was flowing from the bottom of the photo, up and alongside the island. The intention of the photo within the report was to display an area of fissures within the bed of Valdez Glacier Stream.<sup>12</sup> This photo shows that the portion of the island shown is unchanged since 1957.

The original photos of the mouth of Valdez Glacier Stream from June 13, 1964 were located at Quantum Spatial. Downstream of the Richardson Highway the river is flowing in much the same areas as shown in 1957 and 1950. Gravel extraction does not appear to have been taking place in the active channels of the river.

<sup>12</sup> Id, C22.

The remaining photos from USGS Earth Explorer show gravel mining was taking place in the abandoned north channels of the Valdez Glacier Stream near the face of the glacier. Gravel mining was also taking place in the abandoned channels just north of the Richardson Highway and just outside the Old Valdez dike. Structures are also being built outside the Old Valdez dike in former channels of the Valdez Glacier Stream just south of the Richardson Highway.

1973 & 1974: By the early 1970's many of the abandoned channels on the west side of the river have filled in with plant materials. A new road called Haul Road leaves the Richardson Highway on the west side of the Valdez Glacier Stream Bridge paralleling the river in a relatively straight line to the pro-glacial lake at the foot of the glacier. Gravel extraction from the Haul Road within the active river channels was taking place. The abandoned channel area to the east of the Old Valdez City dike is filled with materials most likely for the construction of the Trans-Alaska Pipeline (TAP). Between 1964 and 1973 Corbin Creek had been fully diverted to flow directly into Valdez Glacier Stream instead of Robe Lake. Corbin Creek enters Valdez Glacier Stream just above the levee at the ridge at US C & GD Monument Knife is located.

Current photography available via Google Earth (2010) and the new Ortho-WMS service via GeoNorth (date undetermined) shows that the Valdez Glacier Stream above Corbin Creek has continued to naturally narrow within the braided plane.

Over the time frame of the aerial photography, especially the pre-statehood period; the natural migration of the river was towards the east side of the Valdez Glacier Valley. By 1957 the river exiting the pro-glacial lake had carved a single channel on the east side of the valley. The narrowing braided gravel channel also appears to be of natural origin from the lake to the ridge that US C & GD Monument Knife is located. The levee from this location to the Richardson Highway appears in the 1950 photography, and is expanded from the levee towards the west in the 1957 photography with two additional levees and the removal of a bridge. The natural movement of the river lead to the conversion of the Richardson Highway from pilings (1940's) to having many bridges (1957) to having two bridges (1964). Valdez Glacier Stream post statehood from Old Valdez east focused all water into the one channel at the Richardson Highway, although another bridge remained in existence. There is no indication that the levee at Knife ridge and the Richardson Highway made the river more or less navigable, so for determining if the river was navigable-in-fact at statehood its condition at statehood is considered its ordinary and natural. Based upon the photo analysis and the lack of large displacement during the Alaska Earthquake of March 27, 1964 event also did not change the natural and ordinary nature of the Valdez Glacier Stream.

With the apparent natural migration of the river to the east, the post statehood removal of the remaining Richardson Highway bridges between the current bridge location and Old Valdez took place. During the time frame of the TAP the construction of the Haul Road on abandoned riverbed also took place. This activity does not appear to have modified the navigability of the Valdez Glacier Stream from its condition at statehood so post-statehood use is indicative of the

river's susceptibility to use for travel, trade and commerce in its ordinary and natural condition at statehood.

### **Evidence Used In Making the Determination**

Prior Navigability Determinations: The Bureau of Land Management (BLM) made navigability determination for acreage calculations for land conveyances under the Alaska Statehood Act and Alaska Native Claims Settlement Act in 1989. The BLM determined Valdez Glacier Stream non-navigable, noting that "In accordance with the draft Memorandum of Understanding with the State of Alaska, we also are not required to re-examine the navigability of waterbodies in State-selected or conveyed areas if a navigability determination was issued after 1978." A previous determination was not located; the basis of the previous determination is unknown.

The State of Alaska has not considered the navigability of the Valdez Glacier Stream for title navigability prior to this current review.<sup>13</sup> Review of the river for navigable and public water took place for the conveyance of lands (municipal entitlement) to the City of Valdez.<sup>14</sup> As listed on Alaska State Land Survey no. 79-118, Recorded as Plat No. 80-11, Valdez Recording District, Valdez Glacier Stream and the Unnamed Lake at the Head of Valdez Glacier Stream as well as several other streams were determined to be navigable and public water. As such each side of the river has a 50 foot wide lineal perpetual public easement reserved from mean or ordinary high water upland along Valdez Glacier Stream. Within State of Alaska Patent 5348 issued to the City of Valdez in October 1980, in regards to Valdez Glacier Stream it is noted that the area contains an aggregate of 3827.47 acres, with a net chargeable acreage of 3482.61 acres, or an allowance for the bed of Valdez Glacier Stream of 344.86 acres. The City of Valdez has received title to Alaska Tidelands Survey 10 near the mouth of Valdez Glacier Stream. This survey does not extend up the river.

Summary of Interviews: Mike Buck, former owner of Keystone Raft & Kayak Adventures (Keystone) has utilized Valdez Glacier Stream for both commercial guided use as well as personal recreation. Prior to starting (1988) Keystone and after selling (2009) the business Mr. Buck utilized the river for personal use. During the 15+ years of running Keystone Mr. Buck made 60-75 trips down the Valdez Glacier Stream with take out below the Richardson Highway Bridge, 4 trips continued downriver to Port Valdez with takeout at Old Valdez. When queried regarding the take-out location, Mr. Buck stated that continuing downriver to Port Valdez and rowing/paddling over to Old Valdez took time that many customers did not wish to add to their trip.

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<sup>13</sup> Alaska Statutes 38.04.062. Identification of state submerged land.

<sup>14</sup> Alaska Statutes 38.05.126 and 127. Navigable and public water and Access to navigable or public water.

Pre-statehood Commercial Use: No known pre-statehood use.

Conditions at the Richardson Highway Bridge: In a Department of Transportation and Public Facilities survey of the river in the vicinity of the Richardson Highway Bridge in October 2016 placed the top of the downstream, river right, bridge abutment at 51.05 feet (station 7025). Measurements down stream on river right placed the top bank at 44.39 feet (station 9219), 41.50 feet (station 9218) and 39.77 feet (station 9217). Upstream of the bridge on this October day the water elevation was at 33.52 feet (station 5439) to 34.11 feet (station 10423). It does not appear that ordinary high water was collected.

Tidal Influence: The specific location of tidal influence within Valdez Glacial Stream is undetermined. NOAA Tides & Currents Specific Datum for Station 9454240, Valdez, AK sets mean high water at 17.96 feet. This station and associated benchmarks are located in the vicinity of the ferry terminal. The Valdez ferry terminal is approximately 3.5 miles from the mouth of Valdez Glacier Stream.

## RIVER CHARACTERISTICS

### 1. Valdez Glacier Stream (Valdez (A-6) 1:25000 USGS quadrangle map)

The Valdez Glacier Stream originates at the Valdez Glacier Lake, a proglacial lake at the terminus of the Valdez Glacier. The basin area is 159.7 square miles as delineated by the HUC 10 boundary (HUC 1902020108). The Valdez Glacier and several small glaciers dominate the land coverage within the basin and total 76 square miles (Figure 6). The Valdez Glacier Stream runs 6.3 miles from the Valdez Glacier Lake (207 ft elevation) to the Port Valdez inlet with an average stream gradient of 32.9 feet per mile.

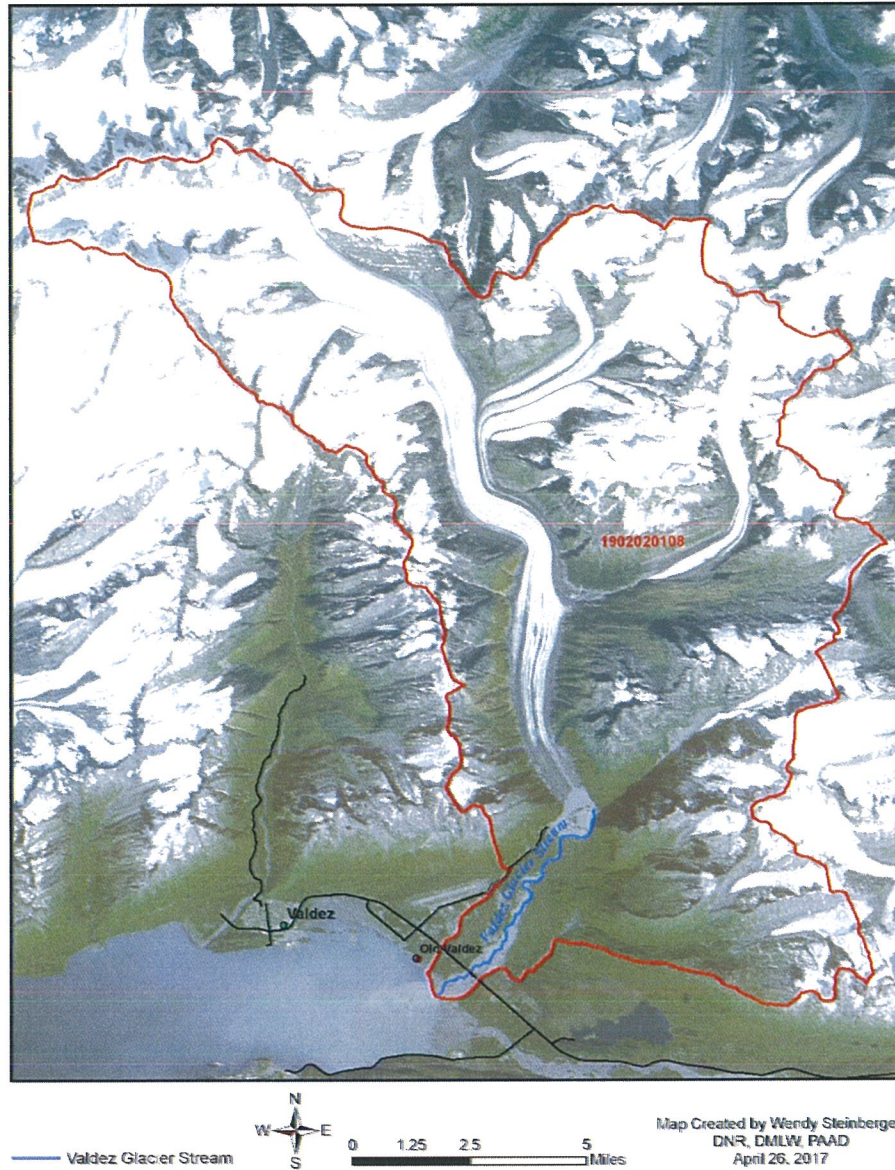


Figure 6. Valdez Glacier Stream basin area delineated by the HUC 10 boundary (HUC 1902020108).

## 2. Climate

The basin of the Valdez Glacier Stream is in a maritime climate with cool winters and summer temperatures moderated by coastal waters. Average annual snowfall for the Valdez Weather Station Office (WSO) at sea level is nearly 300 inches per year.<sup>15</sup> The greatest monthly precipitation occurs during September and October and lowest monthly precipitation is in June.

## 3. Hydrology

A hydrologic record for the 2013 open-water season was estimated by a joint University of Alaska and State of Alaska Division of Geological and Geophysical Surveys project, and published in a University of Alaska Masters thesis<sup>16</sup>. The water surface elevation (stage) at the outlet of Valdez Glacier Lake was continuously monitored using a pressure transducer during 2013. Manual discharge measurements were conducted using Acoustic Doppler Velocity Profiler (ADCP) transects at the lake sill outlet on six occasions in 2013 to develop a flow duration curve.

A discharge time series was estimated from May 23 to October 28 2013. Flow increased sharply from late May reaching a peak flow on June 16 of 7887 cfs which was only exceeded by a later peak flow of 7969 cfs on September 4 (Figure 7). On a monthly basis, mean daily flow was greatest in July (4640 cfs) and lowest in October (405 cfs; Table 1). The flow regime of Valdez Glacier Stream is typical for glacier streams where flow remains high throughout the summer months due to glacial melt.

Table 1. Monthly average discharge for the Valdez Glacier Stream in 2013.

Month	Days of Record	Mean Discharge (cfs)
May	3.7	1231
June	30	3689
July	31	4690
August	31	4404
September	30	3176
October	22.5	405

<sup>15</sup> Valdez Weather Station Office (WSO) Climate Summary; <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak9686>

<sup>16</sup> Davis JL 2015, Temperature-index modelling of mass balance and runoff in the Valdez Glacier catchment in 2012 and 2013, MS Thesis, University of Alaska Fairbanks.

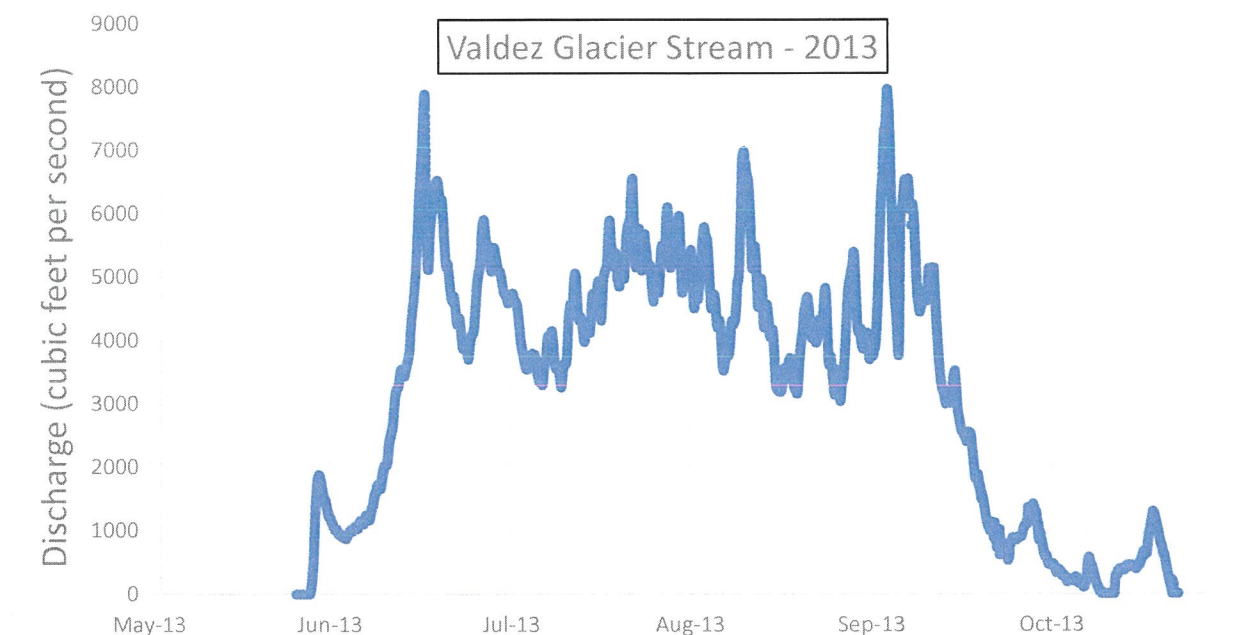


Figure 7. Valdez Glacier Stream 2013 estimated discharge (15-min intervals) from the outlet of the Valdez Glacier Lake. Period of record from May 23 to October 28 2013.

## SUMMARY

The Valdez Glacier Stream at the date of statehood was in its ordinary and natural condition. Keystone Raft & Kayak Adventures operated guided raft tours on the river from the pro-glacial lake. This commercial use existed for a fifteen year period. This use is of a significant period of time on a river that appears to be in its natural and ordinary condition. The full extent of the Valdez Glacier Stream is susceptible to navigation and determined navigable in fact based upon the commercial rafting history.

Summary of the navigability determination is summarized within Figure 5, below. While the extent of tidal influence is undetermined, the State holds the tidally influenced submerged lands based upon the Submerged Lands Act of 1953.

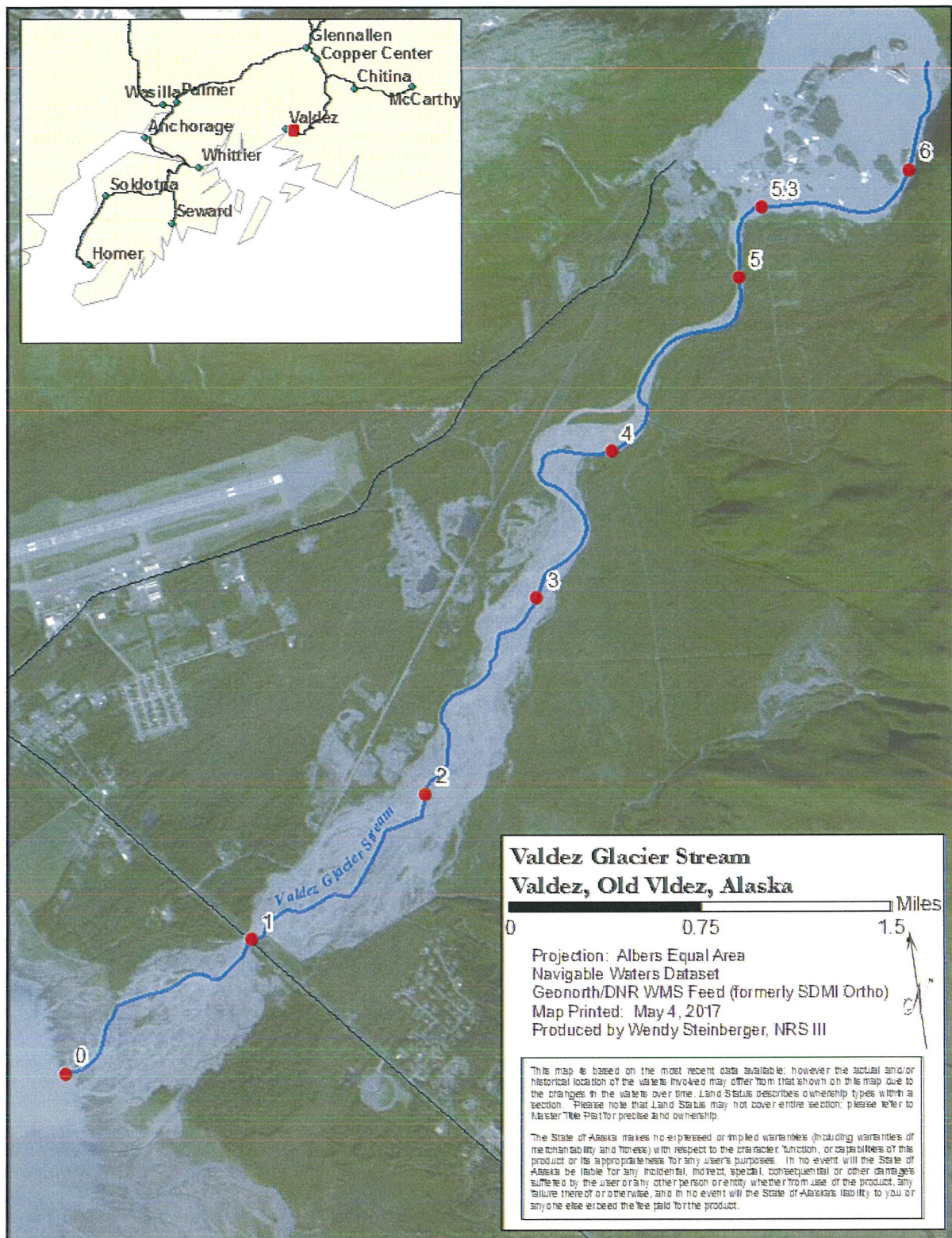
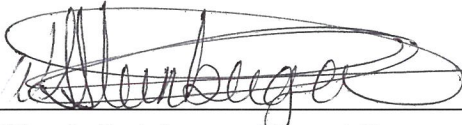


Figure 7. Valdez Glacier Stream Determination Map

**Recommendation:** Based upon the evidence on file at the Department of Natural Resources as summarized in this document, I recommend:

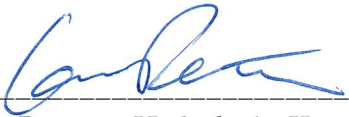
The Valdez Glacier Stream is determined navigable from the outlet of the unnamed pro-glacial lake, within Section 29, Township 8 South, Range 5 West, Copper River Meridian.



Wendy Steinberger, Natural Resource Specialist III  
Navigable Waters Specialist

Date

6/5/2017



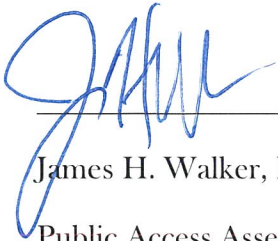
Kevin Petrone, Hydrologist II  
Navigable Waters Hydrologist

Date

6/5/2017

**Determination:** The Valdez Glacier Stream is determined navigable from the outlet of the unnamed pro-glacial lake, within Section 29, Township 8 South, Range 5 West, Copper River Meridian.

This determination is not a final agency action. The State reserves the right to consider additional information and/or evidence in the future which may affect this determination, and issue a subsequent determination which considers and incorporates that information.



James H. Walker, Natural Resource Manager I  
Public Access Assertion and Defense Unit Manager

Date

6/5/2017