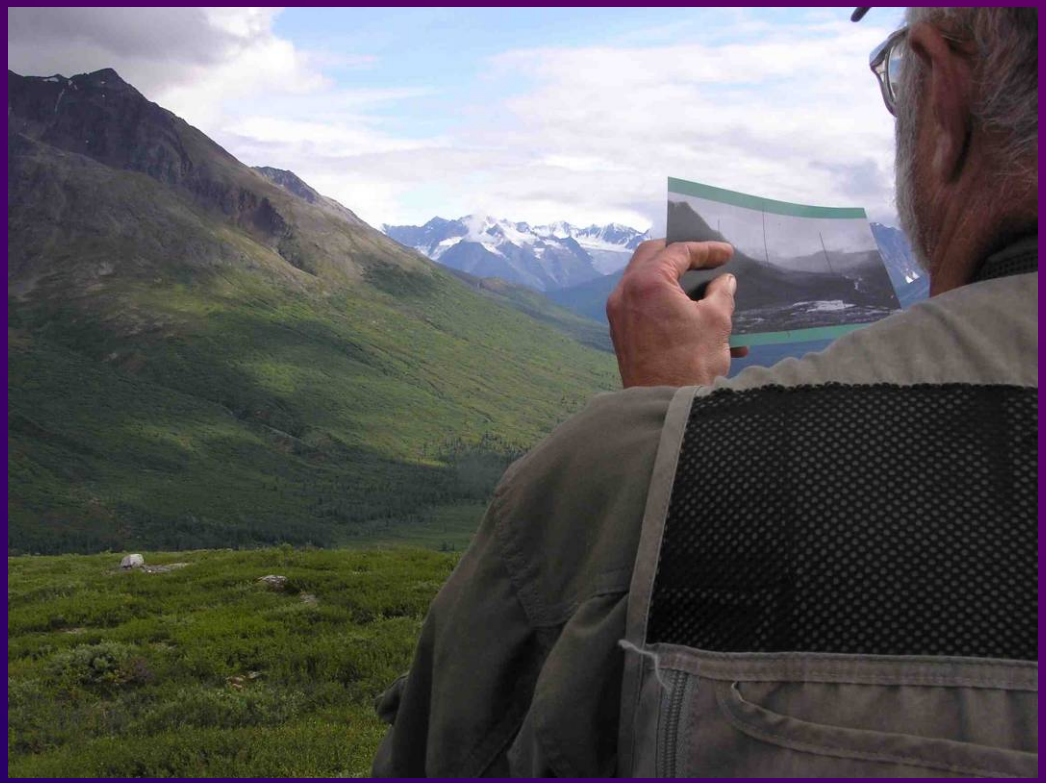
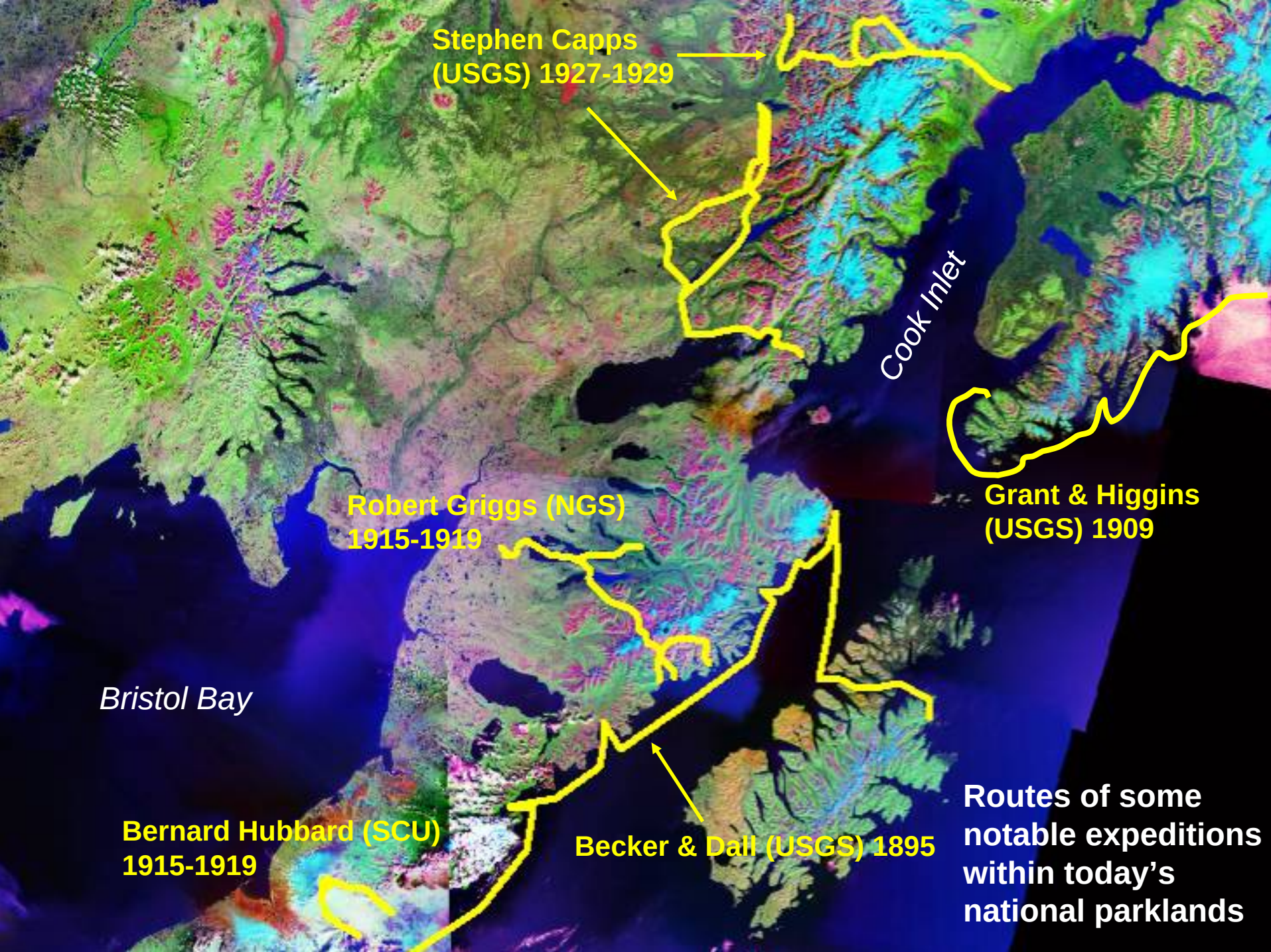
That Was Then – This is NOW!

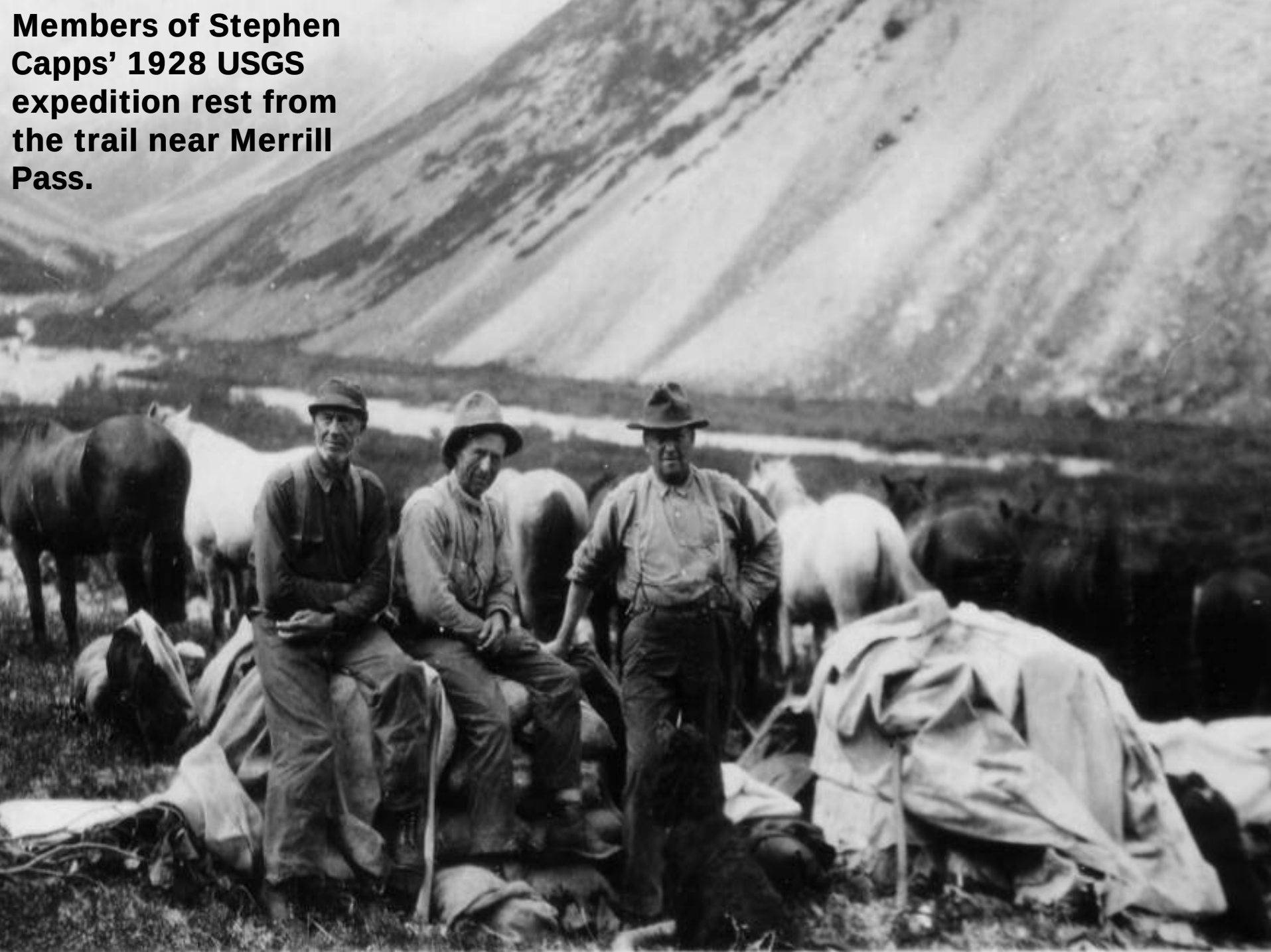
A Century Of Landscape Change In Swan Parks As Revealed By Repeat Photography

Torre Jorgenson
Gerald Frost
Will Lentz
Alan Bennett





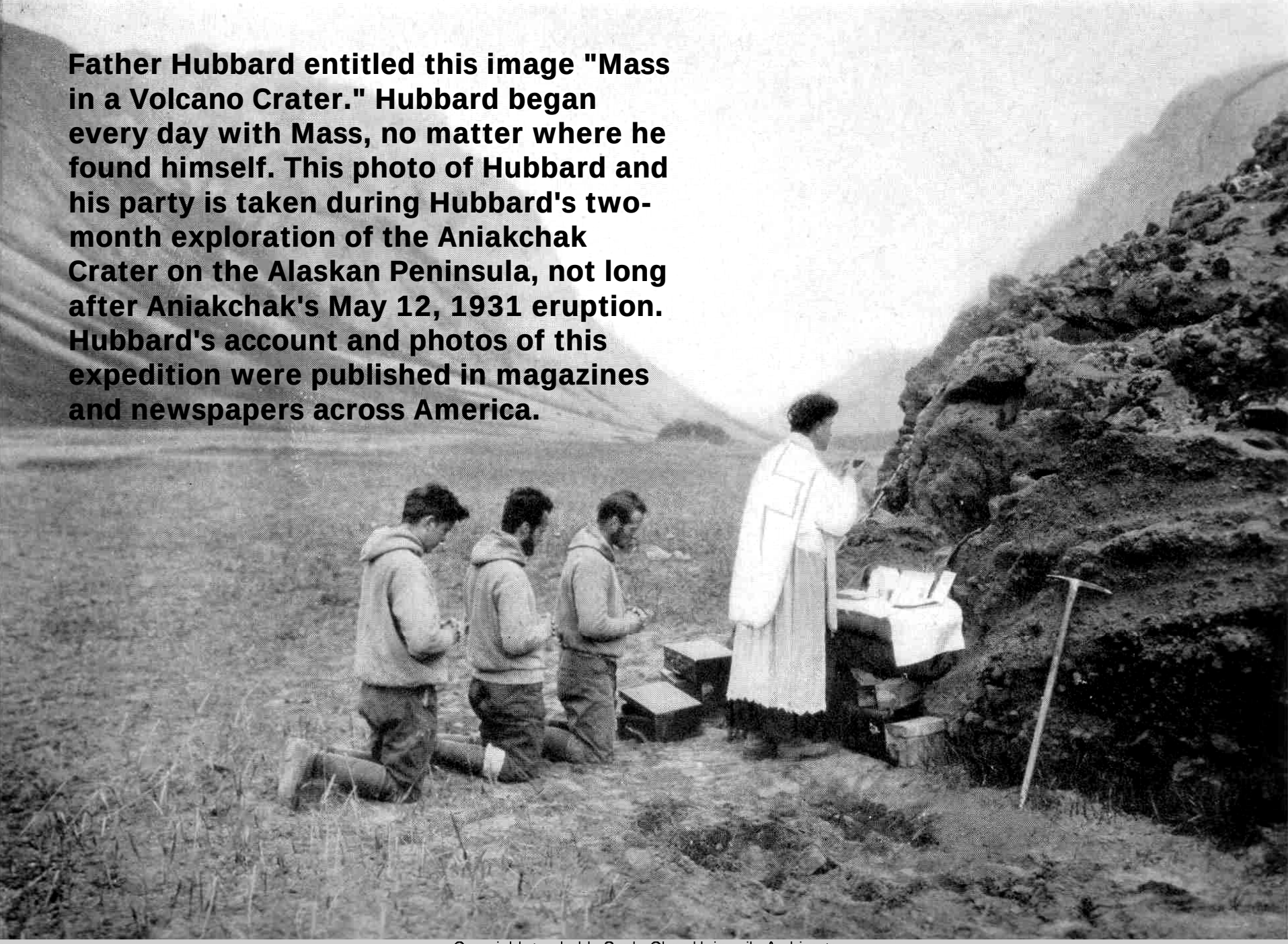
Routes of some notable expeditions within today's national parklands



Members of Stephen Capps' 1928 USGS expedition rest from the trail near Merrill Pass.

The expeditions of the National Geographic Society led by Robert F. Griggs generated great interest in the volcanic landscapes of Katmai and catalyzed the establishment of Katmai National Monument in 1918. The expeditions of the National Geographic Society led by Robert F. Griggs generated great interest in the volcanic landscapes of Katmai and catalyzed the establishment of Katmai National Monument in 1918. At top, a camp used by Griggs in 1919 near the base of Baked Mountain in the Valley of Ten Thousand Smokes

Copyright National Geographic Society



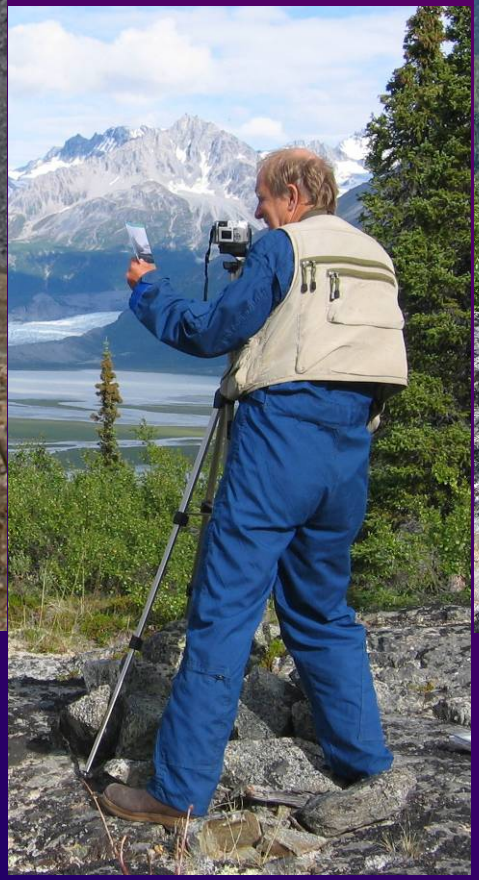
Father Hubbard entitled this image "Mass in a Volcano Crater." Hubbard began every day with Mass, no matter where he found himself. This photo of Hubbard and his party is taken during Hubbard's two-month exploration of the Aniakchak Crater on the Alaskan Peninsula, not long after Aniakchak's May 12, 1931 eruption. Hubbard's account and photos of this expedition were published in magazines and newspapers across America.

Copyright <probably Santa Clara University Archives>

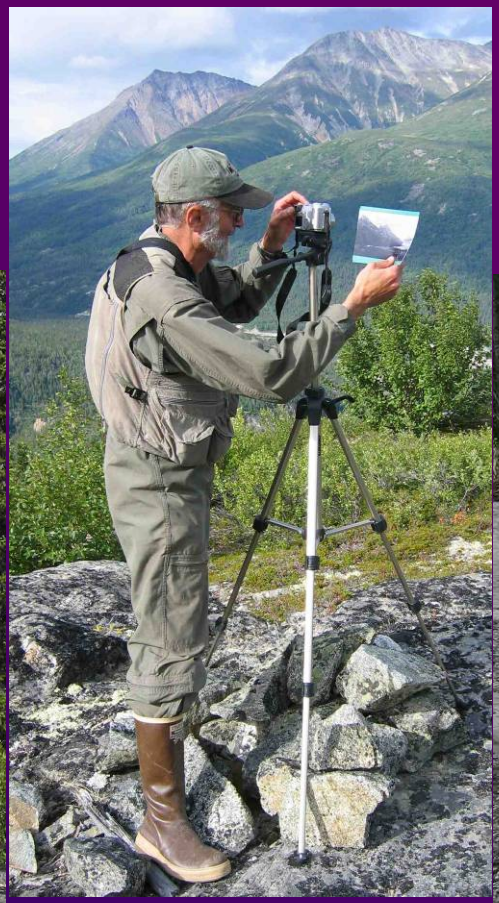
1928

2004
N7193Y

JJ Frost

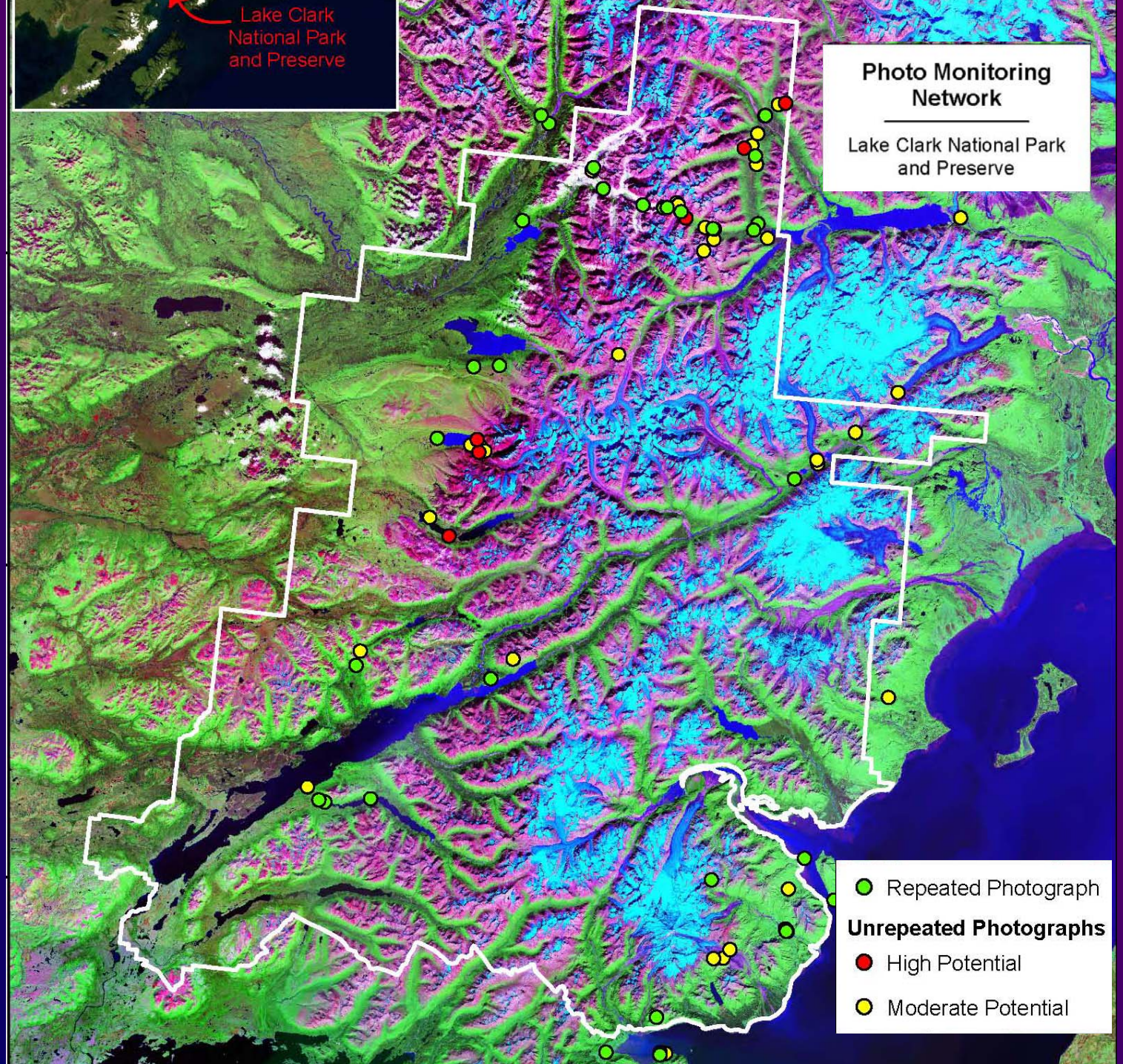


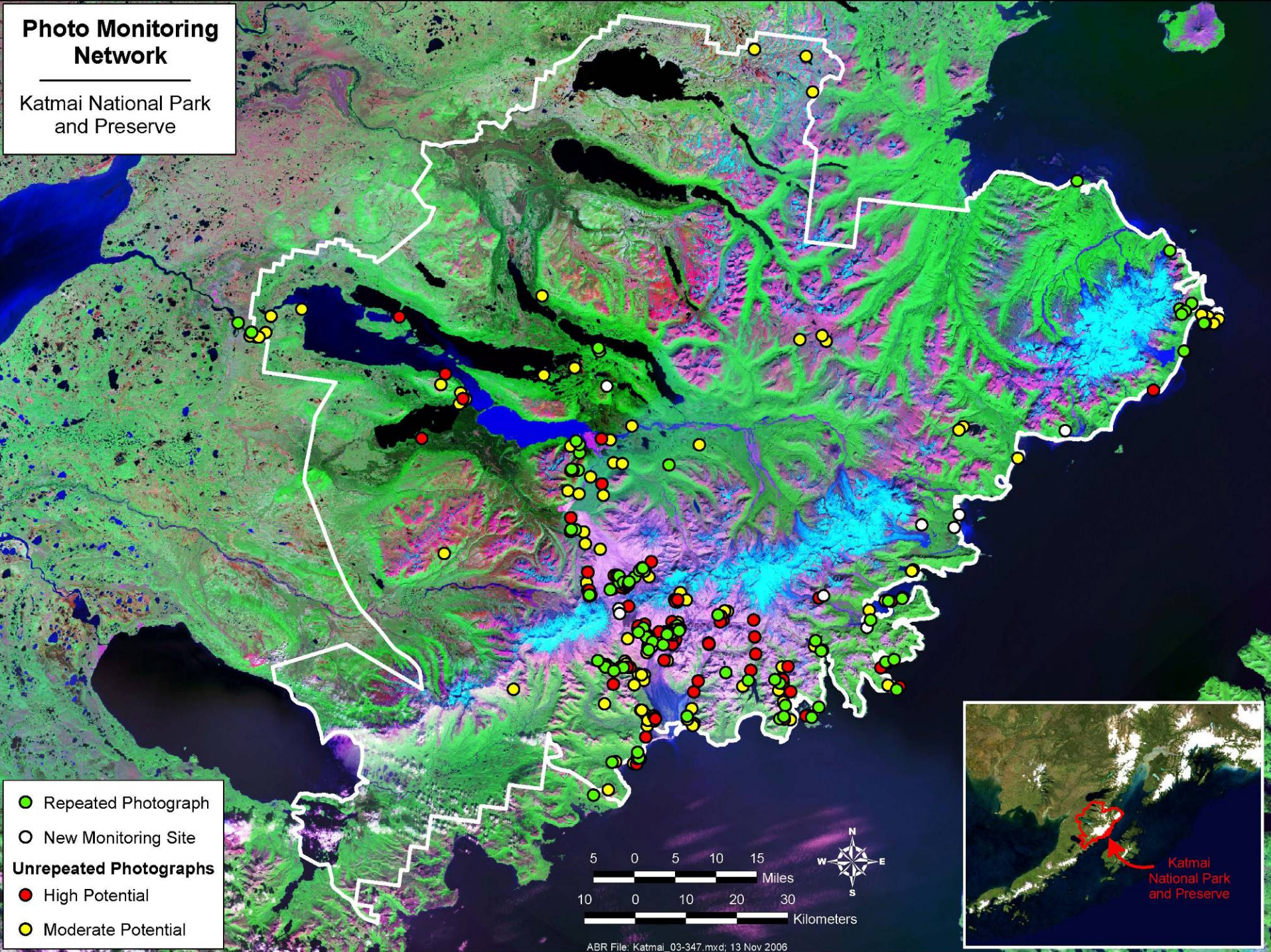
Torre Jorgenson



Alan Bennett

Larry Larrive


Lake Clark
National Park
and Preserve
Photo Monitoring
Network
Lake Clark National Park
and Preserve
Repeated Photograph
Unrepeated Photographs
High Potential
Moderate Potential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Katmai National Park and Preserve
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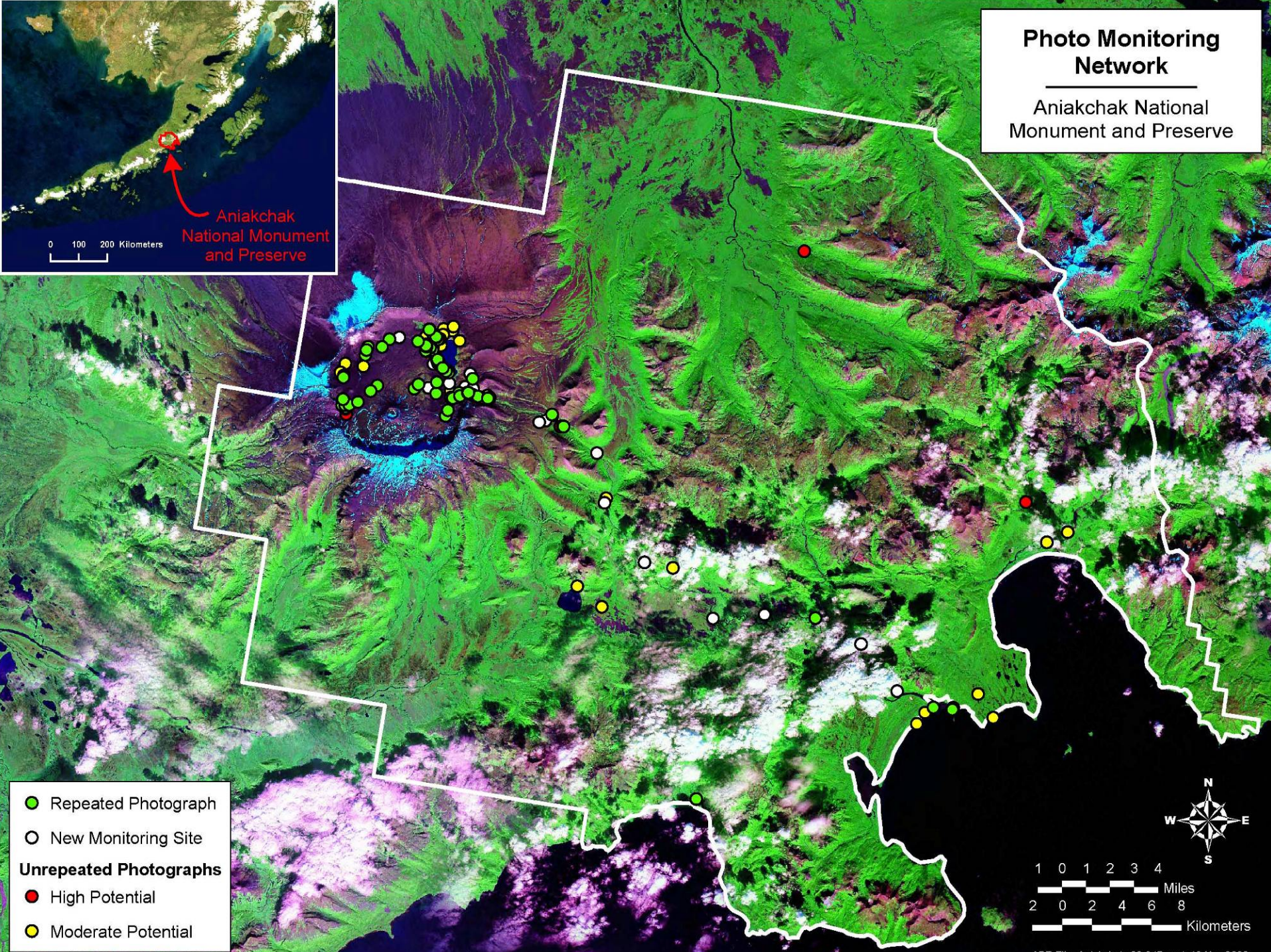
Photo Monitoring Network
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Aniakchak National Monument and Preserve
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Repeated Photograph
New Monitoring Site
Unrepeated Photographs
High Potential
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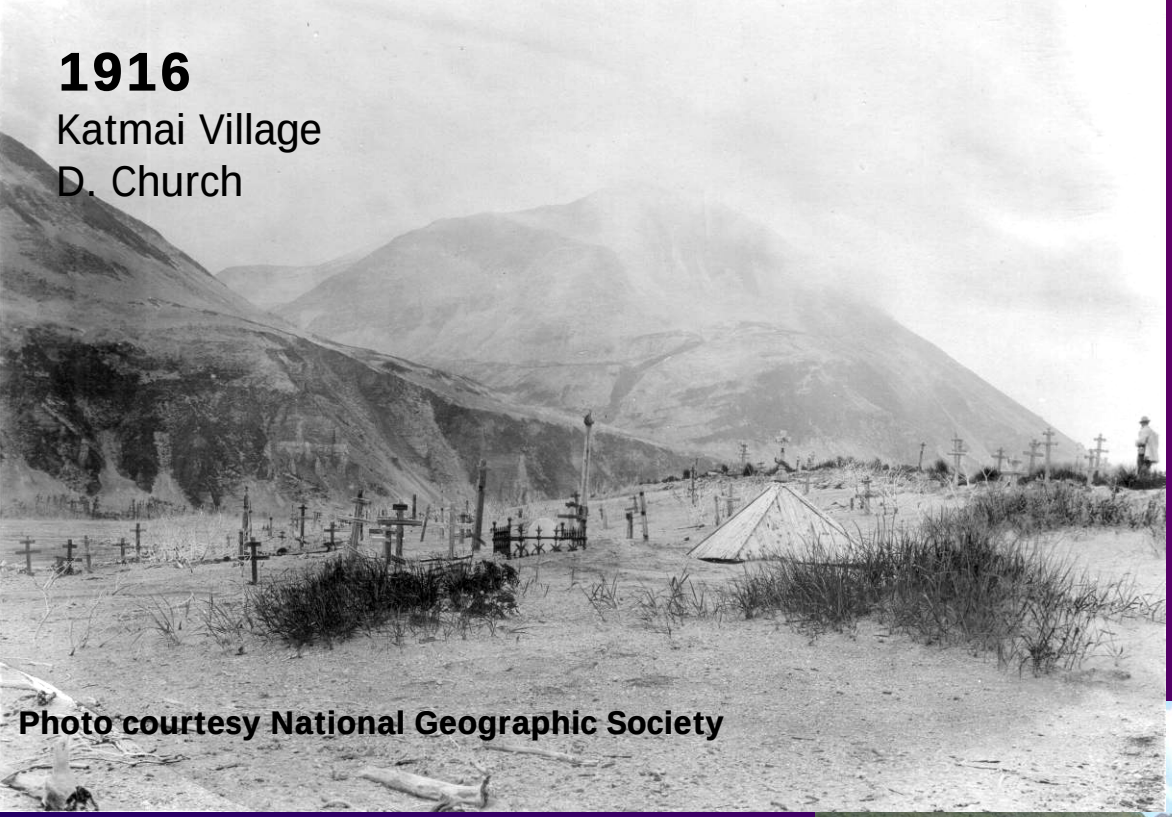
Kilometers

During the cataclysmic eruption in 1912 of Novarupta, the primary vent of the great Katmai eruption, about 4 cubic miles of ash was sent airborne over a period of about 60 hours. Northwesterly winds at the time of the eruption concentrated the ashfall in areas just southeast of Novarupta, with deposits exceeding 6 ft deep. The natives of Katmai village fled in baidarkas to Kodiak and the village was permanently abandoned.



Ash-rich alluvium deposited by the braided Katmai River has buried the entire village site. Recovery of tall alder shrubs after 1912 ashfall is evident on the slopes of Mt. Pedmar in the background.

Photographs from c. 1917 by Clarence Maynard looking up the Katmai River near Katmai Canyon.

2004 (Gerald Frost)

Photographs from 1954 by Victor Cahalane near the terminus of the middle Knife Creek Glacier, Katmai National Park & Preserve.

2004 (Gerald Frost)

1916
Katmai Canyon
D. Church
Photo courtesy National Geographic Society

2004
G. Frost
Small tephra-covered glacier

1916

Katmai Canyon

D. Church

2004 (Gerald Frost)

1919
Amalik Bay
Photo by Paul Hagelbarger,
National Geographic

2005

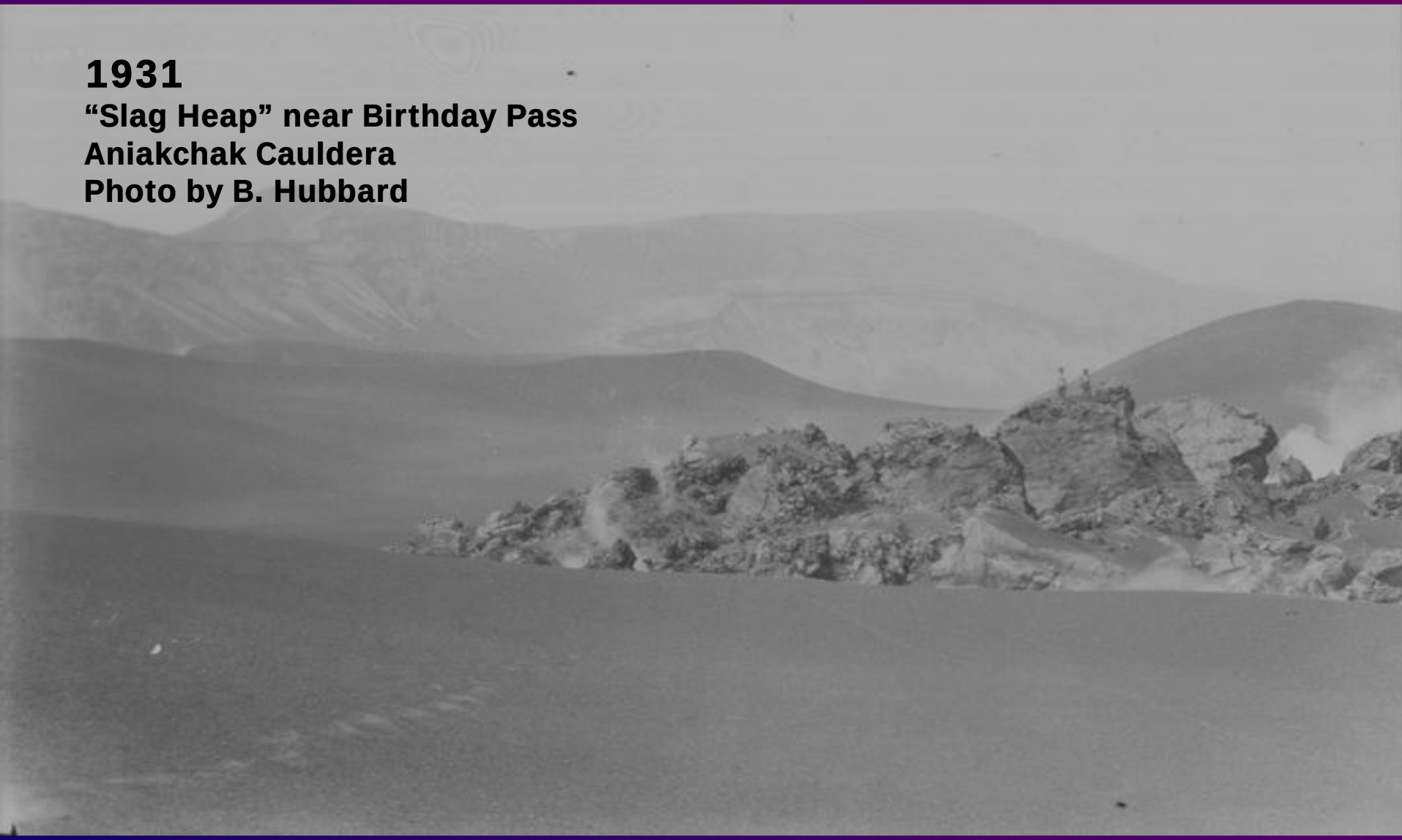
Mountains north of Geographic Harbor seen from an elevation of 330 m in 1919. Twenty miles from Novarupta and directly downwind of it at the time of the 1912 eruption, this site experienced some of the most severe ashfall recorded in the area. Initially alders survived on steep slopes while gentler slopes retained tephra and were much slower to recover.

Photo courtesy National Geographic Society

2005
T. Jorgenson

Photo courtesy Santa Clara University Archives.

Vegetation recovery after tephra burial in 1931 is dramatically illustrated in the foreground by low open willow scrub with a diverse herbaceous understory. This area is laced with several spring-fed creeks. Exposed cinder fields in the background remain barren.



Note fresh blanket of fine-grained tephra

Photo courtesy Santa Clara University Archives.

Primary succession is occurring at a very slow pace in the area. Plant cover is conspicuous only within the microenvironment of the lava rocks and on a toe slope in the left background.

Photo courtesy Santa Clara University Archives

Alluvial deposition of 1931 tephra has modified the lake shoreline. Colonizing willows and graminoids have established quickly on the alluvial flats.

1931
Aniakchak River Valley
B. Hubbard

2006
G. Frost

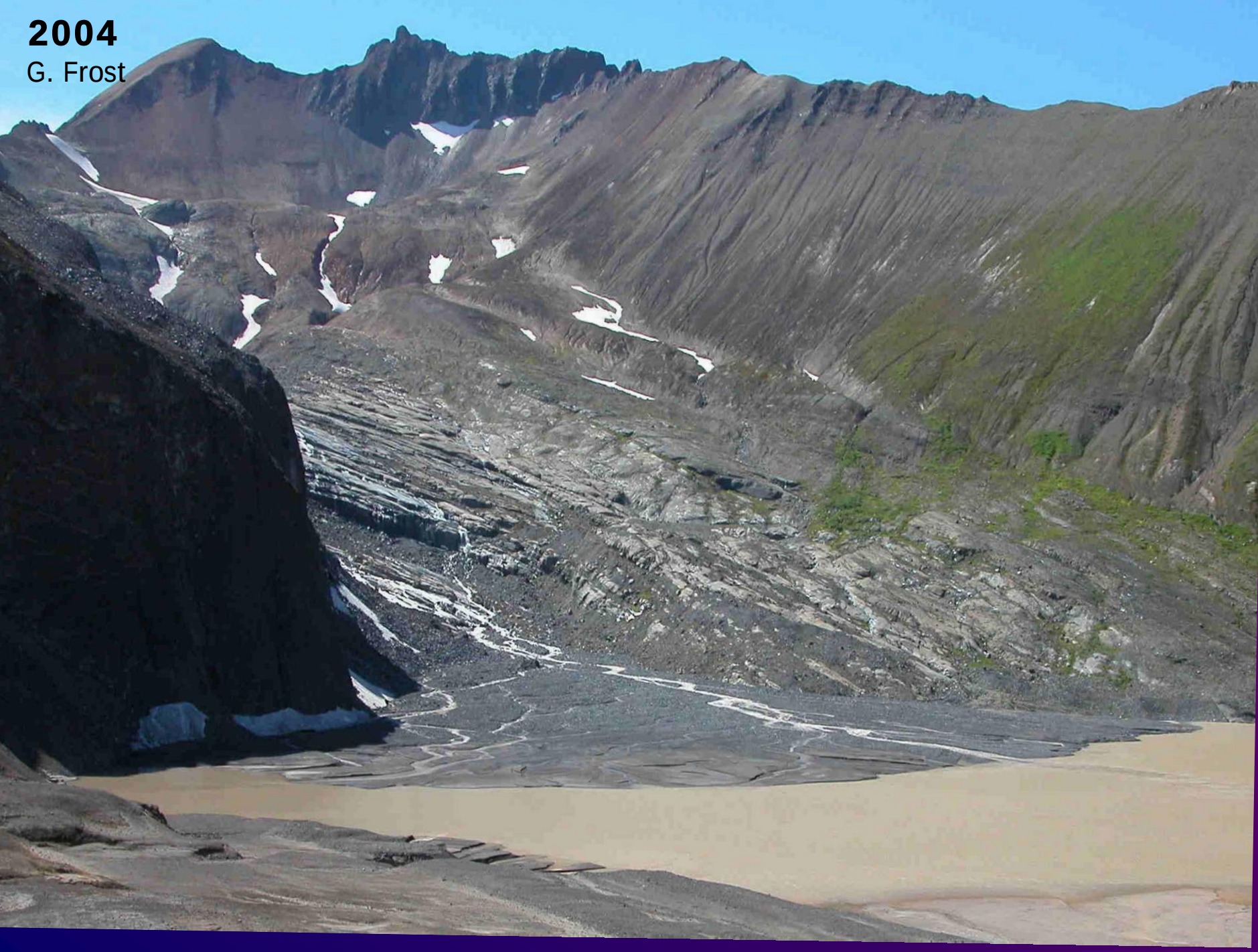
1931

Comparison reveals the persistence of arctic willow (*Salix arctica*) on exposed sites in the area. Extensive dead branches in 1972 suggest that these long-lived dwarf shrubs were severely damaged by the 1931 eruption, but substantially recovered by 1972.

2006
G. Frost
Since 1972 the willows showed little change. Cover of moss (*Racomitrium* sp.) has increased markedly, although total live cover at the site remains <50%.

1918
Glacier off Mt. Mageik
Photo by J. Sayre,
National Geographic

2004
G. Frost



1895

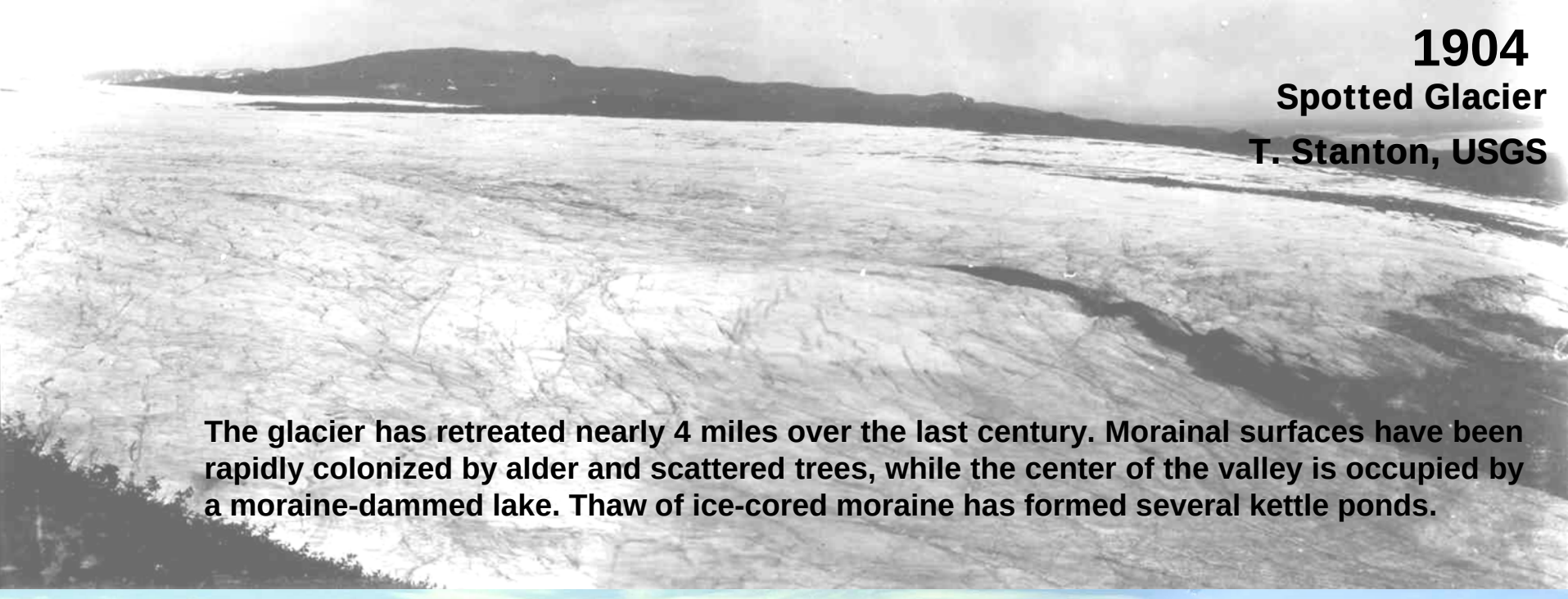
Unnamed glacier near Cape Douglas

Photo by C. Purington, USGS

Among the oldest in the historical photo collection, the 1895 image shows the glacier's terminus near its maximal extent after the Little Ice Age.

2005

46 A
C.W.P



The glacier has retreated nearly 4 miles over the last century. Morainal surfaces have been rapidly colonized by alder and scattered trees, while the center of the valley is occupied by a moraine-dammed lake. Thaw of ice-cored moraine has formed several kettle ponds.

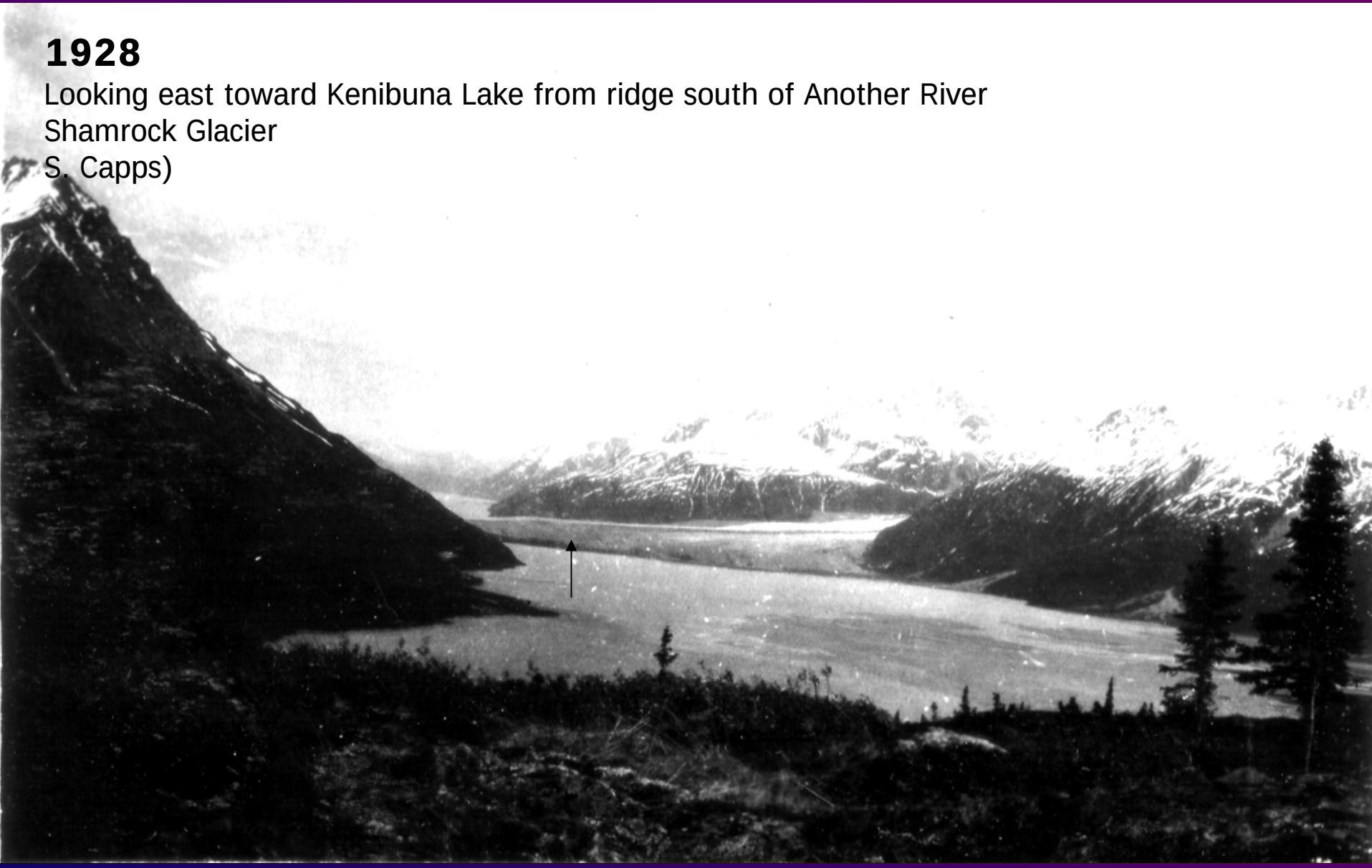
1904
Fourpeaked Mountain area, Cape Douglas
Photo by R. Stone, USGS

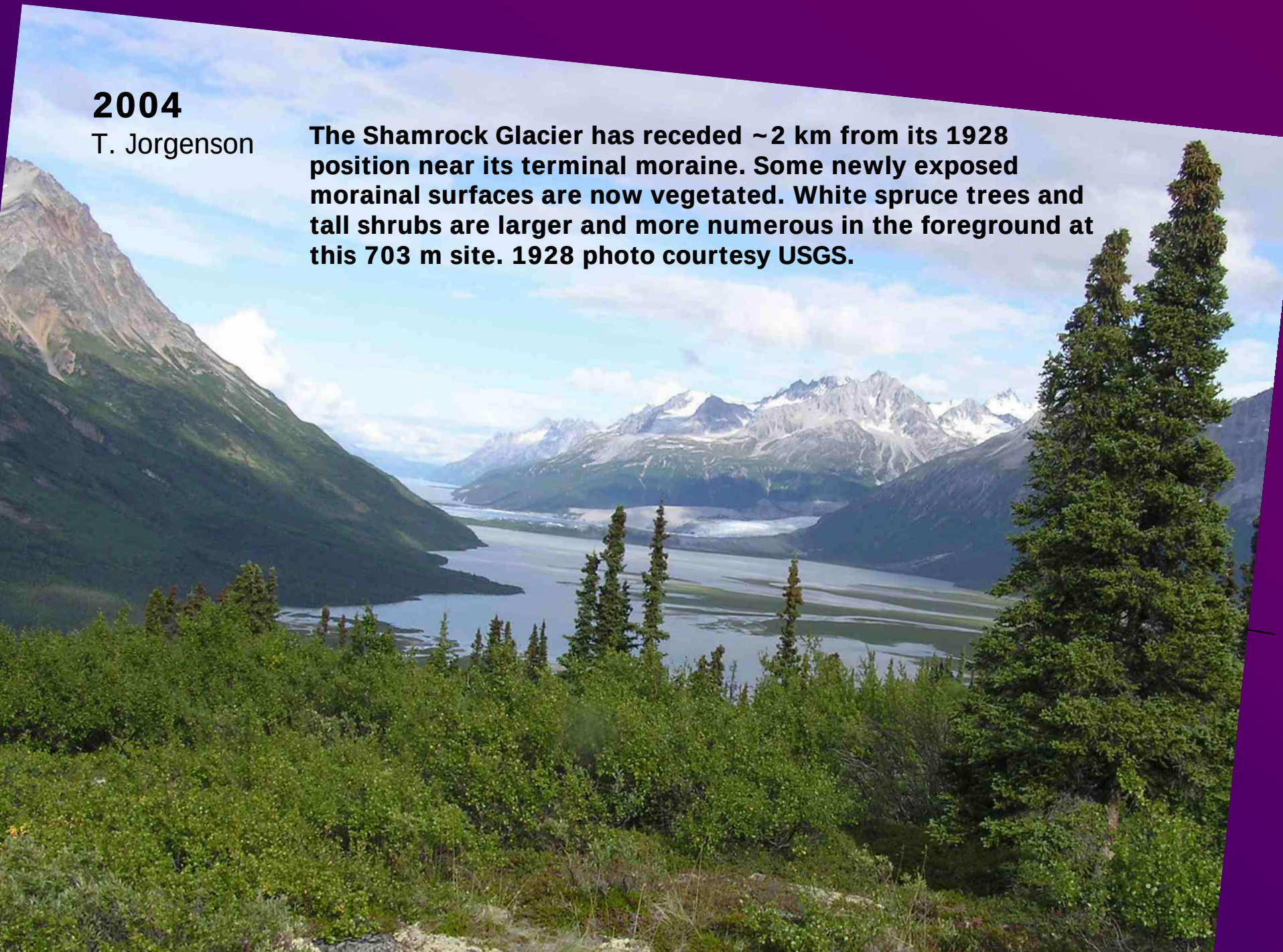
2005
T. Jorgenson

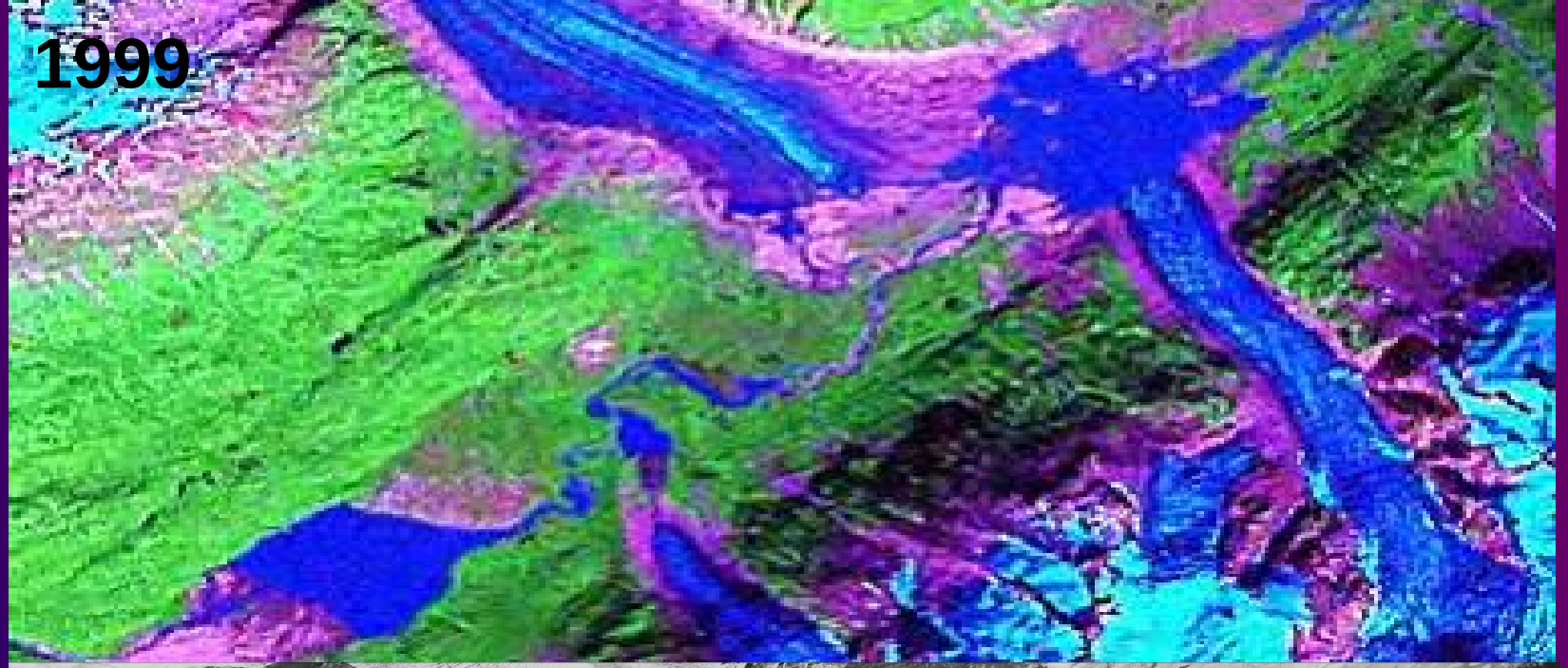
1904
Photo by R. Stone, USGS

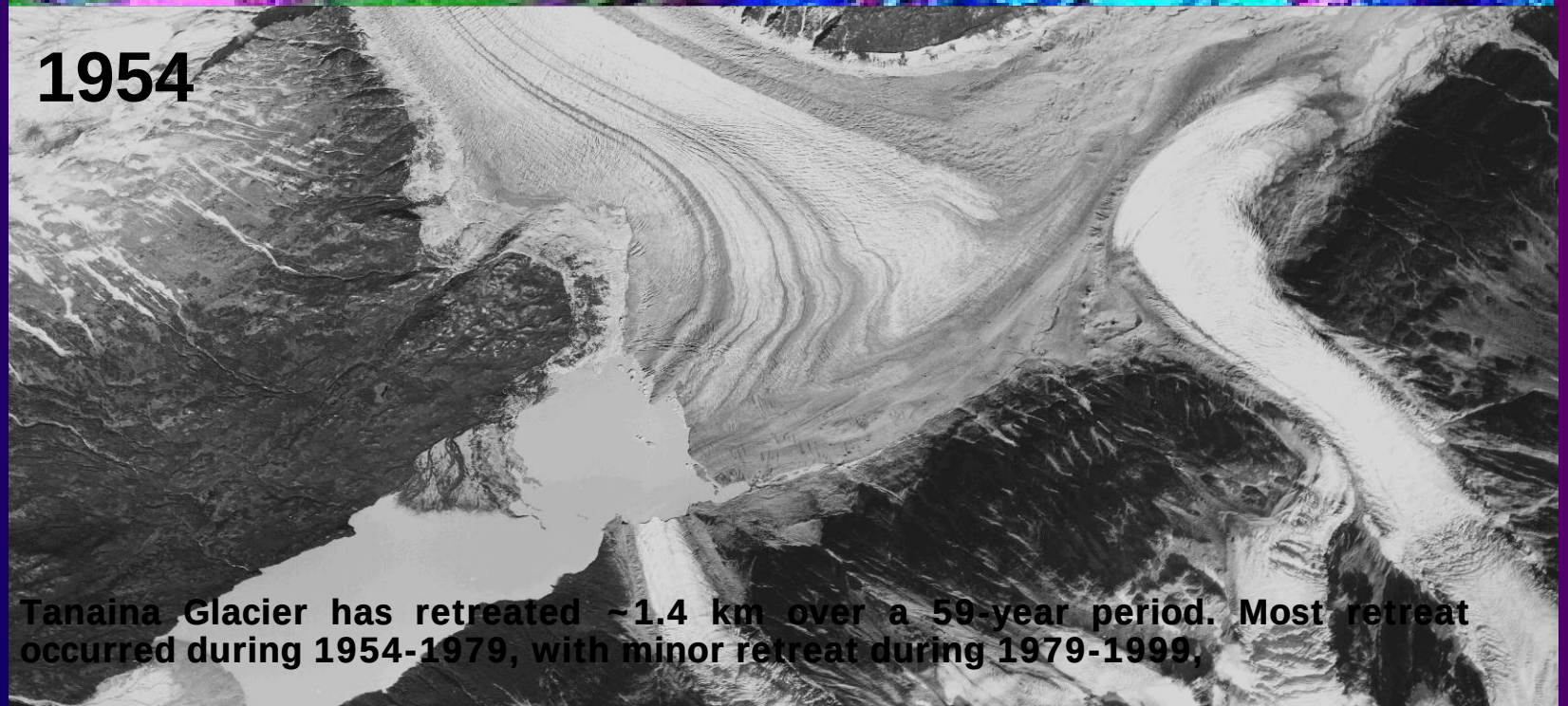
1928

Looking east toward Kenibuna Lake from ridge south of Another River
Shamrock Glacier
S. Capps)




2004
T. Jorgenson
The Shamrock Glacier has receded ~2 km from its 1928 position near its terminal moraine. Some newly exposed morainal surfaces are now vegetated. White spruce trees and tall shrubs are larger and more numerous in the foreground at this 703 m site. 1928 photo courtesy USGS.





Tanaina Glacier has retreated ~1.4 km over a 59-year period. Most retreat occurred during 1954-1979, with minor retreat during 1979-1999,

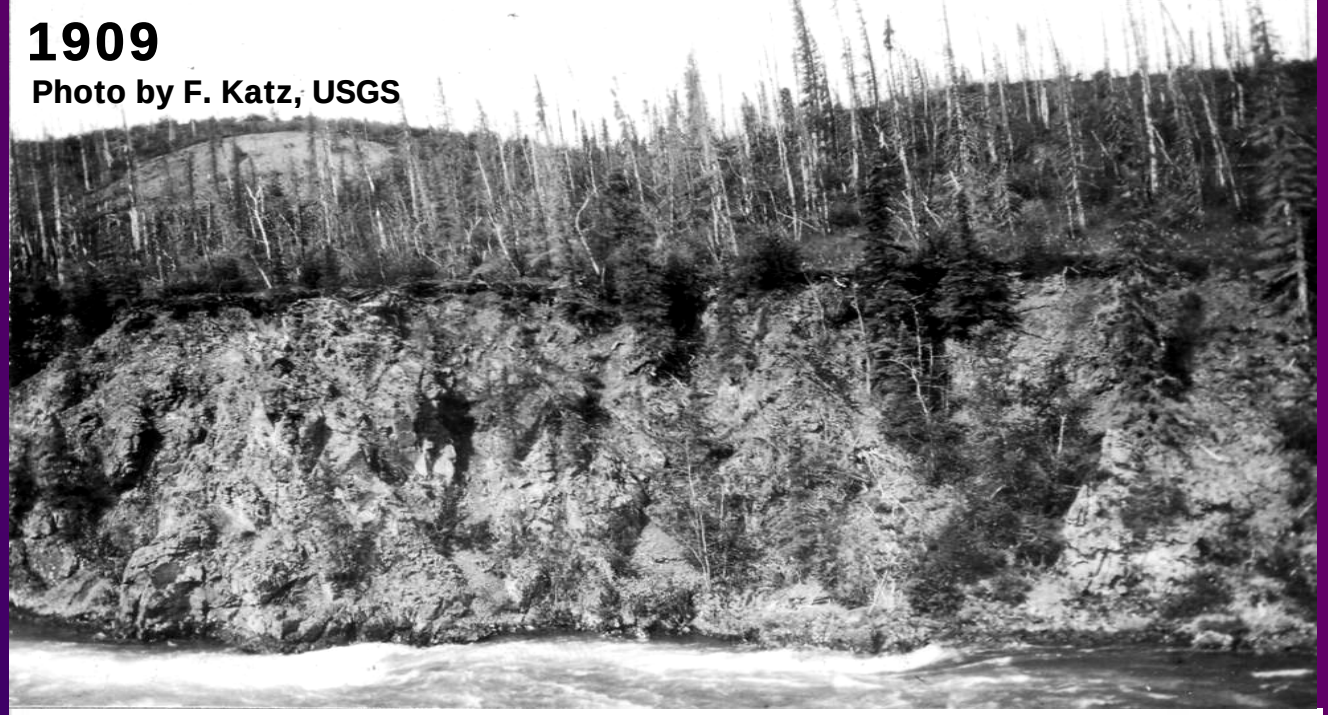
1909
Tlikakila River near Lake Clark
Photo by F. Katz, USGS

2004

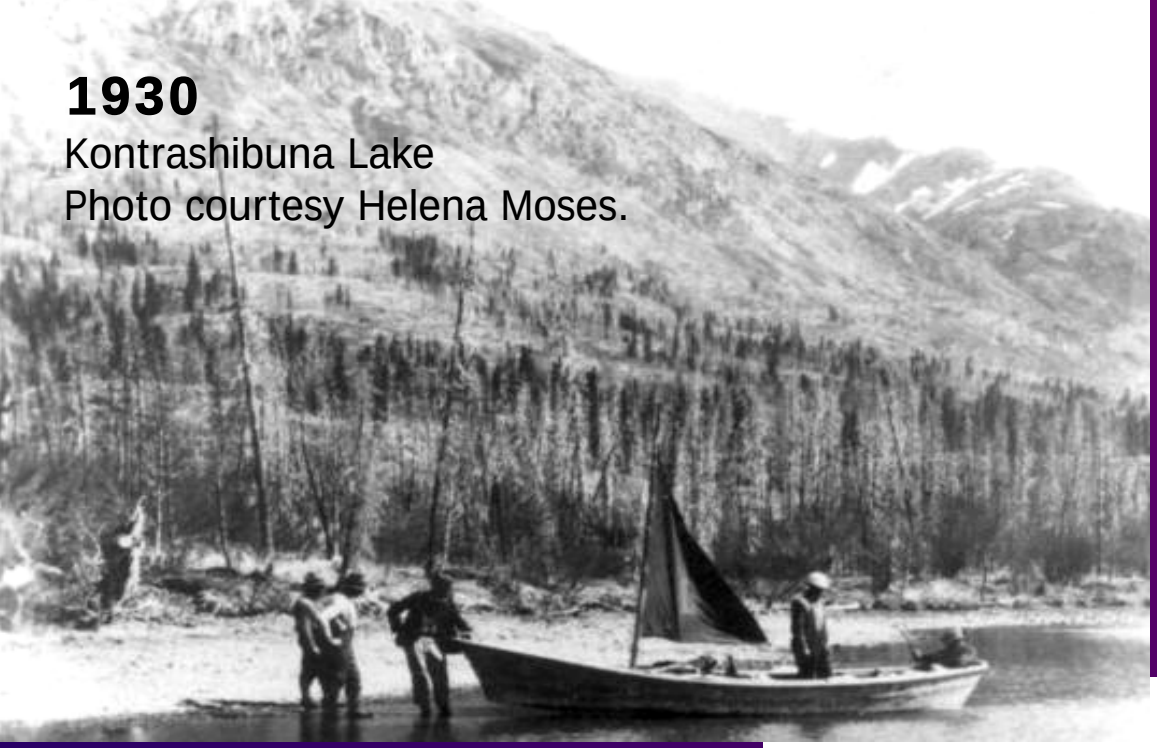
1909
Tlikakila River near Lake Clark
Photo by F. Katz, USGS

Photo courtesy National Geographic Society.

Image reveals that graminoids were already establishing on the landslide debris in 1917. In less than 90 years, the site has been completely vegetated by tall willows (concealing boulders) and graminoids. In contrast to other landslides associated with the 1912 eruption, Griggs reported that Mageik Landslide colluvium was composed of intermixed boulders, mineral soil, and retransported organic material.



Photos near Tanalian Falls reveal dramatic changes in vegetation after a fire shortly before 1909. Scattered white spruce survived the fire and overtop the 90-yr-old, closed birch forest.



1930
Kontrashibuna Lake
Photo courtesy Helena Moses.

2004
T. Jorgenson

Comparison illustrates boreal forest succession after a fire that occurred not long before 1930. White spruce trees are just beginning to overtop the dense canopy formed by paper birches (*Betula papyrifera*) which are about 75 years old.

1929
Photo by S. Capps, USGS

2004
There is some evidence that dwarf birch shrubs have formed a denser ground cover, obscuring some of the rocks, but there has been little change in height. No expansion of trees or tall shrubs is evident on the slopes at an elevation of 825 m.

1929
Kijik River
Photo by S. Capps

2004

1929
Kijik River
Photo by S. Capps

1919
Granite ridge south of Lake Grosvenor
Photo by J. Sayre,
National Geographic

1919

1919

Naknek River valley near King Salmon

Photo by P. Hagelbarger,

National Geographic

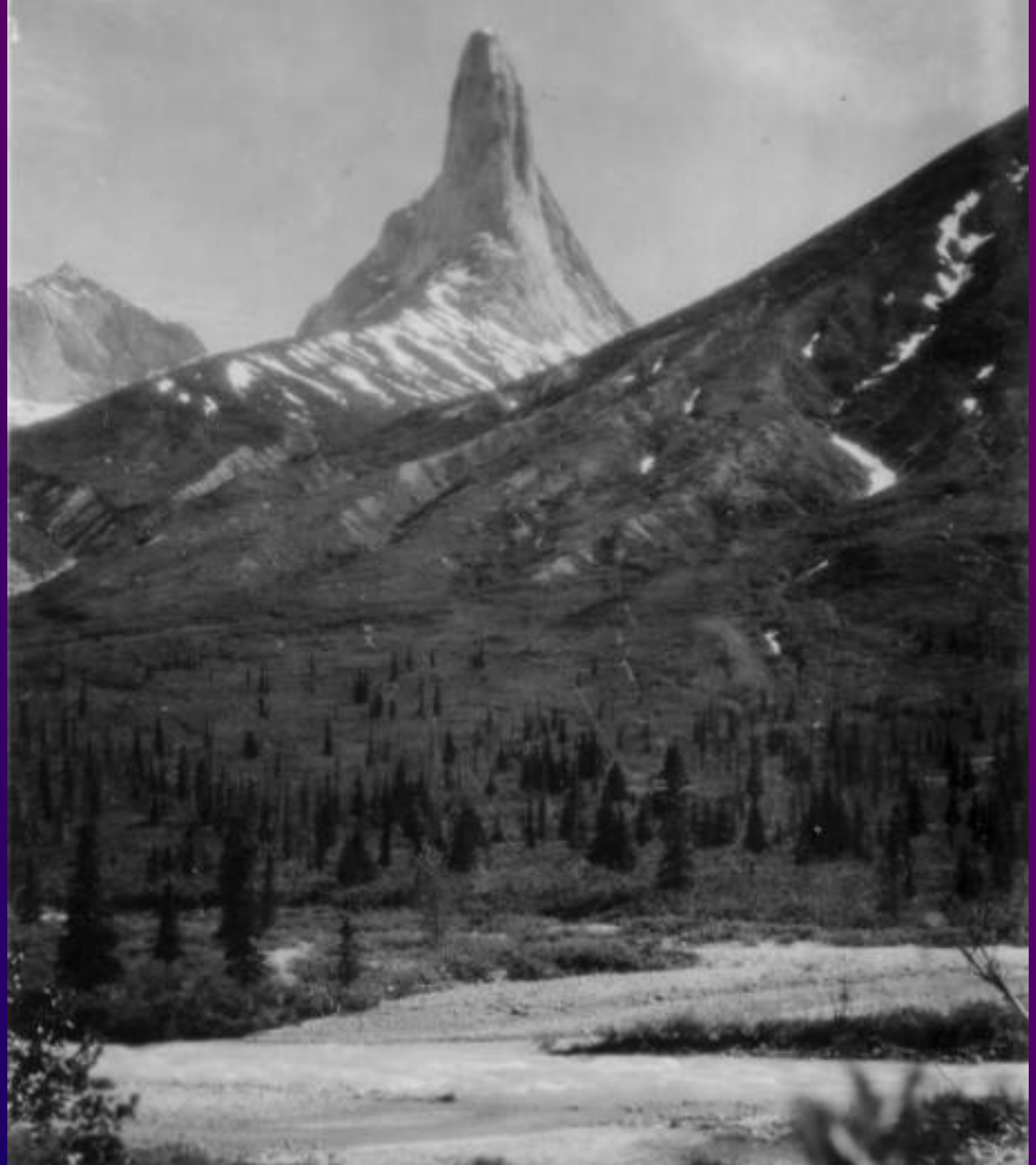
2005

Photograph from 1928 by Stephen Capps of mountain slopes near Two Lakes and the Necons River, LACL

2004 (Torre Jorgenson)

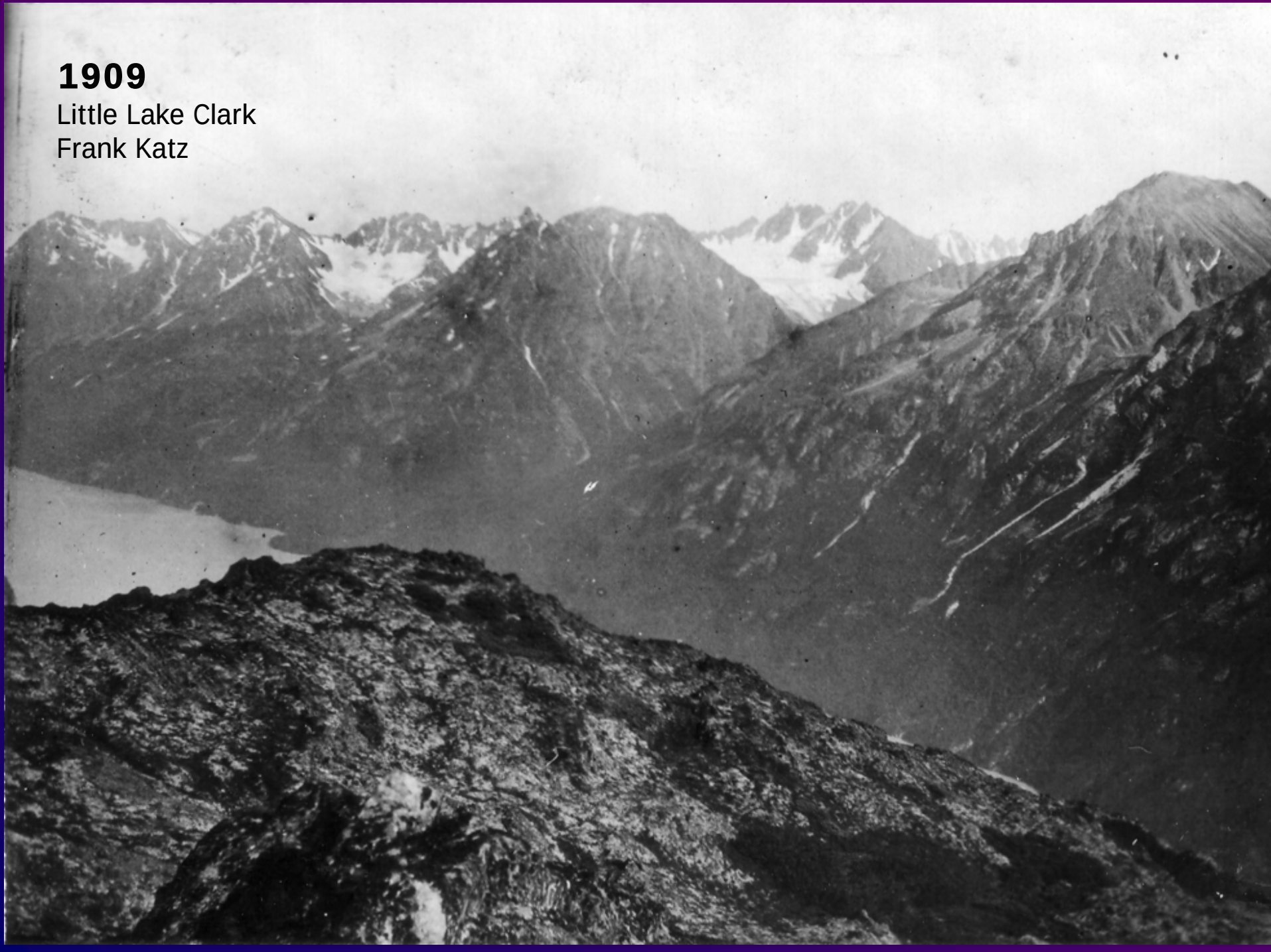
Figure 121. Continuation of panorama of the Two Lakes area in 1928 (S. Capps) and showing the expansion of white spruce and paper birch trees. 1928 photo courtesy USGS.

2004
Jorgenson



1928 photograph by Bernard Hubbard of The Tusk and Another River, LACL.

2004
(Torre Jorgenson)


1909
Little Lake Clark
Frank Katz

A typical palustrine successional sequence is apparent at this site, as live vegetation and accumulating peat have replaced open water. Later-successional species including buckbean, purple marshlocks, and sedges are dominant in the wetland. Deciduous trees and tall shrubs appear to be taller and more abundant in the background. Disturbance associated with the 1912 eruption appears to have been minimal here. 1917 photo courtesy National Geographic Society.

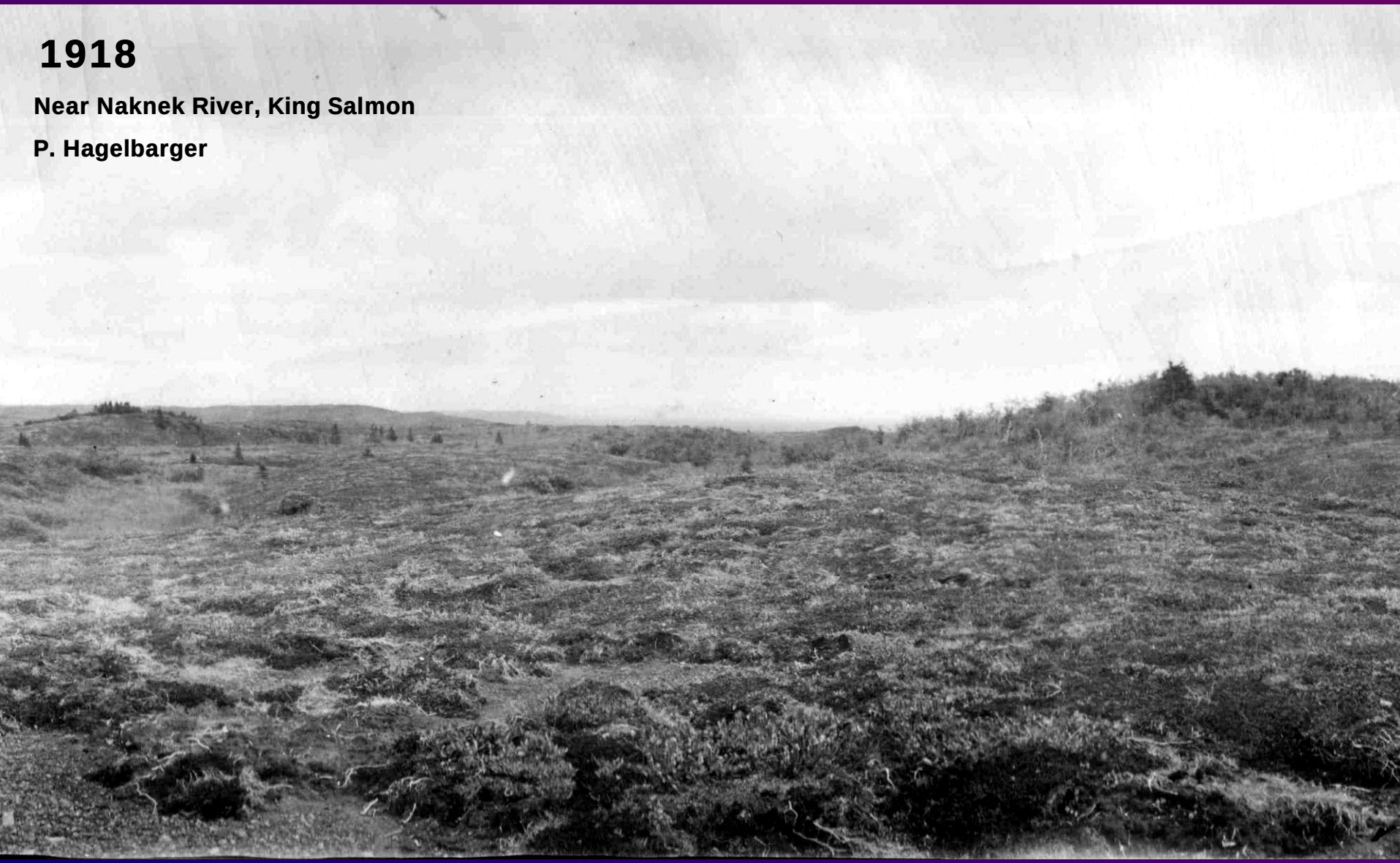
Figure 27. Looking south-east across Kukak Bay from Aguchik Island in 1919 (P. Hagelbarger) and

2005
Jorgenson

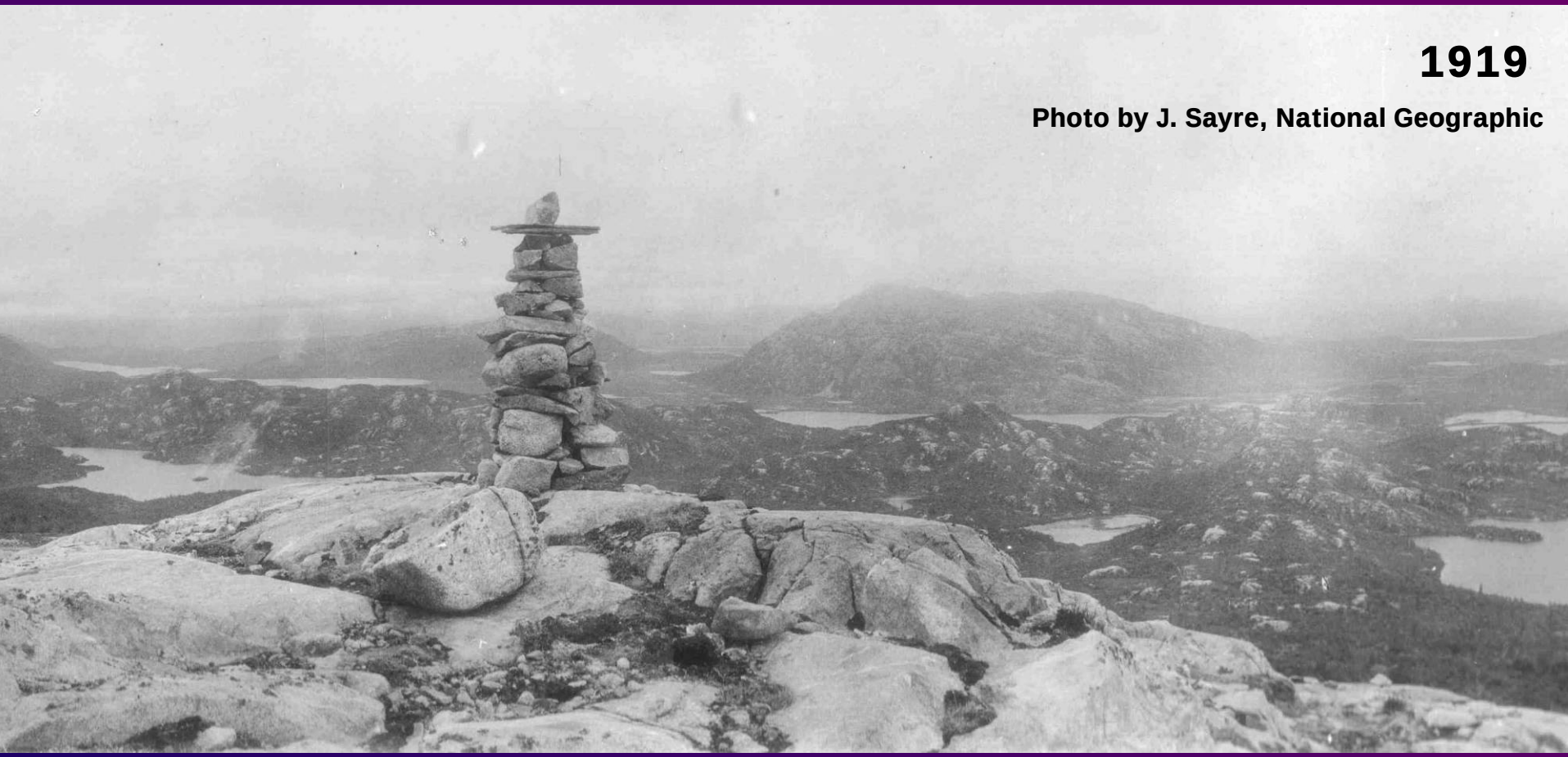
1918

Near Naknek River, King Salmon

P. Hagelbarger

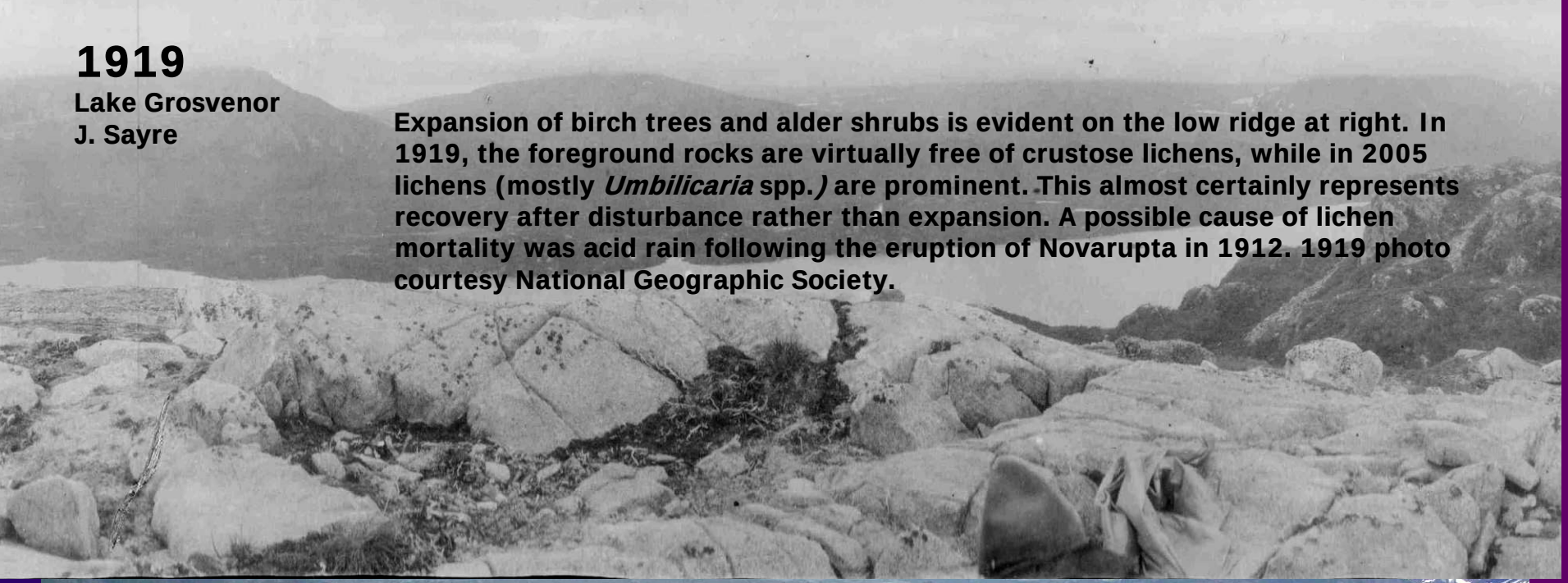


2005
G. Frost

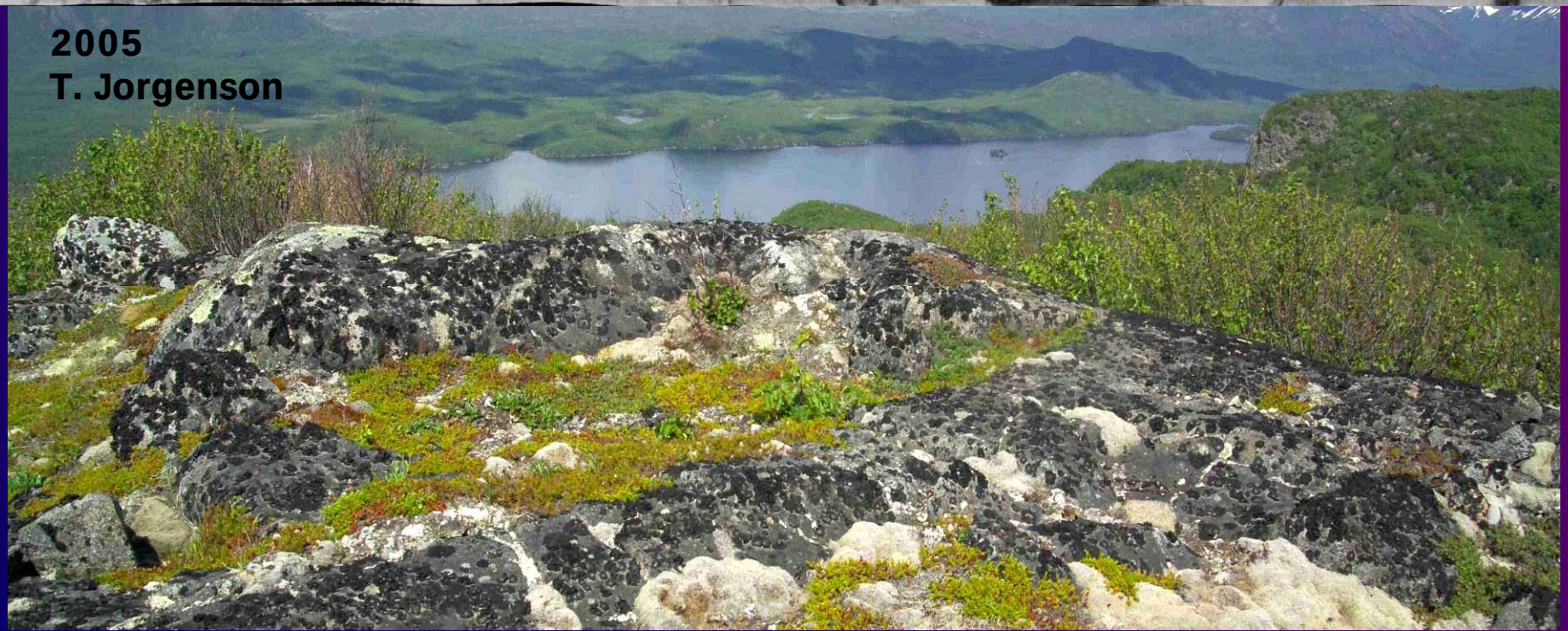


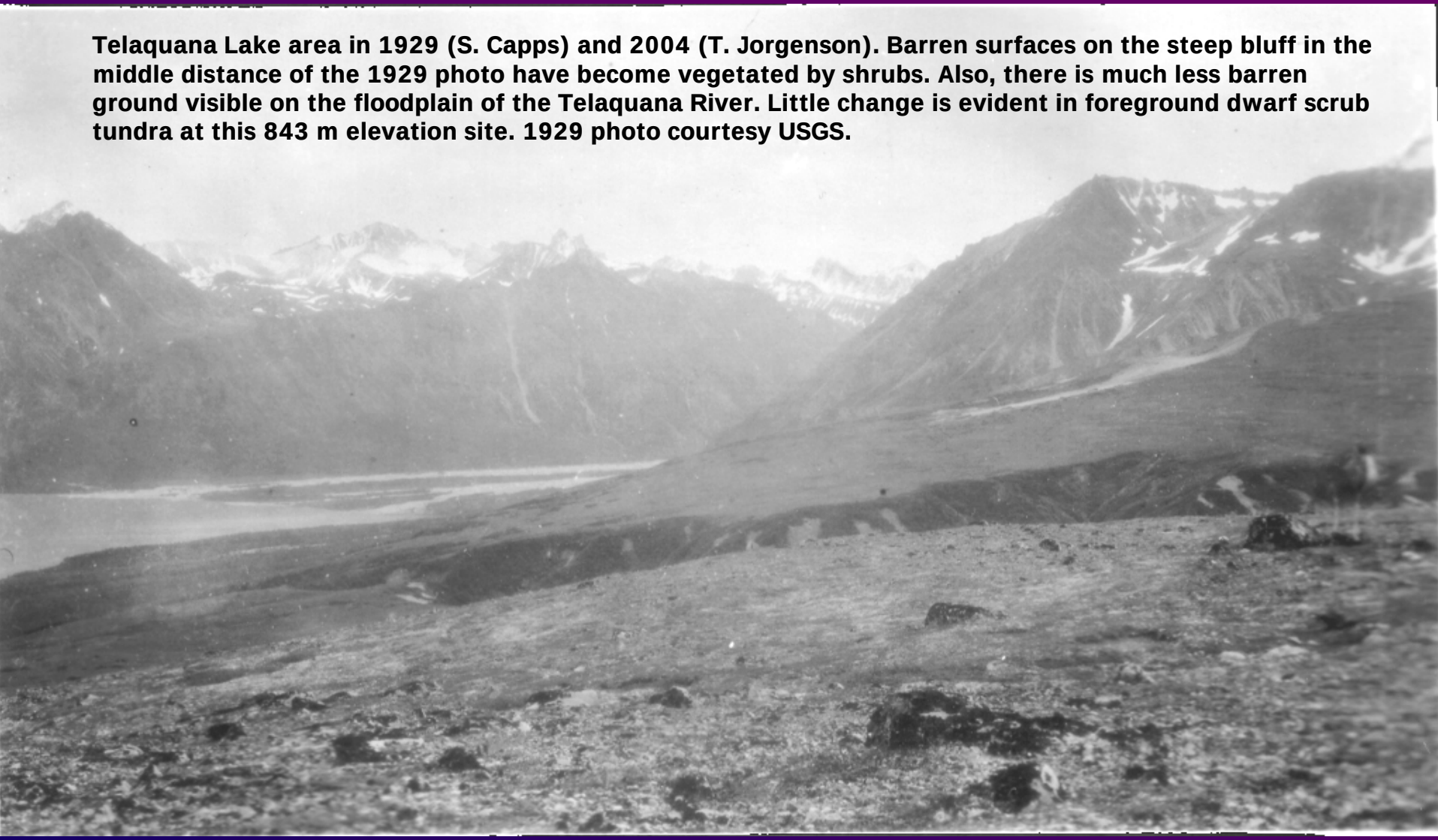
Overlooking area between Lake Grosvenor and lower Savonoski River in 1919 (J. Sayre) and 2005 (T. Jorgenson). Trees and shrubs have overgrown most of the rock outcrops visible in the original image. A lake bottom (far right background) has also drained and become vegetated. Absent in 1919, crustose lichens are now conspicuous on the rocks around Sayre's toppled cairn. This almost certainly represents recovery after disturbance rather than expansion. A possible cause of lichen mortality was acid rain following the eruption of Novarupta in 1912. 1919 photo courtesy National Geographic Society.

2005
Jorgenson



Expansion of birch trees and alder shrubs is evident on the low ridge at right. In 1919, the foreground rocks are virtually free of crustose lichens, while in 2005 lichens (mostly *Umbilicaria* spp.*)* are prominent. This almost certainly represents recovery after disturbance rather than expansion. A possible cause of lichen mortality was acid rain following the eruption of Novarupta in 1912. 1919 photo courtesy National Geographic Society.



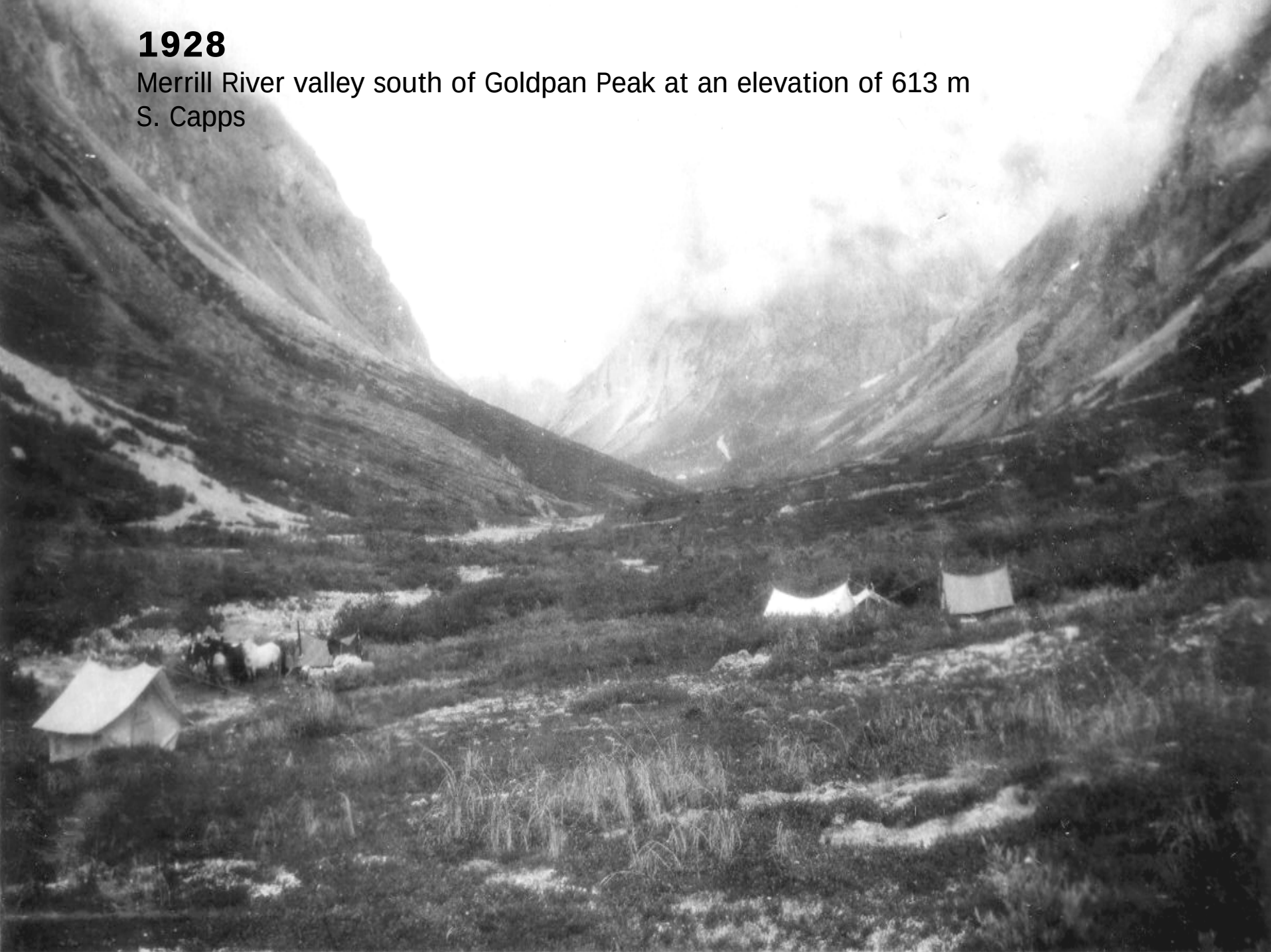


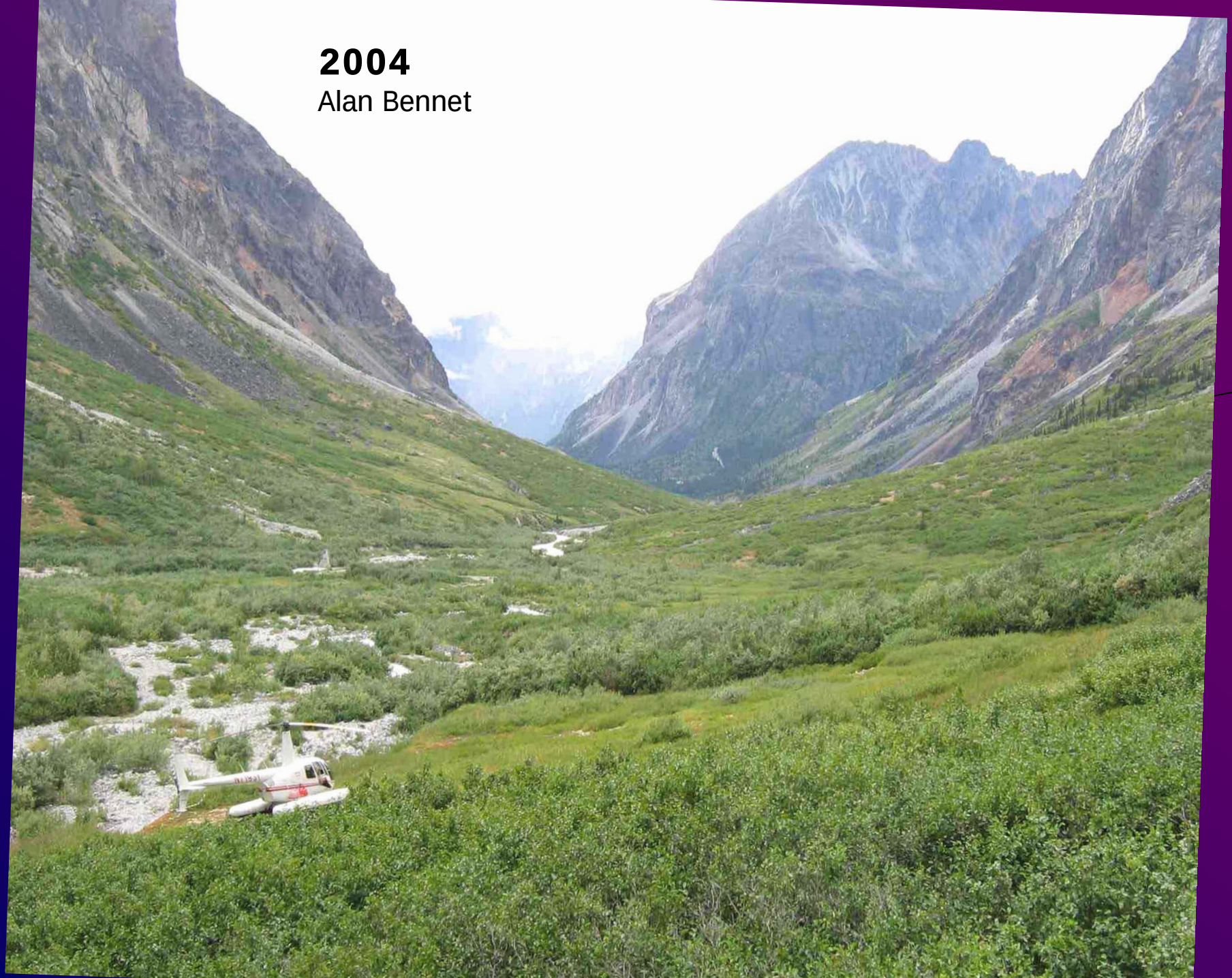
Telaquana Lake area in 1929 (S. Capps) and 2004 (T. Jorgenson). Barren surfaces on the steep bluff in the middle distance of the 1929 photo have become vegetated by shrubs. Also, there is much less barren ground visible on the floodplain of the Telaquana River. Little change is evident in foreground dwarf scrub tundra at this 843 m elevation site. 1929 photo courtesy USGS.

1928

Merrill River valley south of Goldpan Peak at an elevation of 613 m

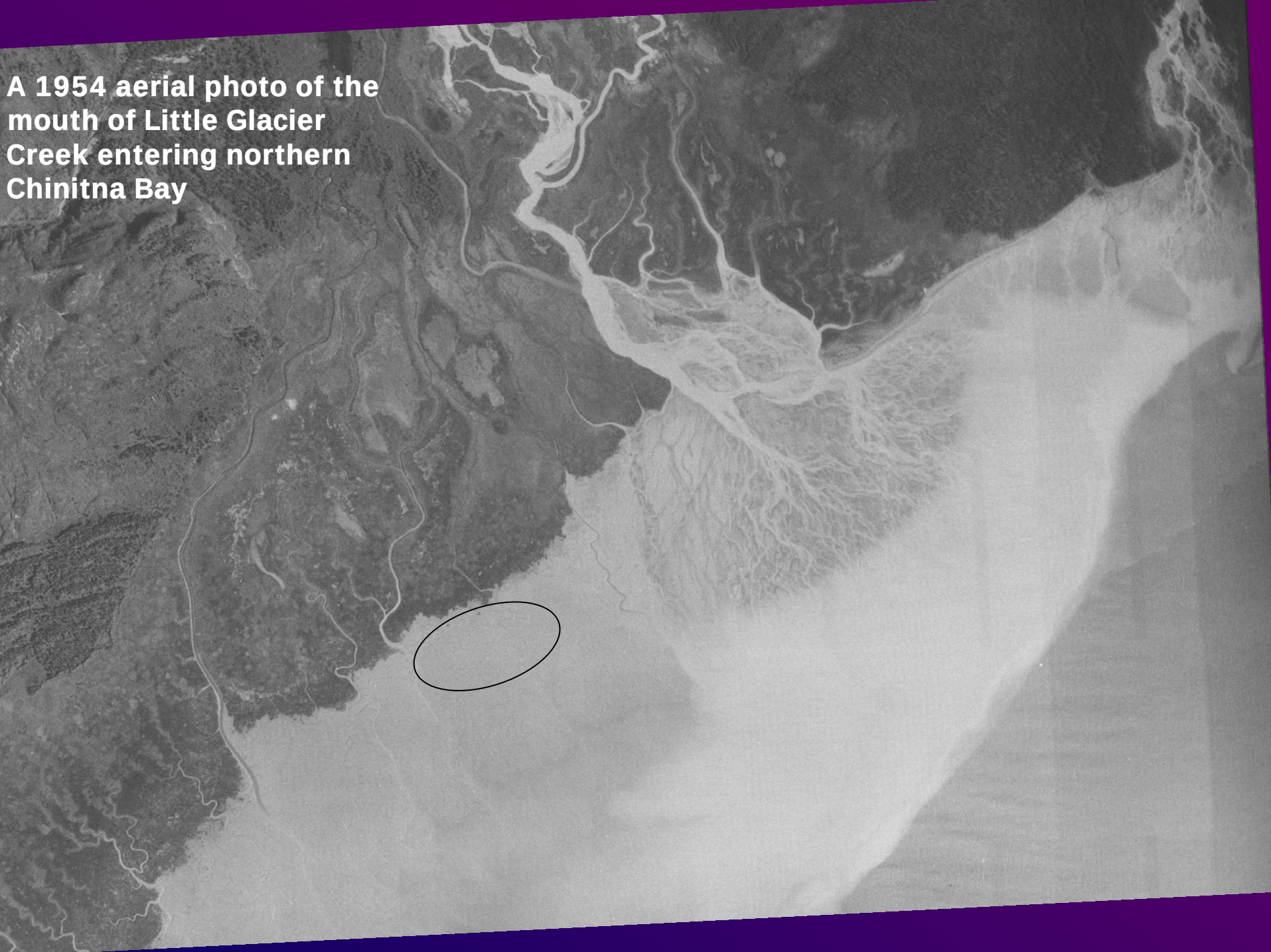
S. Capps




2004
Alan Bennet

Panorama of middle and Expansion of white spruce and tall shrubs over a 77-year period is apparent at this 854 m site. Dominant tall shrubs at this site include resin birch (*Betula glandulosa*) and alder. Scattered balsam poplar trees are also present. 1927 photo courtesy USGS.

2004
Jorgenson



A 1954 aerial photo of the mouth of Little Glacier Creek entering northern Chinitna Bay

2004 Ikonos image

Wet coastal meadow near the head of and Comparison shows the persistence of an herbaceous plant community at this site that probably experienced seismic uplift following the 1964 earthquake. A spruce forest has remained undisturbed on the hillside at left over the 56 year interval. 1948 photo courtesy USGS.

1921
Seal Spit
Chinitna Bay
Frank Moffit

Grunert trapping cabin site at and in Modification of coastal landforms appears to have been limited. Cover of tall willow and alder shrubs has increased at the base of the hillside. Forbs (primarily tall umbels) have become much more abundant in the meadow in the foreground; this area was probably dominated by beach ryegrass in 1932. 1932 photo courtesy Santa Clara University Archives.

CONCLUSIONS

Photographs during the last century reveal:

- **Glaciers have retreated rapidly, except those covered by Katmai ash**
- **Coastline uplift has caused expansion of salt meadows**
- **Channel migration keeps braided floodplains mostly barren**
- **Alder shrub expansion and colonization rapid**
- **Treeline appears to be moving upward**
- **Alpine tundra showed little change, although dwarf birch may be more abundant.**