MAXAN CREEK AND BULKLEY RIVER
HISTORICAL AIR PHOTO ANALYSIS

APPENDIX 1 - MAXAN CREEK
APPENDIX 2 - BULKLEY RIVER

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APPENDIX 1 - MAXAN CREEK

A: MAP SHOWING THE LOCATION OF HISTORICAL AIR PHOTO COMPILATIONS

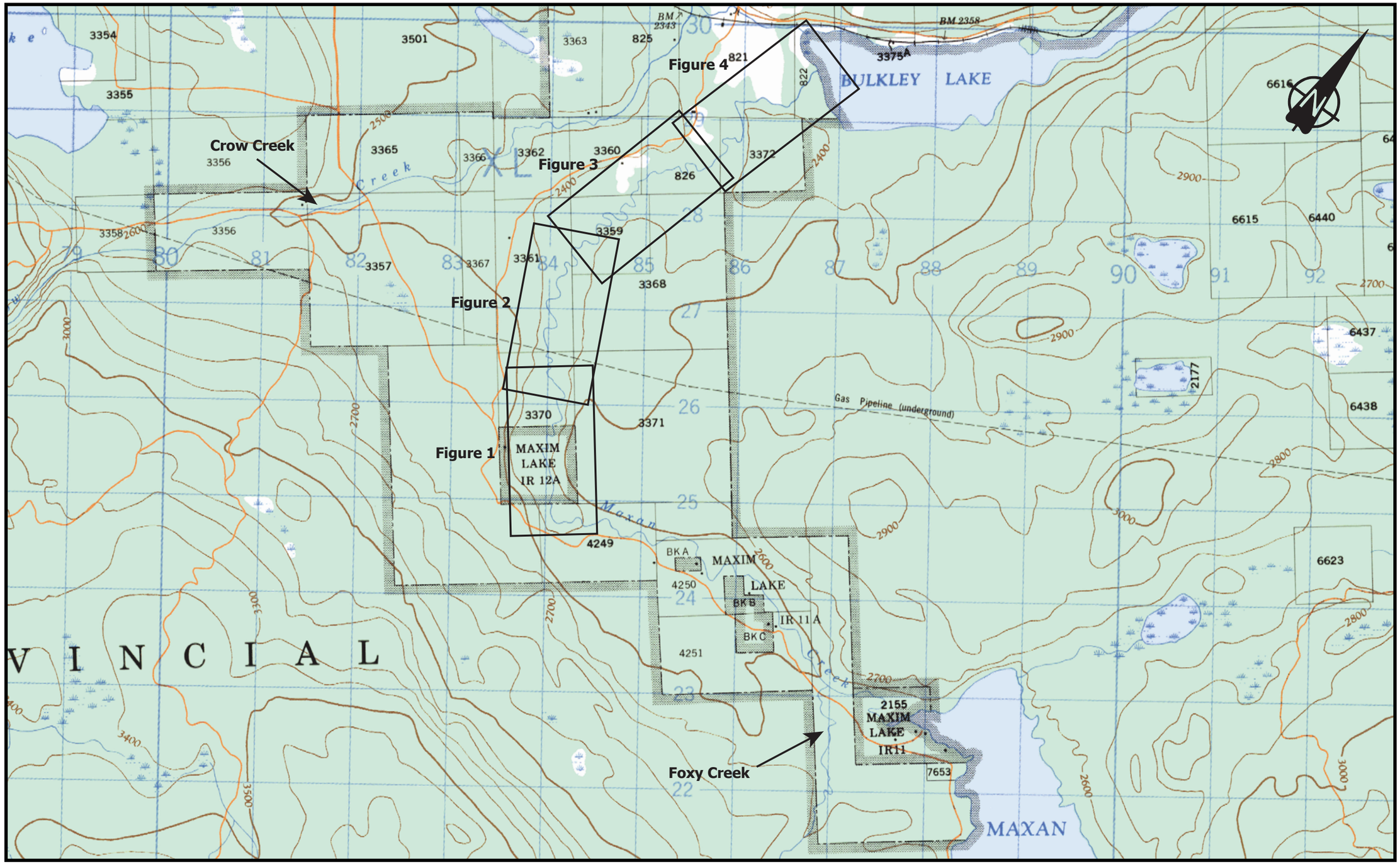
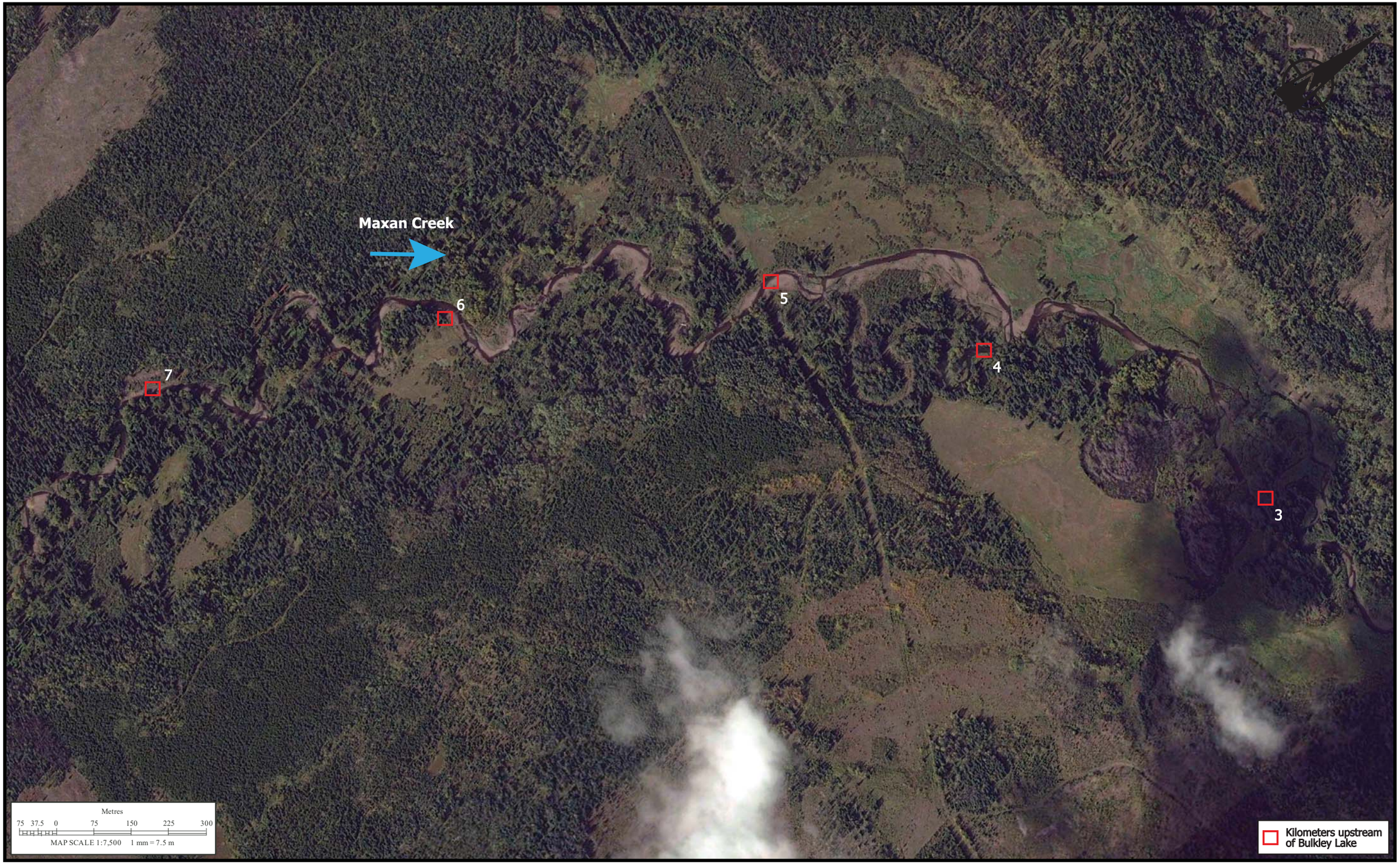


Figure 1: Location of historical air photo analysis, Maxan Creek.

B: 1:7,500 SCALE ORTHOPHOTO MOSAICS
MAXAN CREEK, KM 10 TO 0

September 29, 2019 Google Earth Imagery

Figure 1: Maxan Creek, KM 10 to 7.



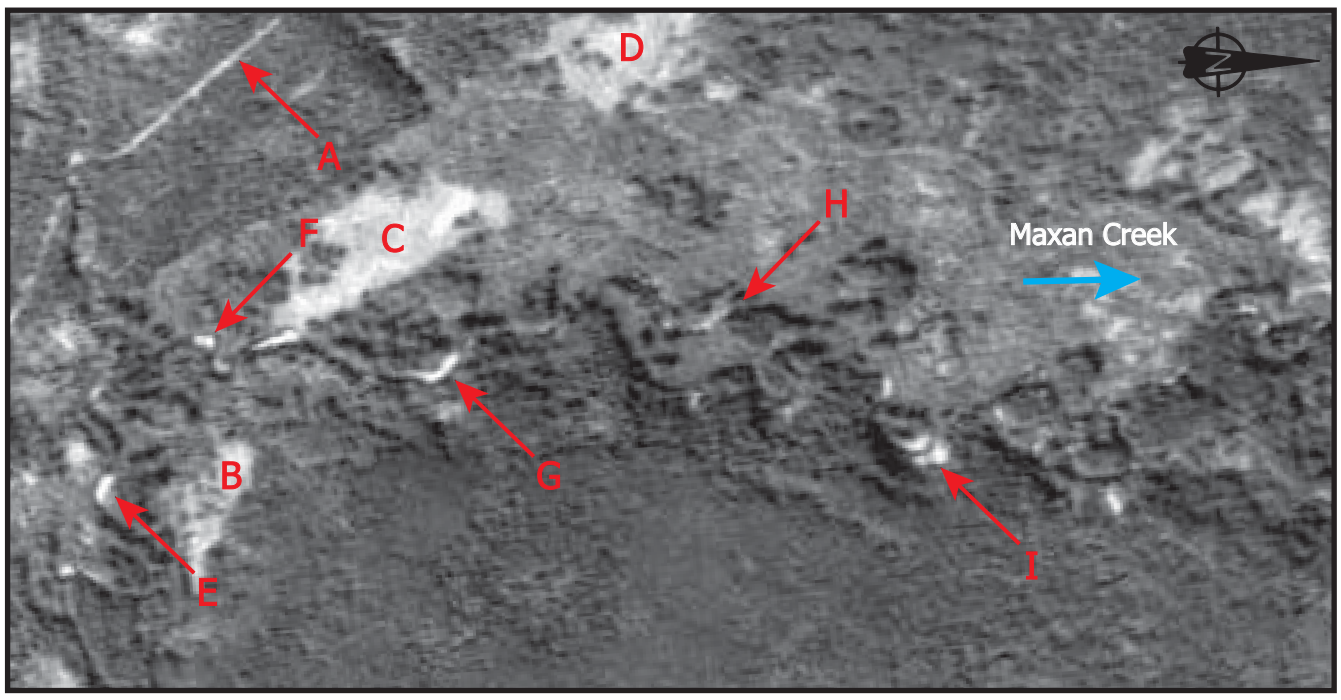
September 29, 2019 Google Earth Imagery

Figure 2: Maxan Creek, KM 7 to 3.

September 29, 2019 Google Earth Imagery

Figure 3: Maxan Creek, KM 3 to 0.

C: HISTORICAL AIR PHOTO ANALYSIS
MAXAN CREEK, KM 10 TO 0



(i)

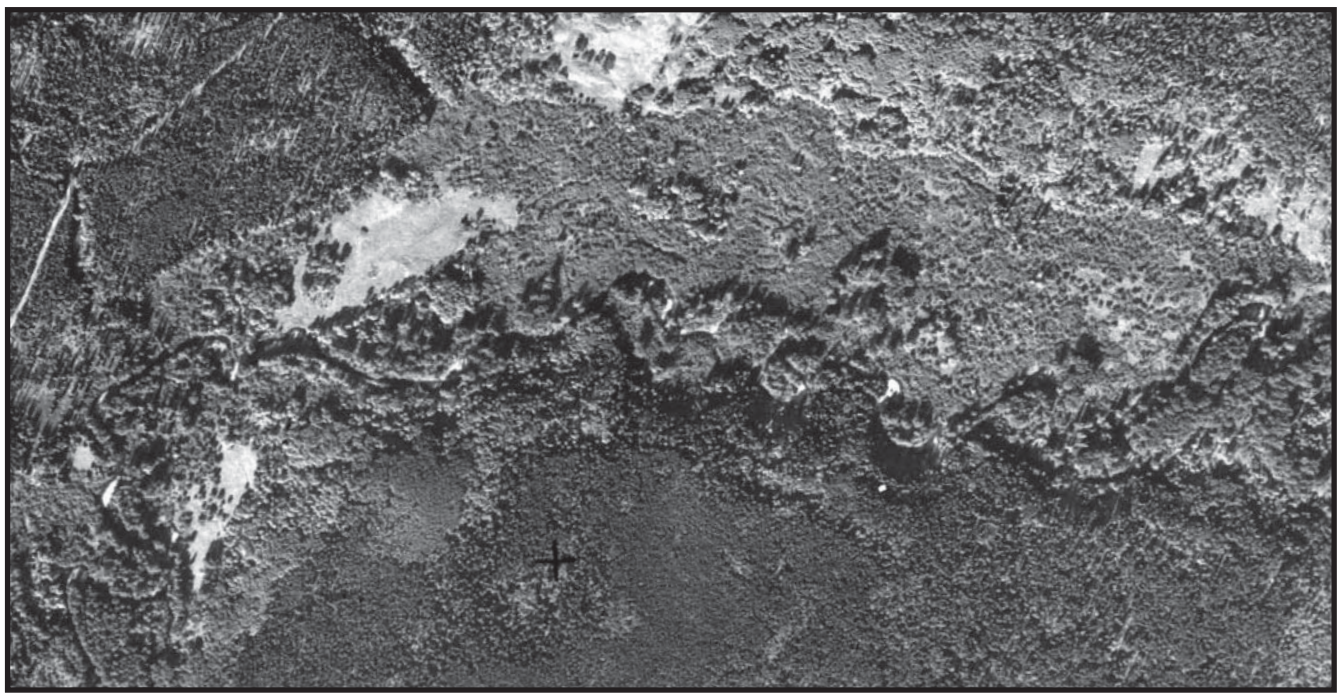
Date: August 22, 1955
A14815 #74

NOTE:

- Road **A**.
- Clearings **B**, **C** & **D**.
- Extent of unvegetated bars exposed at low water indicating areas of active bank erosion **E**, **F**, **G**, **H** & **I**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(ii)

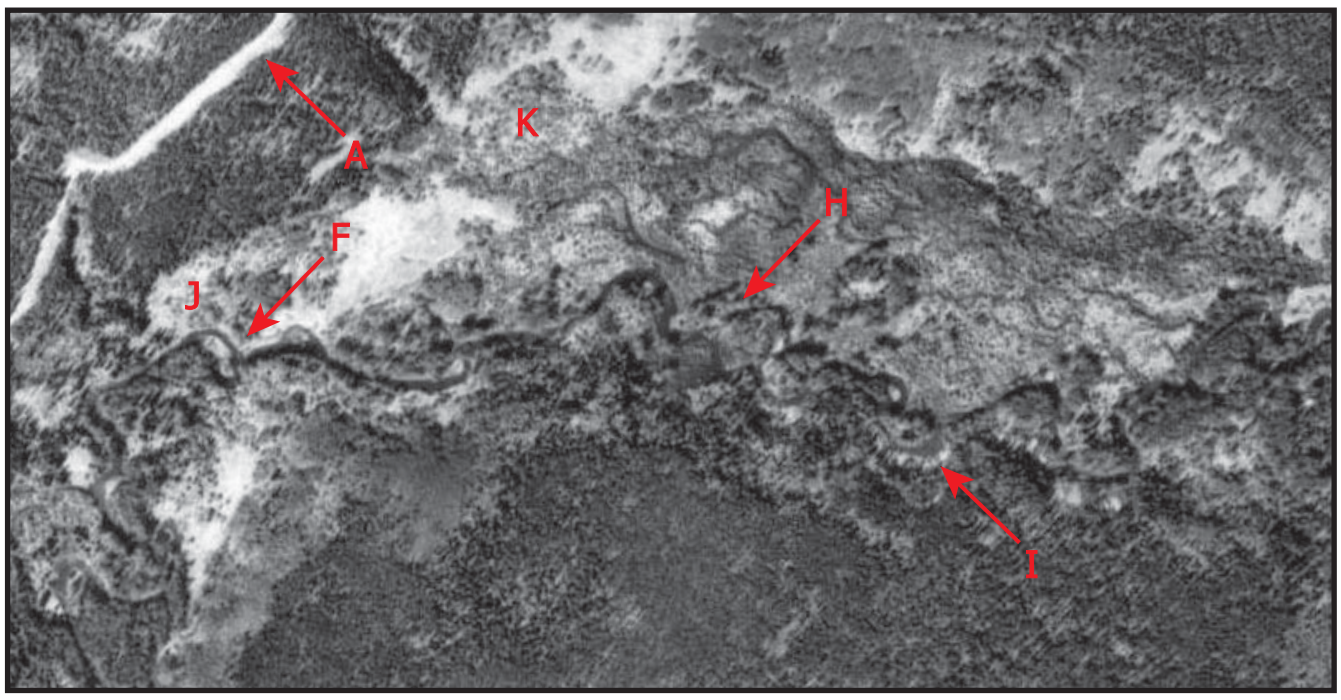
Date: August 12, 1959
BC2680 #19

NOTE:

- Little change in channel conditions.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(iii)

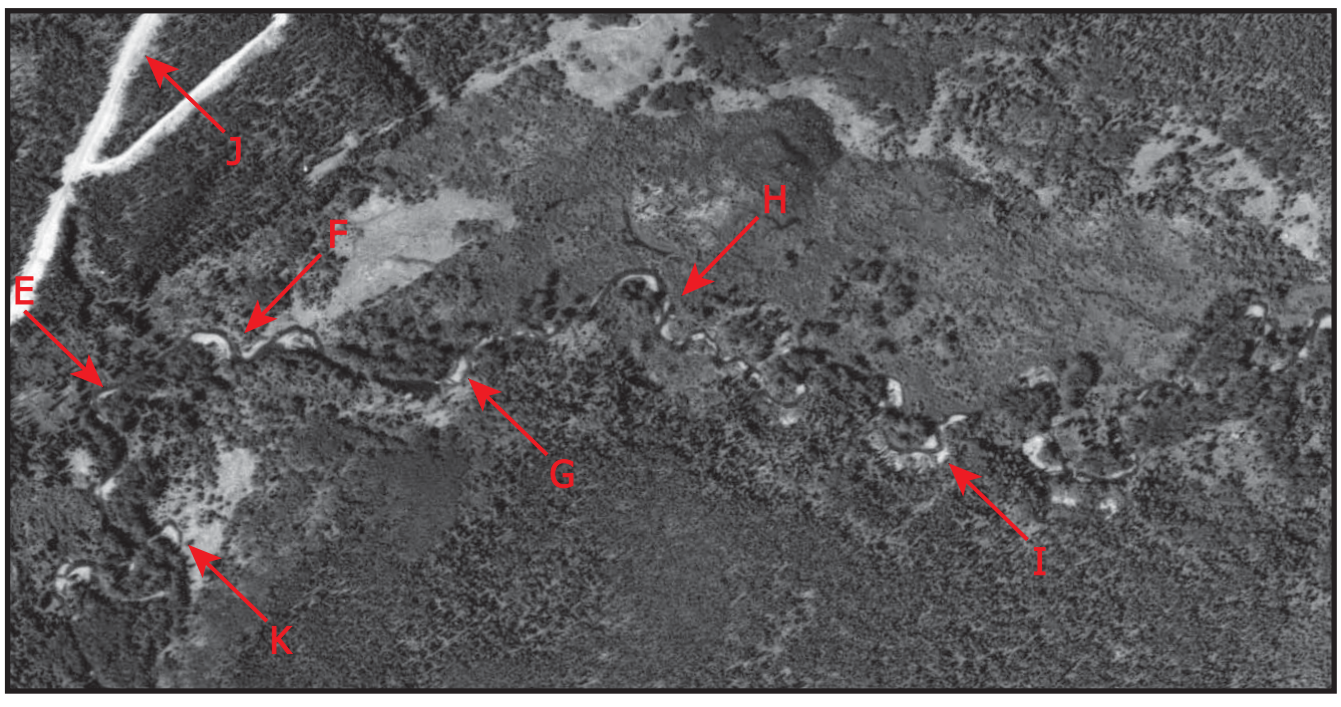
Date: June 5, 1971
BC5420 #96

NOTE:

- Enlarged road **A**.
- Lighter colour on areas **J** & **K** likely reflecting June vegetation cover.
- Bank erosion in the vicinity of **F**.
- Reduced size of bars at **H** & **I** likely reflects vegetation establishment but could result from water conditions in the spring.

Discharge:

Bulkley River near Houston	63.1 m^3/s
Buck Creek at the Mouth	16.7 m^3/s
Maxan Creek above Bulkley Lake	na



(iv)

Date: July 5, 1975
BC7740 #174

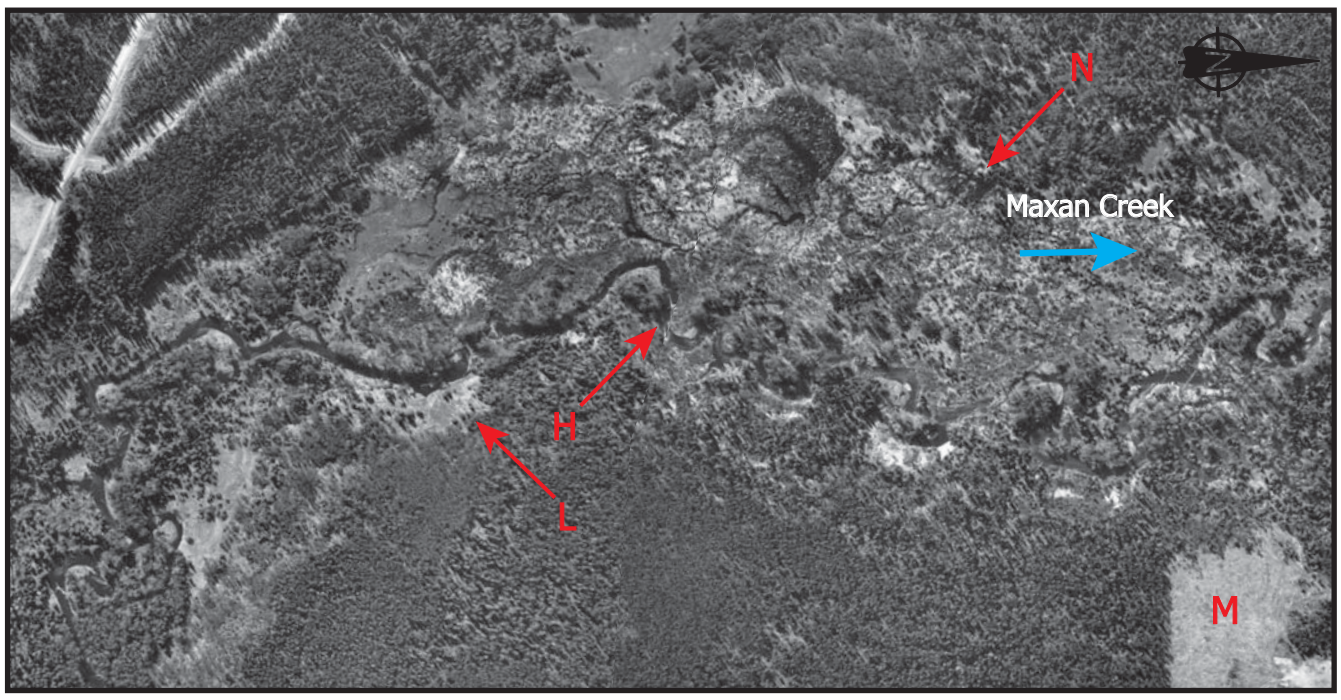
NOTE:

- Road construction **J**.
- Progressive channel shifting and enlarged bars at **K**, **E**, **F**, **G**, **H** & **I**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	2.83 m^3/s
Maxan Creek above Bulkley Lake	1.38 m^3/s

Figure 1A: Historical changes in channel morphology, Maxan Creek, KM 10 to 8.



(v)

Date: June 3, 1986
30BCC437 #100 & 135

NOTE:

- Clearing **L** & **M**.
- Continued progressive channel shifting **H**.
- High spring water levels likely obscuring submerged instream sediment deposits.
- Sizeable beaver dam **N**.

Discharge:

Bulkley River near Houston	88.1 m^3/s
Buck Creek at the Mouth	25.4 m^3/s
Maxan Creek above Bulkley Lake	na

(vi)

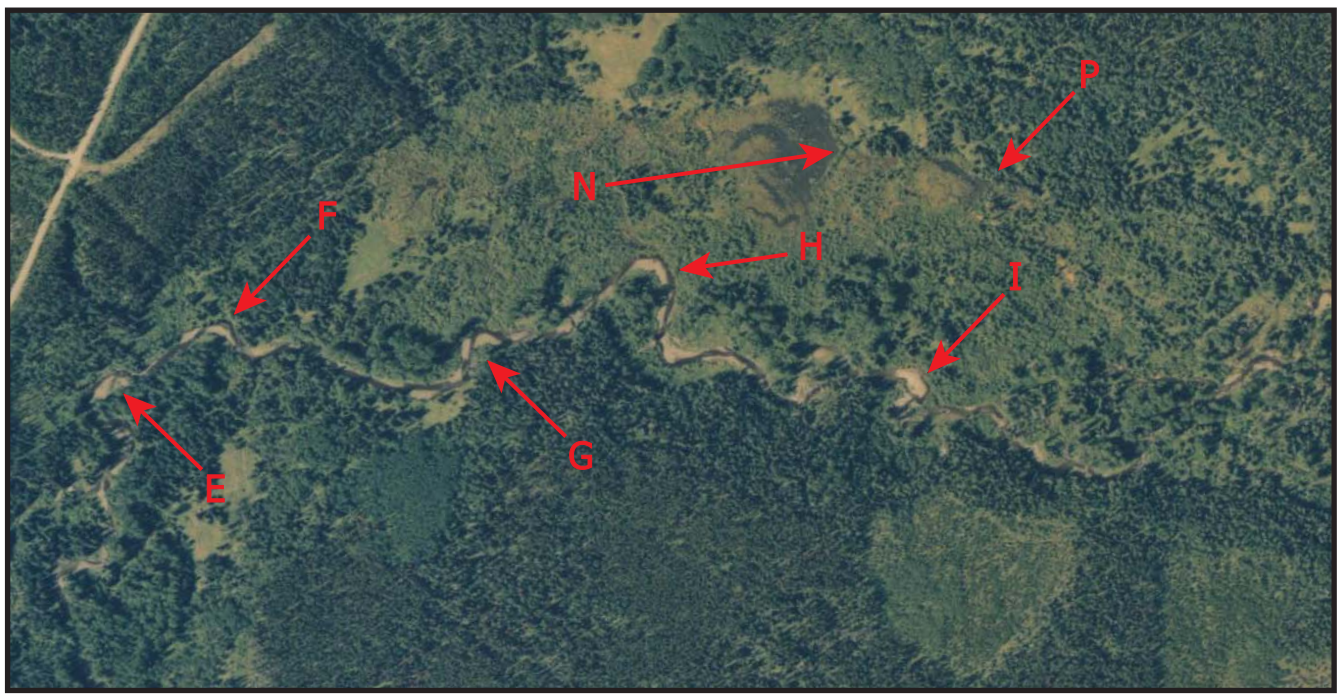
Date: August 1, 1998
30BCC98021 #45

NOTE:

- Clearing **O**.
- Enlarged instream sediment accumulations throughout this section (need to extend the analysis upstream to better evaluate the impportance of local bank erosion versus upstream sediment sources).

Discharge:

Bulkley River near Houston	1.02 m^3/s
Buck Creek at the Mouth	0.657 m^3/s
Maxan Creek above Bulkley Lake	na



(vii)

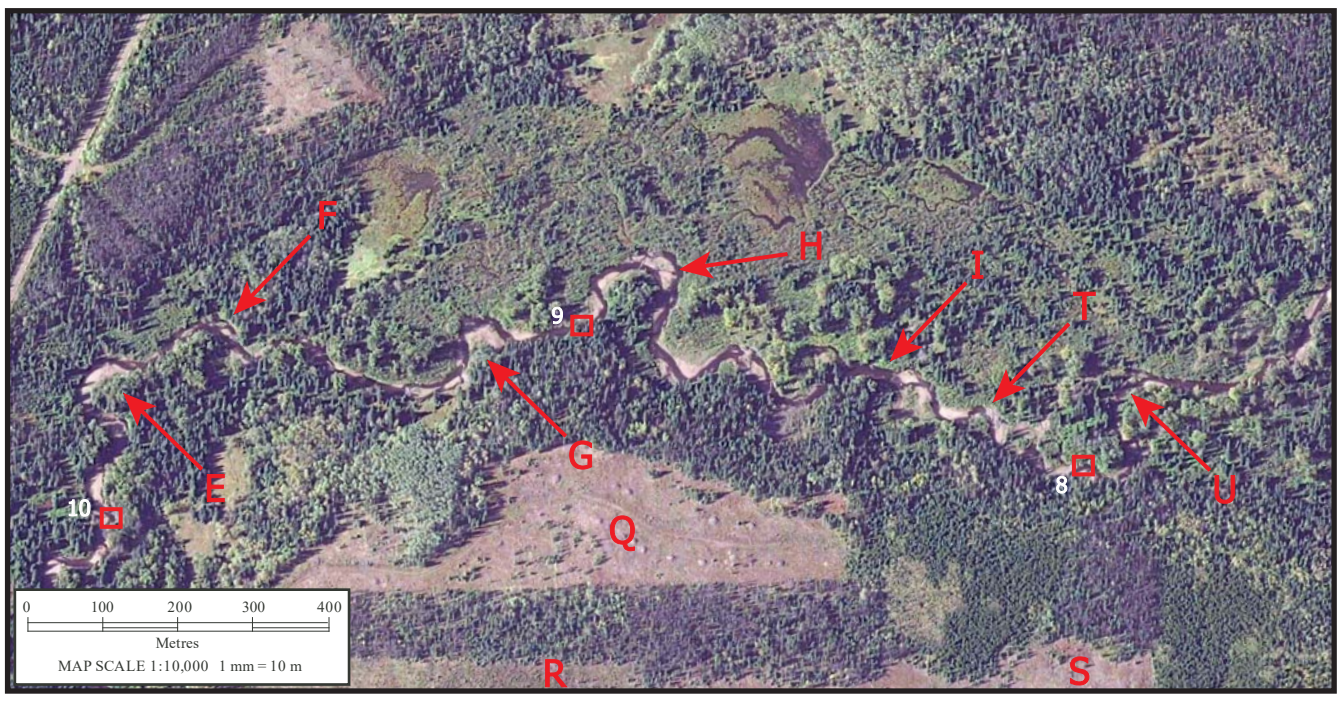
Date: August 10, 2005
30BCC05065 #112

NOTE:

- Continued progressive bank erosion **E**, **F**, **G**, **H** & **I**.
- Limited vegetation development on exposed bars.
- Enlarged wetlands associated with beaver dams **N** & **P**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	1.57 m^3/s
Maxan Creek above Bulkley Lake	na



(viii)

Date: September 10, 2016
Google Earth Imagery

NOTE:

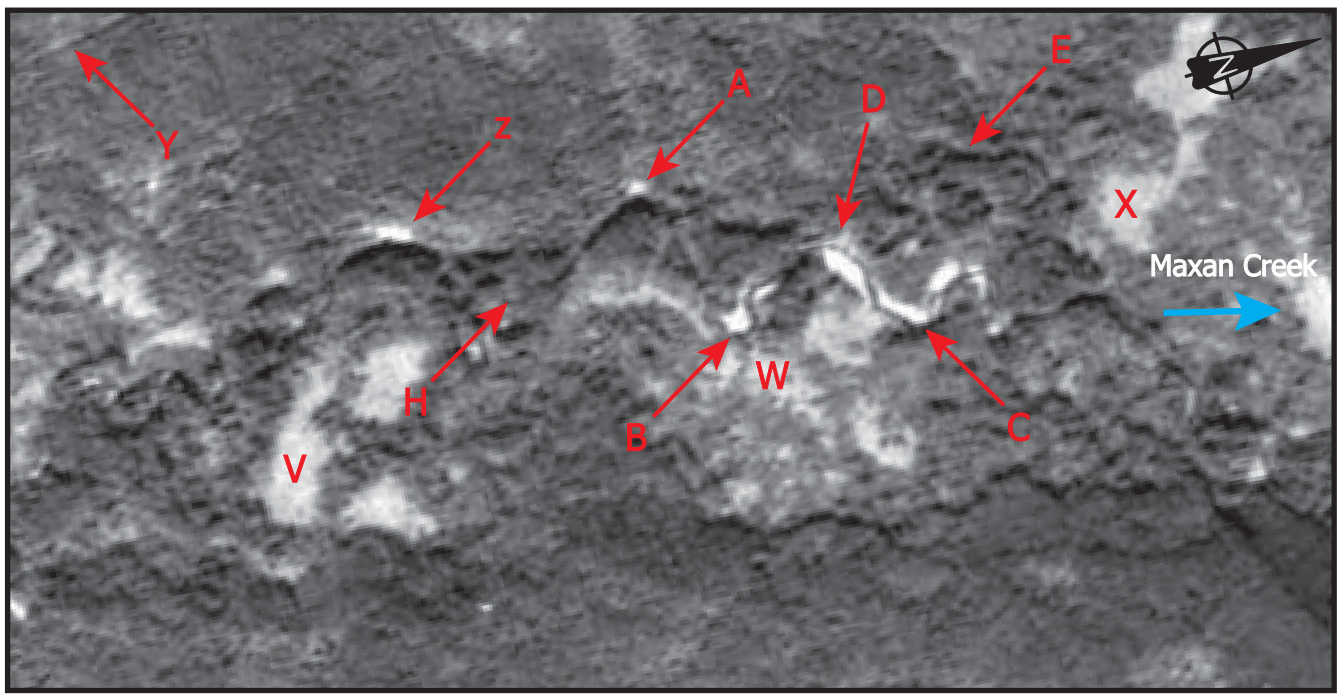
- Clearing **Q**, **R** & **S** with wide riparian reserves.
- Continued progressive bank erosion **E**, **F**, **G**, **H**, **I** & **T**.
- Channel shifting **U**.
- Enlarged, and more visible due to lower water levels, instream sediment accumulations.

Discharge:

Bulkley River near Houston	17.1 m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

□ Kilometers upstream of Bulkley Lake

Figure 1B: Historical changes in channel morphology, Maxan Creek, KM 10 to 8.



(i)

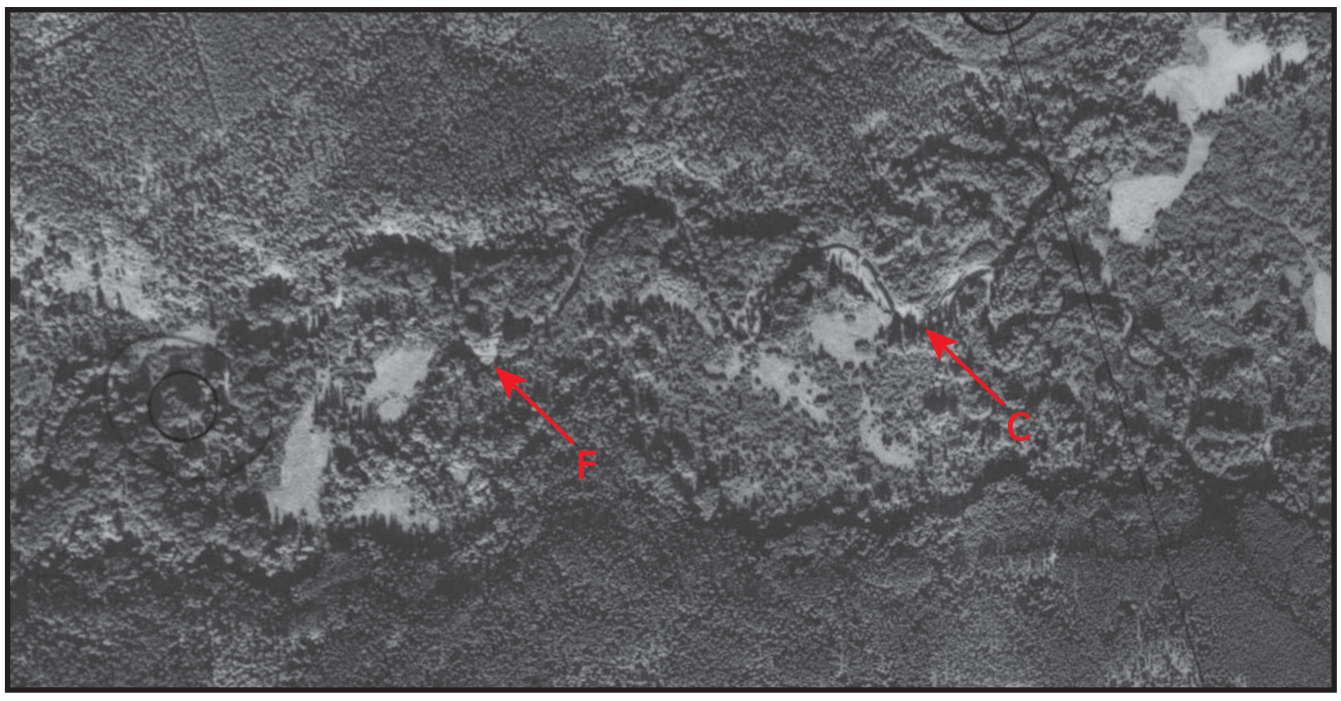
Date: August 22, 1955
A14815 #74

NOTE:

- Clearing **V**, **W** & **X**.
- Trail **Y**.
- Extent of unvegetated bars exposed at low water indicating areas of bank erosion **Z**, **A**, **B**, **C** & **D**.
- Unvegetated bars near **C** could reflect recent cutoff channel at **E**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(ii)

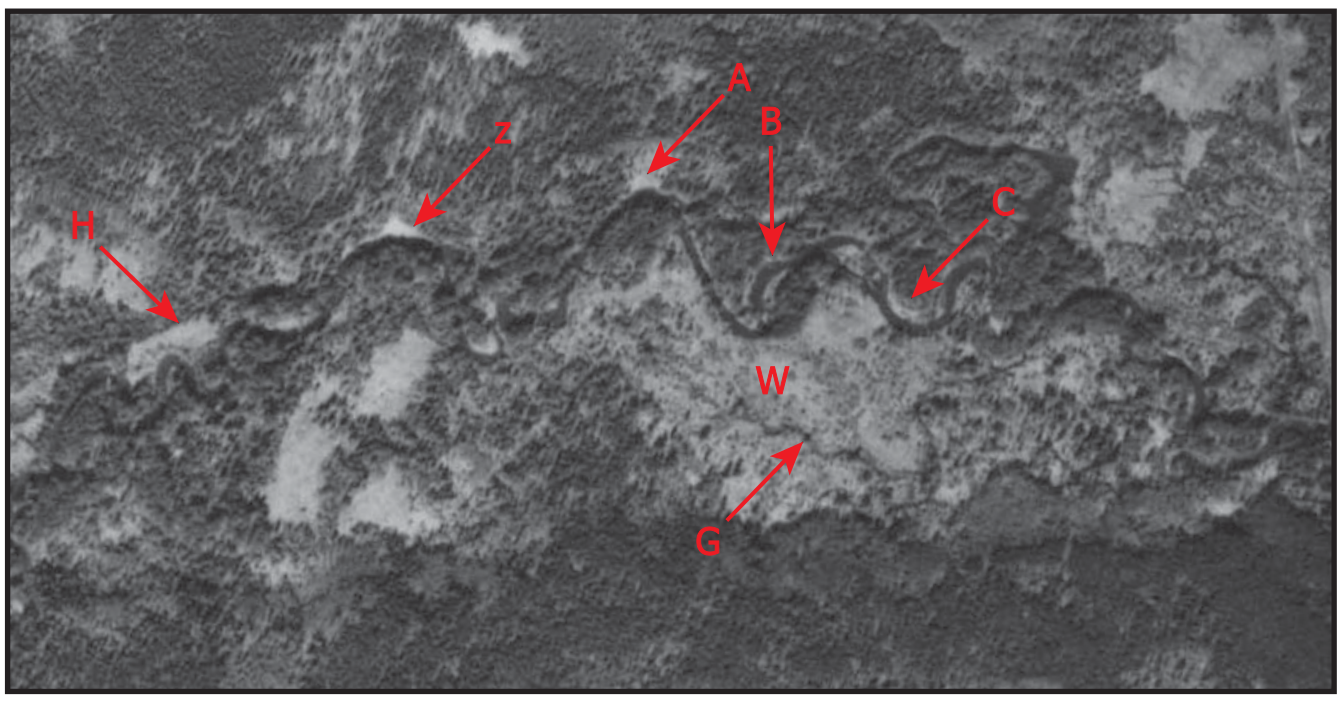
Date: August 12, 1959
BC2679 #50

NOTE:

- Little change in overall channel conditions.
- Probable channel shift at **F** & **C**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(iii)

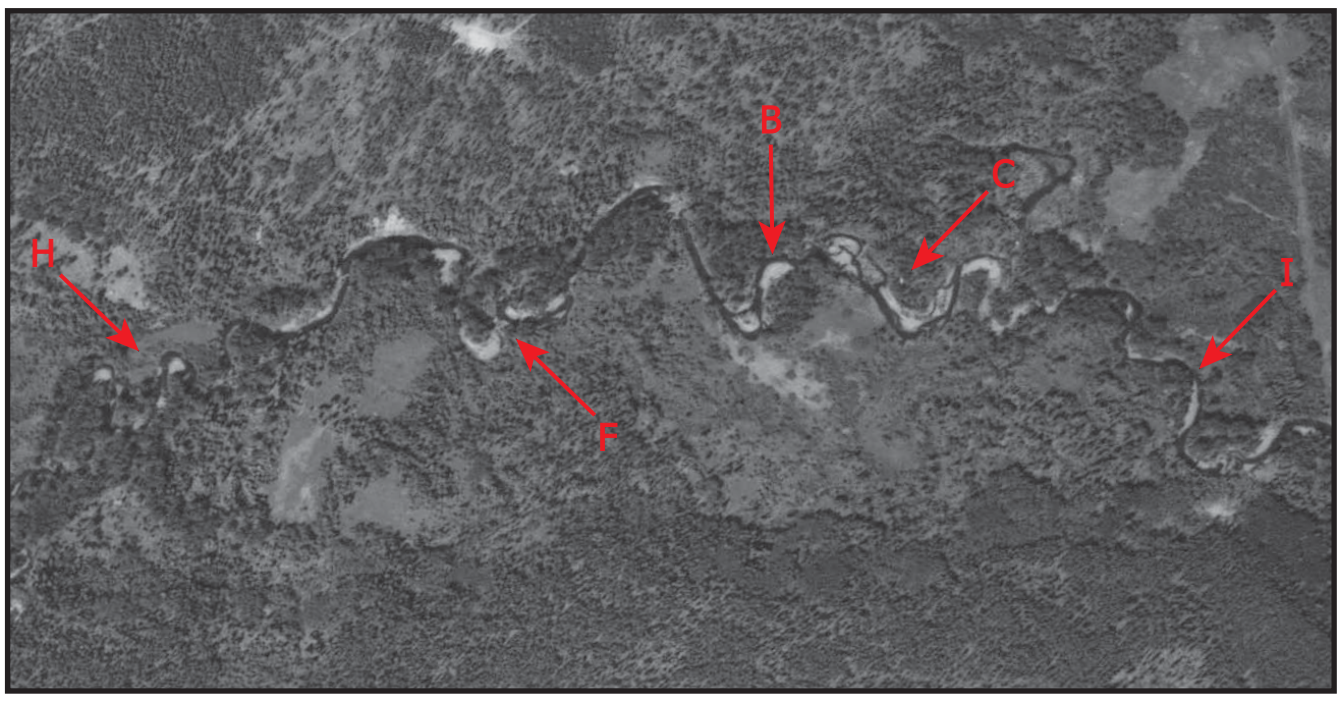
Date: June 5, 1971
BC5420 #96

NOTE:

- Lighter colour of area **W** likely reflects June vegetation cover.
- Beaver dams and wetlands **G**.
- Channel shift and/or enlarged eroding banks **H**, **Z**, **A**, **B** & **C**.
- Reduced size of bars in the vicinity of **C** reflects vegetation growth but could also be a result of higher water levels in the spring.

Discharge:

Bulkley River near Houston	63.1 m^3/s
Buck Creek at the Mouth	16.7 m^3/s
Maxan Creek above Bulkley Lake	na



(iv)

Date: July 5, 1975
BC7740 #174

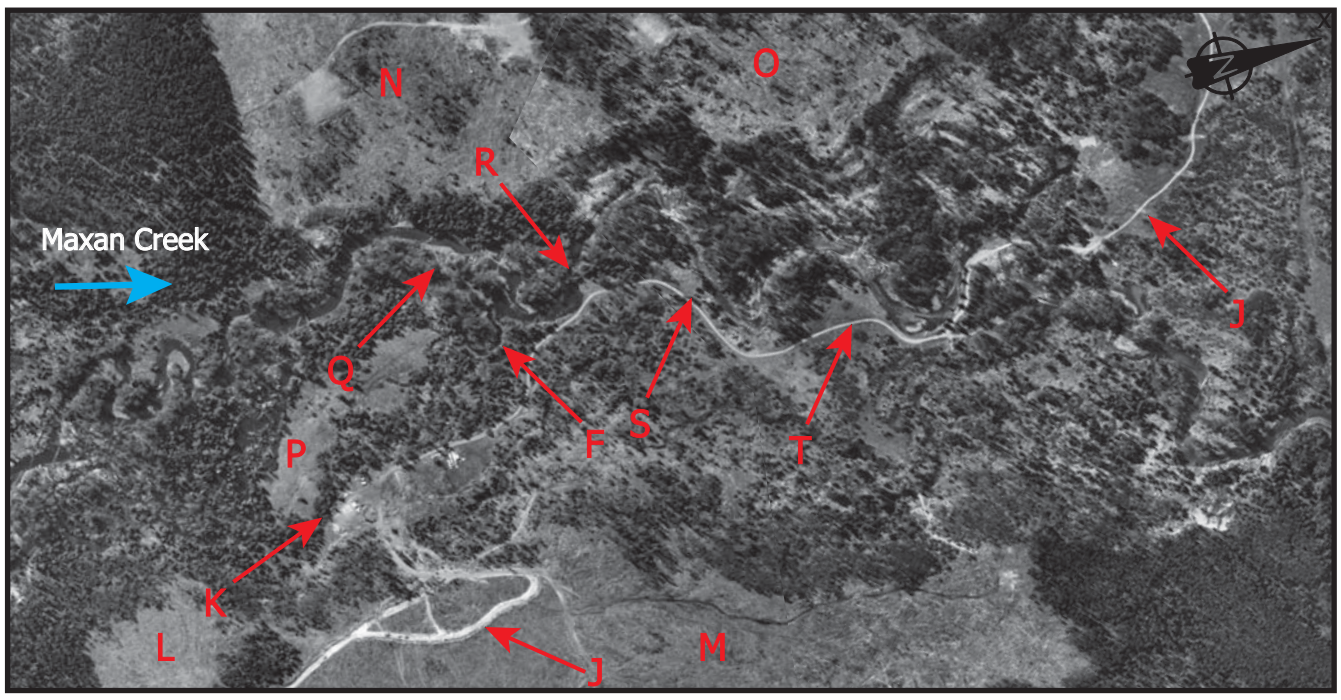
NOTE:

- Channel shifting and enlarged bars at **H**, **F**, **B**, **C** & **I**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	2.83 m^3/s
Maxan Creek above Bulkley Lake	1.38 m^3/s

Figure 2A: Historical changes in channel morphology, Maxan Creek, KM 7 to 6.



(v)

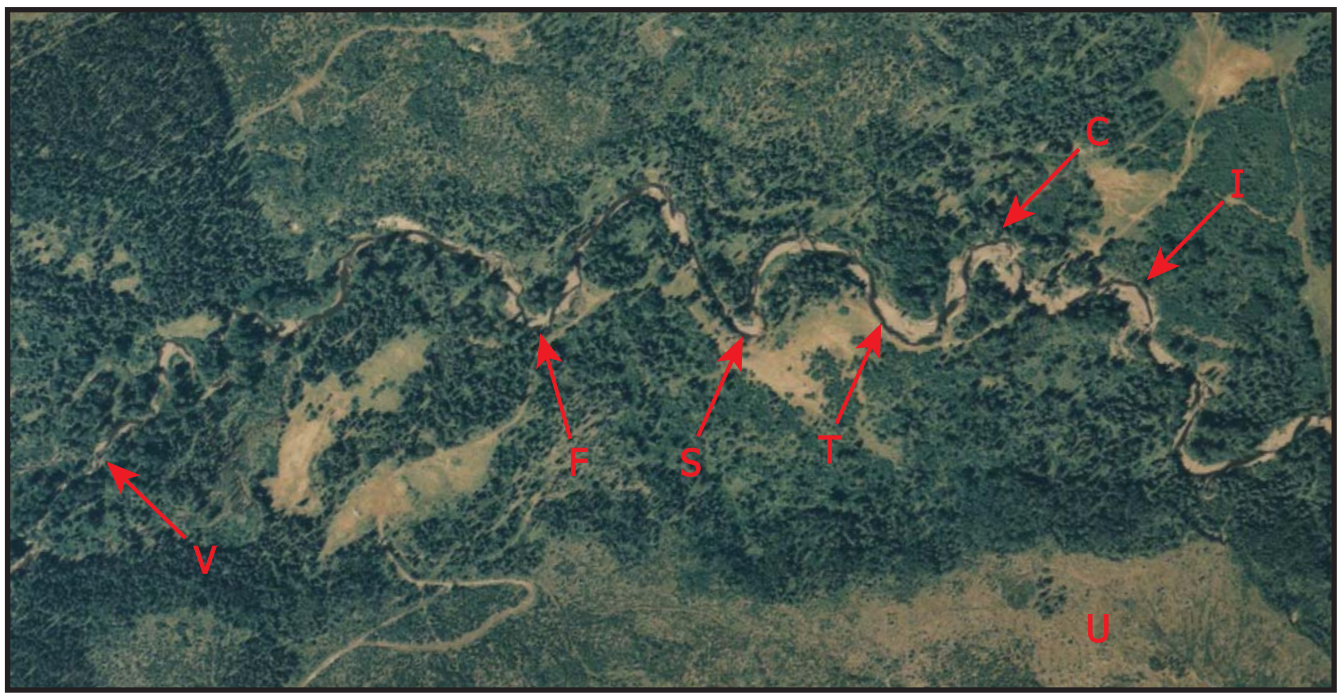
Date: June 3, 1986
30BCC437 #67 & 100

NOTE:

- Roads **J** and buildings **K**.
- Cutblocks **L**, **M**, **N**, **O** & **P**.
- Channel spanning log jam **Q** and channel relocation in the vicnity of **F**.
- Riparian clearing at **R**, **S** & **T**.

Discharge:

Bulkley River near Houston	88.1 m^3/s
Buck Creek at the Mouth	25.4 m^3/s
Maxan Creek above Bulkley Lake	na



(vi)

Date: August 1, 1998
30BCC98021 #66

NOTE:

- Cutblock **U**.
- Channel shifting in the vicinity of **S**, **T**, **C** & **I** and cutoff **V**.
- Enlarged instream sediment accumulations throughout the section (suggesting channel shifting rather than upstream sediment production as the source).

Discharge:

Bulkley River near Houston	1.02 m^3/s
Buck Creek at the Mouth	0.657 m^3/s
Maxan Creek above Bulkley Lake	na

(vii)

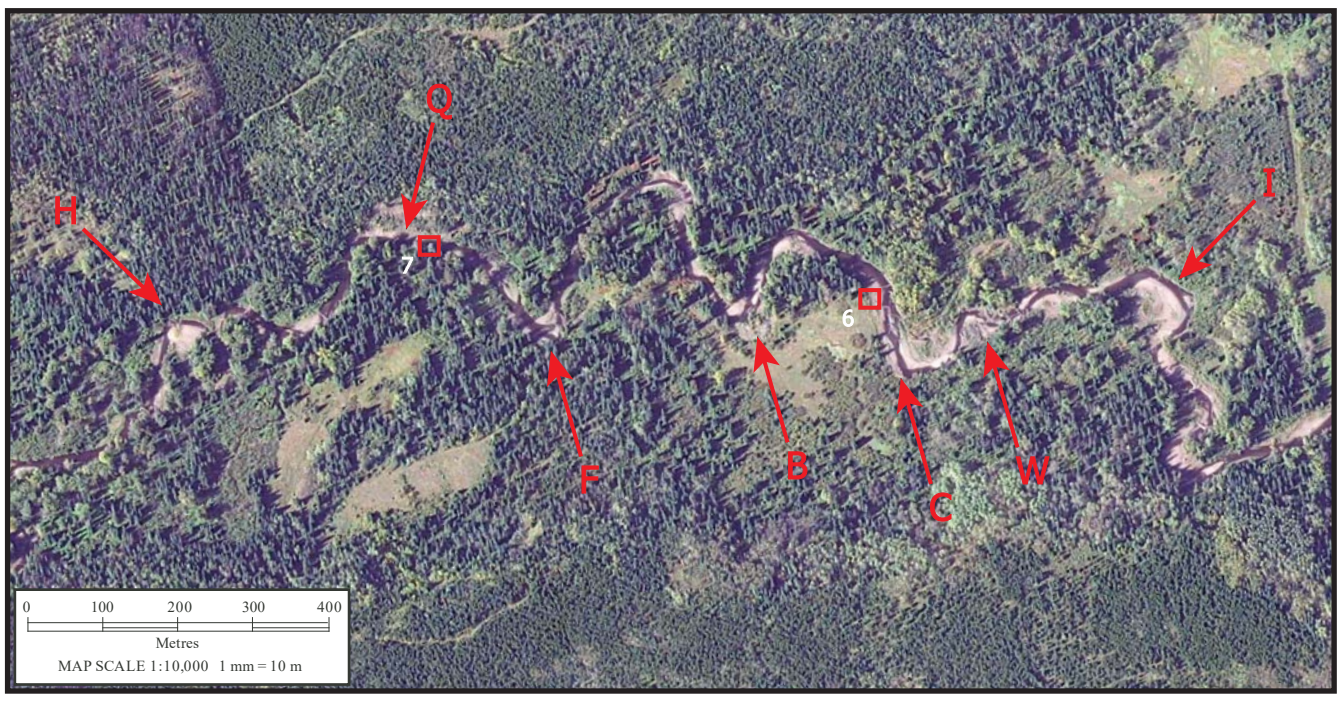
Date: August 10, 2005
30BCC05065 #112

NOTE:

- Continued channel shifting **V**, **F**, **B**, **C** & **I** and cutoff channels **W** & **X**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	1.57 m^3/s
Maxan Creek above Bulkley Lake	na



(viii)

Date: September 10, 2016
Google Earth Imagery

NOTE:

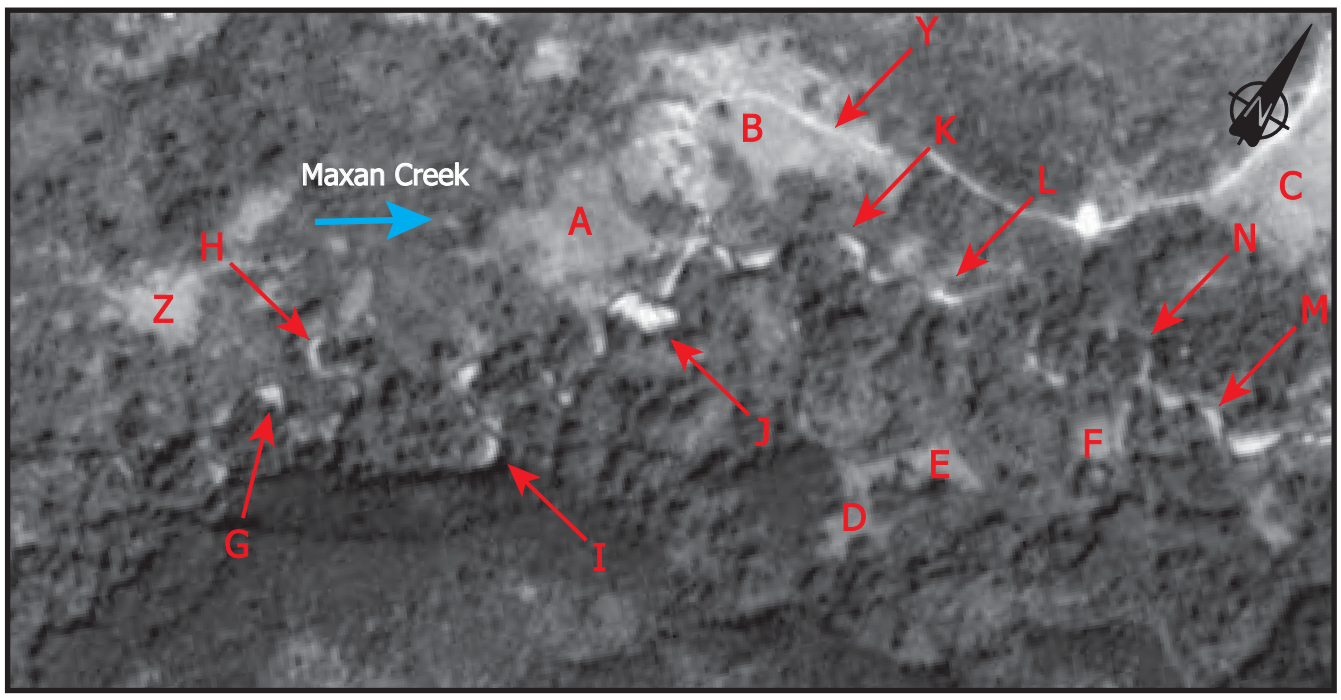
- Widespread cutblock revegetation.
- Channel relocation at **Q**.
- Continued progressive channel erosion **H**, **F**, **B**, **C**, **W** & **I**.
- Widespread enlargement of partially vegetated bars.

Discharge:

Bulkley River near Houston	17.1 m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

☐ Kilometers upstream of Bulkley Lake

Figure 2B: Historical changes in channel morphology, Maxan Creek, KM 7 to 6.



(i)

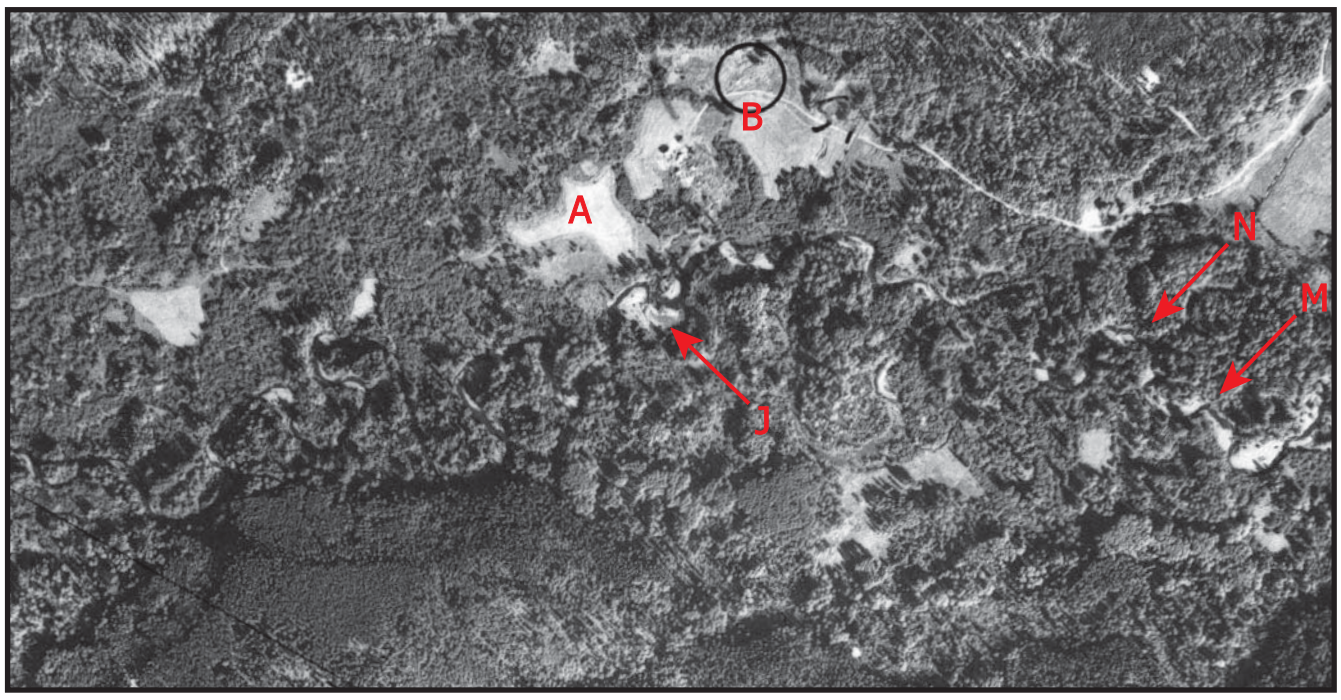
Date: August 22, 1955
A14815 #74

NOTE:

- Road **Y**.
- Clearings **Z**, **A**, **B**, **C**, **D**, **E** & **F**.
- Extent of unvegetated bars and low water indicating areas of bank erosion **G**, **H**, **I**, **J**, **K**, **L** & **M**.
- Historic channel cutoff **N**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(ii)

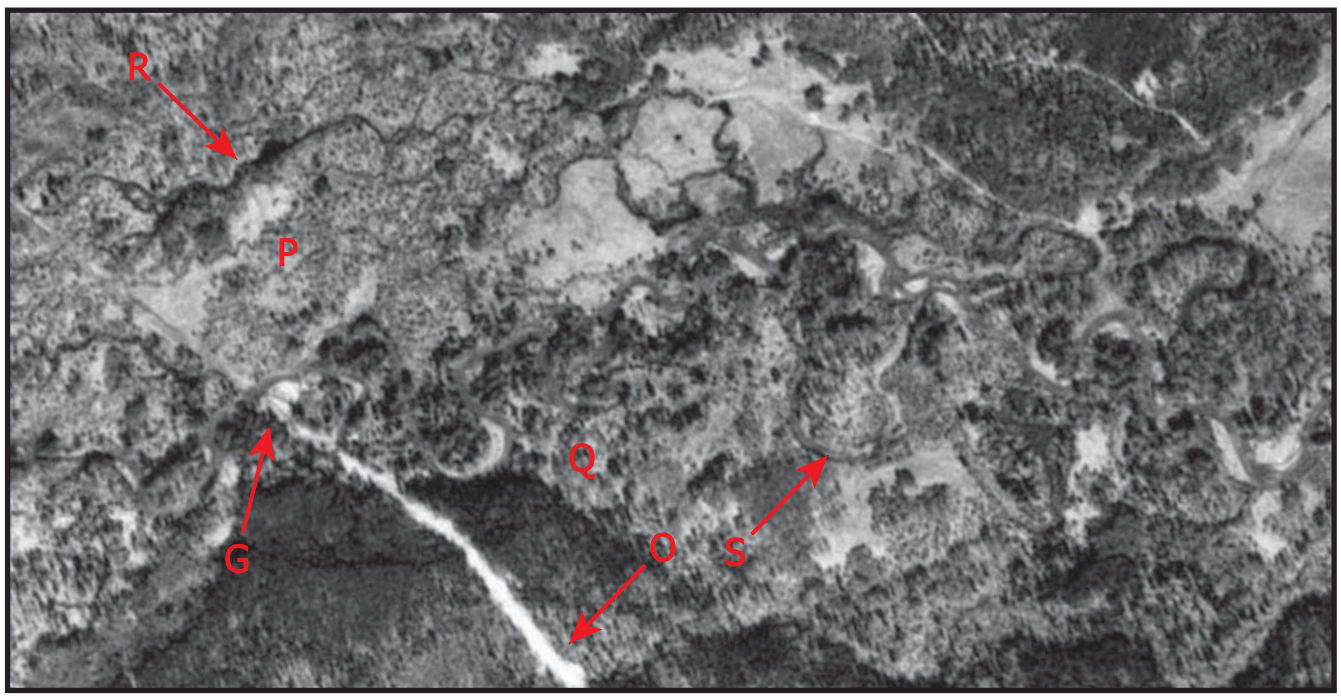
Date: August 12, 1959
BC2679 #50

NOTE:

- Further development **A** & **B**.
- Little change in channel conditions.
- Channel shifting **M** downstream of channel cutoff **N**.
- Channel shifting **J** adjacent to cleared riparian areas.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(iii)

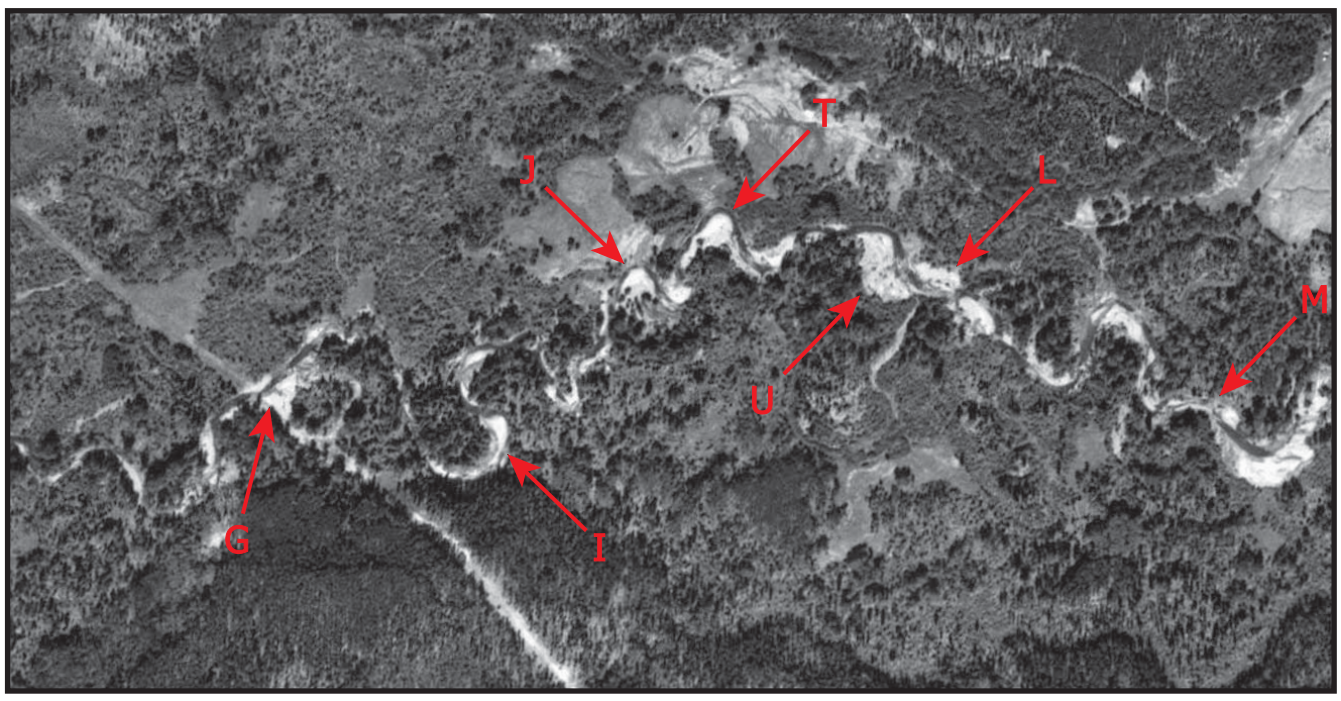
Date: June 5, 1971
BC5420 #96

NOTE:

- Right of way clearing **O**.
- Lighter colour of valley flat **P** & **Q** likely reflecting June vegetation cover.
- Channel cutoff **G**.
- Wetted channel traces **R** & **S** indicates extent of widespread historic channel shifting and historic importance of flood plain connectivity.

Discharge:

Bulkley River near Houston	63.1 m^3/s
Buck Creek at the Mouth	16.7 m^3/s
Maxan Creek above Bulkley Lake	na



(iv)

Date: July 5, 1975
BC7740 #194

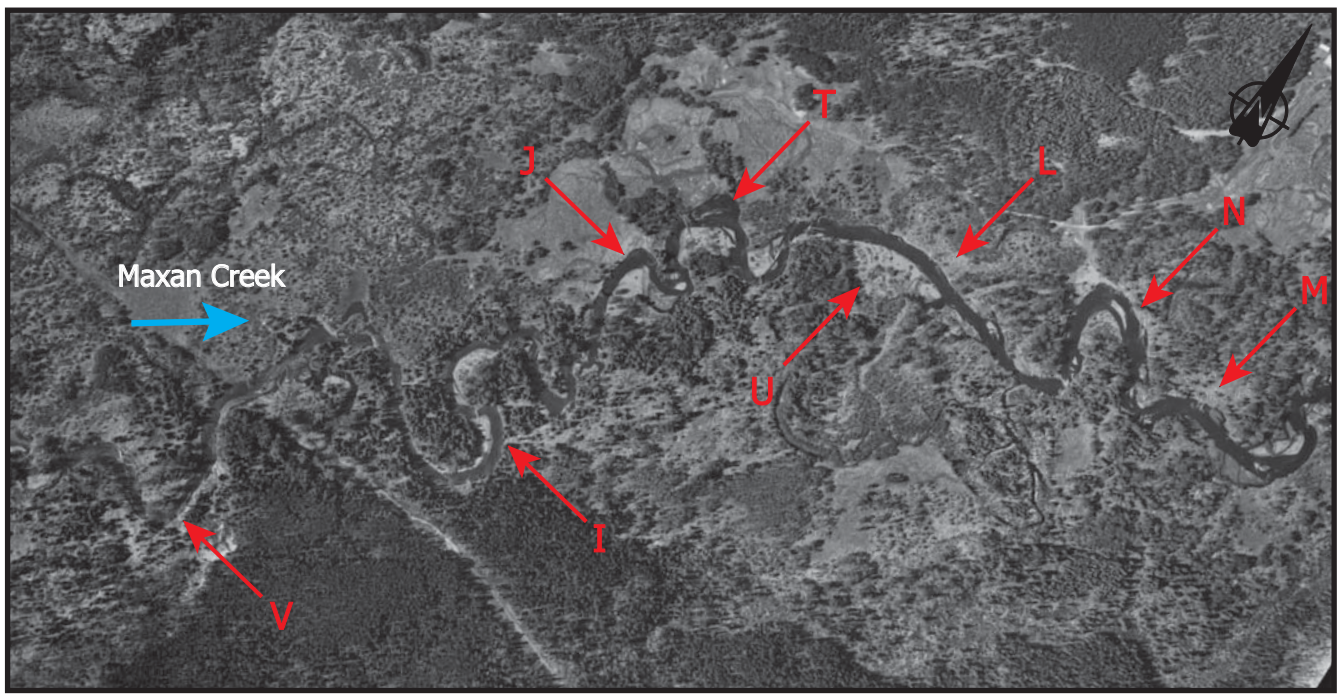
NOTE:

- Extensive bank erosion and widespread enlargement of unvegetated instream sediment accumulations **G**, **I**, **J**, **T**, **U**, **L** & **M**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	2.83 m^3/s
Maxan Creek above Bulkley Lake	1.38 m^3/s

Figure 3A: Historical changes in channel morphology, Maxan Creek, KM 5 to 3.



(v)

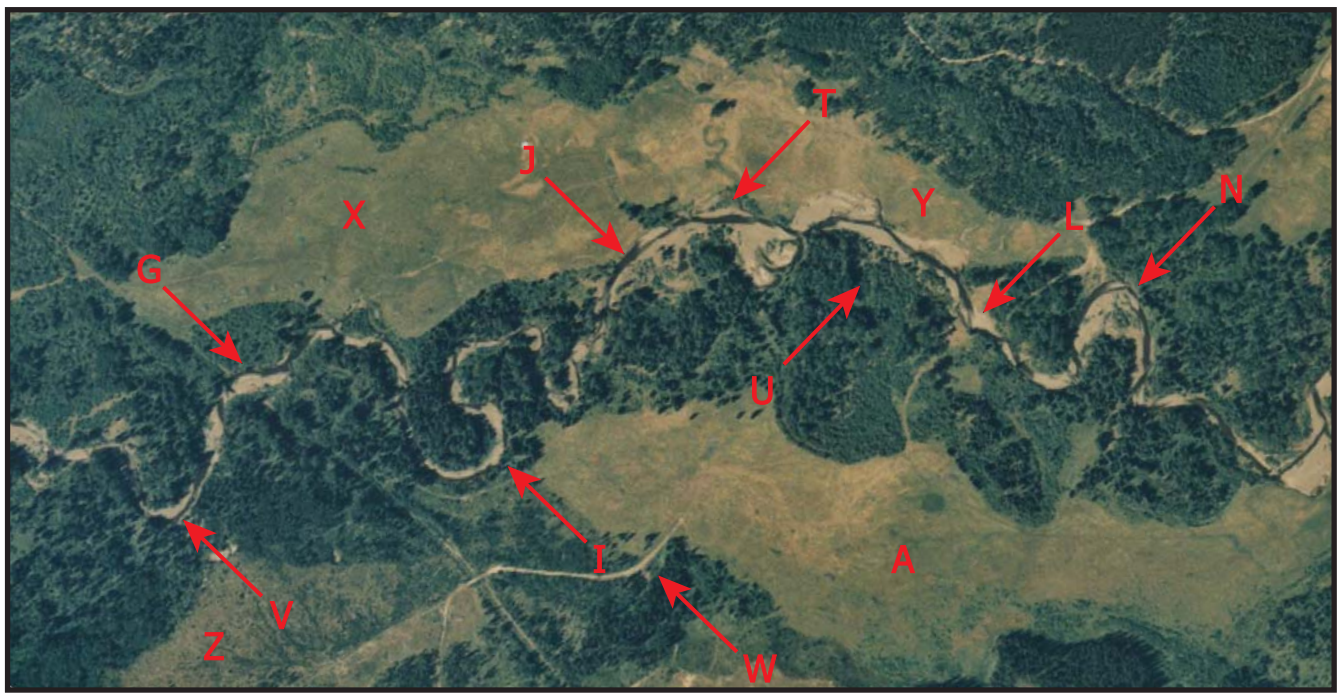
Date: June 3, 1986
30BCC437 #67

NOTE:

- Channel relocation **V**.
- Channel shifting in the vicinity of **I**, **J**, **T**, **U**, **L**, **N** & **M**.

Discharge:

Bulkley River near Houston	88.1 m^3/s
Buck Creek at the Mouth	25.4 m^3/s
Maxan Creek above Bulkley Lake	na



(vi)

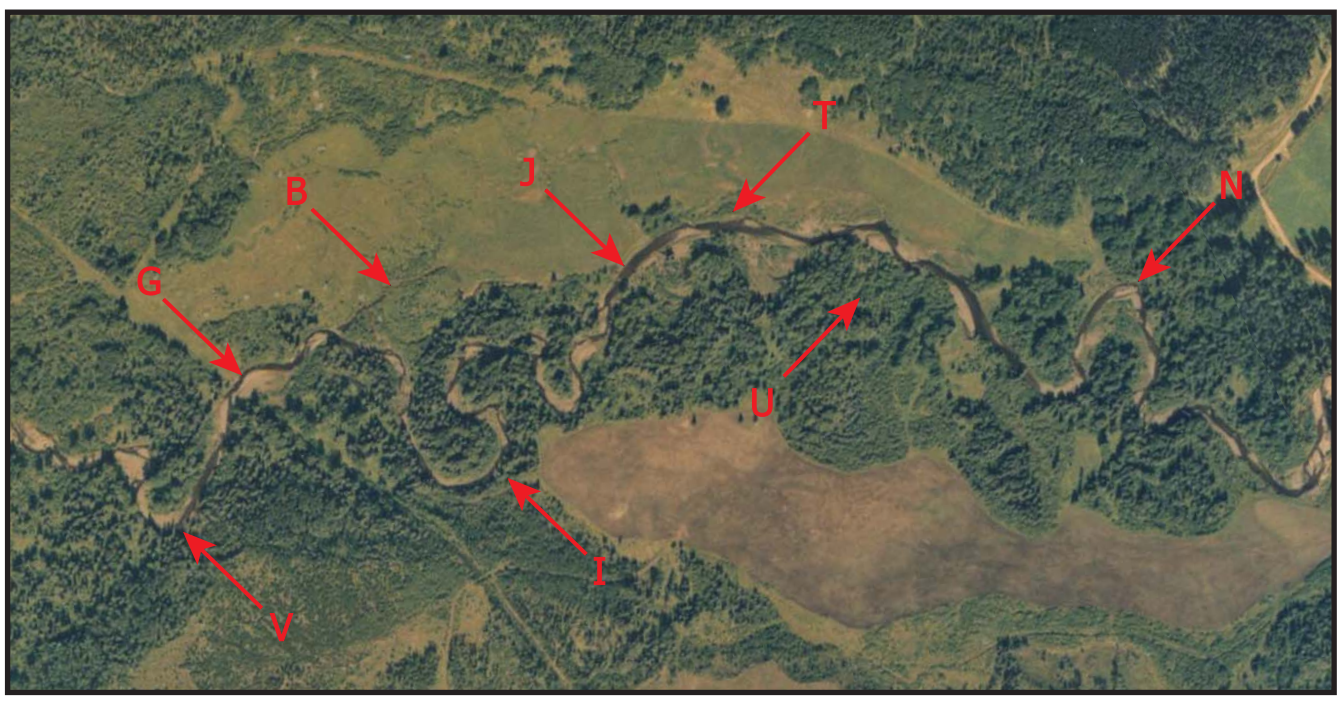
Date: August 1, 1998
30BCC98022 #14

NOTE:

- Road construction **W**.
- Widespread clearing **X**, **Y**, **Z** & **A** with areas of little or no riparian reserve in the vicinity of **J** & **T**.
- Active bank erosion in areas of reduced riparian vegetation **J** & **T** and in other areas **V**, **G**, **I**, **U**, **L** & **N**.
- Enlarged unvegetated instream sediment accumulations.

Discharge:

Bulkley River near Houston	1.02 m^3/s
Buck Creek at the Mouth	0.657 m^3/s
Maxan Creek above Bulkley Lake	na



(vii)

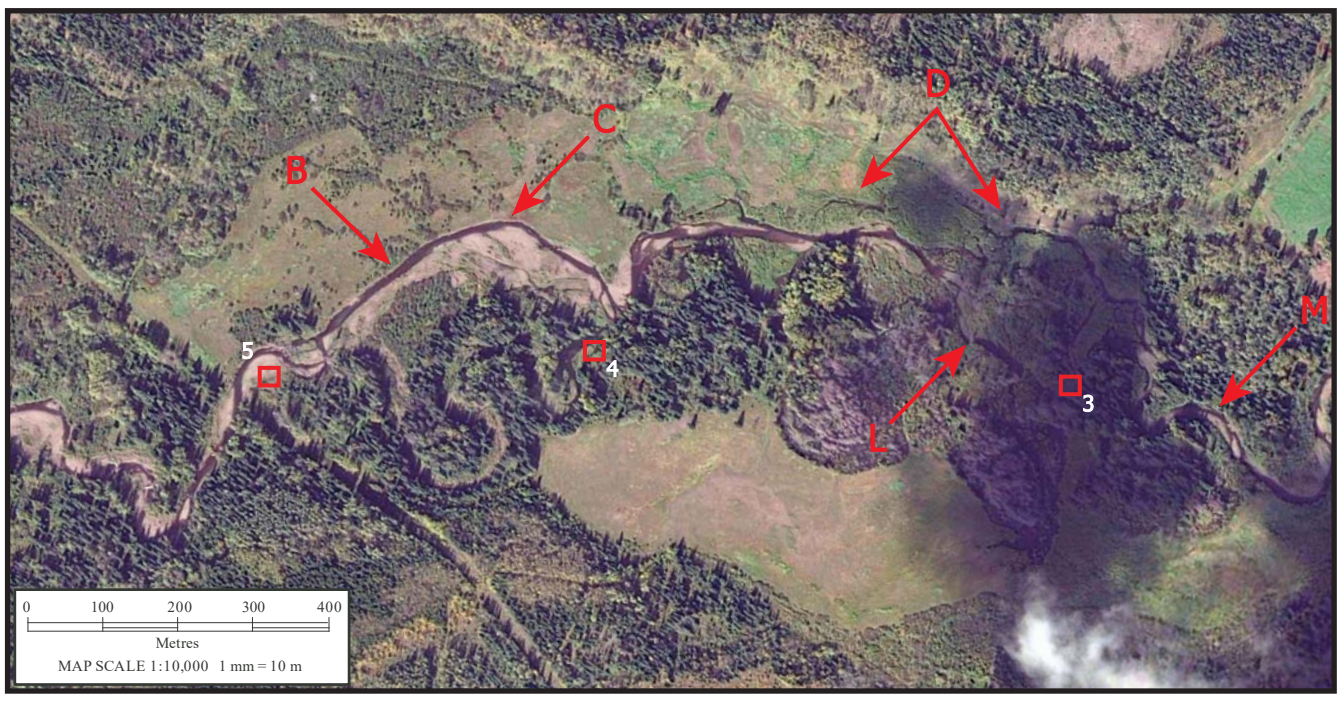
Date: August 10 & 11, 2005
30BCC05065 #112 & 30BCC05052 #52

NOTE:

- Trace of historic channel **B**.
- Continued progressive channel shifting **V**, **G**, **I**, **J**, **T**, **U** & **N**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	1.57 & 1.41 m^3/s
Maxan Creek above Bulkley Lake	na



(viii)

Date: September 10, 2016
Google Earth Imagery

NOTE:

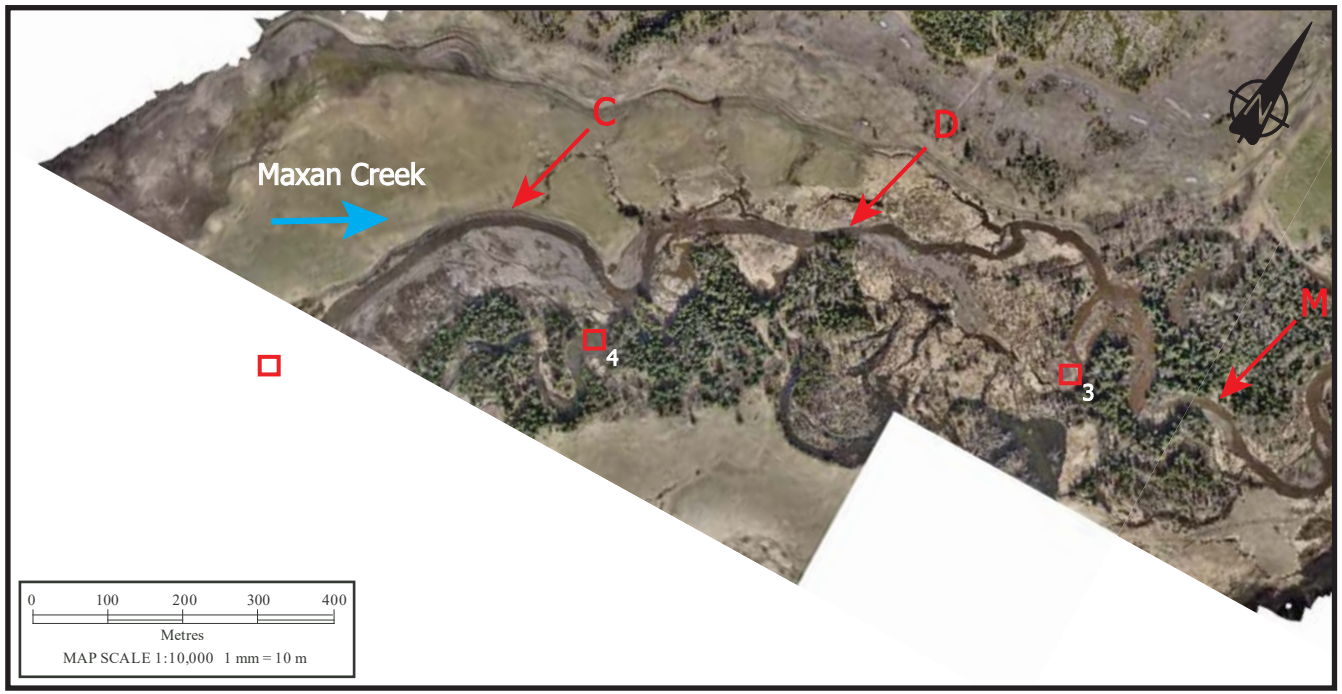
- Channel shifting through cleared field at **B** and subsequent bank erosion **C**.
- Sediment deposition between **L** and **M**, channel blockage and formation of incipient channel **D**.

Discharge:

Bulkley River near Houston	17.1 m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

☐ Kilometers upstream of Bulkley Lake

Figure 3B: Historical changes in channel morphology, Maxan Creek, KM 5 to 3.



(ix)

Date: May 11, 2021
Orthophoto

NOTE:

- Continued bank erosion on cleared field **C**.
- Channel shifting through **D** and formation of wetted flood plain at **M**.

Discharge:

Bulkley River near Houston	81.0 m^3/s
Buck Creek at the Mouth	22.9 m^3/s
Maxan Creek above Bulkley Lake	na

□ Kilometers upstream of Bulkley Lake

(x)

Date:

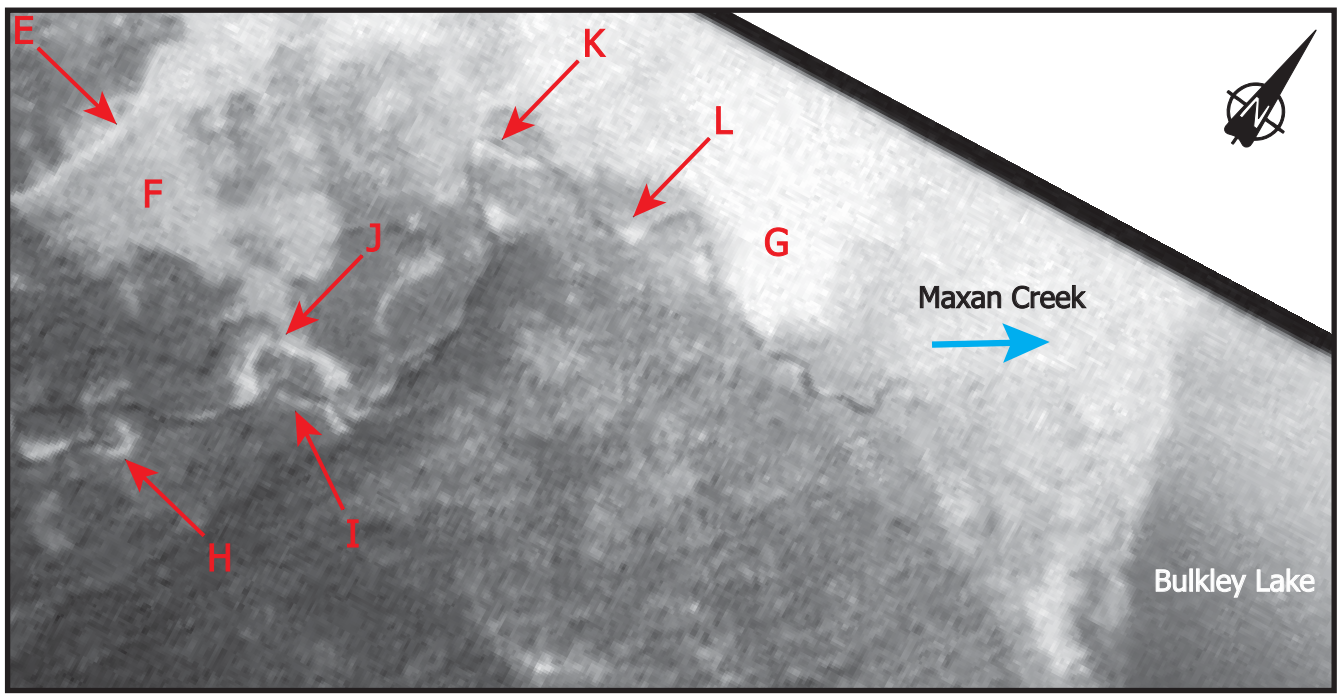
NOTE:

-

Discharge:

Bulkley River near Houston	m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

Figure 3C: Historical changes in channel morphology, Maxan Creek, KM 5 to 3.



(i)

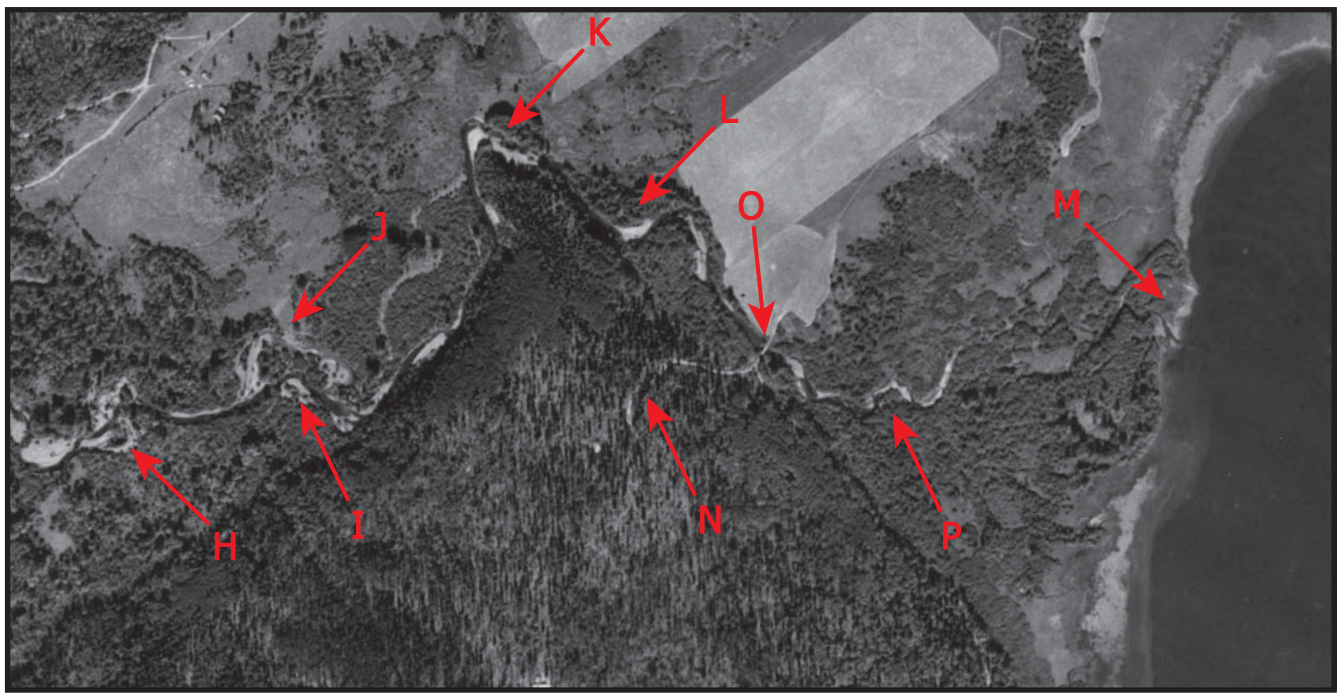
Date: August 22, 1955
A14815 #75

NOTE:

- Road **E**.
- Clearings **F** & **G**.
- Recent channel cutoffs **H** & **I**.
- Extent of unvegetated instream sediment accumulations **J**, **K** & **L** indicating areas of channel shifting.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(ii)

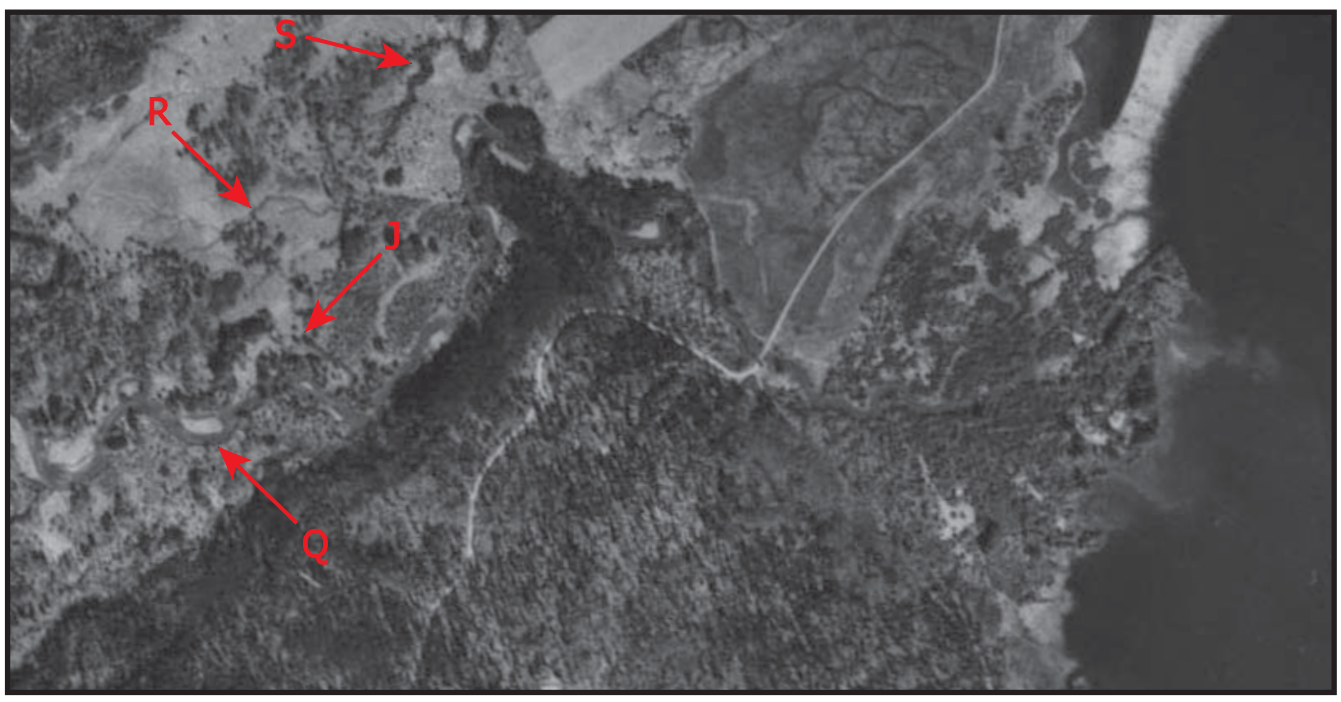
Date: August 12, 1959
BC2678 #59

NOTE:

- Delta at confluence with Bulkley Lake **M**.
- Road **N** and bridge **O**.
- Continued channel shifting in the vicnity of **H**, **I**, **K**, **L**, **O** & **P**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(iii)

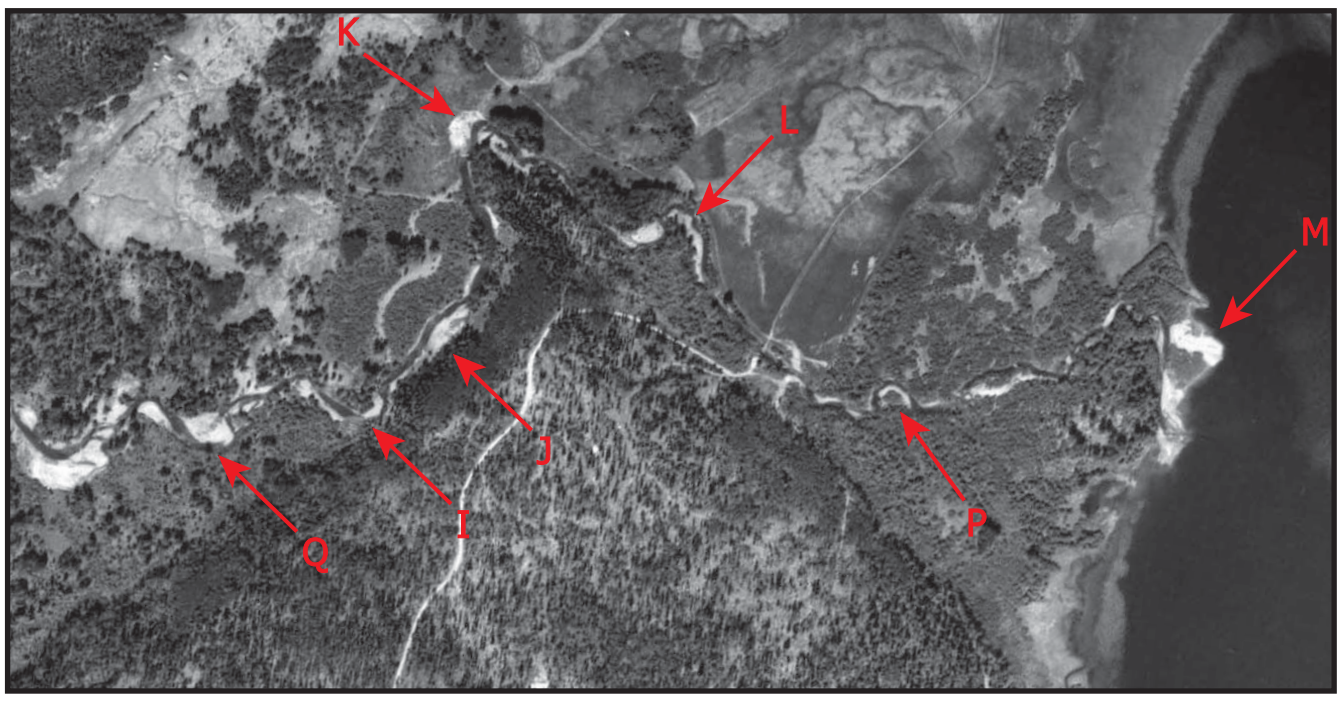
Date: June 5, 1971
BC5420 #95

NOTE:

- Channel shifting **Q**.
- Wetted channel traces **J**, **R** & **S** indicate the importance of channel shifting, and possibly beaver dams, in maintaining hydrologic connectivity to the flood plain.

Discharge:

Bulkley River near Houston	63.1 m^3/s
Buck Creek at the Mouth	16.7 m^3/s
Maxan Creek above Bulkley Lake	na



(iv)

Date: July 5, 1975
BC7740 #195

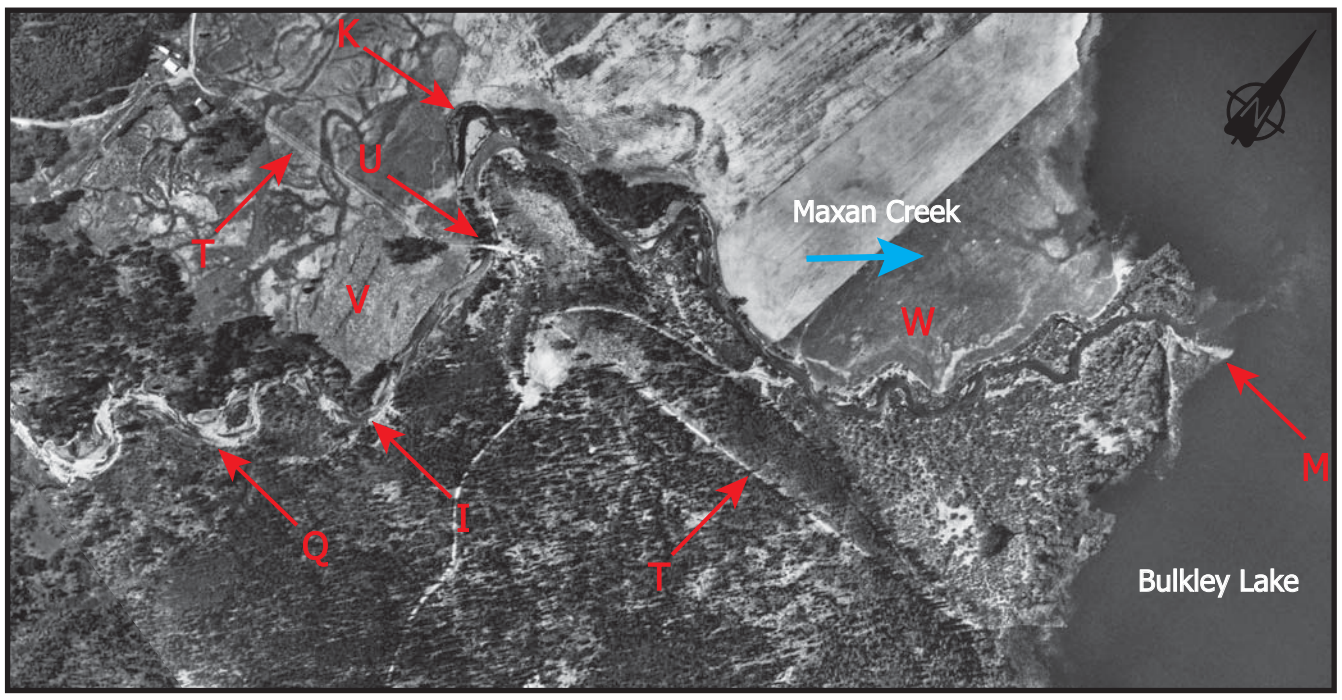
NOTE:

- Channel shifting and enlarged unvegetated instream sediment deposits **Q**, **I**, **J**, **K**, **L** & **P**.
- Channel shifting and enlarged sediment deposit at Bulkley Lake **M**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	2.83 m^3/s
Maxan Creek above Bulkley Lake	1.38 m^3/s

Figure 4A: Historical changes in channel morphology, Maxan Creek, KM 2 to 0.



(v)

Date: June 3, 1986
30BCC429 #202 & 30BCC437 #66

NOTE:

- Road **T**.
- Probable bridge **U**.
- Clearing **V** & **W** with no riparian reserves.
- Channel shifting **Q**, **I** & **K**.
- Vegetation establishment at **M**.

Discharge:

Bulkley River near Houston	88.1 m^3/s
Buck Creek at the Mouth	25.4 m^3/s
Maxan Creek above Bulkley Lake	na

(vi)

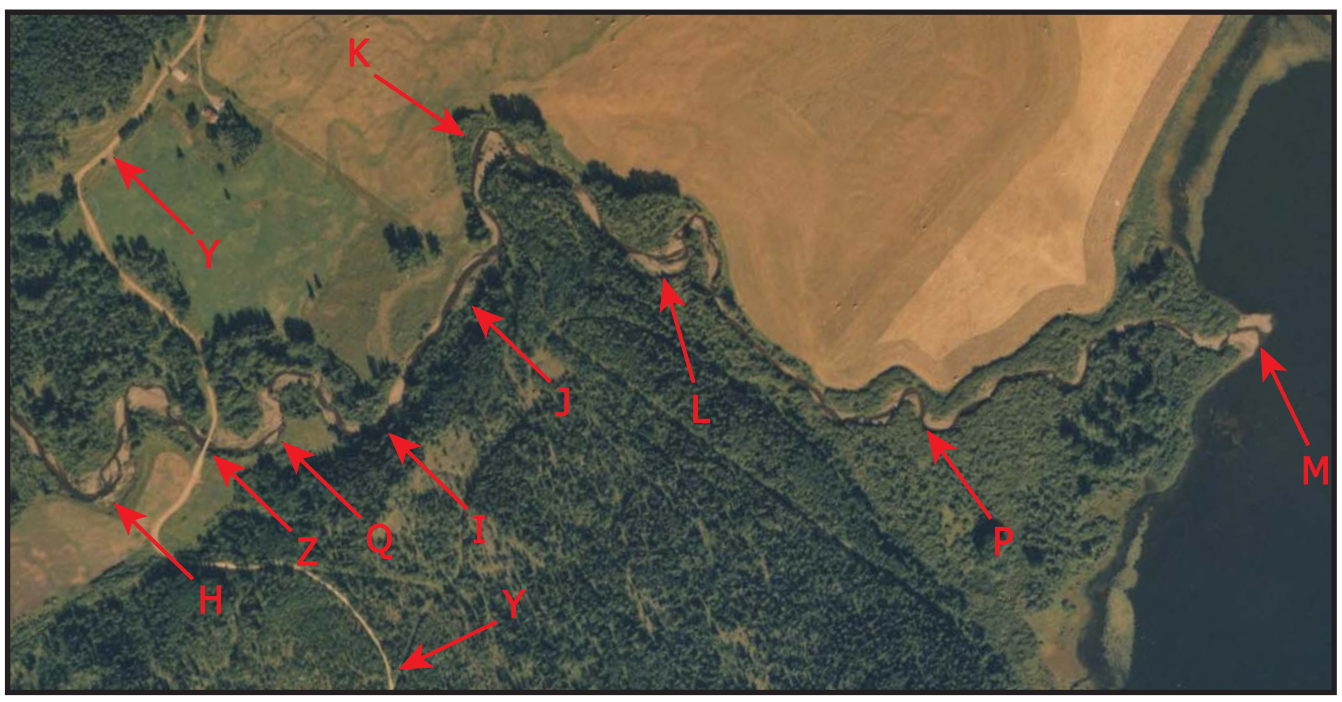
Date: August 1, 1998
30BCC98022 #15

NOTE:

- Clearing **X** with no riparain reserve.
- Widespread channel shifting and enlarged unvegetated instream sediment accumulations associated with cleared channel banks **H**, **Q**, **I**, **J**, **K**, **L** & **P**.
- Progradation of delta **M**.

Discharge:

Bulkley River near Houston	1.02 m^3/s
Buck Creek at the Mouth	0.657 m^3/s
Maxan Creek above Bulkley Lake	na



(vii)

Date: August 11, 2005
30BCC05052 #51

NOTE:

- Road construction **Y**.
- Bridge **Z**.
- Initial vegetation development on previously barren bars **H**, **Q**, **I**, **J**, **K**, **L** & **P**.
- Continued progradation of delta **M**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	1.41 m^3/s
Maxan Creek above Bulkley Lake	na

(viii)

Date: September 10, 2016
Google Earth Imagery

NOTE:

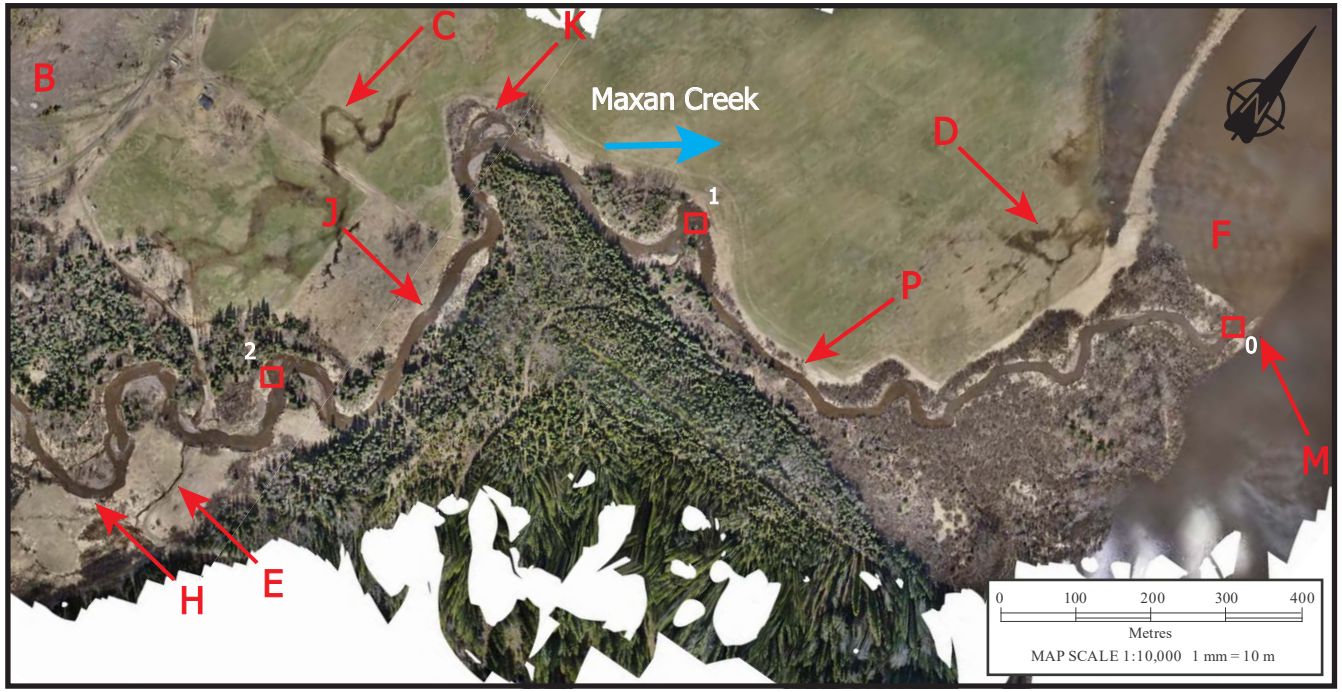
- Loss of bridge **Z**.
- Further progradation of delta **M**.
- Development of riparian vegetation establishment on formerly barren bars.
- Continued local channel shifting **A** & **K**.

Discharge:

Bulkley River near Houston	17.1 m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

□ Kilometers upstream of Bulkley Lake

Figure 4B: Historical changes in channel morphology, Maxan Creek, KM 2 to 0.



(ix)

Date: May 11, 2021
Orthophoto

NOTE:

- Clearing **B**.
- High water levels on Maxan Creek and extent of wetted flood plain channels **C**, **D** & **E**.
- Areas with reduced or non-existent riparian vegetation **H**, **J**, **K** & **P**.
- Vegetation growth on delta **M**.
- Suspended sediment load plume on Bulkley Lake and near shore fine textured sediment deposits **F**.

Discharge:

Bulkley River near Houston	81.0 m^3/s
Buck Creek at the Mouth	22.9 m^3/s
Maxan Creek above Bulkley Lake	na

□ Kilometers upstream of Bulkley Lake

(x)

Date:

NOTE:

-

Discharge:

Bulkley River near Houston	m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

Figure 4C: Historical changes in channel morphology, Maxan Creek, KM 2 to 0.

APPENDIX 2 - BULKLEY RIVER

A: MAP SHOWING THE LOCATION OF HISTORICAL AIR PHOTO COMPILATIONS

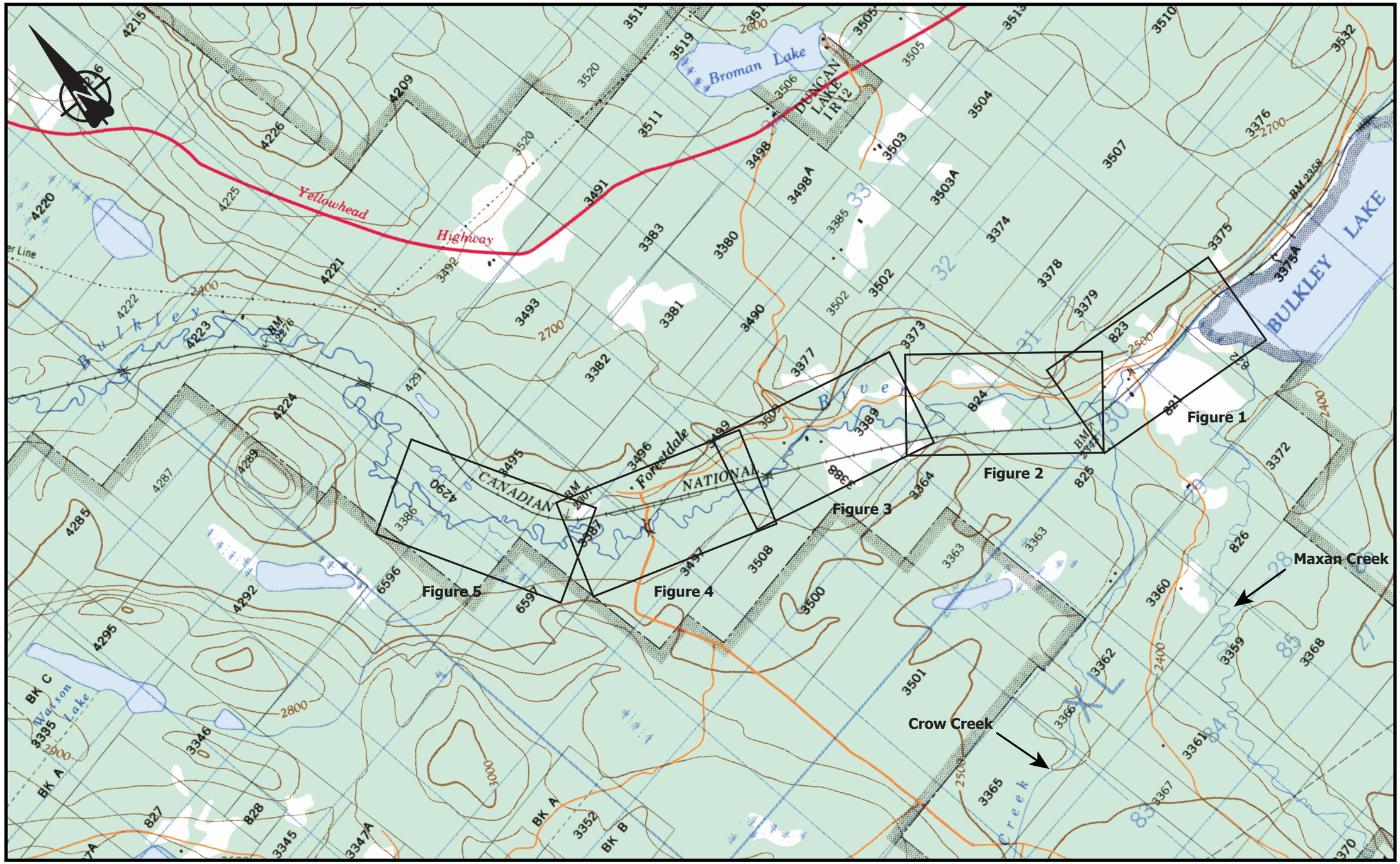


Figure 1: Location of historical air photo analysis, Bulkley River.

B: 1:7,500 SCALE ORTHOPHOTO MOSAICS

BULKLEY RIVER, KM 0 TO 12

September 29, 2019 Google Earth Imagery

Figure 1: Bulkley River, KM 0 to 2.

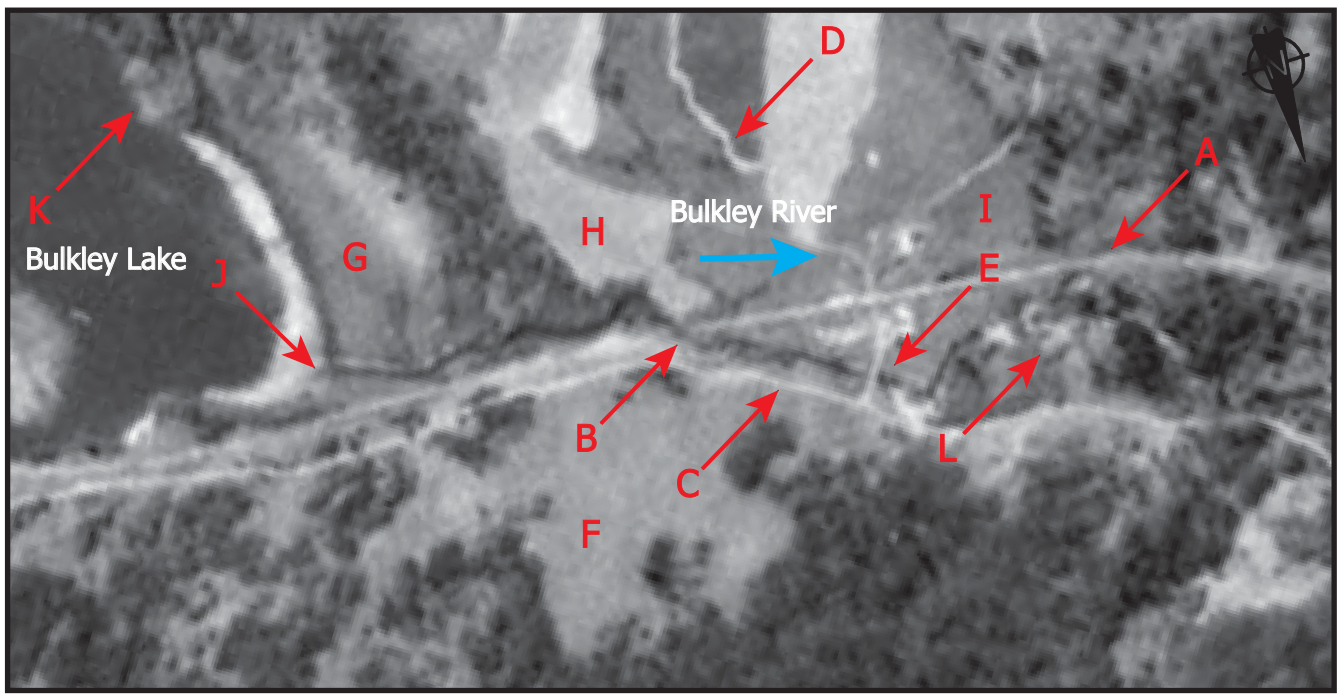
September 29, 2019 Google Earth Imagery

Figure 2: Bulkley River, KM 3 to 6.

September 29, 2019 Google Earth Imagery

Figure 3: Bulkley River, KM 7 to 12.

C: HISTORICAL AIR PHOTO ANALYSIS
BULKLEY RIVER, KM 0 TO 12



(i)

Date: August 22, 1955
A14815 #113

NOTE:

- Railway **A** and railway bridge **B**.
- Roads **C** & **D** and bridge **E**.
- Clearings **F**, **G**, **H** & **I** with no riparian reserves.
- Outlet of Bulkley Lake **J** and Maxan River delta **K**.
- Section of multithread channel **L** with localized instream sediment accumulations.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

(ii)

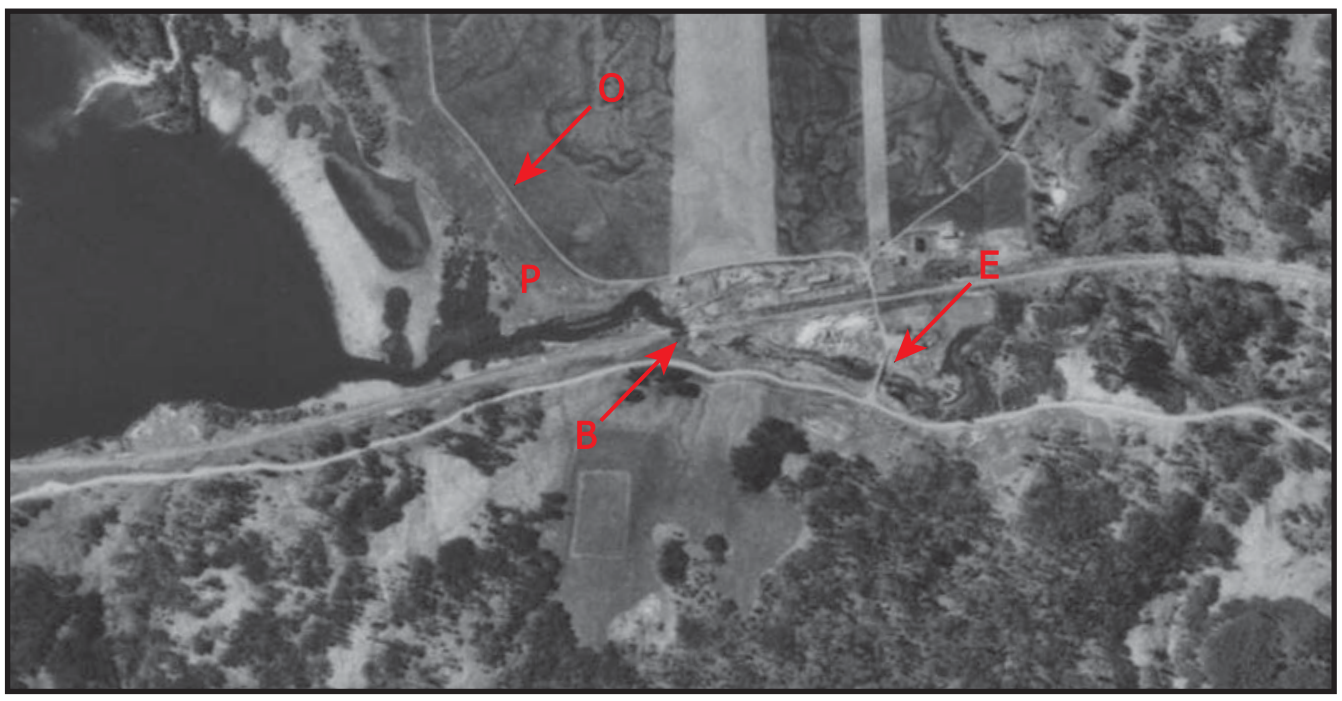
Date: August 11, 1959
BC2678 #59

NOTE:

- Additional clearing of riparian vegetation **M**.
- Channel instability in the vicinity of bridge **E**, downstream channel **L** and delta **K**.
- Improved definition of foreshore sediments **N** between **K** and **J**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(iii)

Date: June 5, 1971
BC5420 #94

NOTE:

- Road construction **O**.
- Additional clearing **P** with narrow riparian reserve.
- Development on the left bank between bridges **B** & **E** with channel disturbance.

Discharge:

Bulkley River near Houston	63.1 m^3/s
Buck Creek at the Mouth	16.7 m^3/s
Maxan Creek above Bulkley Lake	na

(iv)

Date: July 5, 1975
BC7740 #195

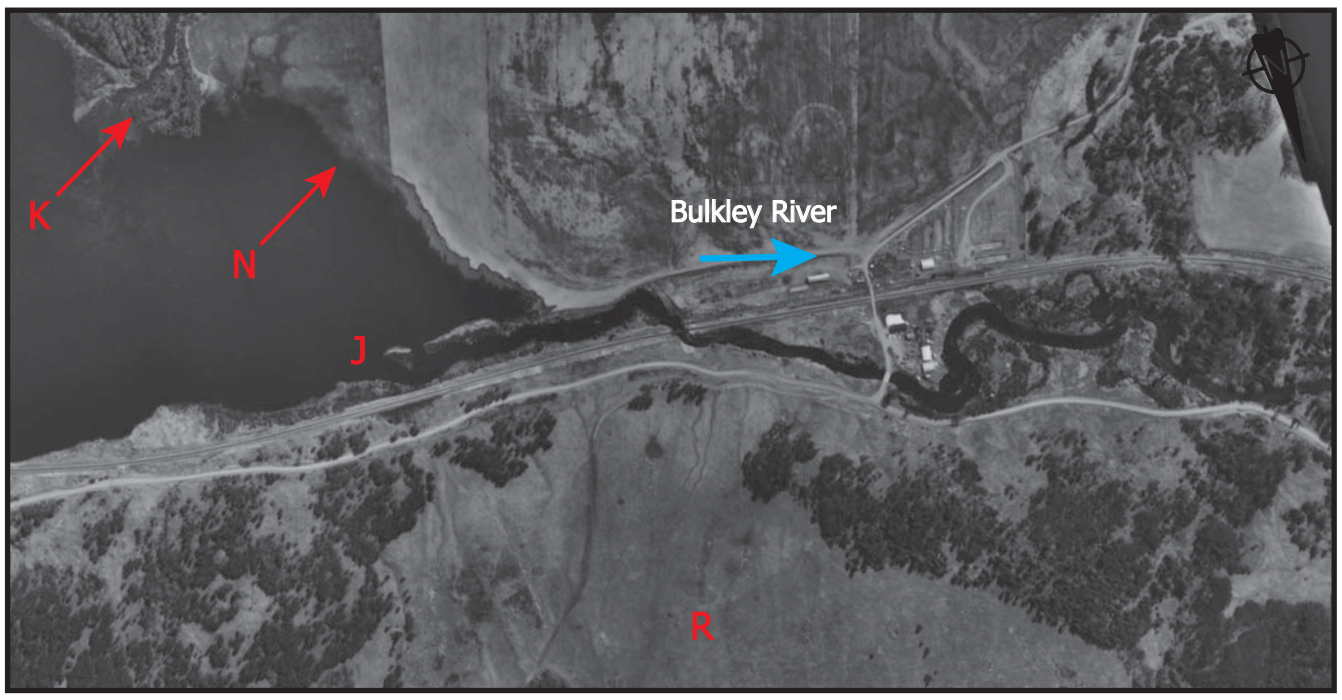
NOTE:

- Improved definition of relic channel **Q**.
- Channel shifting and enlarged unvegetated sediment accumulations in the vicinity of **L**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	2.83 m^3/s
Maxan Creek above Bulkley Lake	1.38 m^3/s

Figure 1A: Historical changes in channel morphology, Bulkley River, KM 0 to 1.



(v)

Date: June 3, 1986
30BCC429 #202

NOTE:

- Upslope clearing **R**.
- High water levels in Bulkley Lake and river submerging foreshore sediments **N** between **K** & **J**.

Discharge:

Bulkley River near Houston	88.1 m^3/s
Buck Creek at the Mouth	25.4 m^3/s
Maxan Creek above Bulkley Lake	na

(vi)

Date: August 1, 1998
30BCC98022 #15

NOTE:

- Probable development of a riparian buffer around the northern and eastern perimeter of field **G**.
- Sediment production on Maxan Delta **K**, vegetation establishment on foreshore sediment deposits **N**, and constricted lake outlet **J**.
- Active channel shifting in the vicinity of **L**.

Discharge:

Bulkley River near Houston	1.02 m^3/s
Buck Creek at the Mouth	0.657 m^3/s
Maxan Creek above Bulkley Lake	na

(vii)

Date: August 11, 2005
30BCC05052 #51

NOTE:

- Further growth of riparian vegetation around field **G** and along the downstream channel.
- Reduced size of unvegetated sediment accumulations in the vicinity of **L**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	1.41 m^3/s
Maxan Creek above Bulkley Lake	na

(viii)

Date: September 29, 2019
Google Earth Imagery

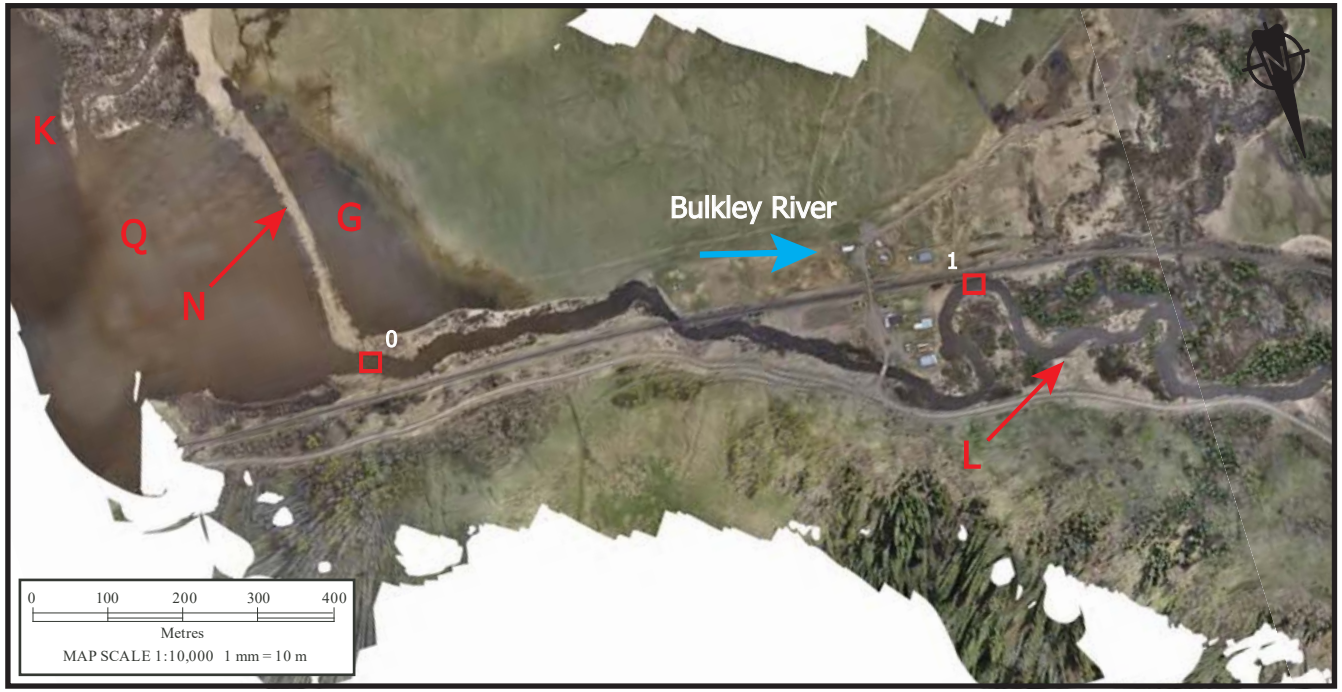
NOTE:

- Low water level on Bulkley Lake exposing foreshore sediments **N**.
- Vegetation growth at outlet of Bulkley Lake **J**.
- Further development of riparian vegetation in the vicinity of **M** & **L**.

Discharge:

Bulkley River near Houston	2.19 m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

Figure 1B: Historical changes in channel morphology, Bulkley River, KM 0 to 1.



(ix)

Date: May 11, 2021
Orthophoto

NOTE:

- Extent of sediment plume **Q** from Maxan Creek **K**.
- High water levels on Bulkley Lake inundating foreshore sediments **N**, portions of field **G** and areas of valley flat in the vicinity of **L**.

Discharge:

Bulkley River near Houston	81.0 m^3/s
Buck Creek at the Mouth	22.9 m^3/s
Maxan Creek above Bulkley Lake	na

□ Kilometers downstream of Bulkley Lake

(x)

Date:

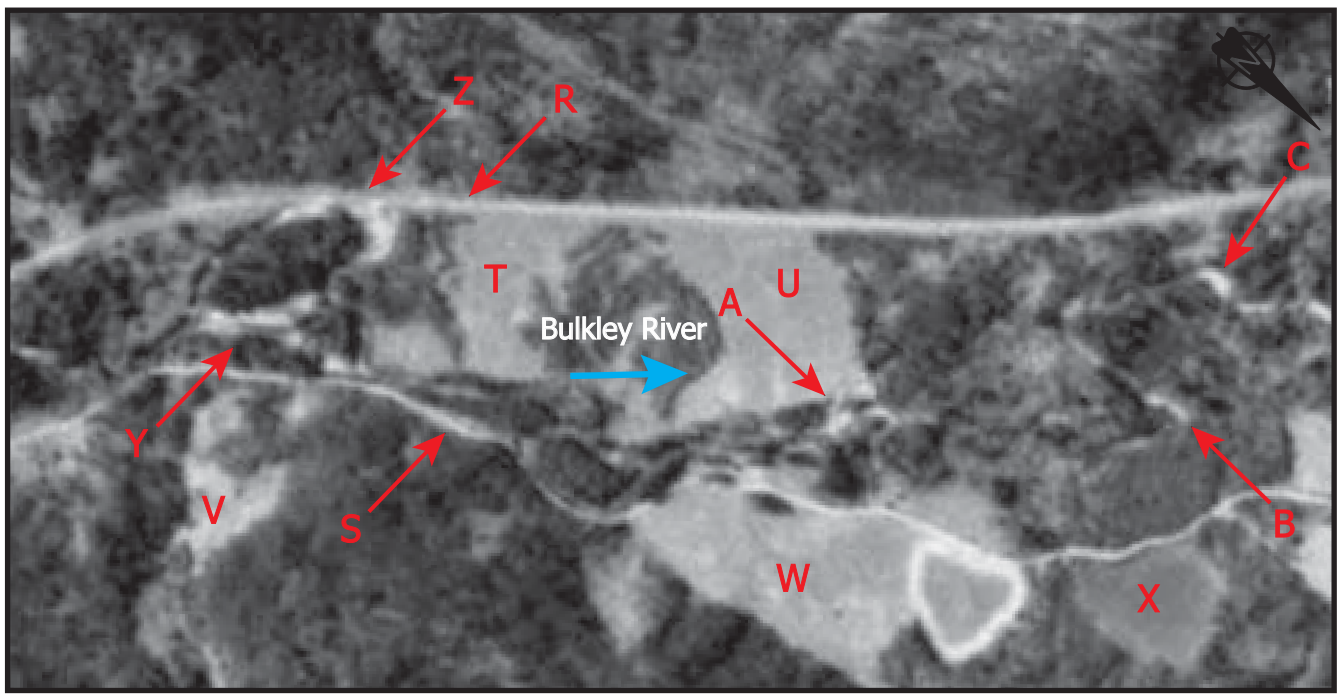
NOTE:

-

Discharge:

Bulkley River near Houston	m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

Figure 1C: Historical changes in channel morphology, Maxan Creek, KM 0 to 1.



(i)

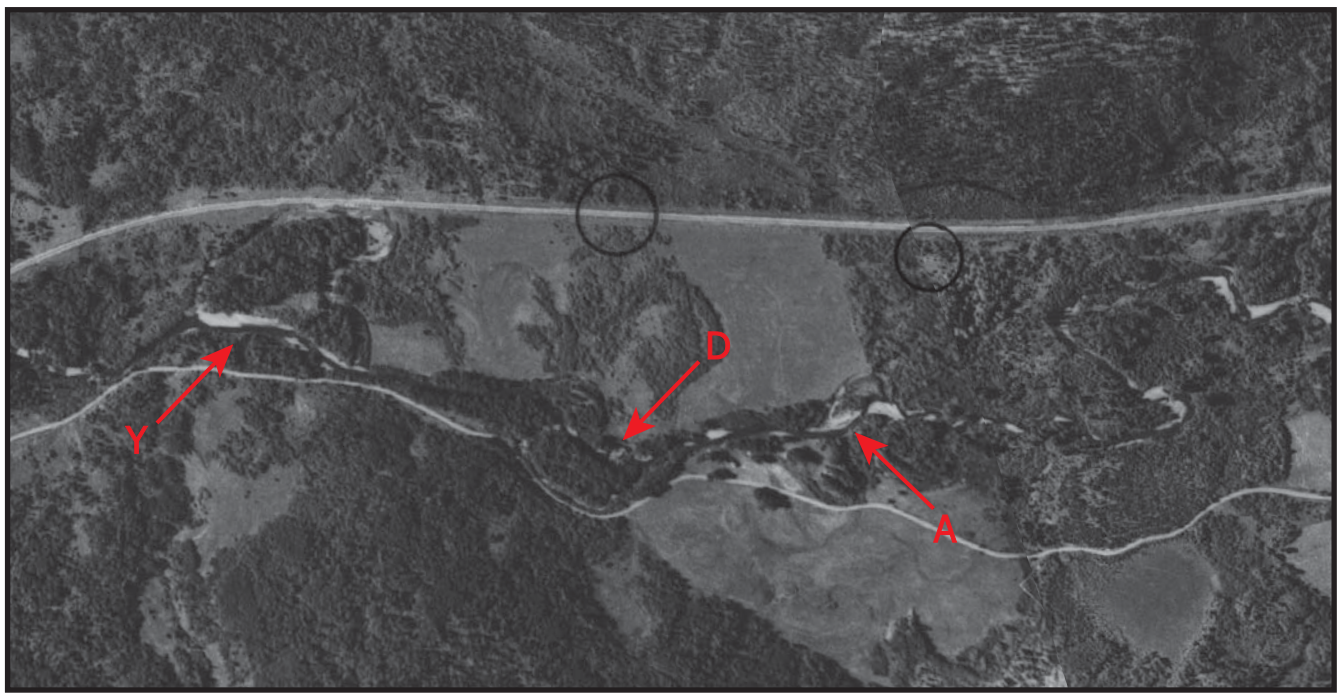
Date: August 22, 1955
A14815 #113

NOTE:

- Railway **R** and road **S**.
- Clearings **T**, **U**, **V**, **W** & **X**.
- Recent channel cutoff **Y** and abandoned channel **Z**, possibly reflecting efforts to reduce erosion on railway **R**.
- Area of exposed unvegetated sediment deposits **A**, **B** & **C** indicating sites of channel instability.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(ii)

Date: August 11, 1959
BC2677 #88

NOTE:

- Continued post cutoff channel evolution in the vicinity of cutoff **Y**.
- Developing meander cutoffs at **D** and **A**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

(iii)

Date: June 5, 1971
BC5420 #94

NOTE:

- Channel realignment at **E** possibly reflecting efforts to reduce erosion of adjacent cleared field.

Discharge:

Bulkley River near Houston	63.1 m^3/s
Buck Creek at the Mouth	16.7 m^3/s
Maxan Creek above Bulkley Lake	na

(iv)

Date: July 5, 1975
BC7727 #14

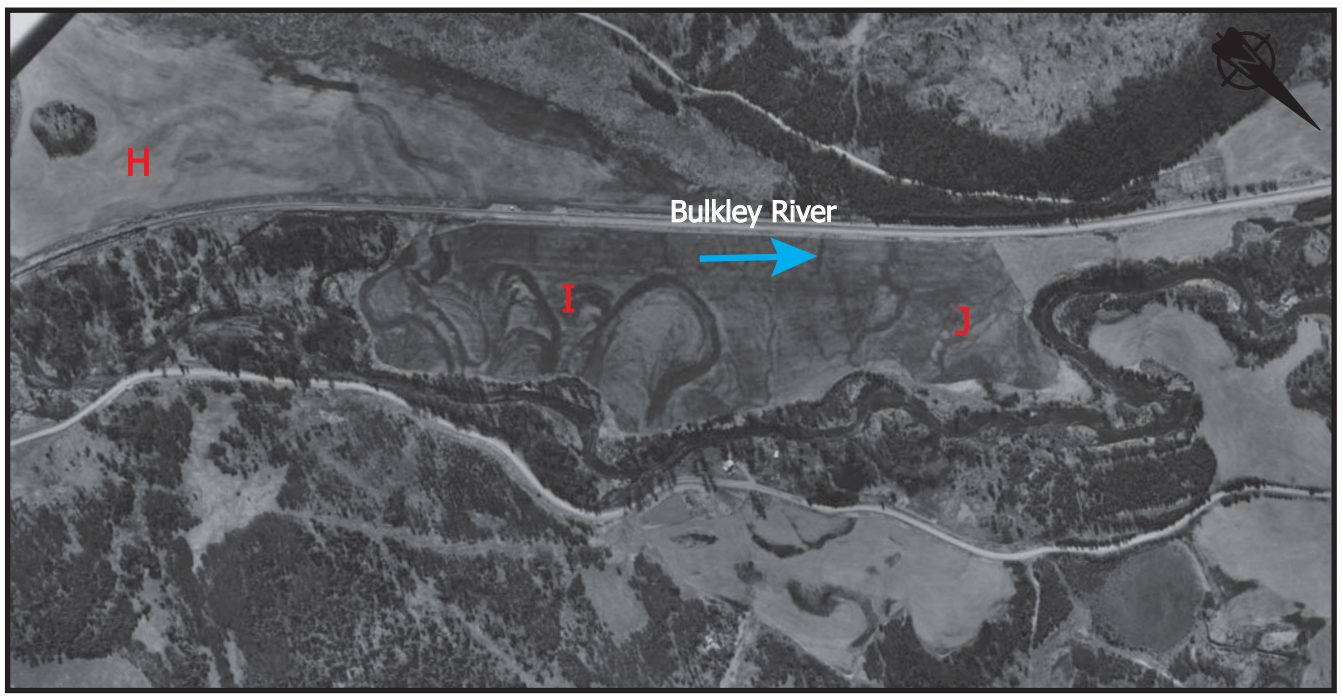
NOTE:

- Valley flat clearing **F** & **G** with loss of riparian vegetation.
- Channel shifting at **Y** and formation of unvegetated point bar.
- Bank erosion and point bar formation in the vicinity of **B** & **G**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	2.83 m^3/s
Maxan Creek above Bulkley Lake	1.38 m^3/s

Figure 2A: Historical changes in channel morphology, Bulkley River, KM 2 to 3.



(v)

Date: June 3, 1986
30BCC429 #121

NOTE:

- Additional clearing **H**, **I** & **J** with loss of riparian vegetation.

Discharge:

Bulkley River near Houston	88.1 m^3/s
Buck Creek at the Mouth	25.4 m^3/s
Maxan Creek above Bulkley Lake	na

(vi)

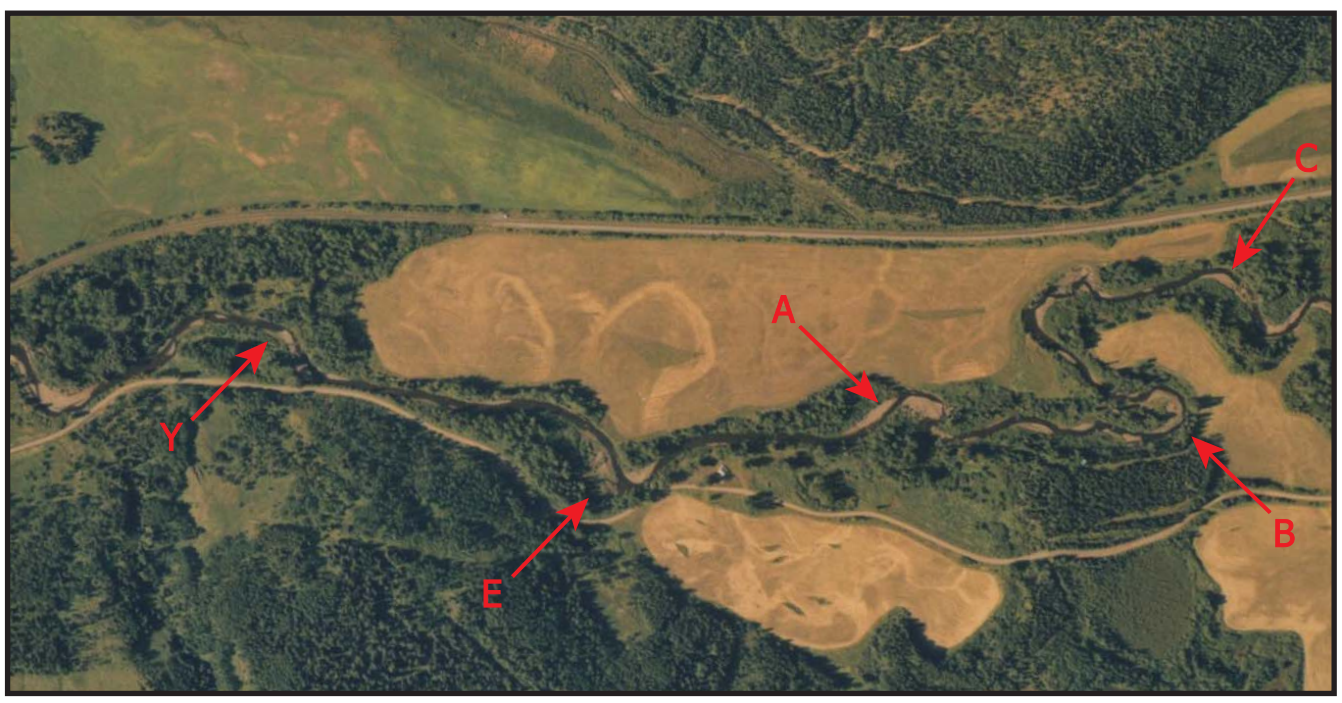
Date: August 1, 1998
30BCC98021 #180 & 30BCC98022 #15

NOTE:

- Increased channel instability and development of unvegetated instream sediment accumulations **Y**, **E**, and between **A**, **B** & **C**.

Discharge:

Bulkley River near Houston	1.02 m^3/s
Buck Creek at the Mouth	0.657 m^3/s
Maxan Creek above Bulkley Lake	na



(vii)

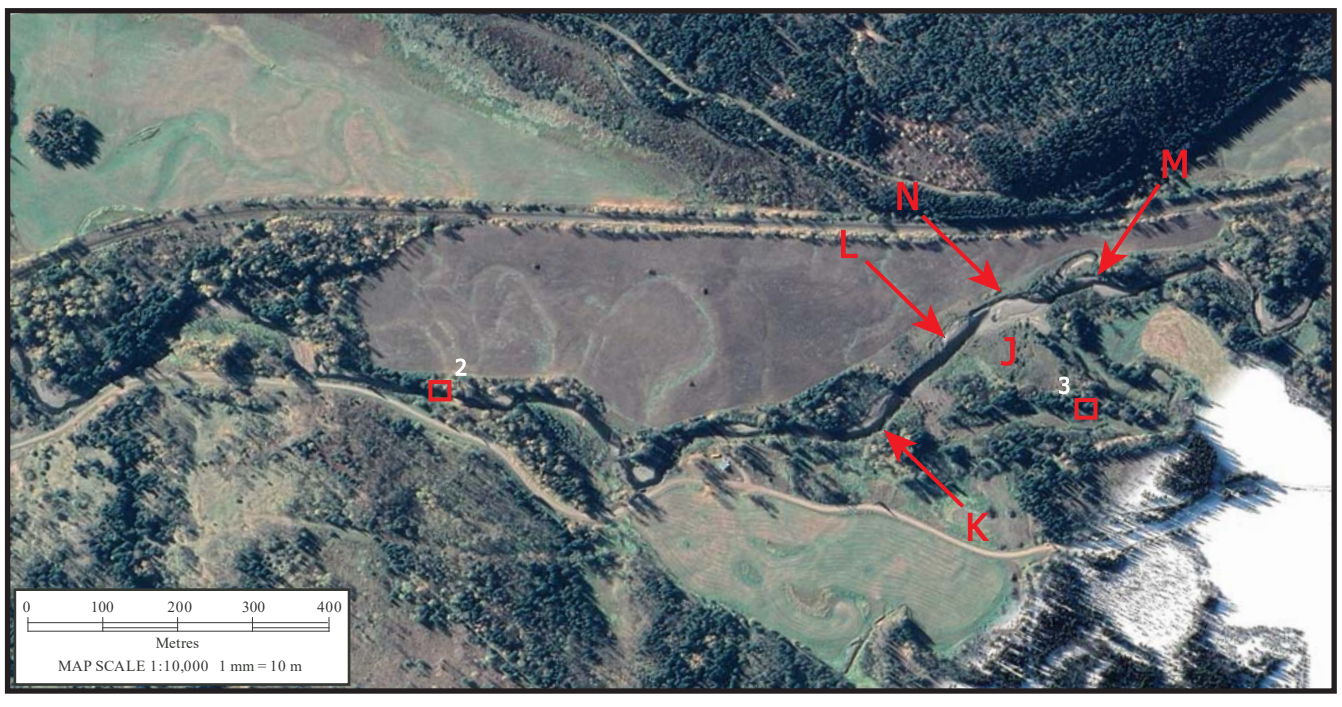
Date: August 11, 2005
30BCC05052 #52

NOTE:

- Continued channel instability with some reduction in the size of unvegetated instream sediment accumulations **Y**, **E**, **A**, **B** & **C**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	1.41 m^3/s
Maxan Creek above Bulkley Lake	na



(viii)

Date: September 29, 2019
Google Earth Imagery

NOTE:

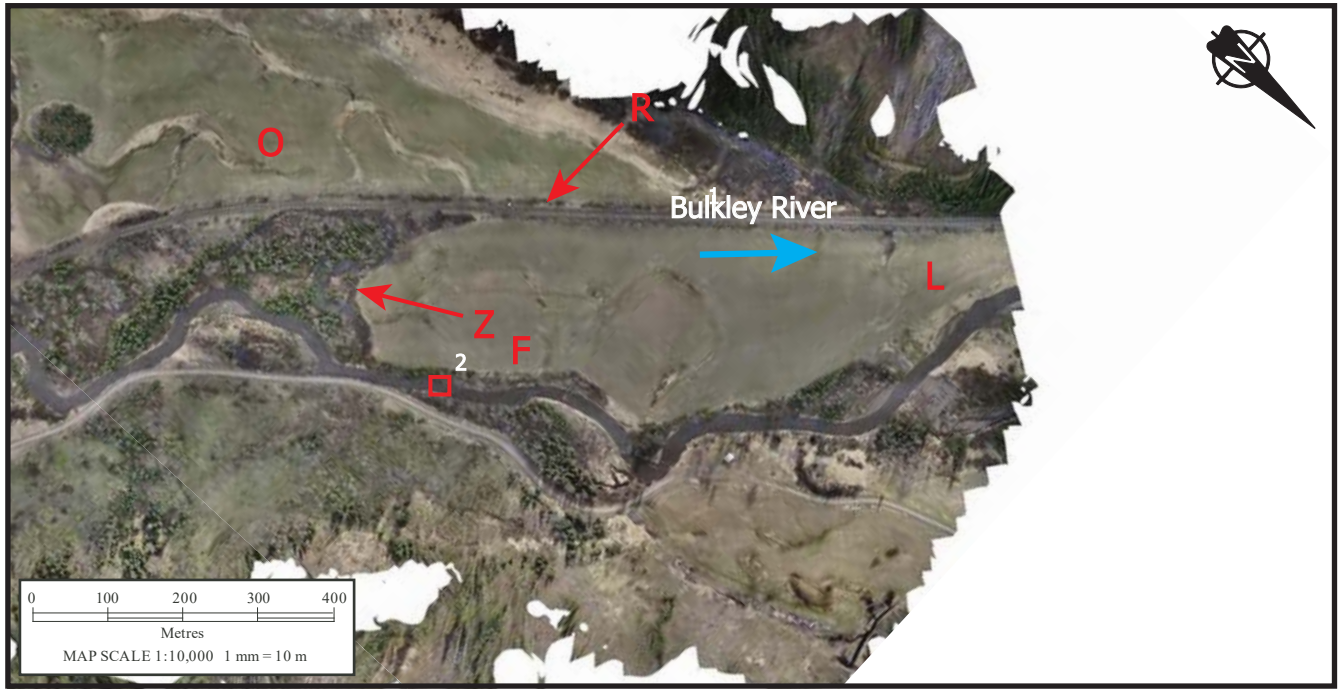
- Channel relocations **K**, **L** & **M** through previously cleared field **J**.
- Formation of unvegetated instream sediment accumulations **N**.

Discharge:

Bulkley River near Houston	2.19 m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

□ Kilometers downstream of Bulkley Lake

Figure 2B: Historical changes in channel morphology, Bulkley River, KM 2 to 3.



(ix)

Date: May 11, 2021
Orthophoto

NOTE:

- High water levels on Bulkley River inundating wetland areas in cutoff channel **Z**.
- Improved definition of isolated channels **O** cutoff by the railway **R**.
- Riparian areas with reduced (**F**) or absent (**L**) vegetation.

Discharge:

Bulkley River near Houston	81.0 m^3/s
Buck Creek at the Mouth	22.9 m^3/s
Maxan Creek above Bulkley Lake	na

□ Kilometers downstream of Bulkley Lake

(x)

Date:

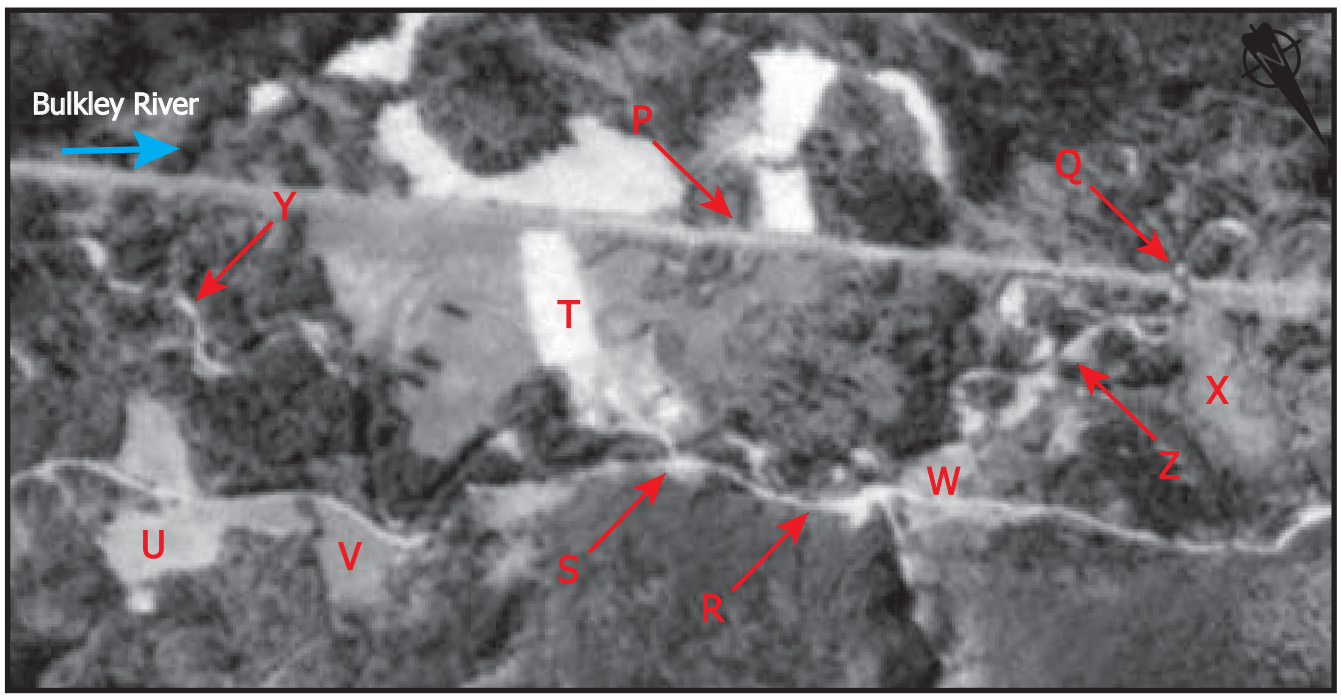
NOTE:

-

Discharge:

Bulkley River near Houston	m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

Figure 2C: Historical changes in channel morphology, Maxan Creek, KM 2 to 3.



(i)

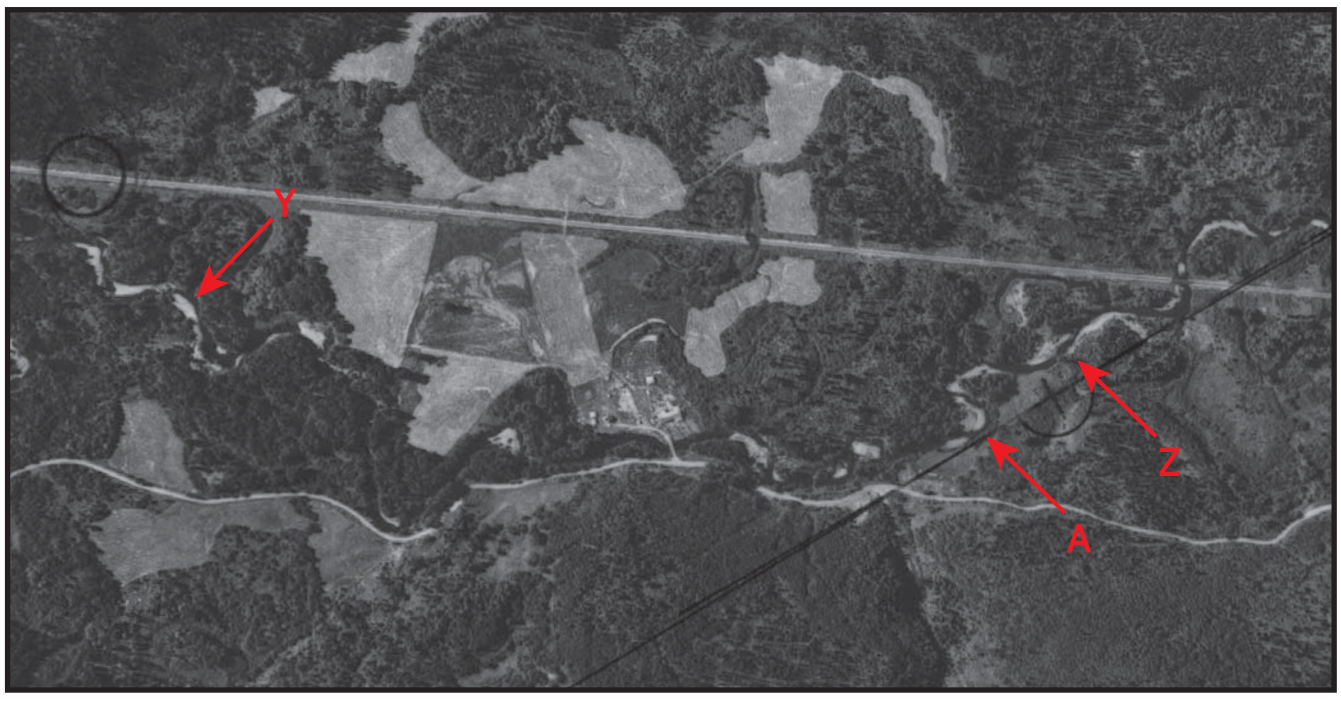
Date: August 22, 1955
A14815 #113

NOTE:

- Railway **P** and bridge **Q**.
- Road **R** and bridge **S**.
- Clearings **T**, **U**, **V**, **W** & **X** many of which resulted in a loss of riparian vegetation.
- Channel cutoffs **Y** & **Z**, possibly railway related, with associated unvegetated instream sediment accumulations.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(ii)

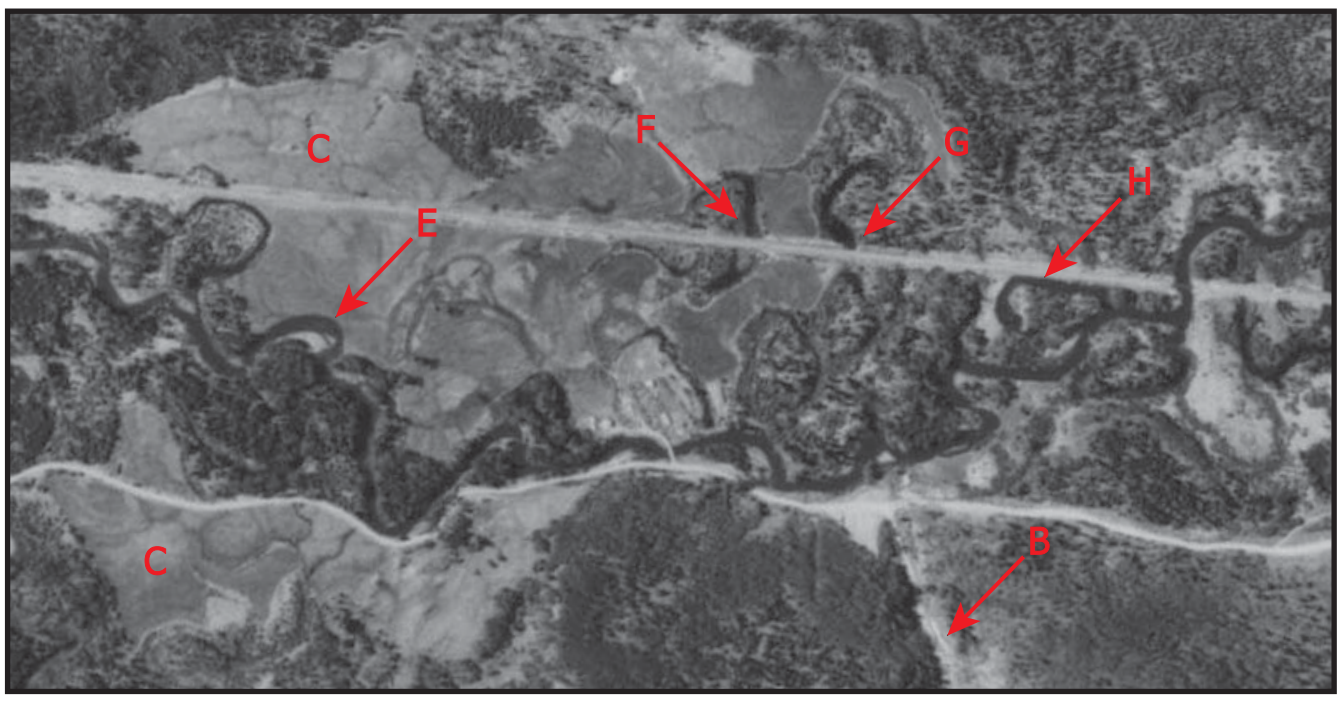
Date: August 11, 1959
BC2677 #88

NOTE:

- Continued channel instability in the vicinity of **Y** & **Z**.
- Bank erosion **A** on cleared field.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(iii)

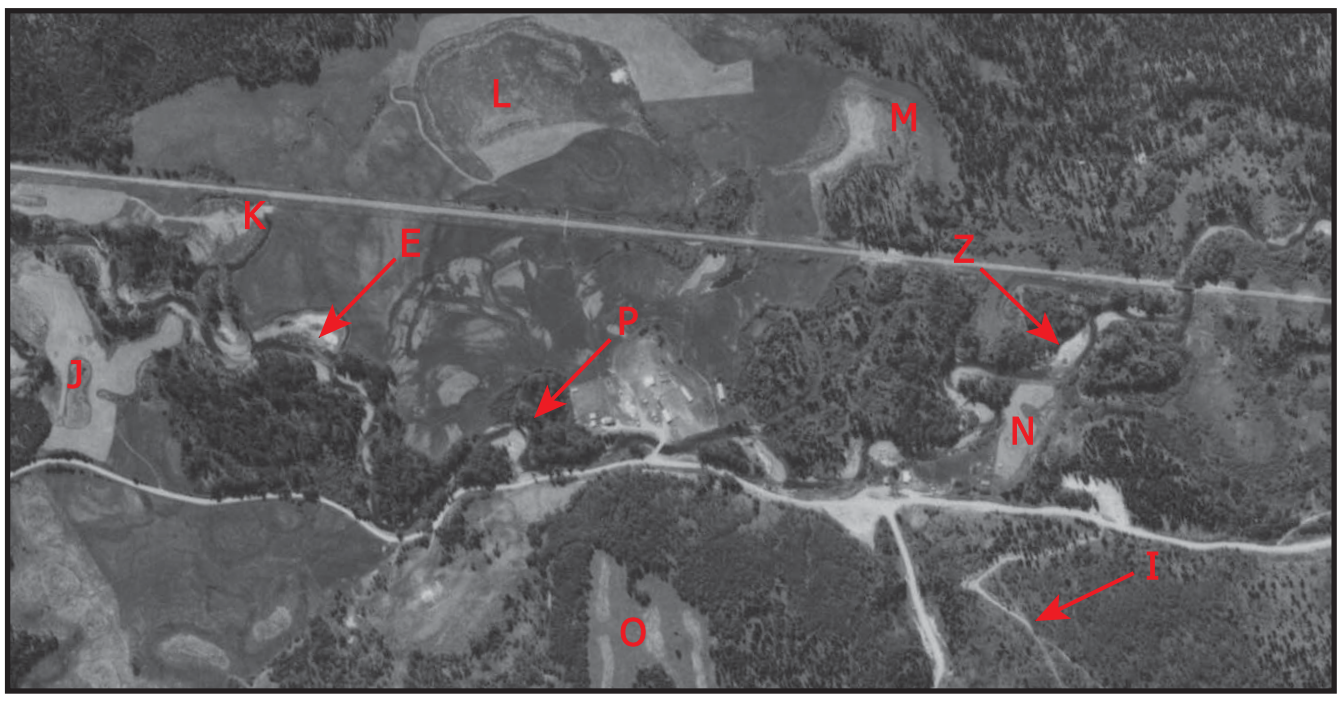
Date: June 5, 1971
BC5420 #94

NOTE:

- Road construction **B**.
- Additional clearing **C**.
- Loss of riparian vegetation at **E**.
- Wetland areas **F**, **G** & **H** are sites likely blocked by the railway grade.

Discharge:

Bulkley River near Houston	63.1 m^3/s
Buck Creek at the Mouth	16.7 m^3/s
Maxan Creek above Bulkley Lake	na



(iv)

Date: July 5, 1975
BC7727 #12

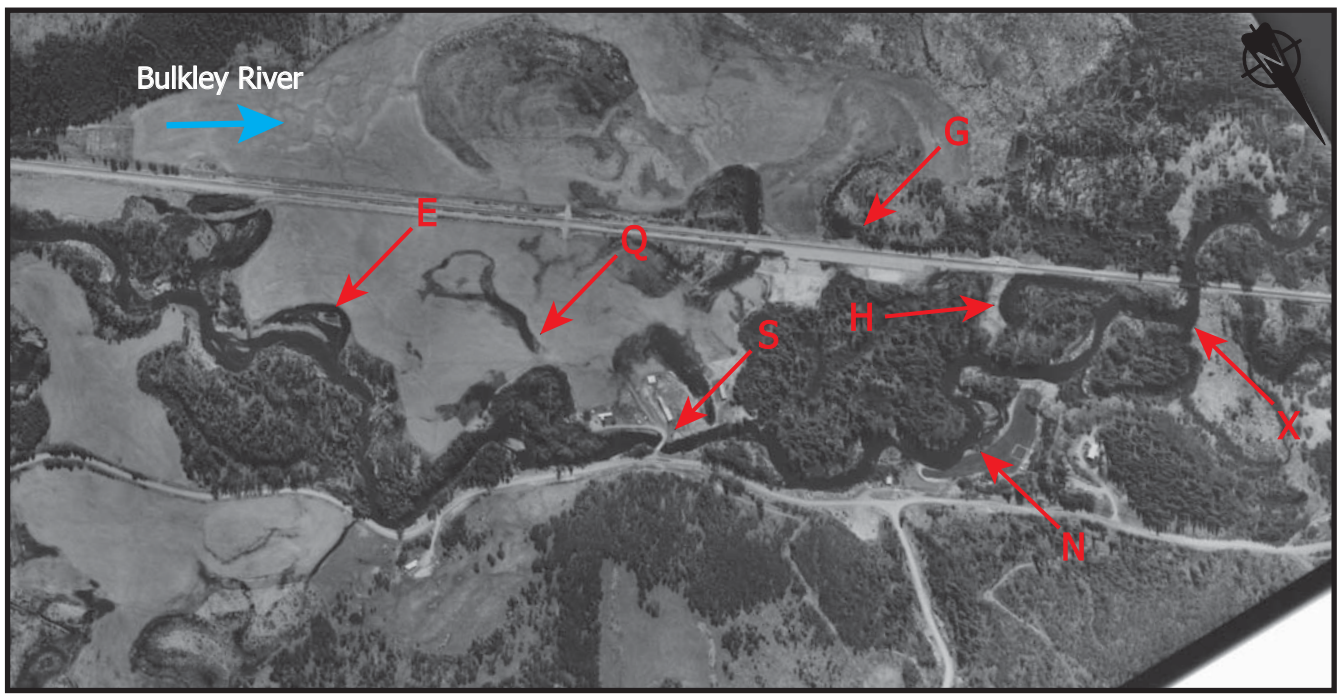
NOTE:

- Road construction **I**.
- Additional clearing **J**, **K**, **L**, **M**, **N** & **O**.
- Channel cutoff **E** (possibly related to protection of eroding field) and downstream sediment production.
- Channel shift at **P**.
- Enlarged unvegetated instream sediment accumulations in the vicinity of **Z**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	2.83 m^3/s
Maxan Creek above Bulkley Lake	1.38 m^3/s

Figure 3A: Historical changes in channel morphology, Bulkley River, KM 4 to 6.



(v)

Date: June 3, 1986
30BCC429 #122

NOTE:

- High water levels obscure instream sediment accumulations.
- Residual wetlands **Q**, **G** & **H**.
- Lack of riparian vegetation at **E**, **S**, **N** & **X**.

Discharge:

Bulkley River near Houston	88.1 m^3/s
Buck Creek at the Mouth	25.4 m^3/s
Maxan Creek above Bulkley Lake	na

(vi)

Date: August 1, 1998
30BCC98021 #180

NOTE:

- Establishment of vegetated riparian reserve in the vicinity of **E**, **S** & **X**.
- Exposed unvegetated sediment accumulations throughout this section of river due to channel shifting.

Discharge:

Bulkley River near Houston	1.02 m^3/s
Buck Creek at the Mouth	0.657 m^3/s
Maxan Creek above Bulkley Lake	na

(vii)

Date: August 11, 2005
30BCC05052 #72

NOTE:

- Additional vegetation growth within the riparian corridor.
- Further channel shifting in the vicinity of **Y**, **P**, **R** & **N**.
- Initial vegetation development on instream sediment accumulations.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	1.41 m^3/s
Maxan Creek above Bulkley Lake	na

(viii)

Date: September 29, 2019
Google Earth Imagery

NOTE:

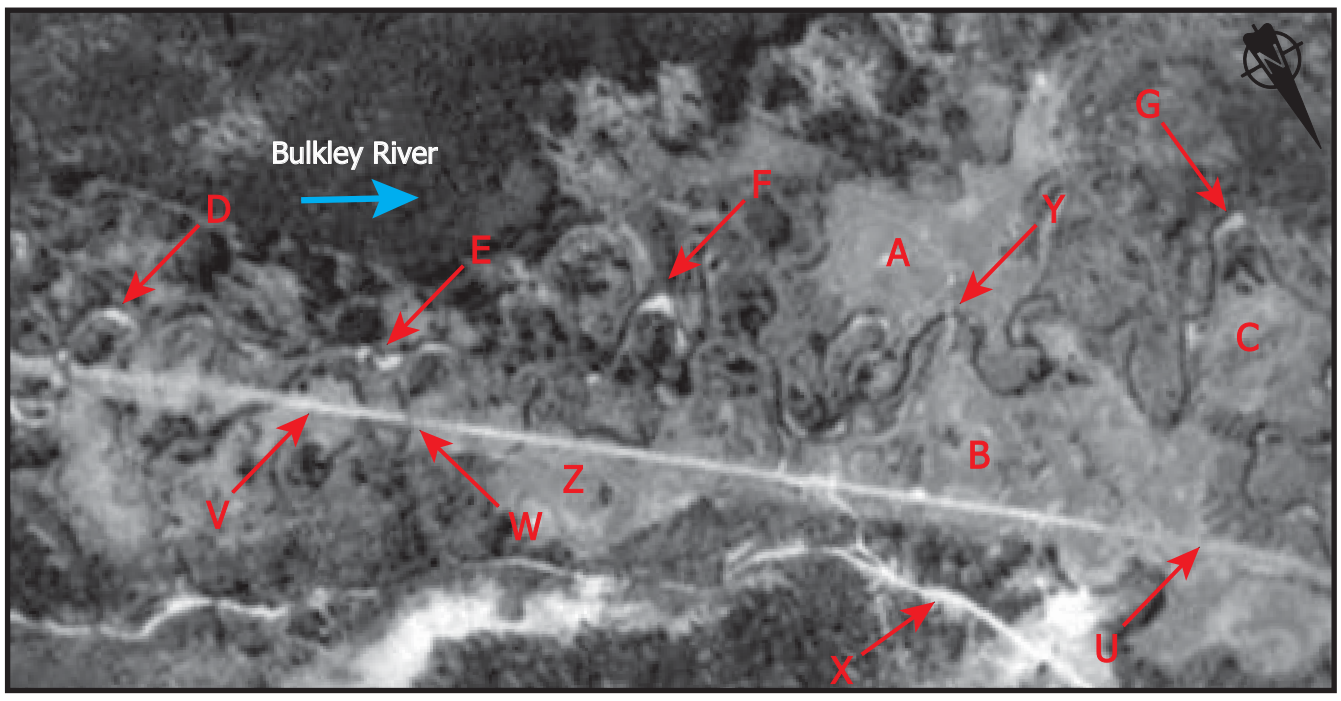
- Channel shifting in the vicinity of and downstream of **Y**.
- Residual width of riparian vegetation **E**.
- Vegetation development on formerly barren point bars **P** & **R**.
- Continued channel shifting at **S** & **T**.

Discharge:

Bulkley River near Houston	2.19 m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

□ Kilometers downstream of Bulkley Lake

Figure 3B: Historical changes in channel morphology, Bulkley River, KM 4 to 6.



(i)

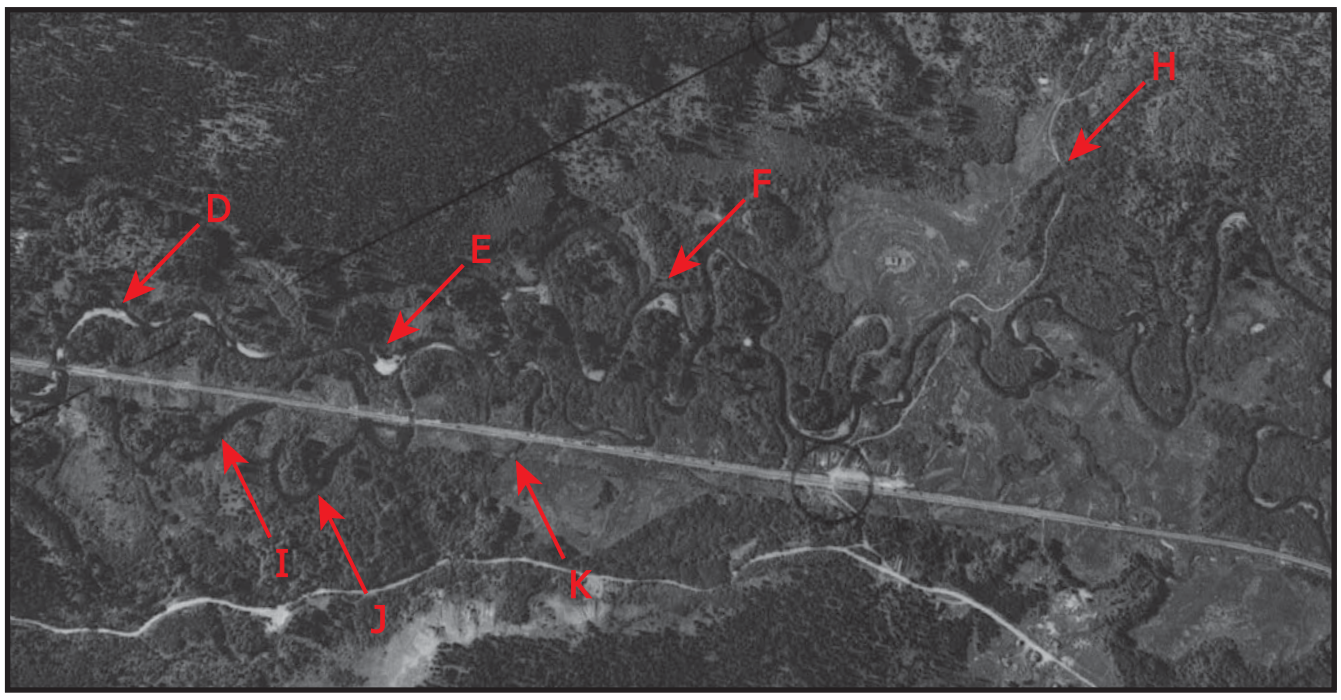
Date: August 22, 1955
A14815 #113

NOTE:

- Railway **U** and cutoff channels **V** & **W**.
- Road **X** and bridge **Y**.
- Clearings **Z**, **A**, **B** & **C** with little or no riparian reserves.
- Localized instream sediment accumulations **D**, **E**, **F** & **G**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(ii)

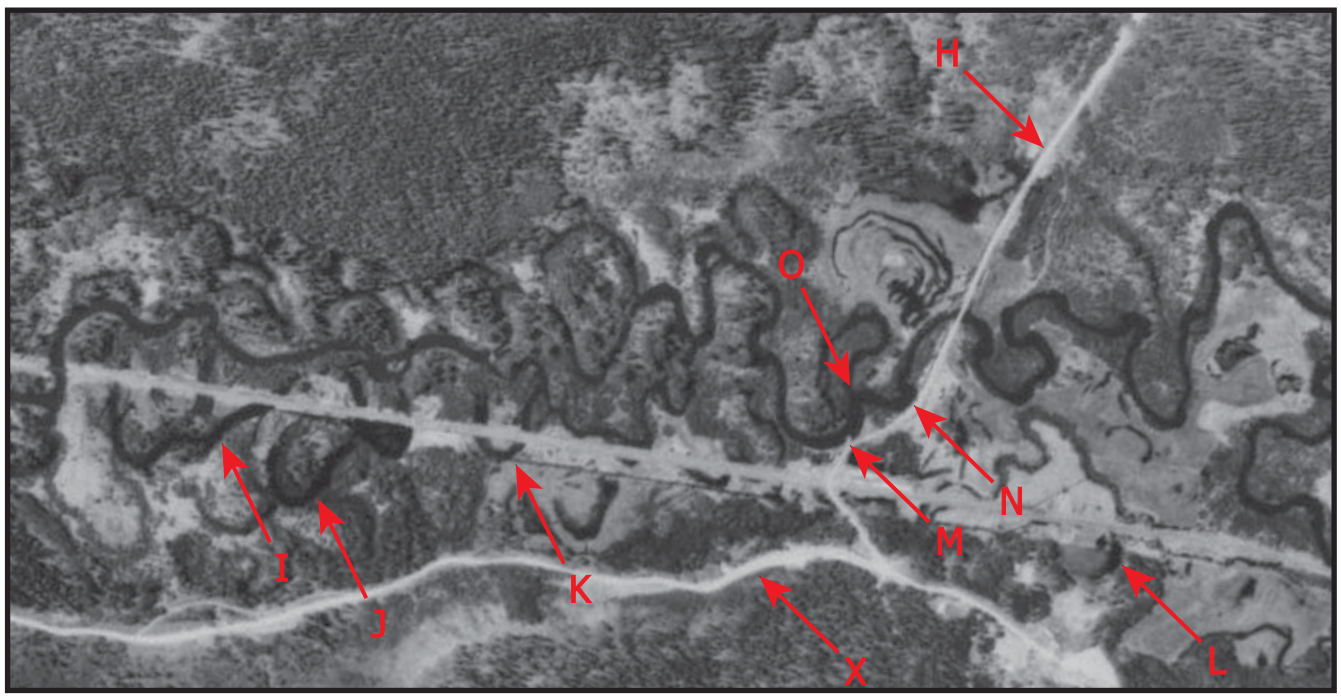
Date: August 11, 1959
BC2677 #89

NOTE:

- Road construction **H**.
- Better visualization of wetland channels cut off by railway construction **I**, **J** & **K**.
- Enlarged instream sediment accumulations **D**, **E** & **F** possibly reflecting channel straightening associated with railway construction.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(iii)

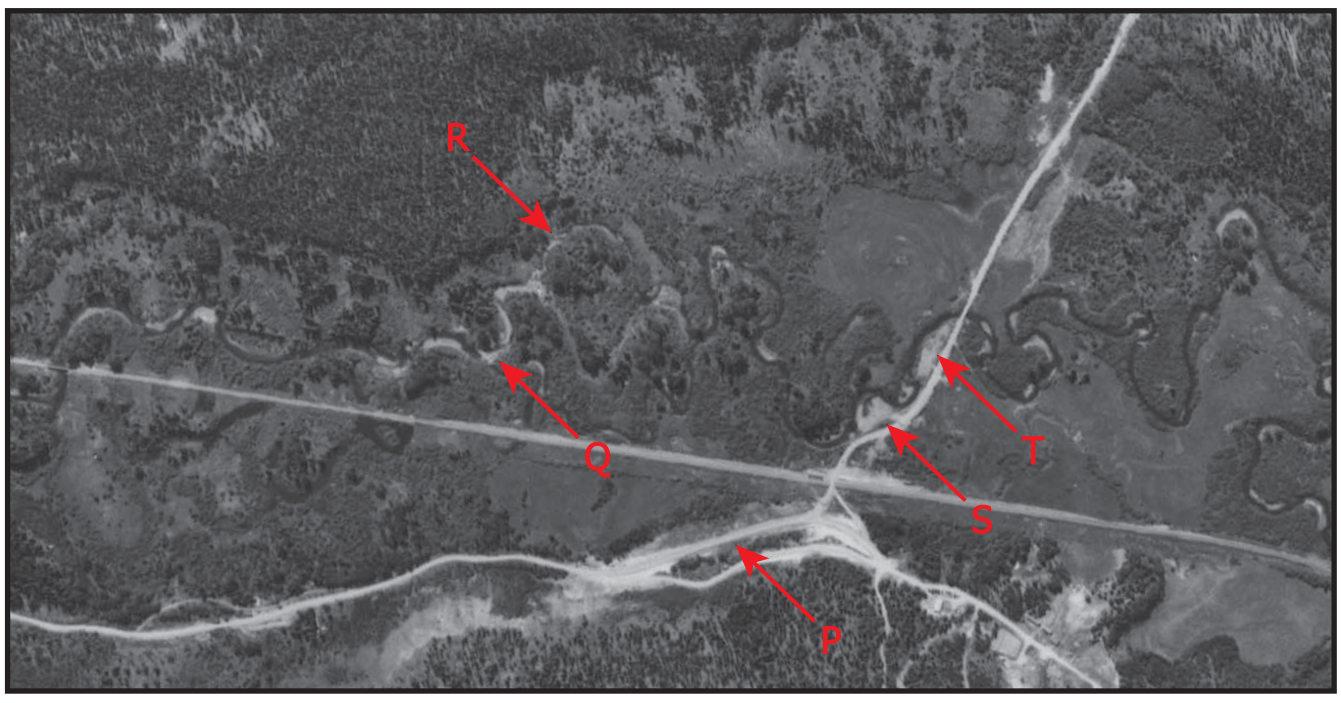
Date: June 5, 1971
BC5420 #94

NOTE:

- Enlarged roads **X** & **H** and channel encroachments **M** & **N**.
- Highwater levels which illustrate the extent of wetland areas potentially isolated by railway construction **I**, **J**, **K** & **L**.
- Historic channel cutoff **O**.

Discharge:

Bulkley River near Houston	63.1 m^3/s
Buck Creek at the Mouth	16.7 m^3/s
Maxan Creek above Bulkley Lake	na



(iv)

Date: July 5, 1975
BC7727 #11

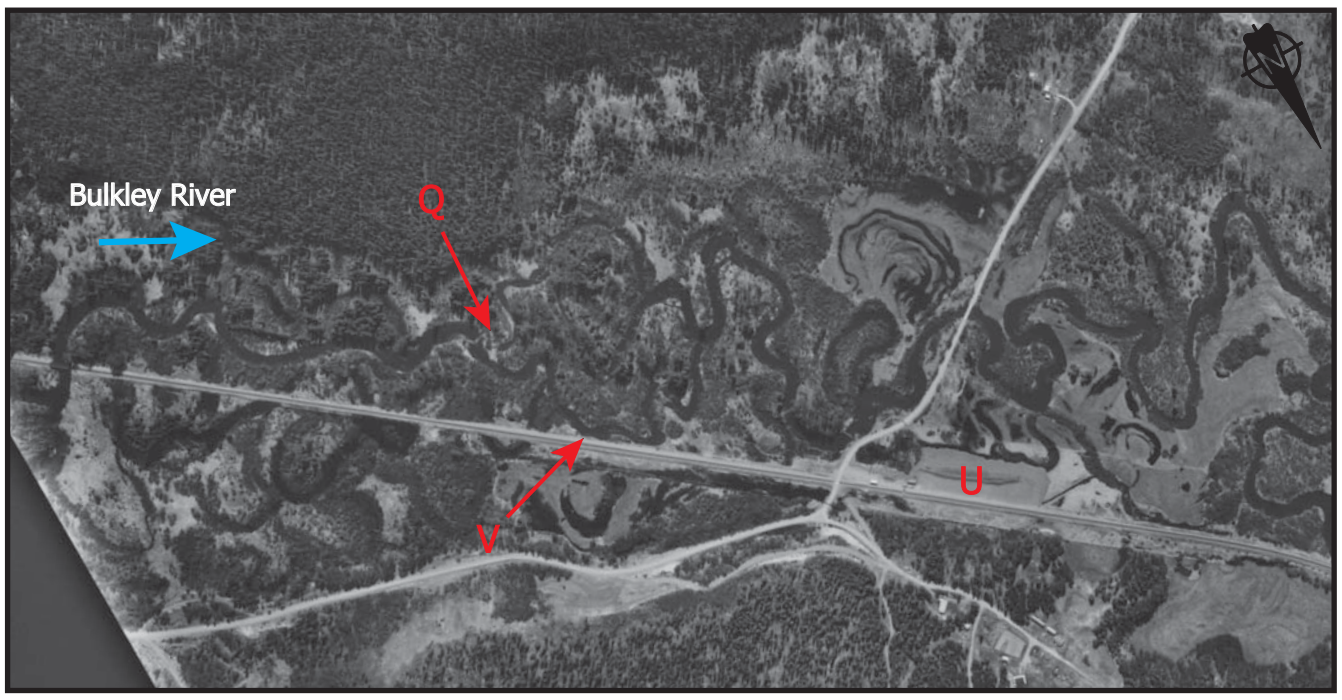
NOTE:

- Road construction **P**.
- Incipient channel relocations **Q** & **R**.
- Clearing and channel disturbance **S** & **T**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	2.83 m^3/s
Maxan Creek above Bulkley Lake	1.38 m^3/s

Figure 4A: Historical changes in channel morphology, Bulkley River, KM 7 to 9.



(v)

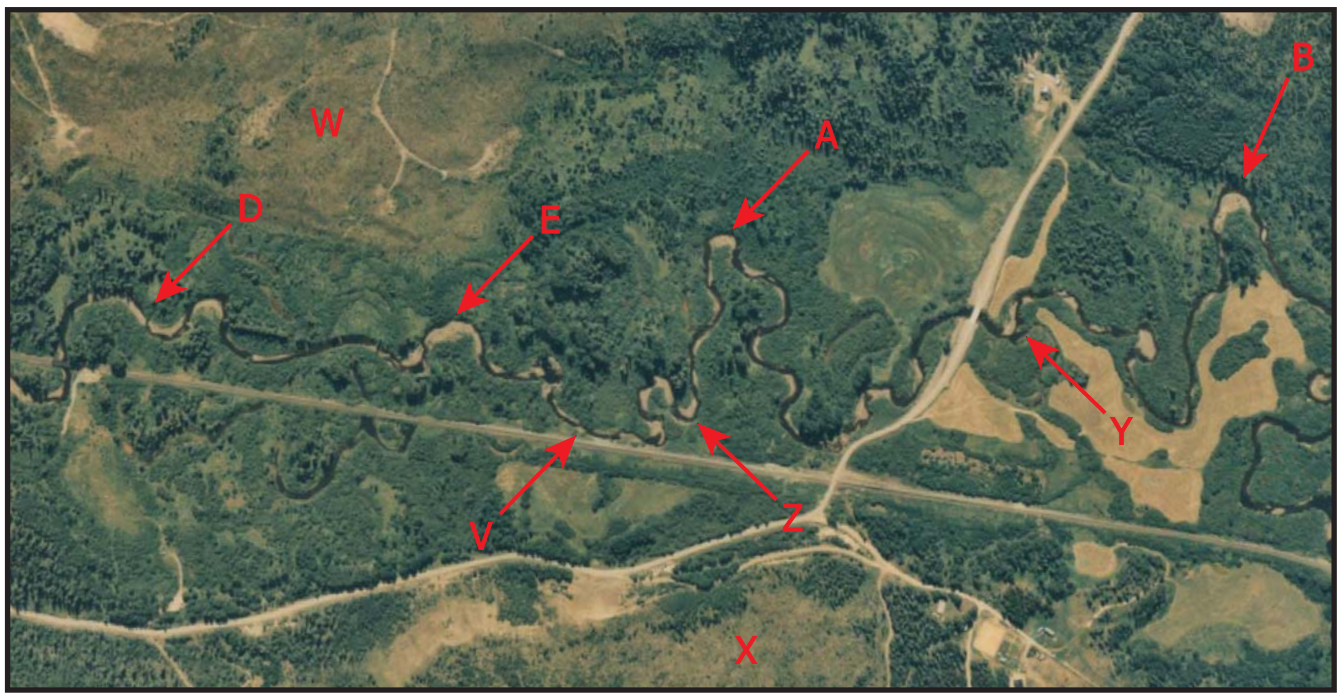
Date: June 3, 1986
30BCC429 #141

NOTE:

- Clearing **U**.
- Beaver dam **Q**.
- High flow relocated through wetland channel **V**.

Discharge:

Bulkley River near Houston	88.1 m^3/s
Buck Creek at the Mouth	25.4 m^3/s
Maxan Creek above Bulkley Lake	na



(vi)

Date: August 1, 1998
30BCC98021 #181

NOTE:

- Clearings **W** & **X**.
- Cutoff channels **V** & **Y**.
- Channel shifting in the vicinity of **D**, **E**, **Z**, **A** & **B**.
- Exposed and probably enlarged point bars **D** & **E**.

Discharge:

Bulkley River near Houston	1.02 m^3/s
Buck Creek at the Mouth	0.657 m^3/s
Maxan Creek above Bulkley Lake	na

(vii)

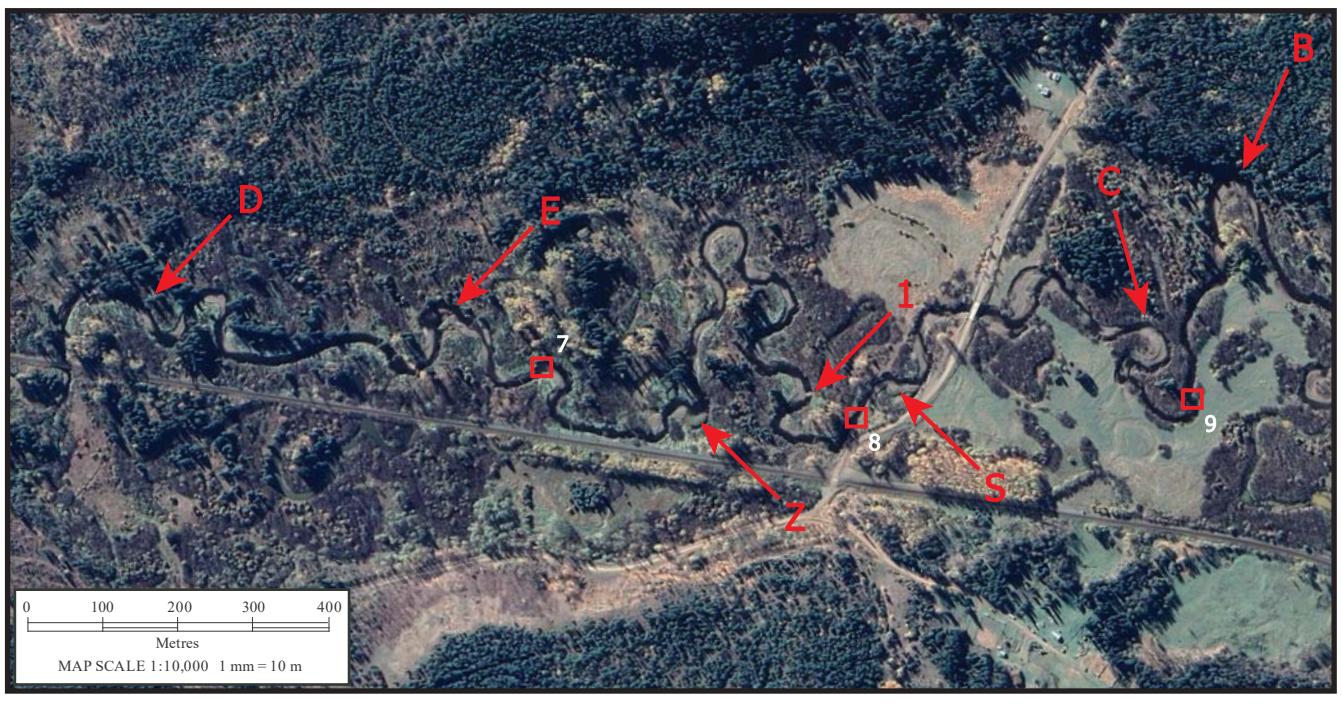
Date: August 11, 2005
30BCC05052 #72

NOTE:

- Continued channel shifting in the vicinity of **D**, **E**, **Z**, **A** & **B**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	1.41 m^3/s
Maxan Creek above Bulkley Lake	na



(viii)

Date: September 29, 2019
Google Earth Imagery

NOTE:

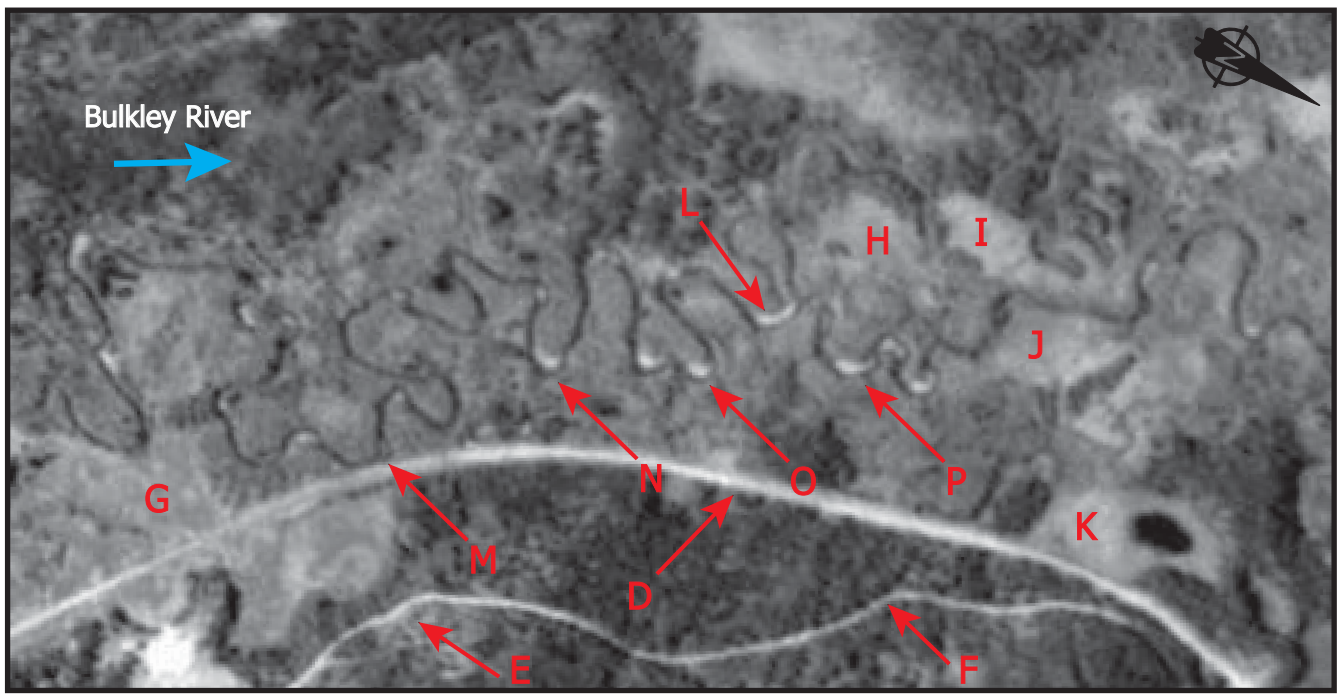
- Bridge (?) and clearing in the vicinity of **1**.
- Channel cutoff at **Z**.
- Channel shifting at **D**, **E**, **S**, **C** & **B**.
- Developing vegetation on point bars.

Discharge:

Bulkley River near Houston	2.19 m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

□ Kilometers downstream of Bulkley Lake

Figure 4B: Historical changes in channel morphology, Bulkley River, KM 7 to 9.



(i)

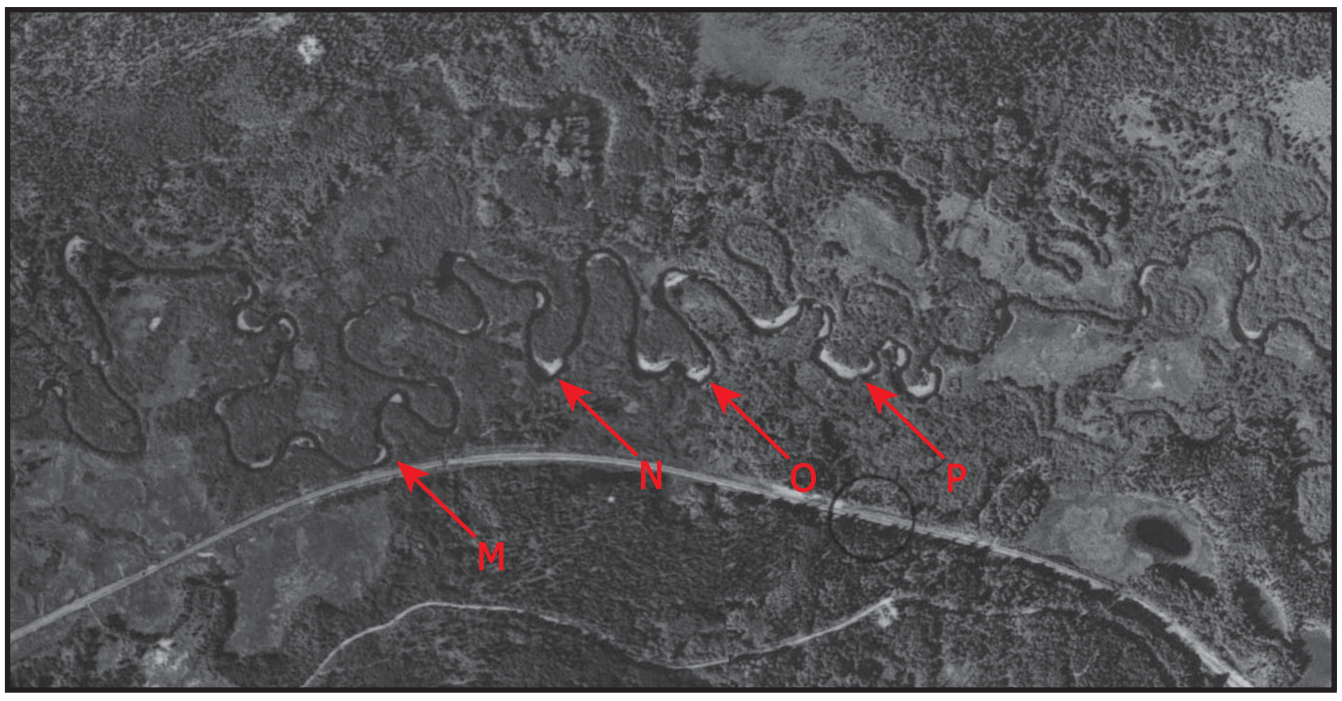
Date: August 22, 1955
A14815 #113

NOTE:

- Railway **D** and potentially isolated wetland **E**.
- Road **F**.
- Clearing **G**, **H**, **I**, **J** & **K** frequently with little or no riparian reserve.
- Recent cutoff **L**.
- Extent of unvegetated point bars in the vicinity of **M**, **N**, **O** & **P**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(ii)

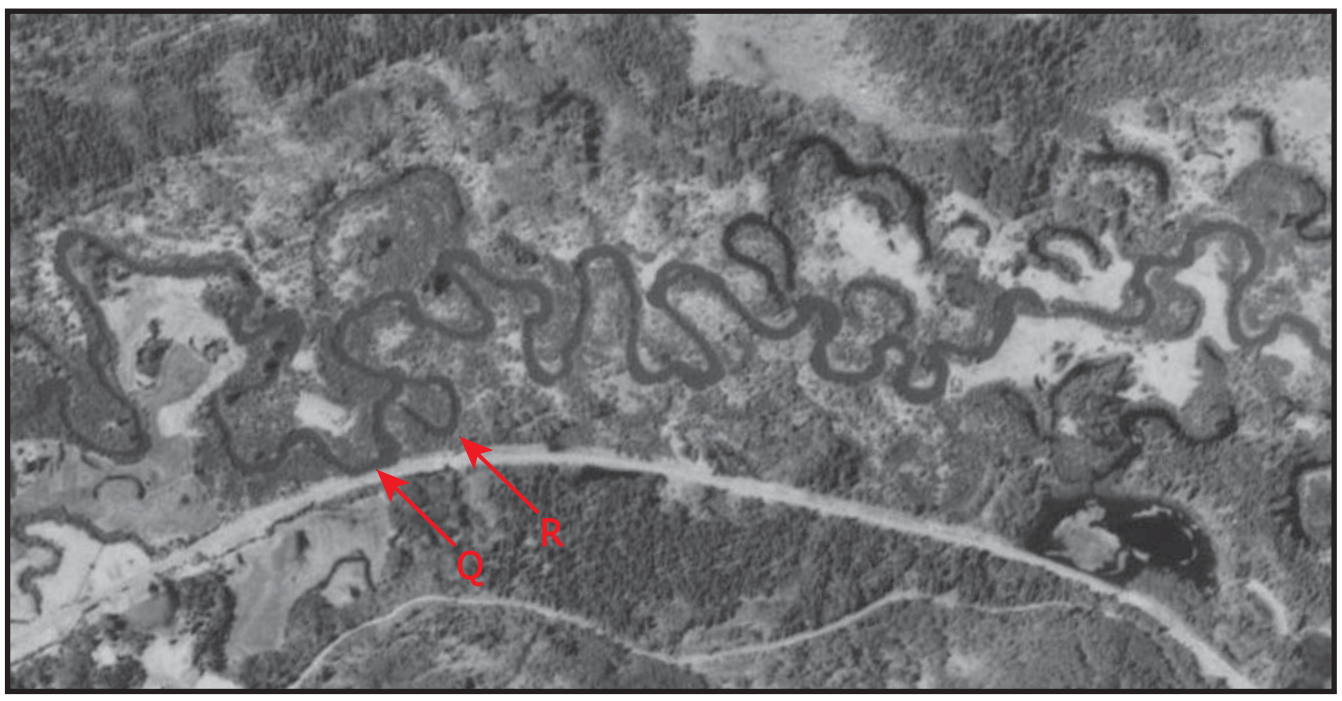
Date: August 11, 1959
BC2676 #112 & BC2677 #89

NOTE:

- Channel shifting and probably enlarged point bars **M**, **N**, **O** & **P**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na



(iii)

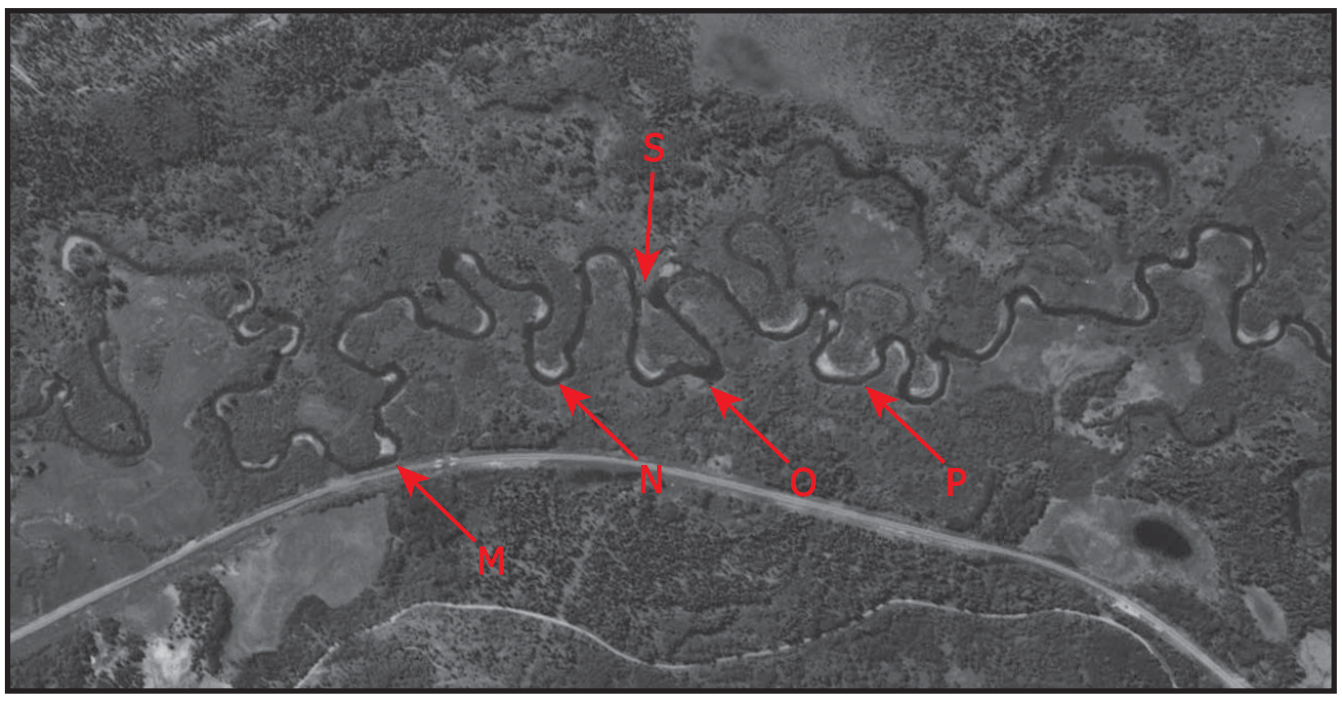
Date: June 5, 1971
BC5420 #93

NOTE:

- Possible increased bank protection **Q**.
- High water levels illustrating the extent of wetland areas.
- Cutoff channel **R**.

Discharge:

Bulkley River near Houston	63.1 m^3/s
Buck Creek at the Mouth	16.7 m^3/s
Maxan Creek above Bulkley Lake	na



(iv)

Date: July 5, 1975
BC7727 #11

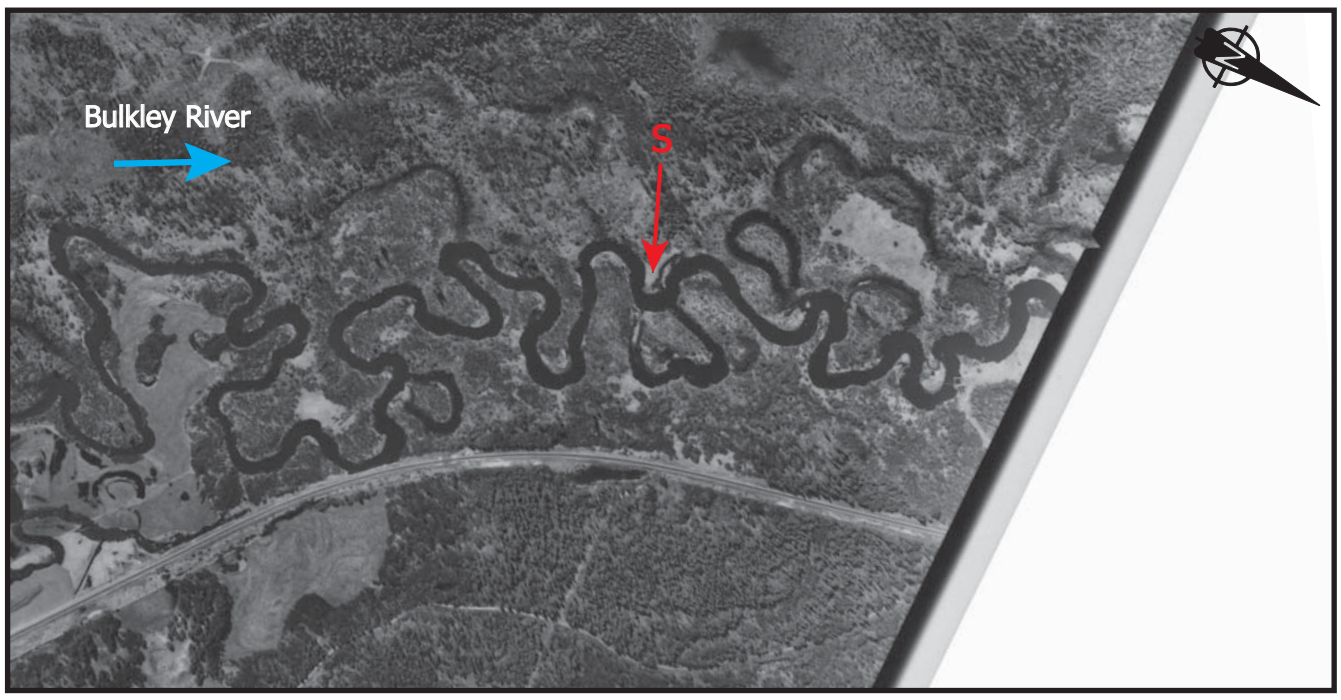
NOTE:

- Channel shifting and probably increased extent of unvegetated instream sediment accumulations in the vicinity of **M**, **N**, **O** & **P**.
- Incipient channel cutoff **S**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	2.83 m^3/s
Maxan Creek above Bulkley Lake	1.38 m^3/s

Figure 5A: Historical changes in channel morphology, Bulkley River, KM 9 to 12.



(v)

Date: June 3, 1986
30BCC429 #202

NOTE:

- Channel cutoff at **S**.

Discharge:

Bulkley River near Houston	88.1 m^3/s
Buck Creek at the Mouth	25.4 m^3/s
Maxan Creek above Bulkley Lake	na

(vi)

Date: August 1, 1998
30BCC98022 #15

NOTE:

- Channel shifting and probably increased extent of unvegetated instream sediment accumulations in the vicinity of **M**, **N**, **O**, **P** & **T**.
- Bank stability in the vicinity of **T** is likely impaired by the loss of riparian vegetation.

Discharge:

Bulkley River near Houston	1.02 m^3/s
Buck Creek at the Mouth	0.657 m^3/s
Maxan Creek above Bulkley Lake	na

(vii)

Date: August 11, 2005
30BCC05052 #71

NOTE:

- Channel cutoff **U**.
- Continued channel shifting in the vicinity of **M**, **N**, **O**, **P** & **T**.

Discharge:

Bulkley River near Houston	na
Buck Creek at the Mouth	1.41 m^3/s
Maxan Creek above Bulkley Lake	na

(viii)

Date: September 29, 2019
Google Earth Imagery

NOTE:

- Channel cutoffs **V**, **W** & **X**.
- Continued shifting in sections of channel adjacent to cutoff.
- Developing vegetation on point bars.

Discharge:

Bulkley River near Houston	2.19 m^3/s
Buck Creek at the Mouth	na
Maxan Creek above Bulkley Lake	na

☐ Kilometers downstream of Bulkley Lake

Figure 5B: Historical changes in channel morphology, Bulkley River, KM 9 to 12.