
Hydrological Interviews & Observations in Dyea, AK 2021-2024

A Klondike Gold Rush National Historical Park – Natural Resources Management Data Record

November, 2024

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This document is a collection of hydrological notes, photographs, interviews and observations made by people who lived in or worked in Dyea from 2021 to 2024. Hydrological events and associated geomorphological changes related to high water (flood) events are emphasized.

Sections

A) Interviews with Dyea residents who experienced the 20.11 ft. Taiya River flood of 13 October 2022.

B) Bank stability at un-armored shore - photo record at Dyea NPS campground entrance, 2021 to 2024.

C) Backflow at high water into relic river channel, photo documentation at Dyea NPS campground entrance in flood of 26 September 2022.

D) Blocked meander at municipal campground – sediment deposits after October 2022 floods.

Background

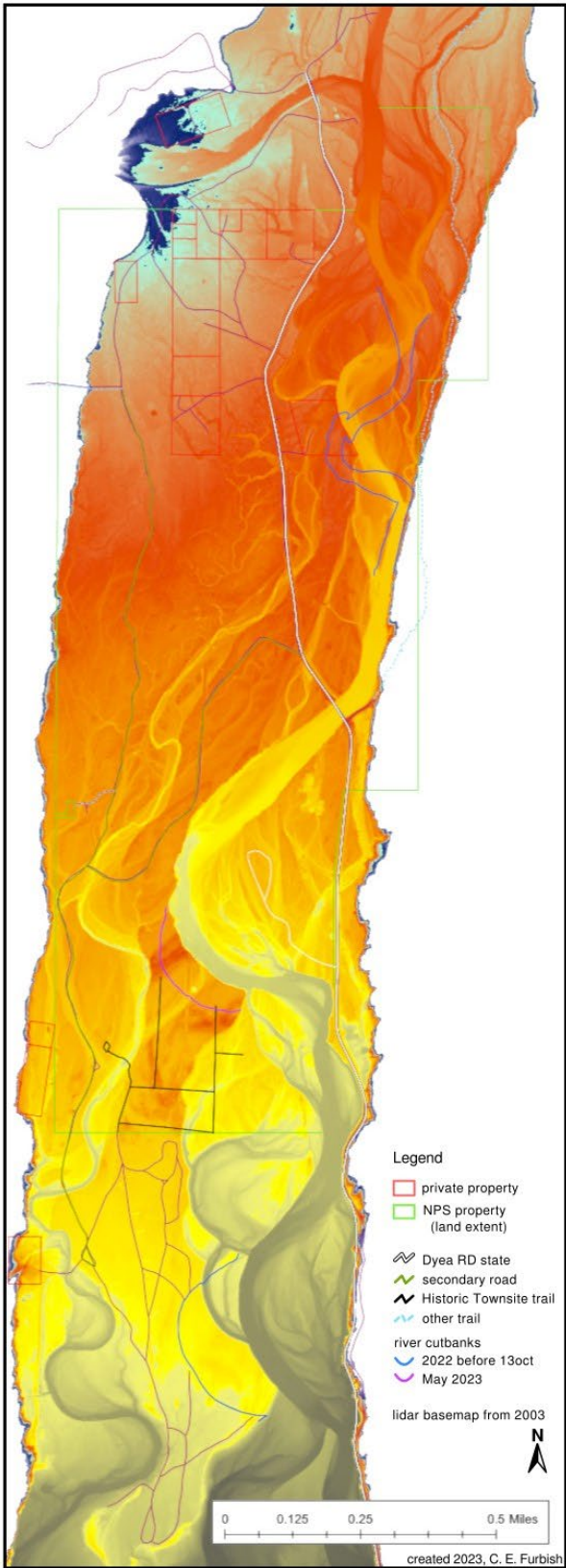
Dyea is the informal hamlet near the mouth of the Taiya River in the borough of Skagway, AK. The location is at the terminus of the ~250 mile long Chatham Strait-Lynn Canal fjord of southeast Alaska. The Dyea area is often described as the low elevation flat lands from West Creek (north) to the Taiya Inlet bay (south). See area orientation maps on next page.

Dyea is a delta of mostly sandy to coarse sedimentary river deposits severely confined between steep, granite mountainsides. The predominant source of sediment is meltwater from glaciers and icefields, including reworked sediments associated with active river channels. Development of Dyea landforms and river channels is also influenced by glacial isostatic rebound (land uplift over millennia after weight of glaciers removed) and mean daily tidal ranges of about 17ft.* The delta includes a large, shallow, gradually-sloping unvegetated intertidal flats area; emergent-vegetated estuarine shoals and bars; and vegetated terraces and relic river channels forming meadows, shrublands and forests.

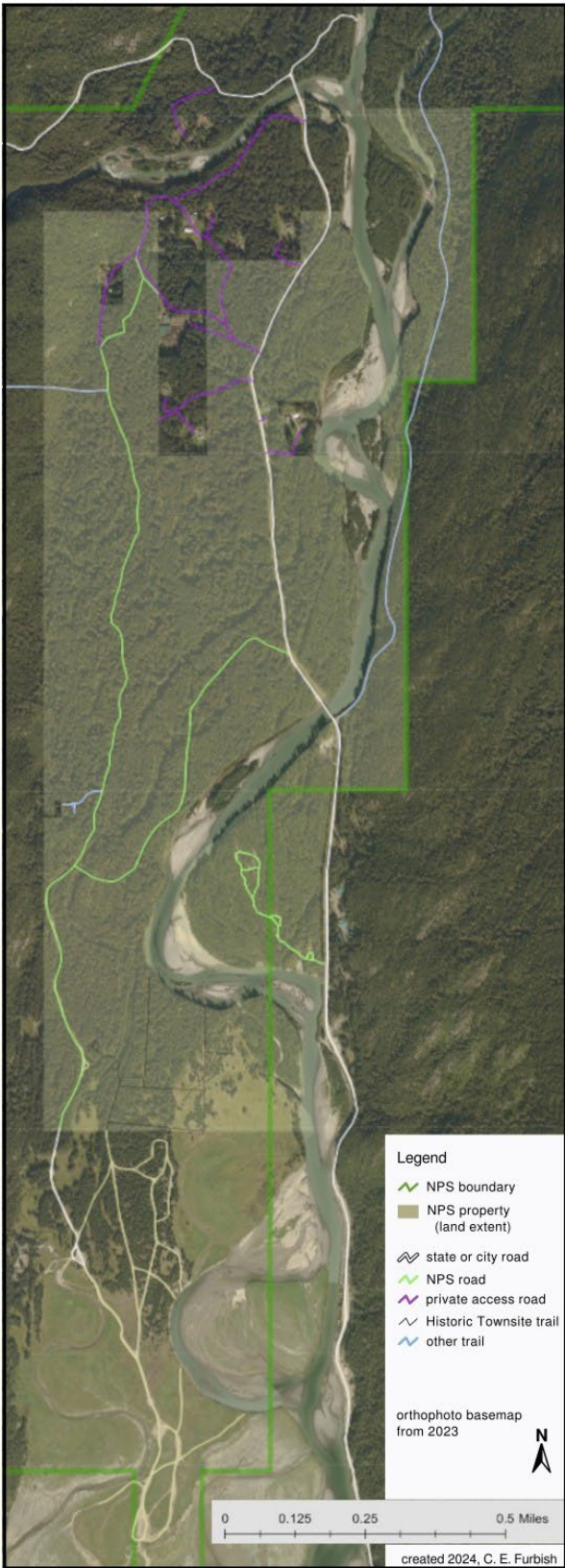
* USGS Skagway tides; <https://www.tidesandcurrents.noaa.gov/stationhome.html?id=9452400>

Area Orientation Maps

DYEA LANDWATER SURFACE ELEVATION 2003



DYEA AERIAL ORTHOPHOTOGRAPHY 2023



A) Dyea Resident Interviews - Taiya River October 2022 flood and general flooding history

The Taiya River flood of 13 October 2022 crested at 20.11 feet, with a provisional discharge of 20,300 cubic feet per second (USGS cite). This was the largest Taiya River recorded flood since 1967 (Curran 2023).

The residents of Dyea who were present during the flood have first-hand knowledge of river overflow behavior during the flood event. They also have knowledge of Taiya River conditions in the past, leading back to the 1970s.

The resident owners of 4 lots agreed to be interviewed about their experiences. The interviews are presented on maps in the following pages.

The interview maps are identified by the interviewer's name on the reference map to the right.

Acknowledgements

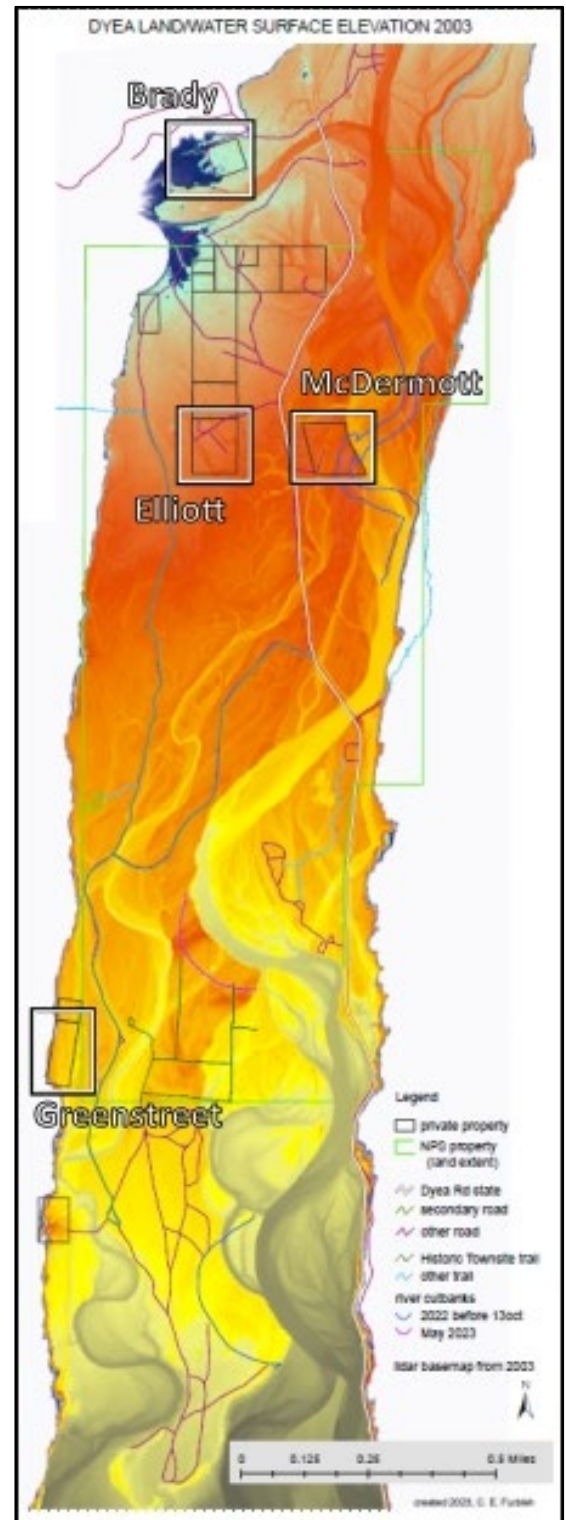
Thank you to the residents of Dyea who agreed to share their experiences during the 13 October 2022 flood and their general hydrology observations over the years.

References

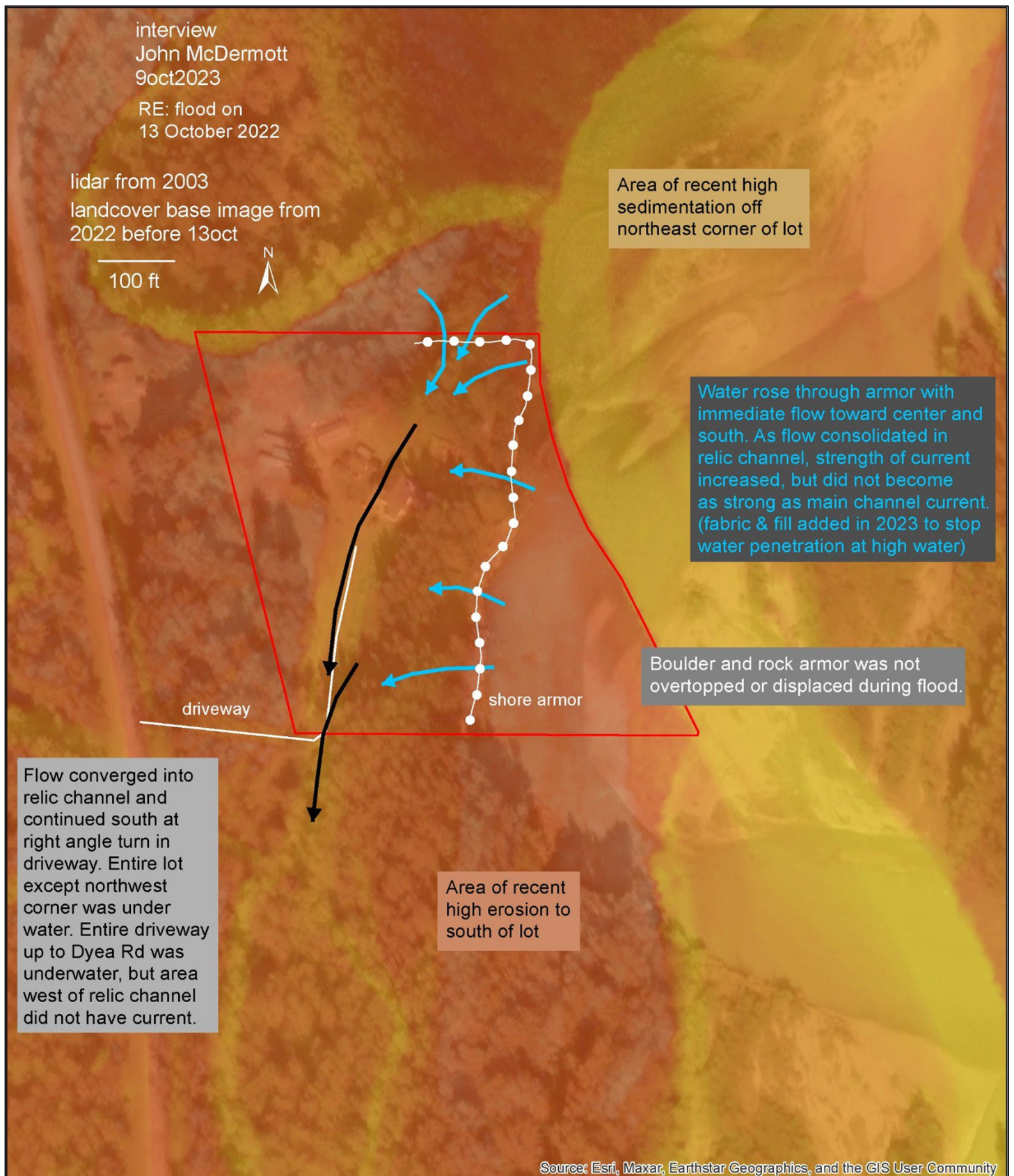
Curran, J.H., 2020, Hydrology and geomorphology of the Taiya River near the West Creek Tributary, southeast Alaska: U.S. Geological Survey Scientific Investigations Report 2020–5059, 57 p., <https://doi.org/10.3133/sir20205059>.

Curran, J.H., 2023, personal communication.

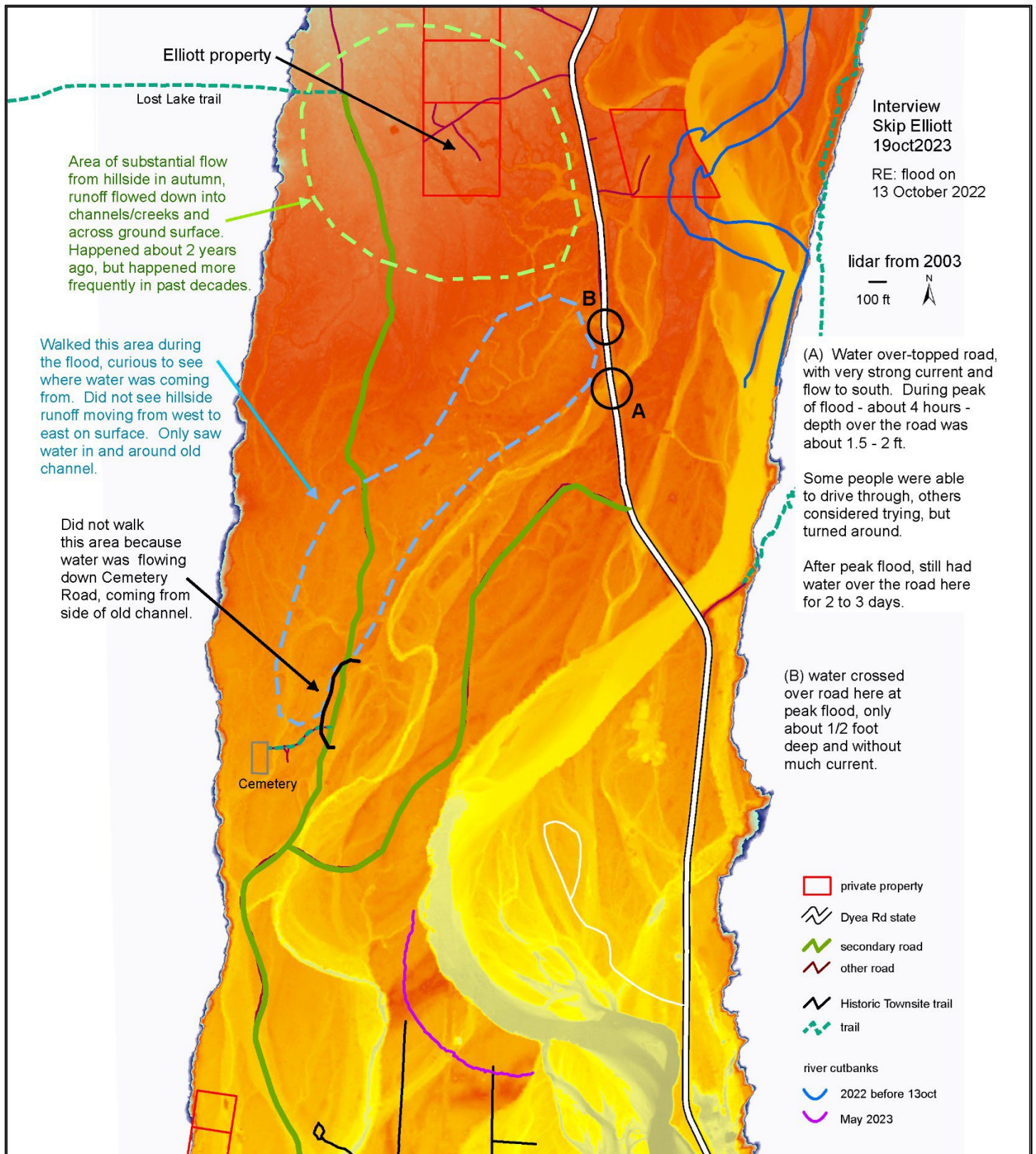
USGS cite: Water Data for the Nation, Taiya R NR Skagway AK, accessed 24 Nov 2023, <https://waterdata.usgs.gov/monitoring-location/15056210/#parameterCode=00060&showMedian=true&startDT=2022-10-12&endDT=2022-10-14>



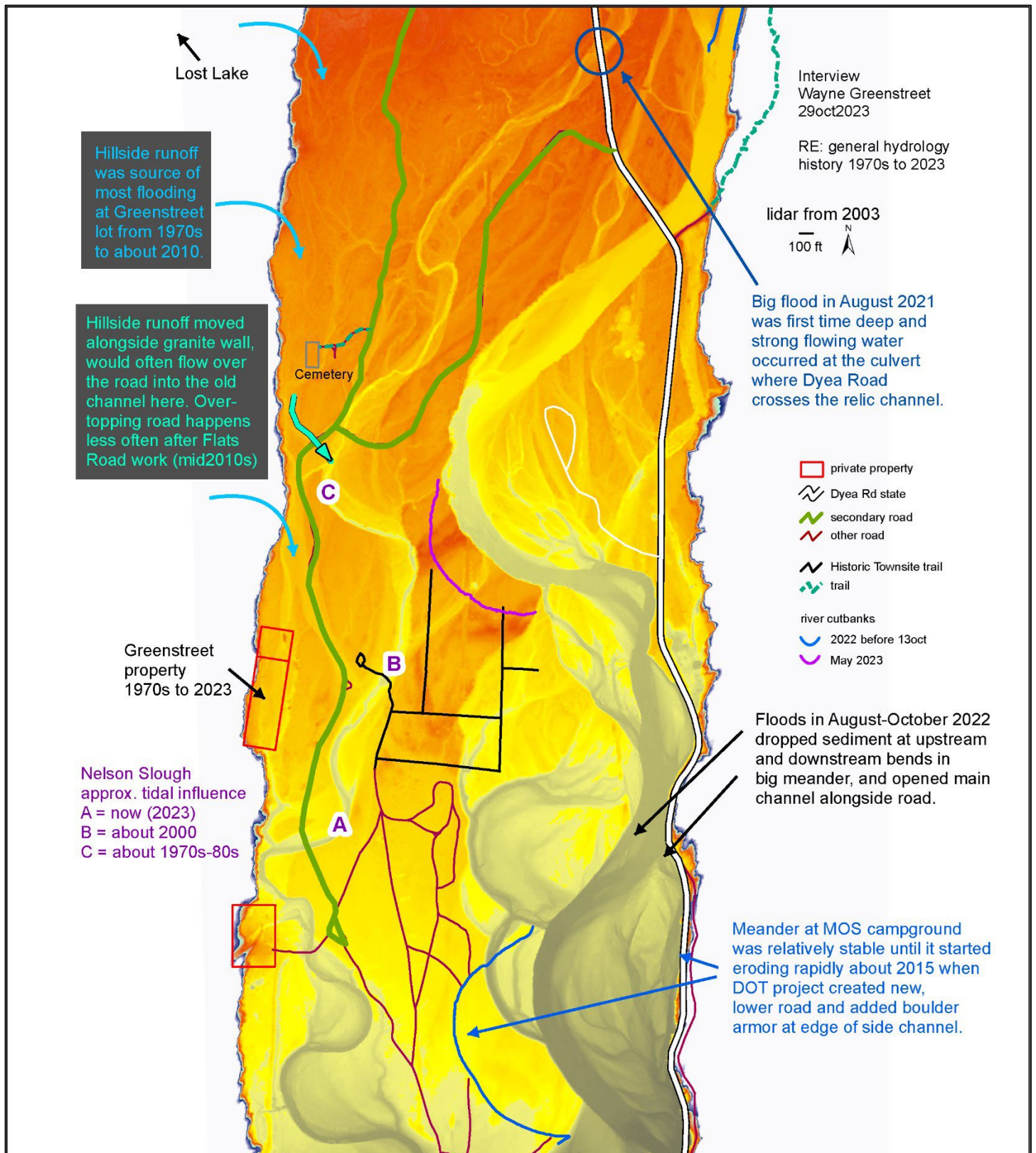
John McDermott Interview 13oct2023



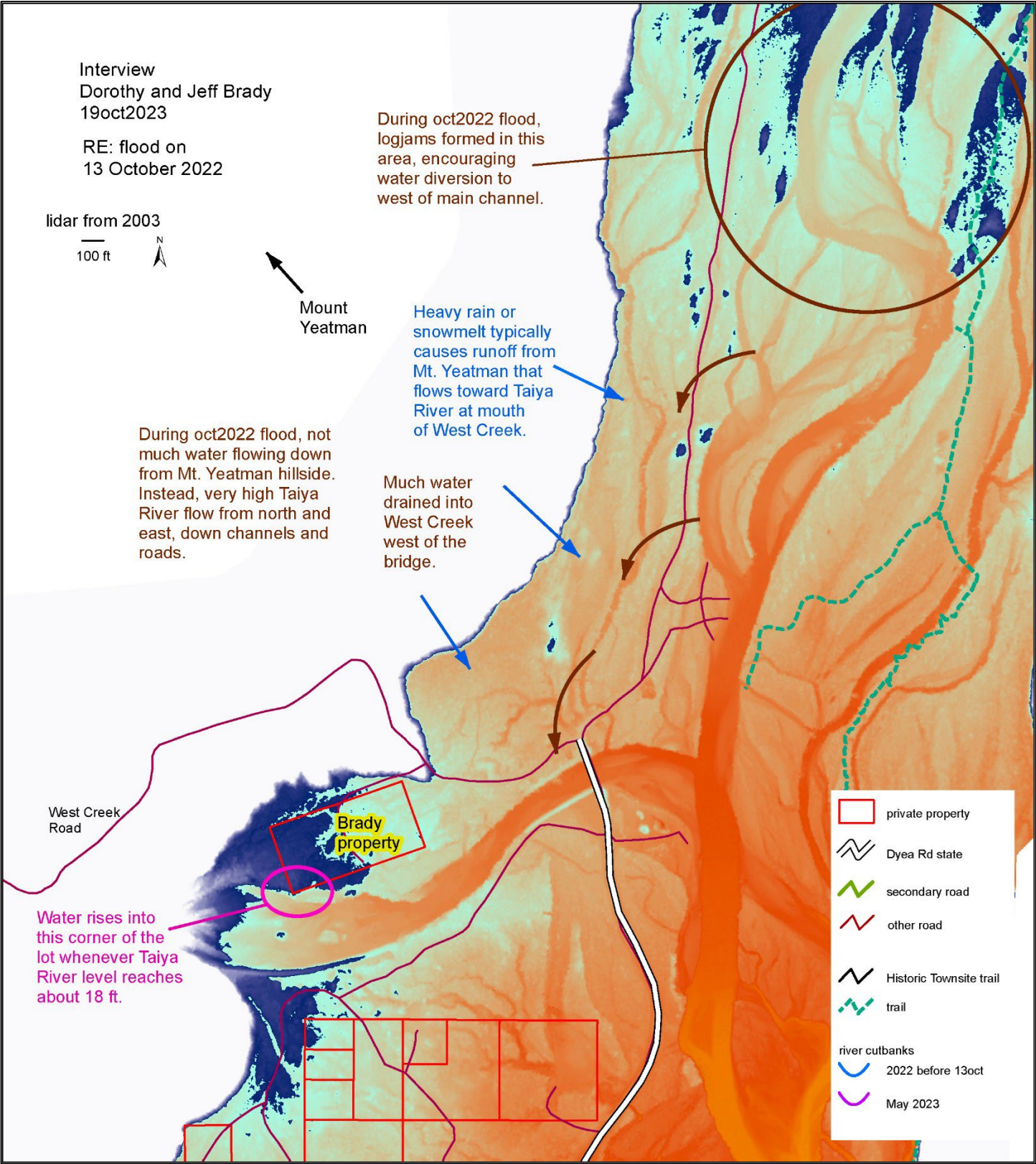
Skip Elliott Interview 19oct2023



Wayne Greenstreet Interview 29oct2023



Dorothy and Jeff Brady Interview 19oct2023



B) Bank stability photo record at Dyea NPS campground entrance, 2021 to 2024.

The area of interest is the Taiya River shoreline at the intersection of NPS campground entrance area with the boulder-armored shore berm protecting Dyea Road. This photo record was initiated in January 2021 to document shoreline changes to the un-armored shore in the area of interest. The last photos in the record are from June 2024, and the last description of the area is from a site visit in October 2024.

During the time period of this record, the Taiya River experienced eleven flood events, with associated damage to KLGO infrastructure in Dyea. The flood on 13 October 2022 was the most severe Taiya River flood since the flood of 1967 (Curran 2023) and exceeded the relatively recent damaging flood of July 2002.

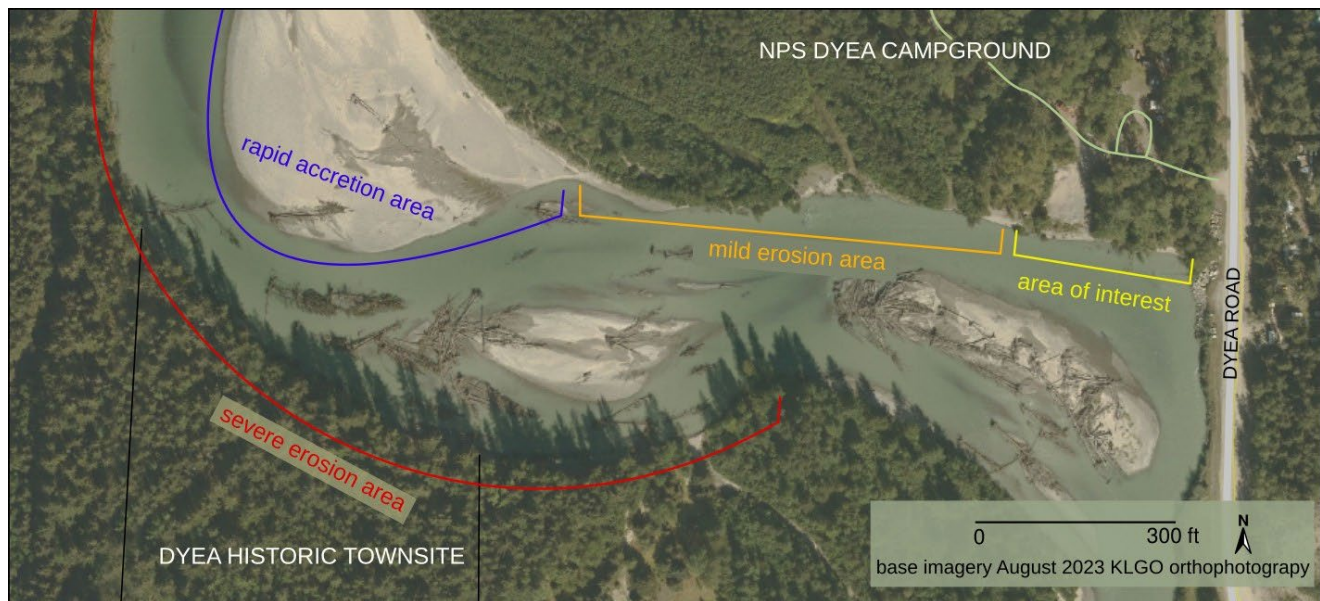
The 1967 flood was calculated to have reached a discharge of 708m³/s for Dyea (Curran 2020), and the 2002 flood had a calculated discharge of 527m³/s at the Taiya River streamgauge location. The 2002 flood level (gage reading) was 19.86ft, and the 13 October 2022 gage level reached 20.11ft (NOAA-AHPS 2024).

Flood Event	Discharge (m ³ /s)	Stream gage (ft)
1967 - September	708	--
2002 - July 23	527	19.86
2022 - October 13	--	20.11

USGS record of floods (gage level greater than 16.5) from January 2019 to November 2024.

- (1) 17.78 ft on 10/08/2023 (P)
- (2) 16.90 ft on 08/12/2023 (P)
- (3) 20.11 ft on 10/13/2022
- (4) 16.61 ft on 10/09/2022
- (5) 19.30 ft on 10/01/2022
- (6) 16.62 ft on 09/29/2022
- (7) 18.84 ft on 09/26/2022
- (8) 16.86 ft on 09/03/2022
- (9) 17.58 ft on 08/17/2022
- (10) 16.58 ft on 08/06/2022
- (11) 19.64 ft on 08/13/2021

(P) = provisional
USGS Taiya River TYAA2 gage
NOAA-AHPS, accessed Nov 2024



The data indicate that the western half of the “area of interest” experienced bank steepening and material loss, but not enough to remove 4 sentinel vegetative features used to track change. Mild bank erosion was discernable in the eastern half of the area of interest. In the “mild erosion area” to the west, where 2 relic river channels connect with the main channel, shoreline recession and bank erosion was observed but not tracked. However, the overall extent of shoreline change in that vicinity was mild compared to the severe erosion and rapid accretion change areas further west.

In summary, the time period of this photo record included a high frequency of flood events and the most severe flood since 1967. However, the record shows that no substantial erosion occurred at the shoreline area of interest from 2021 to 2024.

SETTING and FEATURES

Four vegetative features within the area of interest were identified for references at the edge of the shore berm on 22 January 2021. These features were photographed throughout the period, ending on 30 June 2024. A site visit description, without photos, completed the record on 19 October, 2024.

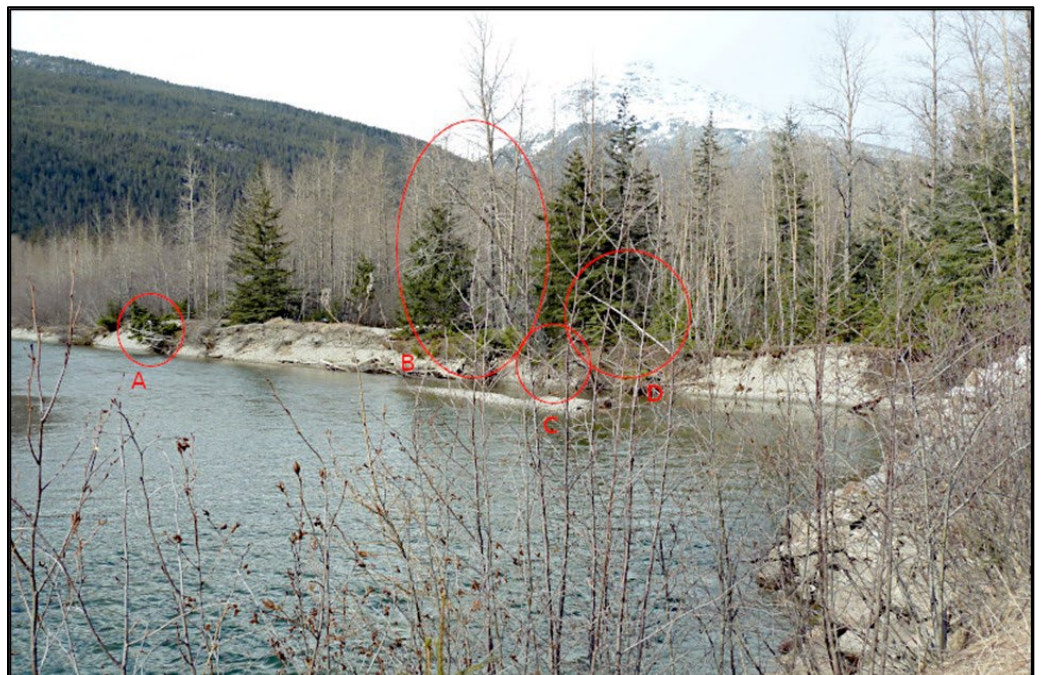
22 January 2021

- A) three dead tree trunks at berm edge, leaning away from shore
- B) a double trunk tree at berm edge, leaning away from shore
- C) a small live tree, sticking out horizontally from below the berm
- D) a small, dead tree trunk at berm edge, leaning away from shore



6 April 2024

- A) three dead tree trunks below the berm, broken off and leaning nearly horizontal
- B) double trunk tree at berm edge, but leaning more steeply away from shore
- C) small live tree, still in place sticking out horizontally from below the berm
- D) small, dead tree trunk at berm edge, unchanged



Example of photo record tracked features, view point and digital zoom – the photos in this record are of high resolution, allowing digital zoom to view details. If you are reading a printed version of this document, please obtain the digital version to see this effect.



PHOTO RECORD

The photo record consists of matched sets of two images: a broad view showing the shoreline and nearby channel waters (left column), and a closeup of the shoreline showing the tracked features (right column).

The images are at a resolution that allows magnification. The digital version of this document is recommended to adequately view the small images by using zoom when needed.

flood event
----- 19.64 ft on 08/13/2021 -----



2021 august 27



2021 october 7



2022 march 8



----- 16.56 ft on 08/06/2022 -----



2022 august 12



----- 17.58 ft on 08/17/2022 -----



2022 august 19



----- 16.86 ft on 09/03/2022 -----



2022 sept 4



----- 18.84 ft on 09/26/2022 -----



2022 sept 26
at 5pm
(near peak flow)

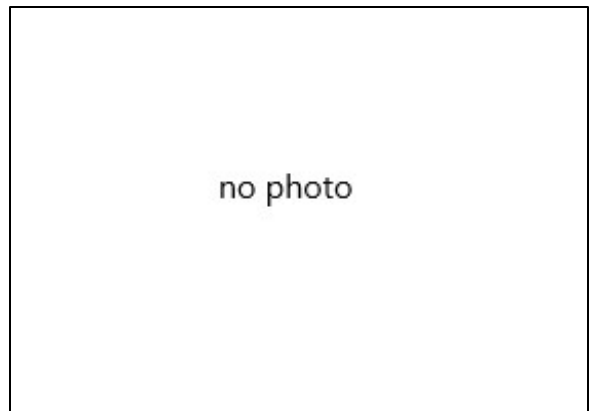


----- 16.62 ft on 09/29/2022 -----

----- 19.38 ft on 10/01/2022 -----



2022 october 3



----- 16.61 ft on 10/09/2022 -----

----- 20.11 ft on 10/13/2022 -----



2022 october 16





2023 february 18



2023 june 2



----- 16.90 ft on 08/12/2022 -----



2023 sept 1





2023 sept 29



----- 17.78 ft on 10/08/2022 -----



2023 dec 28



2024 april 6





2024 june 30



2024 october 19 – site visit: all 4 vegetative features were still present.

Between the features:
some material removed, berm steeper.

Within area of interest, to the east of the features and the road:
some material removed.

To the west of the area of interest (away from the road) past the indicator features, in front of a picnic area, and including the mouths of two intermittentl-flowing creeks formed from relic river channels:
some material removed, berm steeper, shore receded near creek mouths.

REFERENCES FOR SECTION B

Curran 2020, Hydrology and geomorphology of the Taiya River near the West Creek Tributary, southeast Alaska: U.S. Geological Survey Scientific Investigations Report 2020–5059, 57 p., <https://doi.org/10.3133/sir20205059>.

Curran 2023, personal communication.

(NOAA-AHPS) National Weather Service - Advanced Hydrologic Prediction Service. Taiya River data, <https://water.weather.gov/ahps2/hydrograph.php?wfo=pajk&gage=tyaa2> accessed November 2024.

C) Backflow at highwater example at Dyea NPS campground - flood water backflow into relic river channels.

Orientation map: NPS campground entrance area and the two relic river channels that most often activate during flood events (dashed pink lines). Base imagery is 2003 lidar land-water surface elevation, with color ramp from gray (low elevation) to yellow-orange-red (higher elevation).

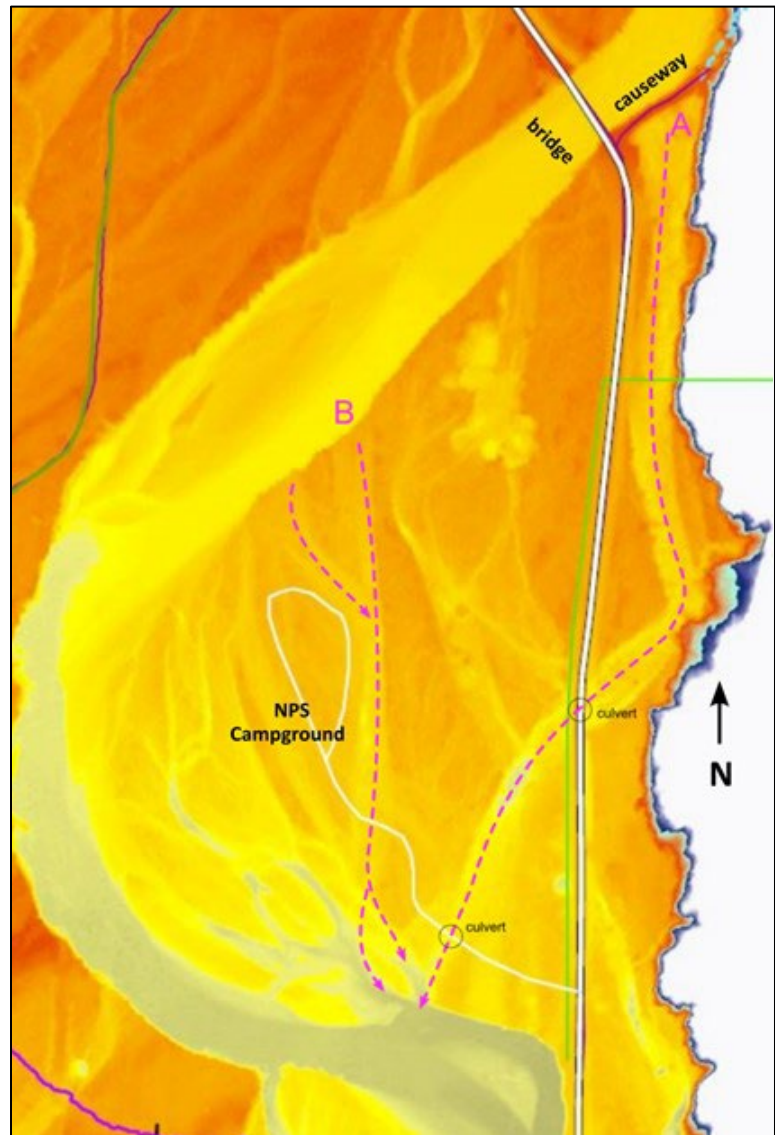
Channel A is cut off from the river at the causeway near the bridge, passes under a large culvert at Dyea Road, and passes under a small culvert at the campground road.

Channel B spreads wider from north to south, and passes over the campground road where it crosses.

Both channels flow with clear water when river levels rise and groundwater also rises to occupy the channels, creating flow from north to south. Hillside runoff will also contribute to channel A flow.

During rapid, higher level flood events, both channels will initially backfill with muddy water from the main river channel near the campground entrance. Groundwater and hillside runoff will later develop enough head to push against the backfill. Eventually, as river levels drop, the channels will drain with clear water.

During very high flood events, channel B as well as all other remnant channels except channel A, may experience direct inflow from the river along the western berm from the bridge to the point bar. All of the low channels west of Dyea Road, including the pond complex at the north end, showed signs that they received direct overwash flow from the river during the 20.11ft flood on 13 October 2022.



NPS Dyea campground area map of relic river channels.

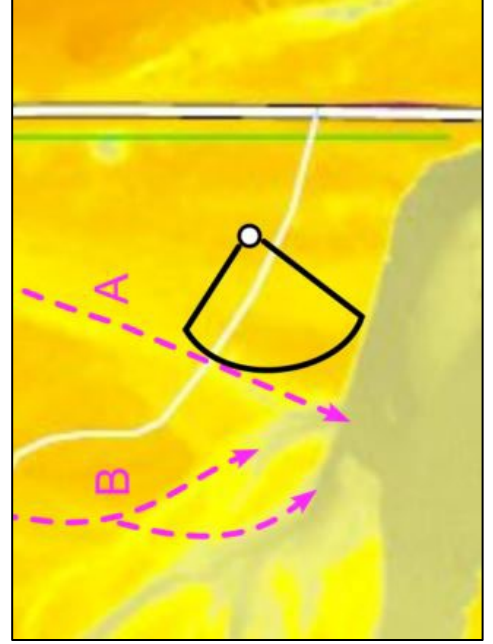


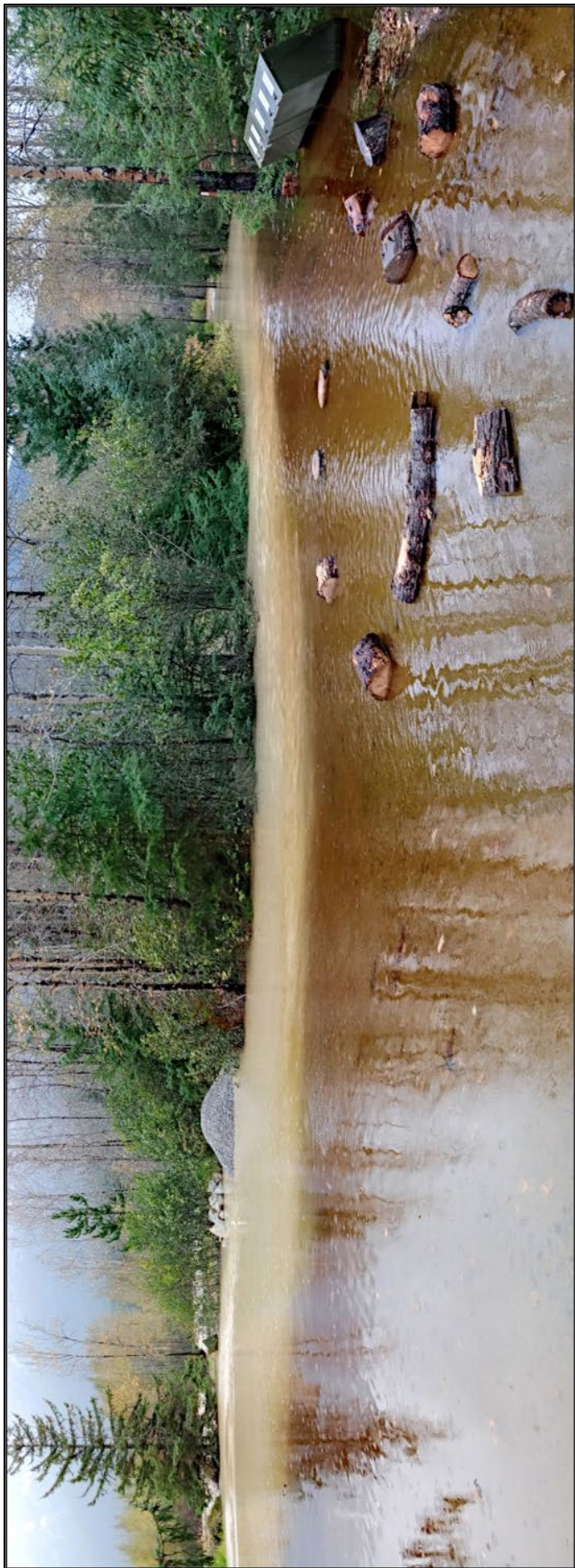
26 September 2022 flood (18.84ft) at about 5pm – near peak flow.

The panorama photo above was taken from the point on the map to the right, and covers the area shown by the arc. The photo was obtained on 26 Sept 2022 at about 5pm - near peak flow during an 18.84 ft. flood event.

Muddy river flood water has entered the channels from the south, and is covering the campground road and surrounding area.

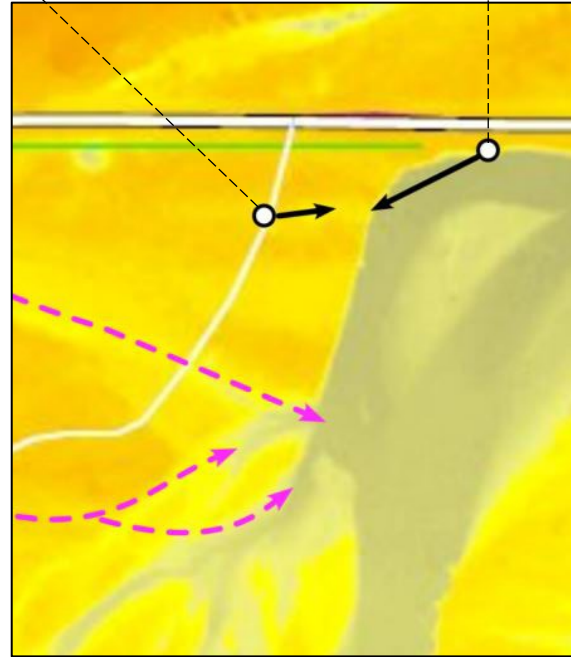
Clear water from channel A is flowing from the north and is being pushed to the east onto the campground road and the entrance parking area.





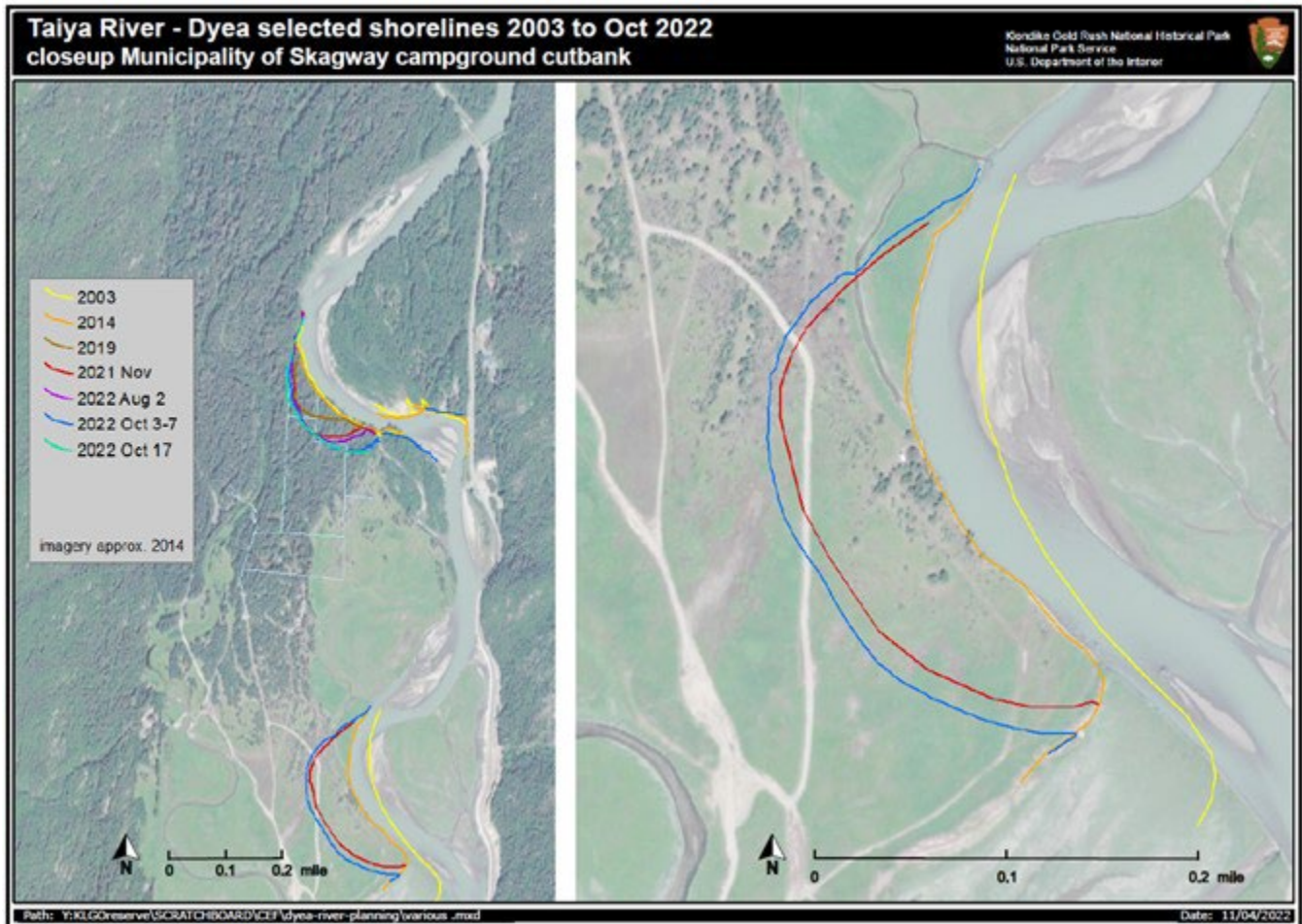
The panorama photo of backflow example without arrows. The photo was obtained on 26 Sept 2022 at about 5pm - near peak flow during an 18.84 ft. flood event.

26 September 2022 flood (18.84ft), at about 5pm - near peak flow
 A smaller incursion of muddy river water reached the edge of the campground road. The water topped the river berm where shown by the blue arrow.
 This water did not connect with the larger backflow from channels A and B.



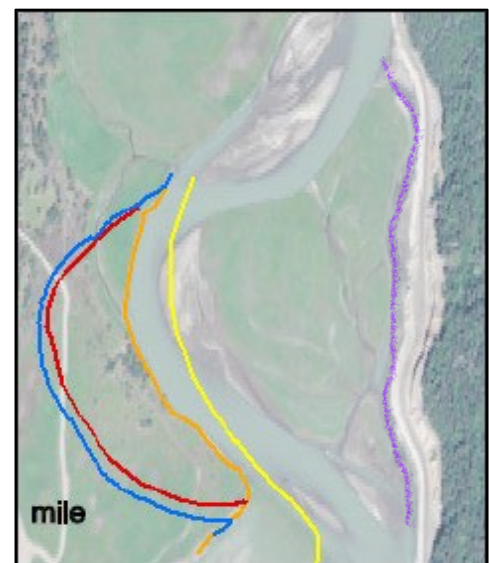
D) Meander at Dyea municipal campground blocked by sediment after October 2022 floods.

A large Taiya River main channel meander had existed for decades east of the Skagway municipal campground prior to October 2022. The meander caused substantial erosion of the campground area from 2014 to 2022. The right panel of the map below shows the meander channel moving westward into the campground infrastructure.



This excerpt from the left panel shows two small small side channels to the east in 2014.

One side channel roughly bisects the meadow vertically. The other hugs the base of the hillside to the east, next to the Dyea Road (purple highlight).



Dyea experienced numerous high water events in late summer to early fall, 2022. Three floods greater than 16.5 gage height occurred in each month; August, September and October.

The 20.11 ft flood of 13 October 2022 caused extensive reworking of the sediments and channels in the meander area, closing off the upstream entrance to the meander and opening the side channel adjacent to Dyea road.



Arrow points to berm formation at former upstream opening to meander.



Main channel opens adjacent to Dyea Road.

From November 2022 through 2024, the new main channel remained in place. The meander channel became a mostly isolated oxbow at low tide, and filled again at high tides.

