

# Copyright statement

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Questions concerning use of this presentation should be directed in the first instance to:  
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Tel: +44 191 334 1965 ♦ Fax: +44 191 334 1962 ♦ Email: [e.a.buxton@durham.ac.uk](mailto:e.a.buxton@durham.ac.uk)

Thank you.



# International Boundary Commission United States and Canada



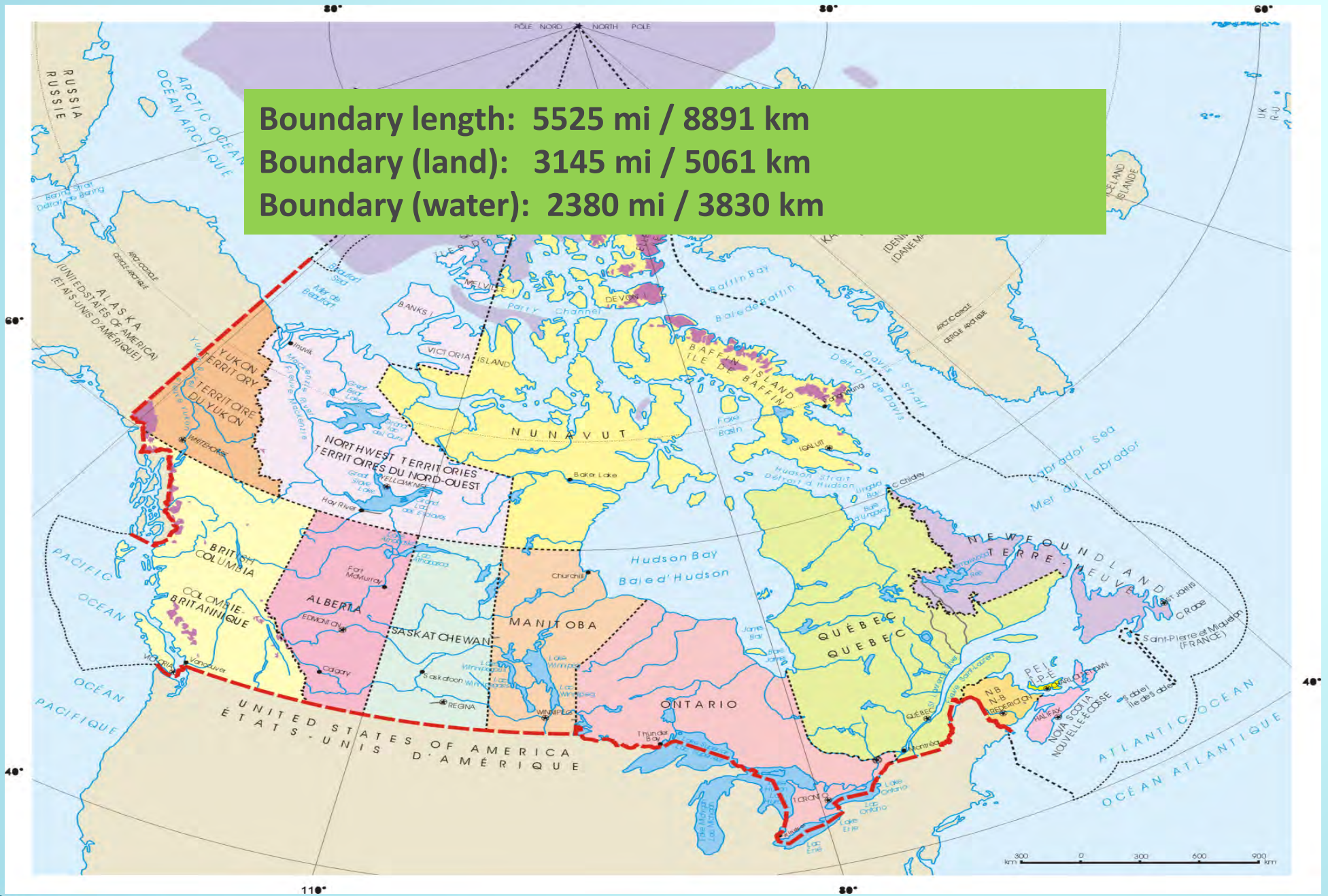
Kevin Bagwell

Supervisory Engineering Tech- US Section

- Managed IBC field operations for the past 7 years
- Conducts special projects as needed
- Over 17 years of Geodetic Surveying

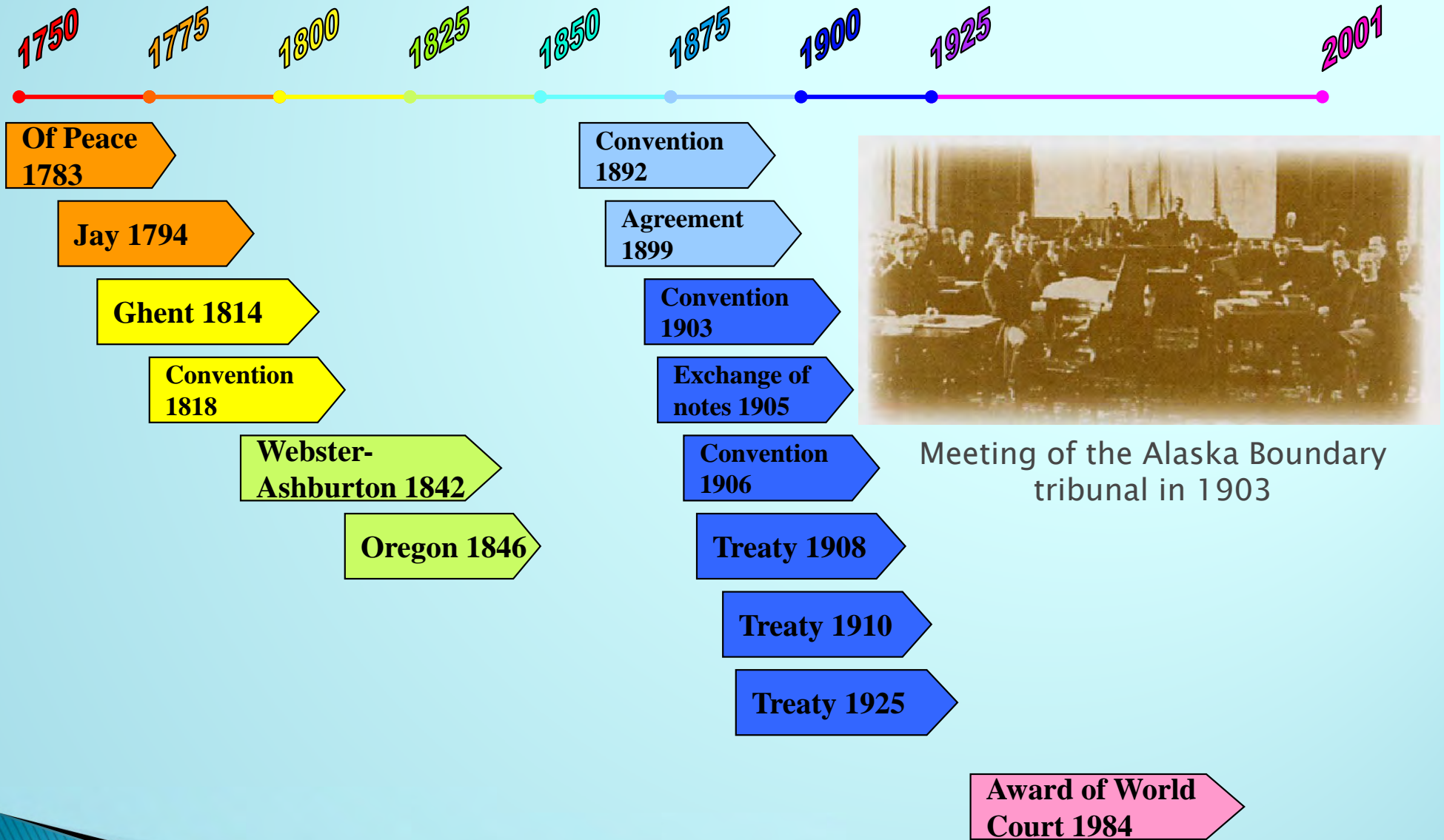


**Boundary length: 5525 mi / 8891 km**  
**Boundary (land): 3145 mi / 5061 km**  
**Boundary (water): 2380 mi / 3830 km**



**Over 11,500 points define the Boundary**

# DELIMITATION OF THE CANADA/USA BOUNDARY





Mitchell Map - used to define the boundaries in the Jay Treaty



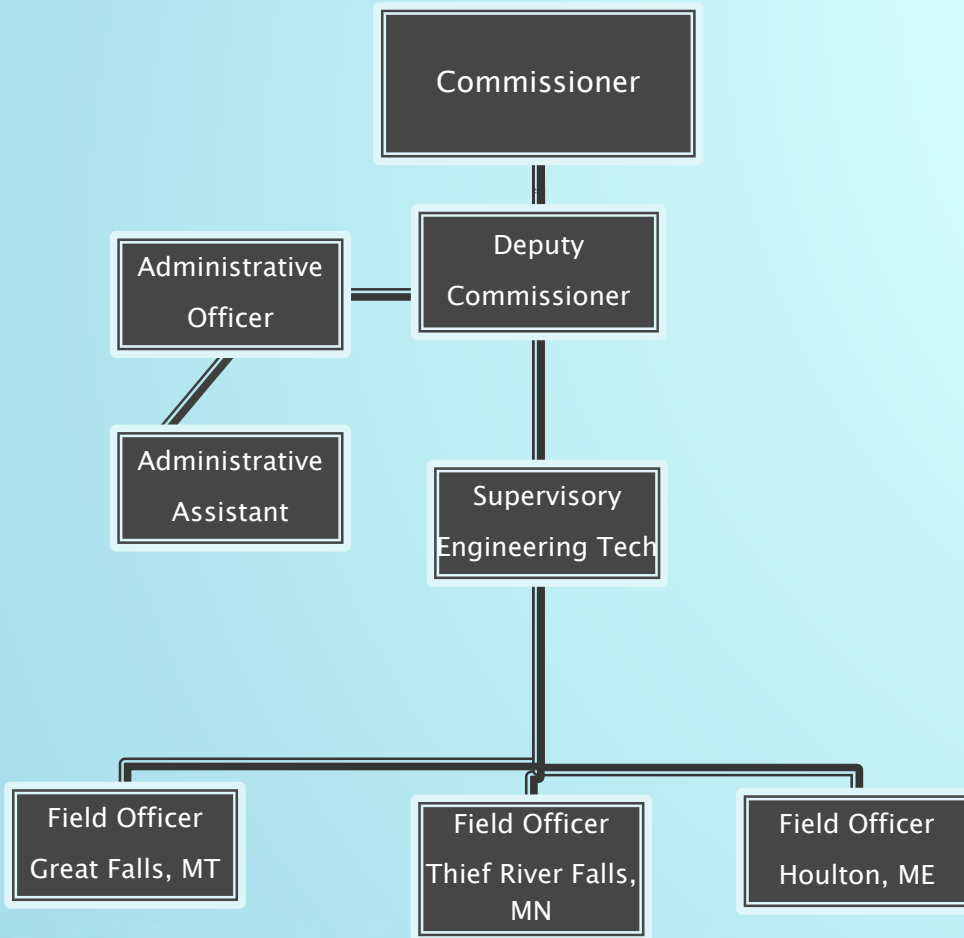
The Treaty of 1842 more thoroughly defined the boundary between the Atlantic ocean and the Rocky Mountains and settled two disputed areas one on the Maine/New Brunswick boundary and the 2nd in the area of Lake of the Woods.





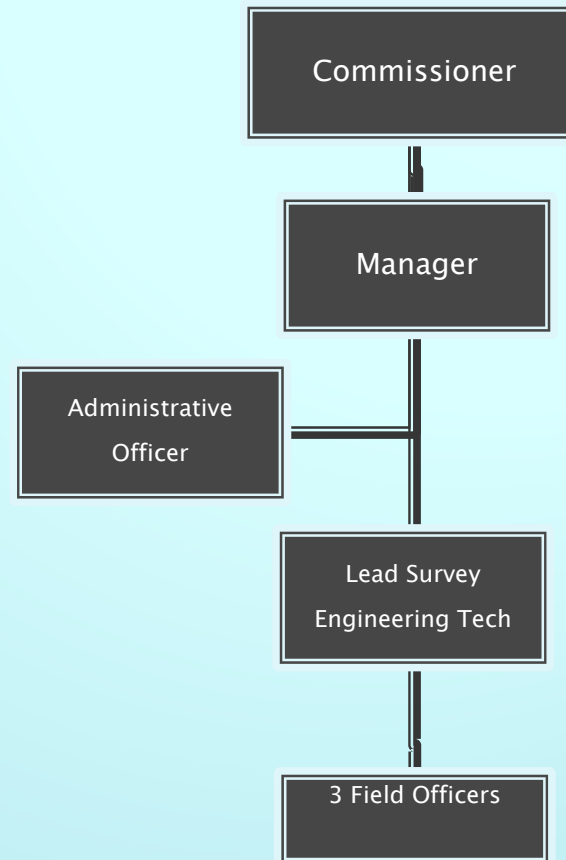
# ORGANIZATION

## UNITED STATES



\* Commissioner is appointed by the President

## CANADA



\* Commissioner is appointed by Order in Council

# FUNCTIONS OF THE COMMISSION

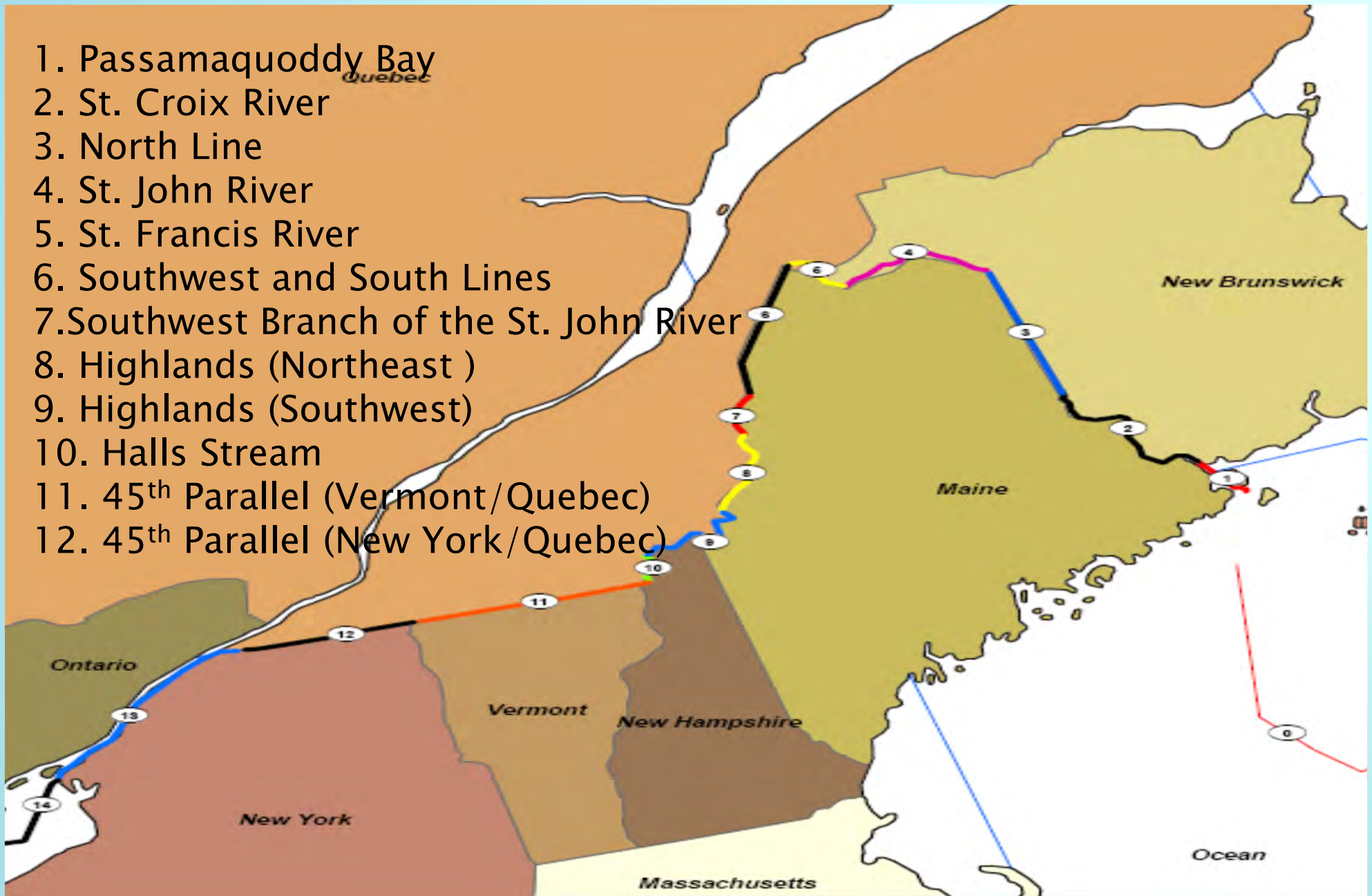
- Operational
- Regulatory
- Boundary Interpretation
- Advisory
- Custodial



## PROCESS OF BOUNDARY DEFINITION

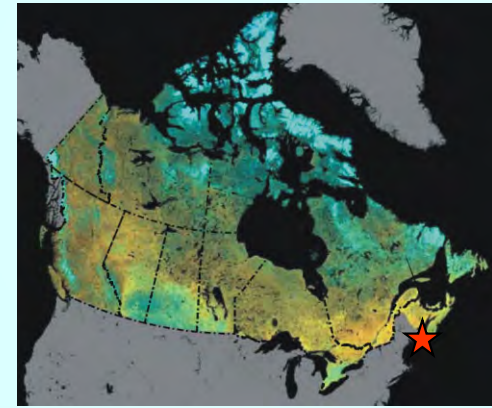
- Delimitation
- Demarcation
- Delineation

1. Passamaquoddy Bay
2. St. Croix River
3. North Line
4. St. John River
5. St. Francis River
6. Southwest and South Lines
7. Southwest Branch of the St. John River
8. Highlands (Northeast)
9. Highlands (Southwest)
10. Halls Stream
11. 45<sup>th</sup> Parallel (Vermont/Quebec)
12. 45<sup>th</sup> Parallel (New York/Quebec)

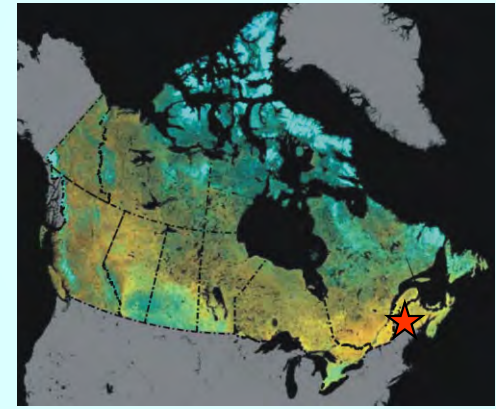


1. Passamaquoddy Bay
2. St-Croix River

New Brunswick / Maine  
Campobello Island



- 3. North Line
- 4. St. John River
- 5. St-Francis River

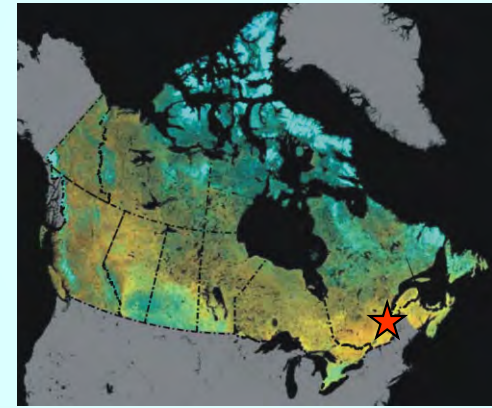


### North Line



## 6. Southwest & South Line

Grading and placing grass seed to facilitate the use of mowers on eastern boundary

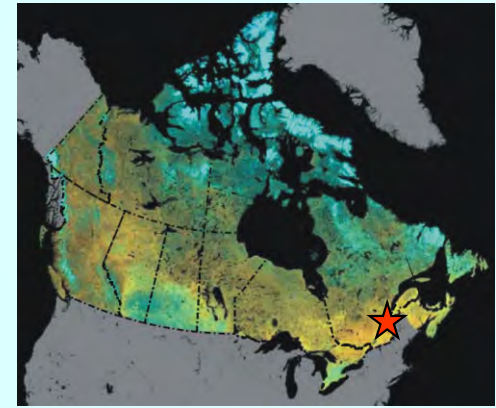


# 7. Southwest Branch of St. John River

Monument rebuilding



Transporting material



Transporting material



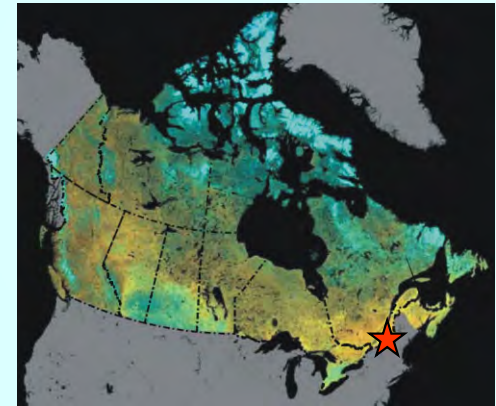
Cross-cut line clearing





# 8/9. Highlands (Northeast & Southwest Sections)

Highlands Survey



Mount Slide Down

“Crooked” boundary



Mount Pisgah

Vista Clearing

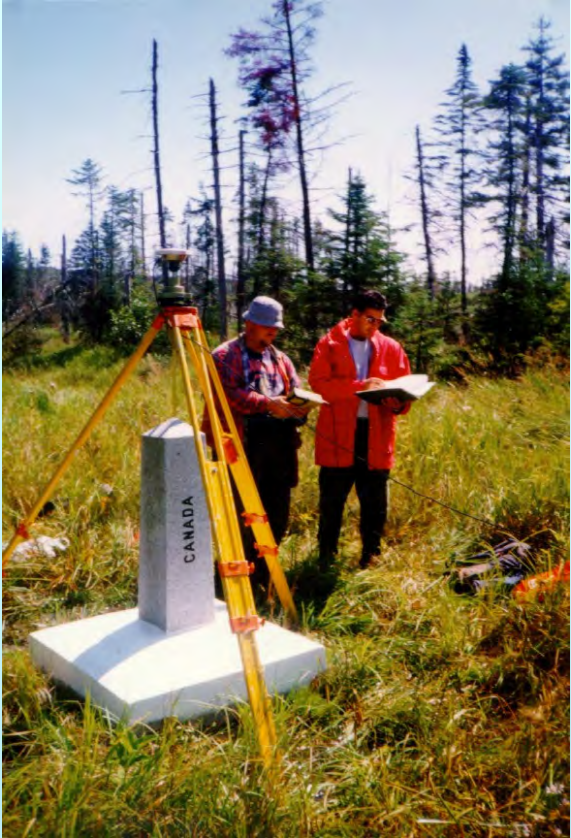


# 10. Halls Stream

GPS survey



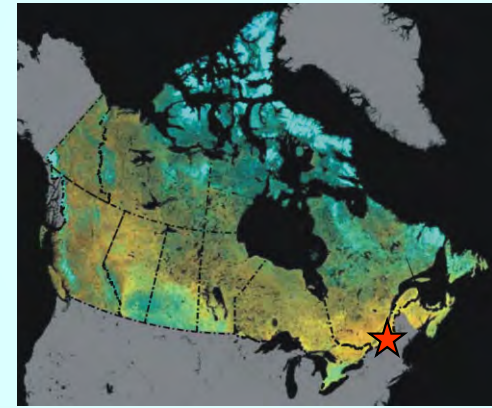
GPS survey



Reconnaissance work

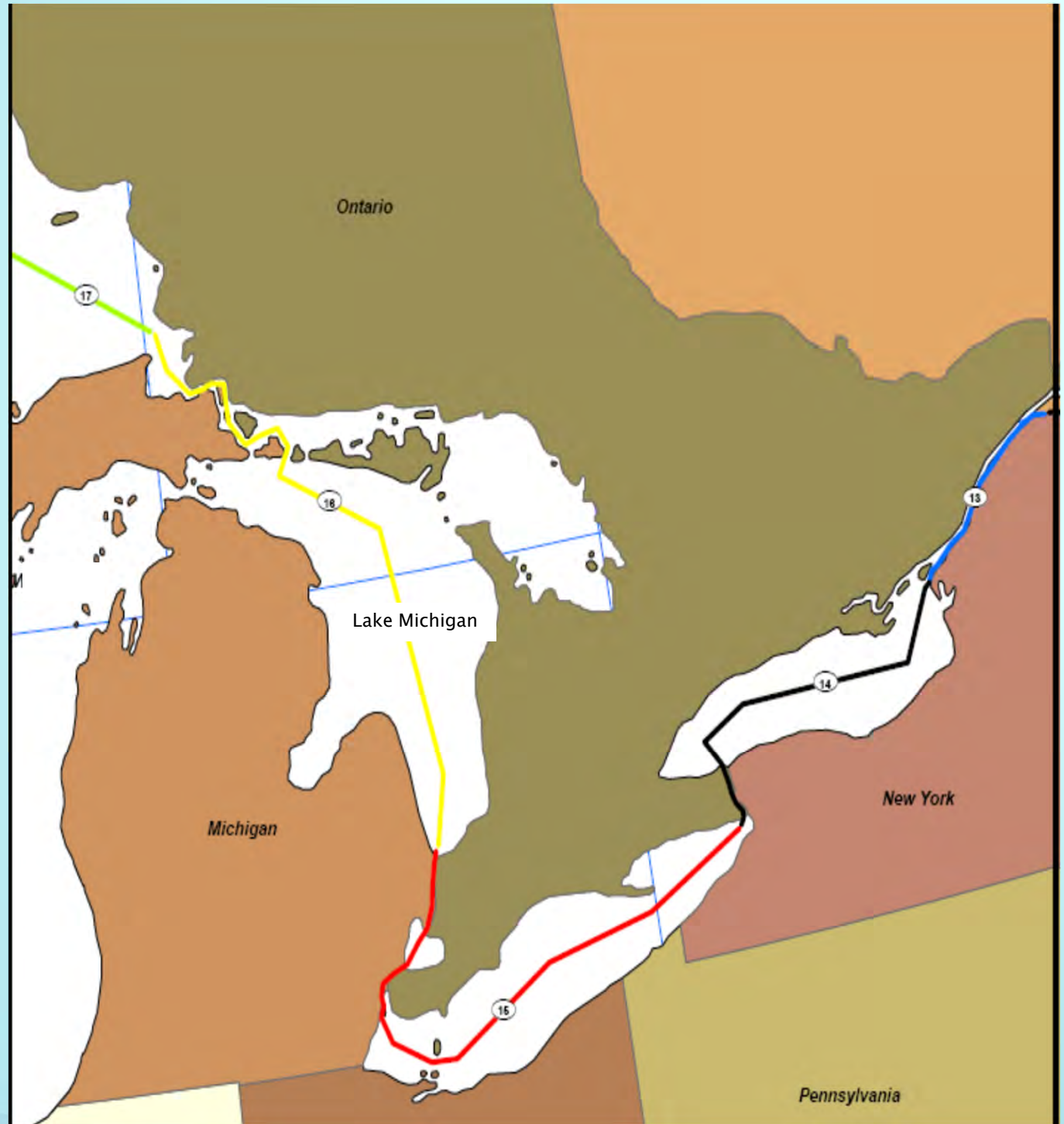


# 11/12. 45th Parallel (Vermont-Quebec, New York- Quebec)



Haskell Library

13. St Lawrence  
River  
and  
14, 15, 16. The  
Great Lakes



# 13. St. Lawrence River 14/15/16. Great Lakes

( 2700km of water boundary, but only a total of 1 km of land boundary along The Ontario/US border )

GPS Lake Huron



Height of land portage



Typical shape for  
Reference Monument



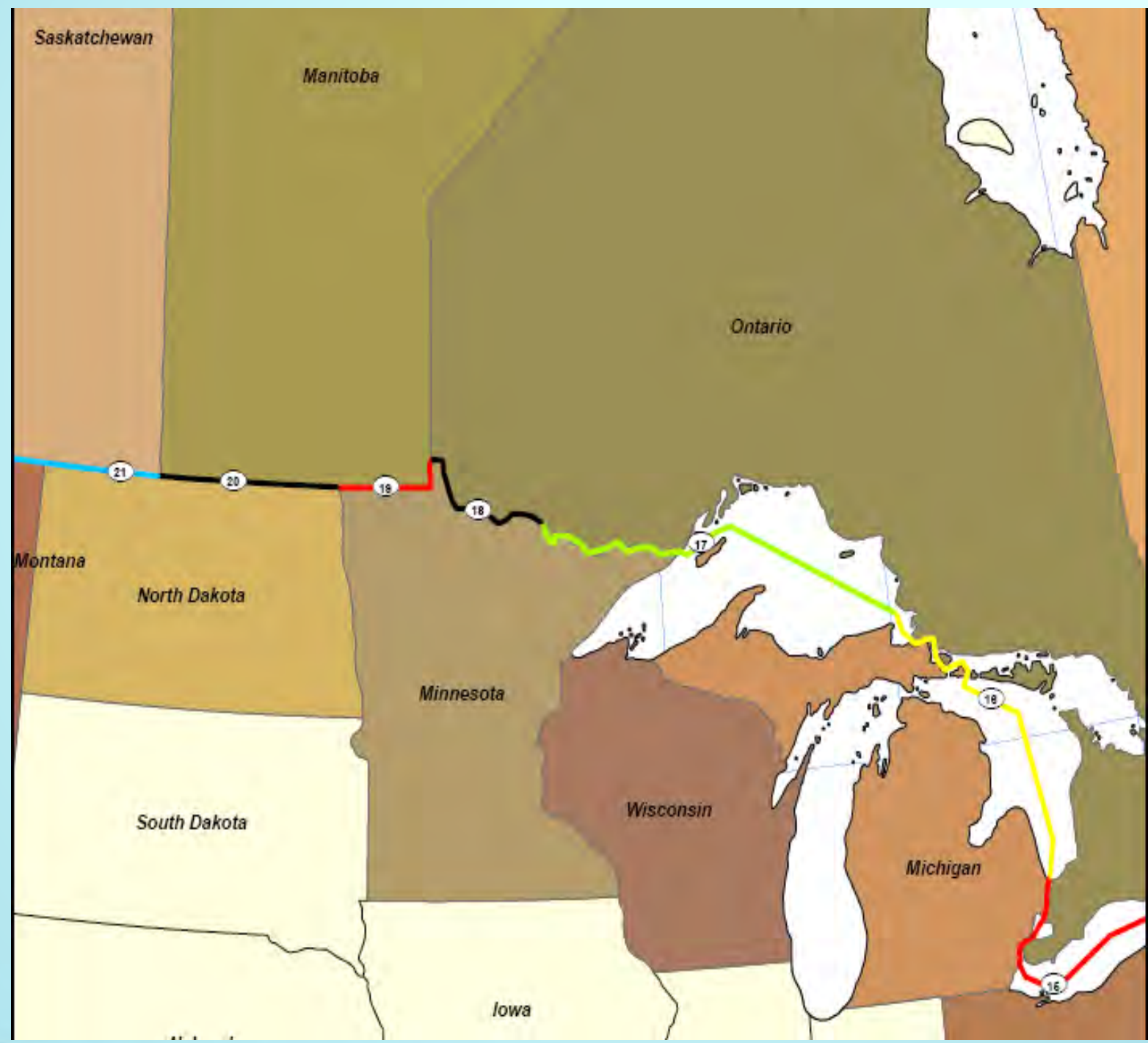
Survey on the bridge



17. Rainy River to  
Lake Superior

and

18. Rainy River to  
Lake of the Woods

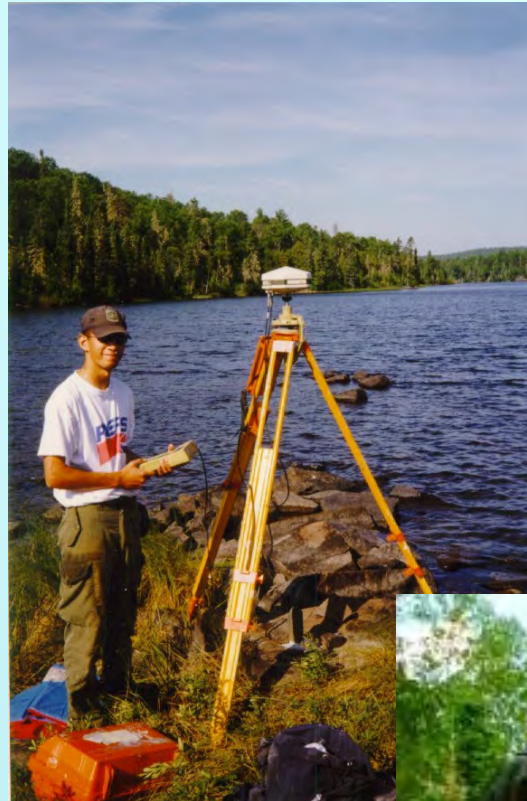


# 17. Rainy River to Lake Superior 18. Rainy River to Lake of the Woods

Portaging canoe during survey



GPS survey at  
Reference Monument  
1237



Canadian and American  
Commissioners

Camping is at times necessary in this  
remote area



19-25. 49<sup>th</sup> Parallel





# 19–25. 49th Parallel



Originally marked by sod mounds

Present-day cast-iron boundary monument on the Prairies



GPS survey in the mountains



# 49th Parallel (continued)

Rugged Coast Mountain segment



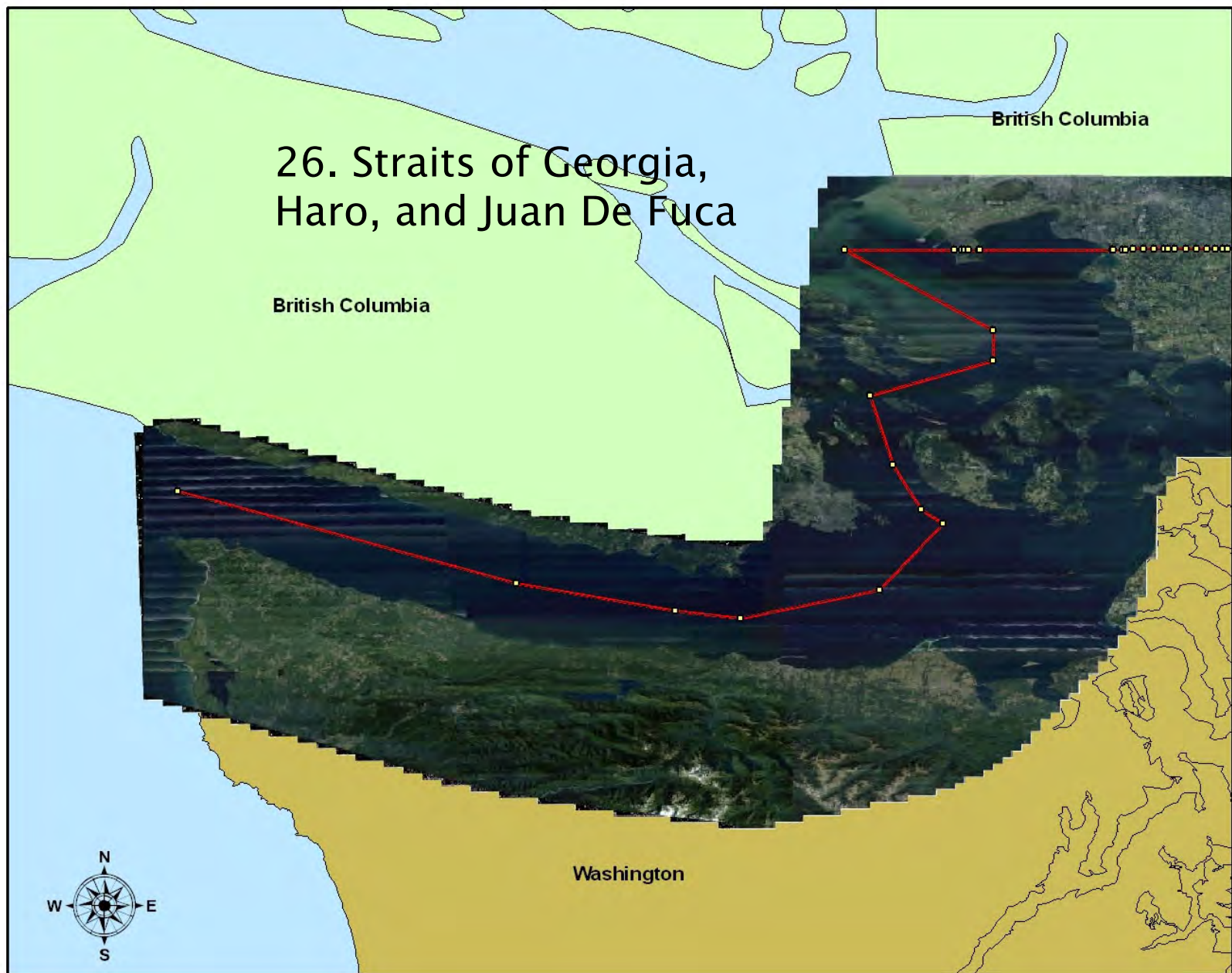
Looking west from the highest ridge of  
BC / Idaho Boundary



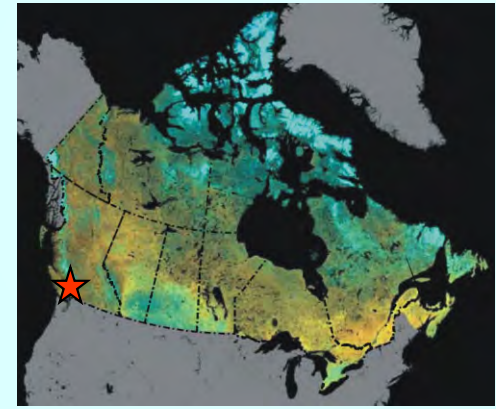
Bulldozers were similarly used to groom the  
vista  
in the Fraser Valley



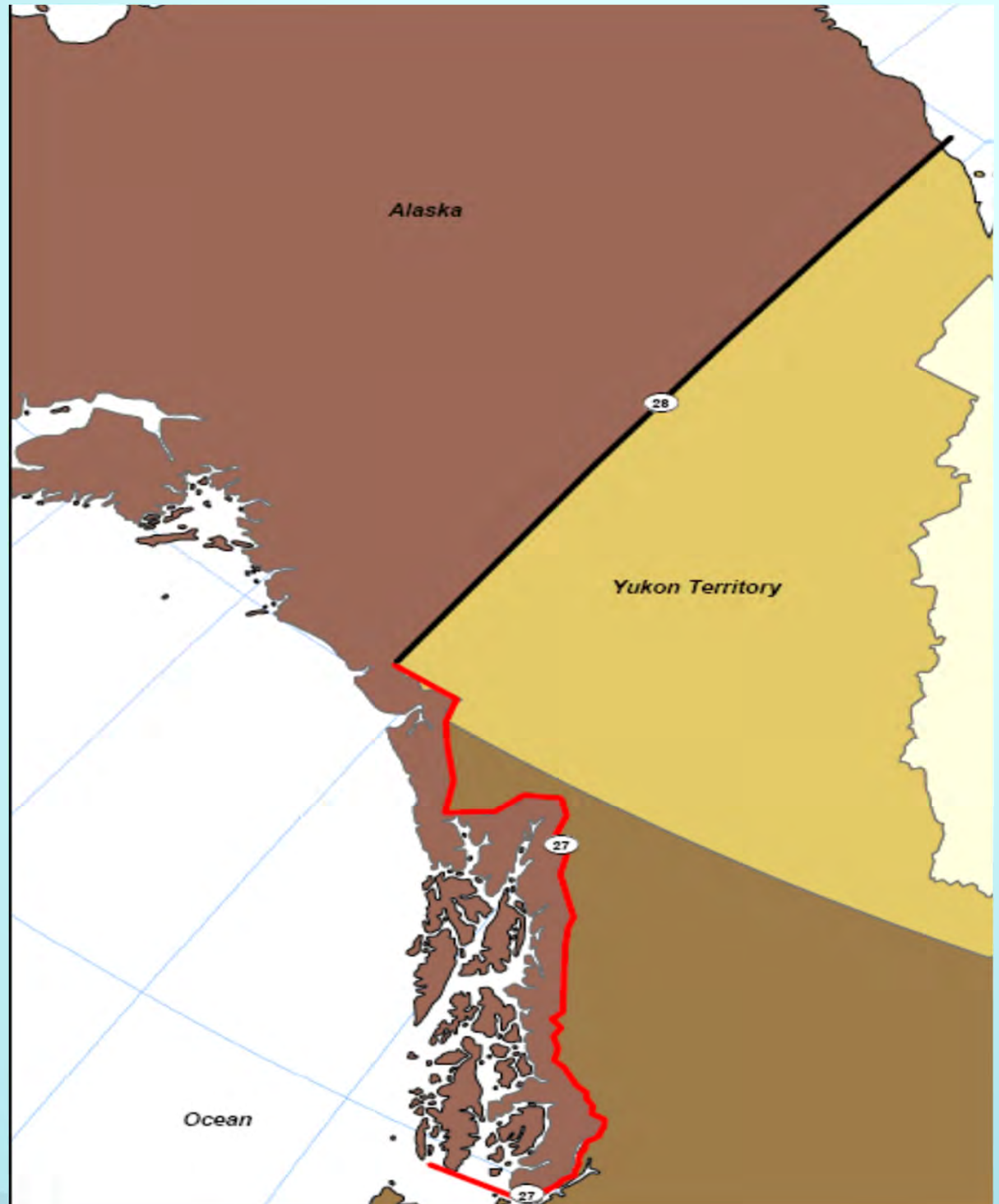
## 26. Straits of Georgia, Haro, and Juan De Fuca



# 26. Straits of Georgia, Haro, and Juan de Fuca

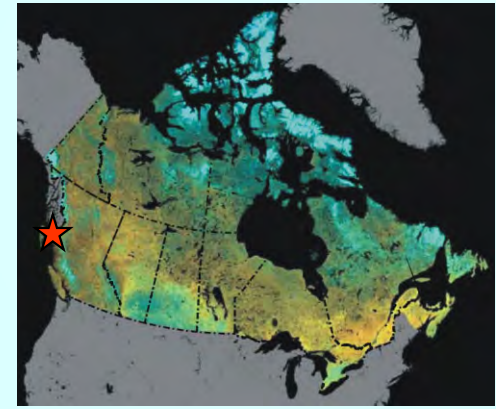


- 27. Portland Canal
- 28. Southeast Alaska
- 29. 141<sup>st</sup> Meridian

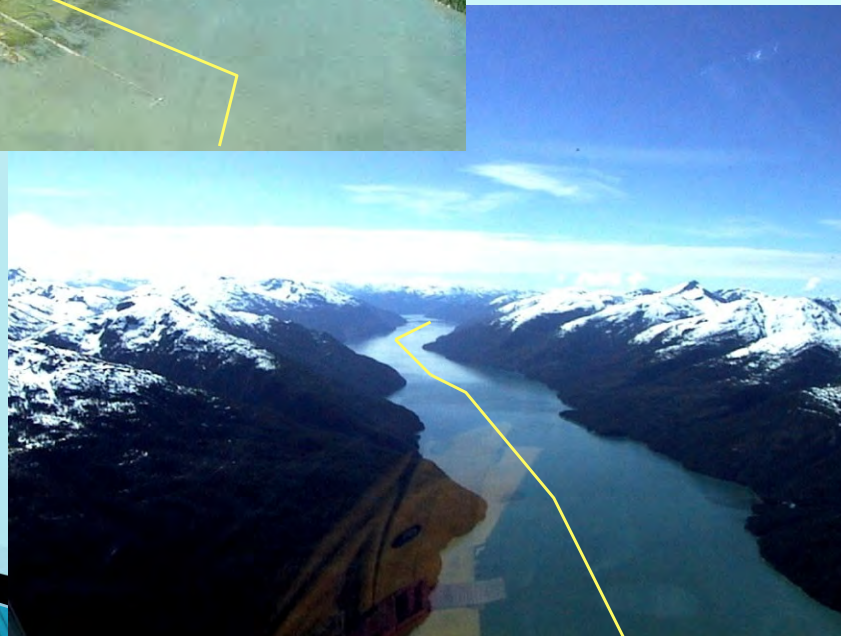
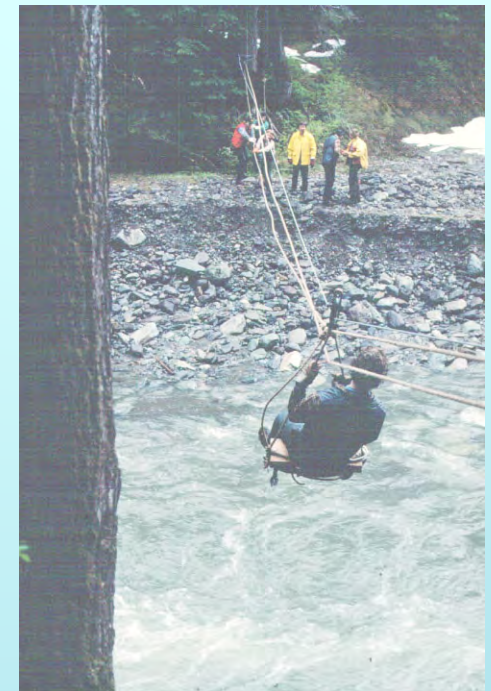


# 27. Portland Canal

Hyder Alaska and Stewart BC where boundary emerges from the fjord called Portland Canal to run from peak to peak in NW British Columbia

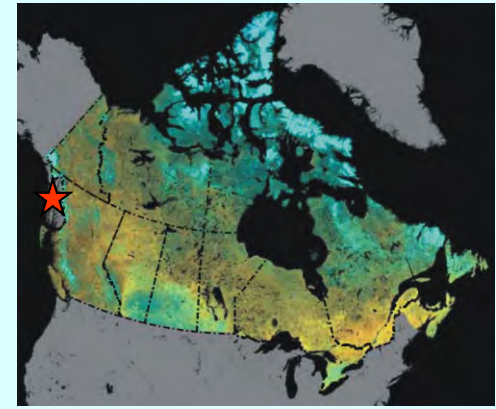


Crossing Cascade Creek with a trolley

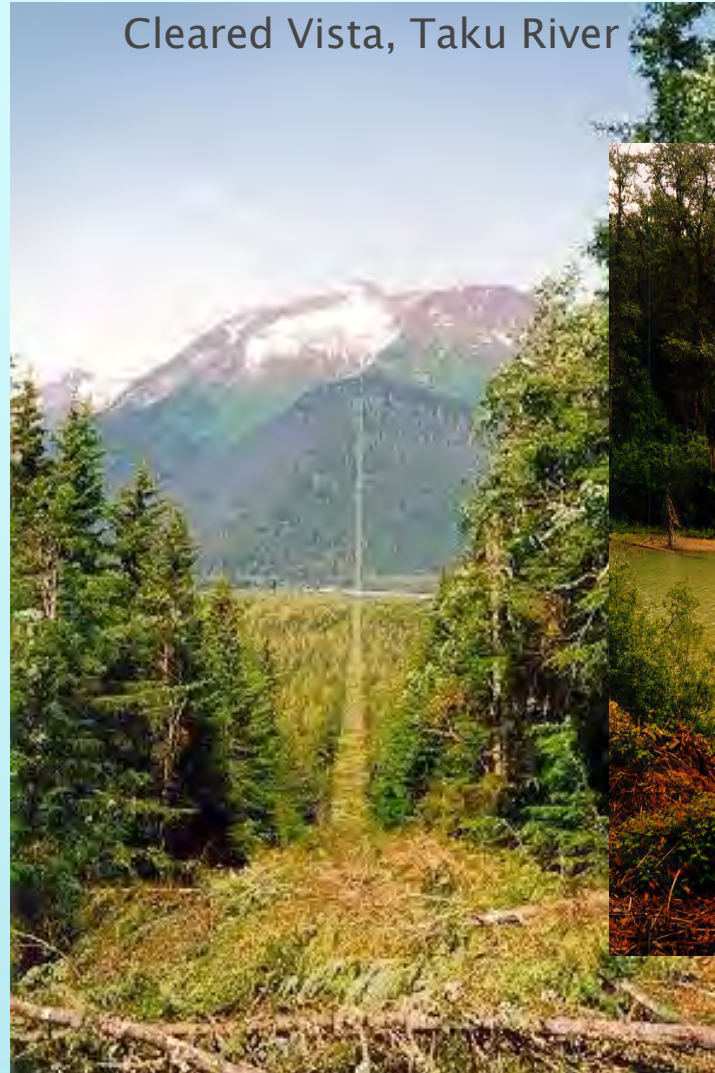


# 28. Southeast Alaska

Vista Clearing , Alesek River



Cleared Vista, Taku River



# More of Southeast Alaska



Use of helicopter in remote areas



Flying in helicopter over White Pass Valley





# 29. 141st Meridian

Alaska Highway crossing vista with BC on the right



Triangulation station near Beaufort Sea



# MONUMENT TYPES



Stainless Steel Monument: Life expectancy is 75 years



# Additional Boundary Marking

- ▶ Trail markers to enhance boundary delineation where needed
- ▶ Range towers along navigable water



# MAINTENANCE CYCLES

SUB-SECTIONS	LENGTH OF SECTION IN		PREFERRED D CYCLE	PRIORITY
	KM	MI		
1. Passamaquoddy Bay	40	25	3	7
2. St. Croix River System	211	130	8	24
3. North Line & Mon. Brook	126	78	6	14
4. St. John River	115	71	8	13
5. St. Francis River	70	43	4	1
6. Southwest & South Lines	136	84	6	3
7. S.W. Br. of St. John River	62	38	8	26
8. Highlands (N.E. Section)	284	175	6	16
9. Highlands (S.W. Section)	154	95	6	8
10. Halls Stream	44	27	4	2
11. West Line (Que.-Vt.)	146	90	6	4
12. West Line (Que.-N.Y.)	105	65	6	12
13. St. Lawrence River	194	120	8	22
14. Lake Ontario and Niagara River	338	210	8	23
15. Lake Erie St.-Clair and Detroit River	545	338	8	26
16. Lake Huron and St. Mary's River	537	333	8	18
17. Lake Superior to Rainy River	467	290	8	29
18. Rainy River and Lake of the Woods	220	136	8	20
19. 49th (Man. - Minn.)	196	121	5	19
20. 49th (Pemb. & Tur. Mts.)	76	47	5	11
21. 49th (Prairies)	889	549	8	17
22. 49th (Foot Hills to West Koot)	201	124	8	5
23. 49th (W. Koot. to Simil.)	233	144	8	21
24. 49th (Simil. to Columbia V. )	170	105	8	24
25. 49th (Fraser V.)	55	34	5	10
26. Straits of Georgia and Juan de Fuca	241	149	8	9
27. Portland Canal	290	180	8	25
28. S. E. Alaska	1147	708	10	6
29. 111st Meridian	1050	648	15	15

# 15 Year Maintenance Plan

- Based on comprehensive study of old reports
- Cost estimates adjusted for inflation
- Projects do get shuffled

	Task	Section	x 1000\$
<b>2021</b>	Maintenance	Highlands S.W. Section	210
	Vista Clearing & Maintenance	Meridian and 49th Parallel (MB/MN)	253
	Vista Clearing	49th Parallel (MB/ND)	58
	Vista Clearing	49th Parallel (Foothills to West Kootenay River)	450
	Vista Clearing	49th Parallel (Foothills to West Kootenay River)	466
	Vista Clearing & Maintenance	49th Parallel (Pacific to Columbia Valley)	150
	Inspection & Maintenance	Portland Canal	117
	Vista Clearing & Maintenance	Southeast Alaska	400
	Contingency		50
	<b>TOTAL</b>		<b>2,154</b>

	Task	Section	x 1000\$
<b>2022</b>	Inspection & Maintenance	St. Francis River	182
	Vista Clearing	Highlands N.E. Section	250
	Maintenance	Highlands S.W. Section	220
	Inspection & Maintenance	Halls Stream	50
	Maintenance	Meridian and 49th Parallel (MB/MN)	182
	Maintenance	49th Parallel (AB-SK-MB/MT- ND)	182
	Maintenance	49th Parallel (Foothills to West Kootenay River)	400
	Vista Clearing	49th Parallel (Foothills to West Kootenay River)	133
	Vista Clearing	49th Parallel (Similkameen River to West Kootenay River)	415
	Contingency		50
<b>TOTAL</b>		<b>2,064</b>	

	Task	Section	x 1000\$
<b>2023</b>	Survey	Passamaquoddy Bay	91
	Maintenance	Passamaquoddy Bay	44
	Survey	St. Croix River	91
	Vista Clearing & Maintenance	Southwest and South Lines	280
	Vista Clearing & Maintenance	Highlands S.W. Section	480
	Vista Clearing	West Line (QC/NY)	165
	Maintenance	Meridian and 49th Parallel (MB/MN)	183
	Vista Clearing & Maintenance	49th Parallel (Foothills to West Kootenay River)	376
	Maintenance	49th Parallel (Similkameen River to West Kootenay River)	183
	Contingency		50
<b>TOTAL</b>		<b>1,943</b>	

# Products

## Maps

A total of 256 official Maps.

Scales varies from 1:6 000  
to 1:12 000  
1:18 000  
1:24 000  
1:62 500  
1:250 000

\* these Maps were made between 1917 and 1928.

## Annual Reports

Produced each Year and submitted by the commissioners to their respective government.

## Field Reports

Prepared each year by the Field Engineers

## Special Reports

Contain the results of negotiations and new set of coordinates in Technical Appendices

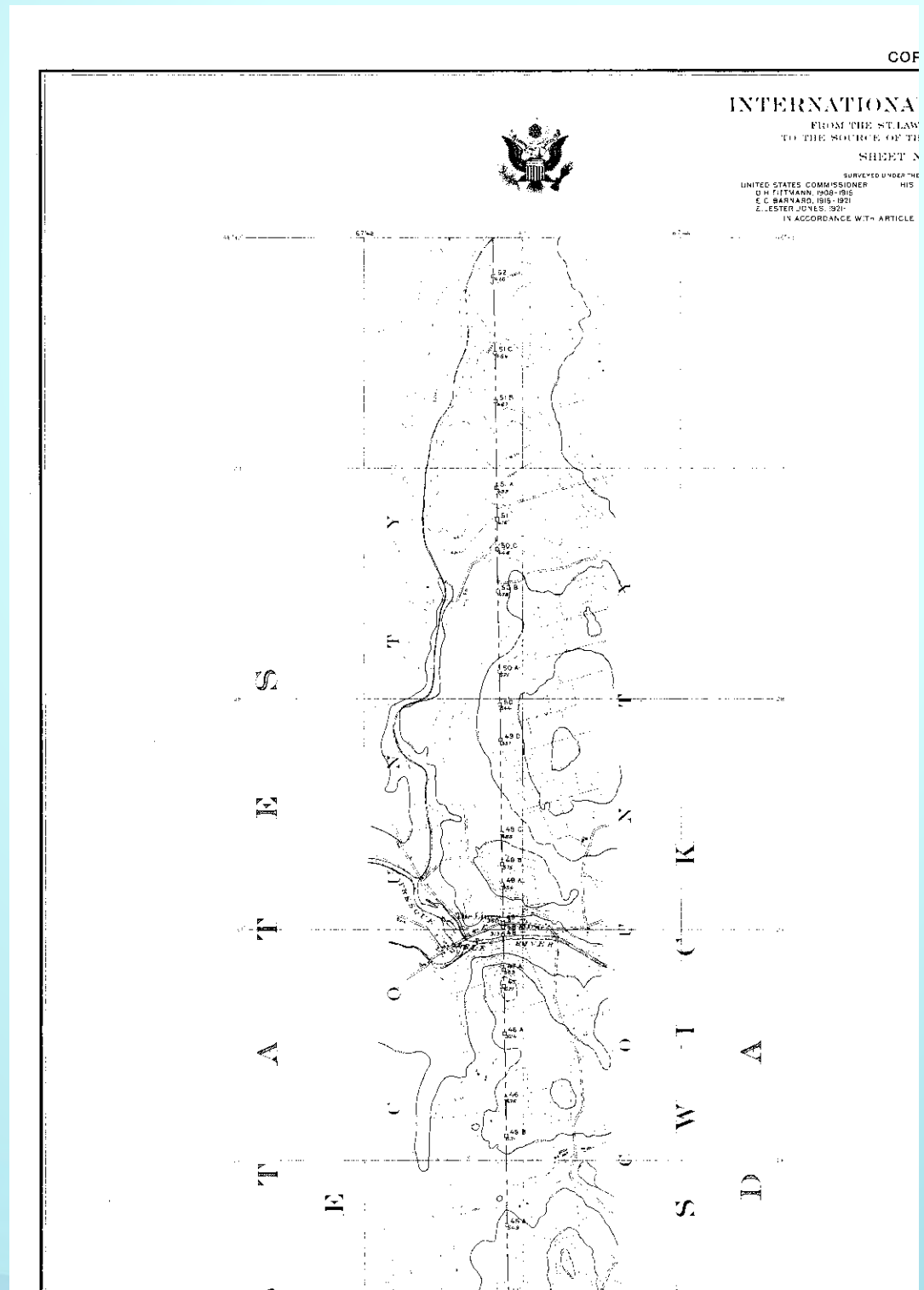
## Survey Data

Available on the Web:

<http://www.internationalboundarycommission.org>

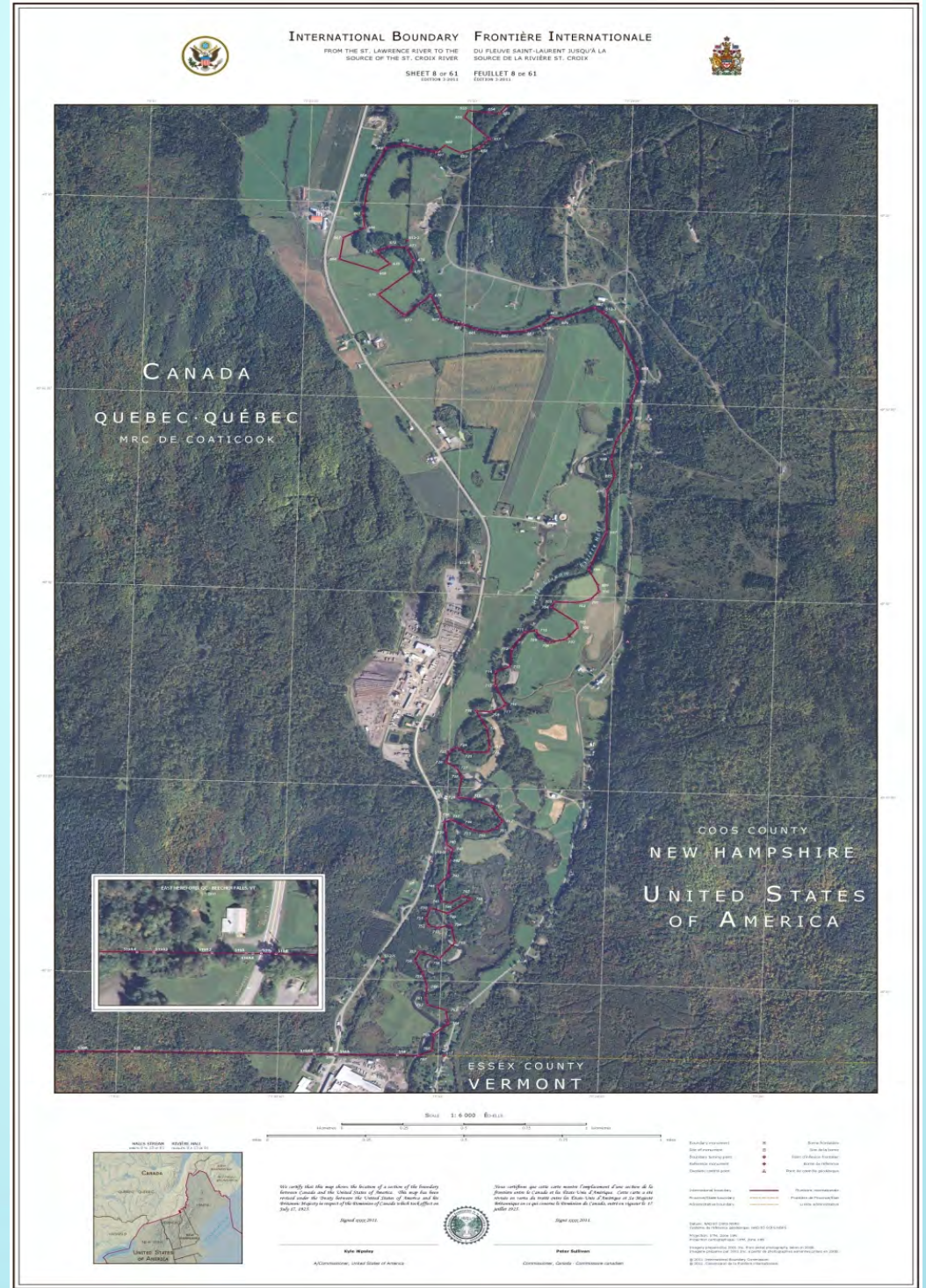
## International Boundary Commission

Reports, on the Re-establishment of the Boundary between the United States and Canada



## IBC's next generation of official boundary maps.

- Same layout as originals
- Same number of map sheets (256)
- Same scale







# INTERNATIONAL BOUNDARY FRONTIÈRE INTERNATIONALE

FROM THE ST. LAWRENCE RIVER TO THE SOURCE OF THE ST. CROIX RIVER

DU FLEUVE SAINT-LAURENT JUSQU'À LA SOURCE DE LA RIVIÈRE ST. CROIX

SHEET 31 of 61  
ÉDITION 2 2011

FEUILLET 31 de 61  
ÉDITION 2 2011



SCALE 1:6 000 ÉCHELLE



SOUTHWEST SAINT JOHN RIVER RIVIÈRE SAINT-JEAN NORD-OUEST



*We verify that this map shows the location of a section of the boundary between Canada and the United States of America. This map has been revised under the Treaty between the United States of America and the Dominion of Quebec in respect of the Commission of Canada which took effect on July 17, 1925.*

Signed 2011



**Kyle Huxley**  
A Commissioner, United States of America

*Nous vérifions que cette carte montre l'emplacement d'une section de la frontière entre le Canada et les États-Unis d'Amérique. Cette carte a été révisée en vertu du traité entre les États-Unis d'Amérique et le Dominion du Québec en ce qui concerne la Commission du Canada, entrée en vigueur le 17 juillet 1925.*

Signé 2011

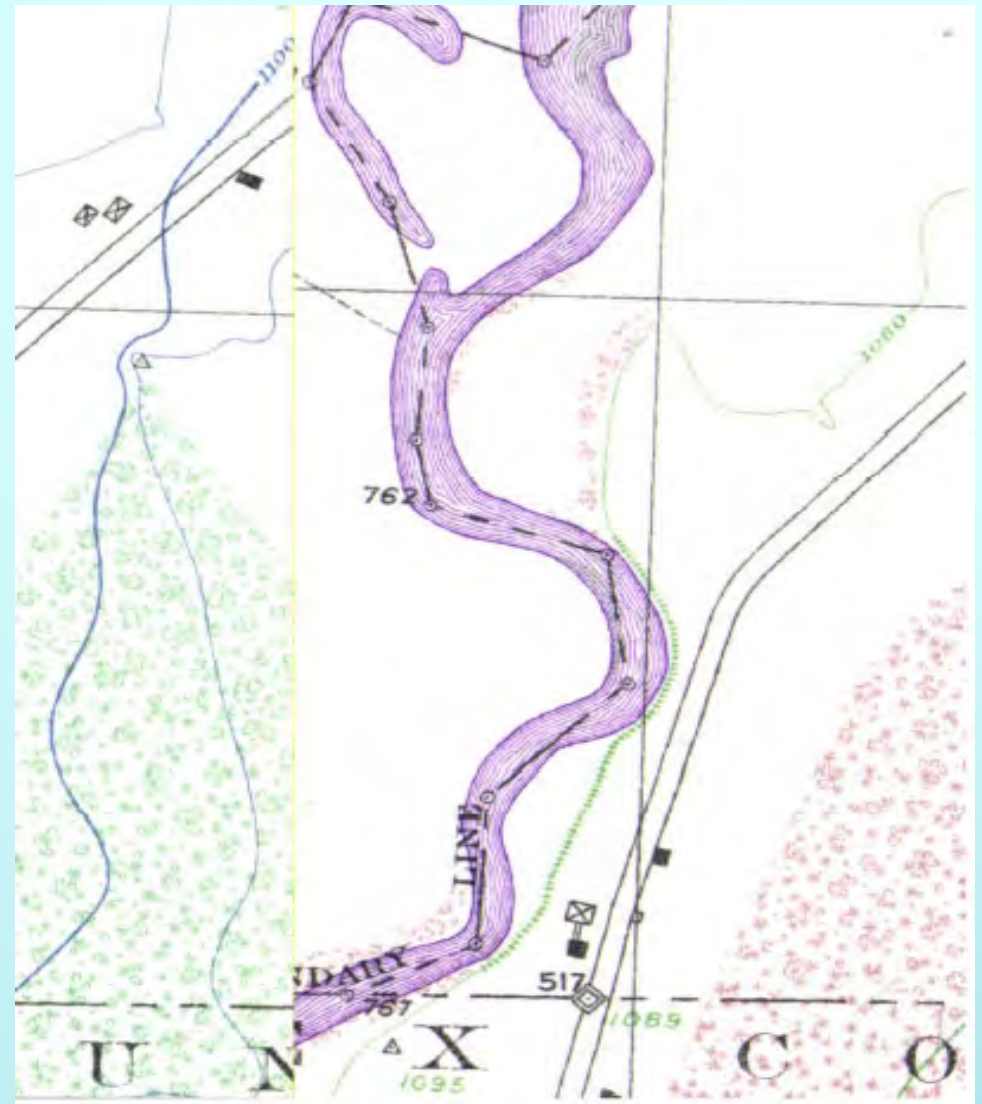
**Peter Sullivan**  
Commissioner, Canada - Commissaire canadien

- |                         |   |                             |   |
|-------------------------|---|-----------------------------|---|
| Boundary monument       | ■ | Stone landmark              | ■ |
| Site of monument        | □ | Site de la borne            | □ |
| Boundary turning point  | ● | Point d'inflexion frontière | ● |
| Reference monument      | ▲ | Point de référence          | ▲ |
| Shaded relief contour   | — | Contour ombré               | — |
| International boundary  | — | Frontière internationale    | — |
| Provisional boundary    | — | Frontière de provision      | — |
| Administrative boundary | — | Limite administrative       | — |
- Scale: 1:6 000 Échelle  
System: North American Datum 83  
Projection: UTM Zone 18N  
Datum: NAD 83  
Units: Meter  
Copyright: 2011  
© 2011 International Boundary Commission  
© 2011 Commission de la frontière internationale

# Halls Stream New Hampshire – Quebec



2009



1923

# UNITED STATES BEING FARMED BY CANADIAN FARMER ST. FRANCIS RIVER MAINE-QUEBEC



# Typical Year in the Life of a Field Engineer

- January thru February – Annual Report
- March – Training and Headquarters Meeting
- April – Prepares for Field Season
- May thru September – Field Projects
- October – Equipment Maintenance and Storage
- November thru December – Stake Holder Visits

The Field Engineer has three areas of focus in maintaining the boundary:

- Vista clearing
- Monument repairs
- Surveying

These are typically done in order.



# The Team

The IBC's most active season runs from May through September.

Each Field Officer will hire 5 or 6 hand picked "seasonal" employees to help them achieve the projects they are assigned.

They will ALWAYS be:

- Of good character
- Clean criminal record
- Athletic
- Intelligent
- Motivated





The importance of a cohesive crew cannot be underestimated.

# Boots on the Ground

The plan you left the office with will undoubtedly need updating when you arrive in the field.





## Equipment Inventory for a Field Office will include:

- Work trucks and trailers
- Tractor / backhoe
- ATV's
- Canoes
- Power boat
- Survey gear both GPS and Conventional
- Brush and Chainsaws
- Jackhammer
- Hand tools
- Concrete mixer
- Generators
- Laptop Computers, Cameras

# TYPICAL CLEARING CREW



Typically 5 or 6 persons consisting of skilled woodsmen.



Some areas require attention more often than others.



Segments running east and west have significant more growth on the north side.

# TYPICAL MONUMENTING CREW

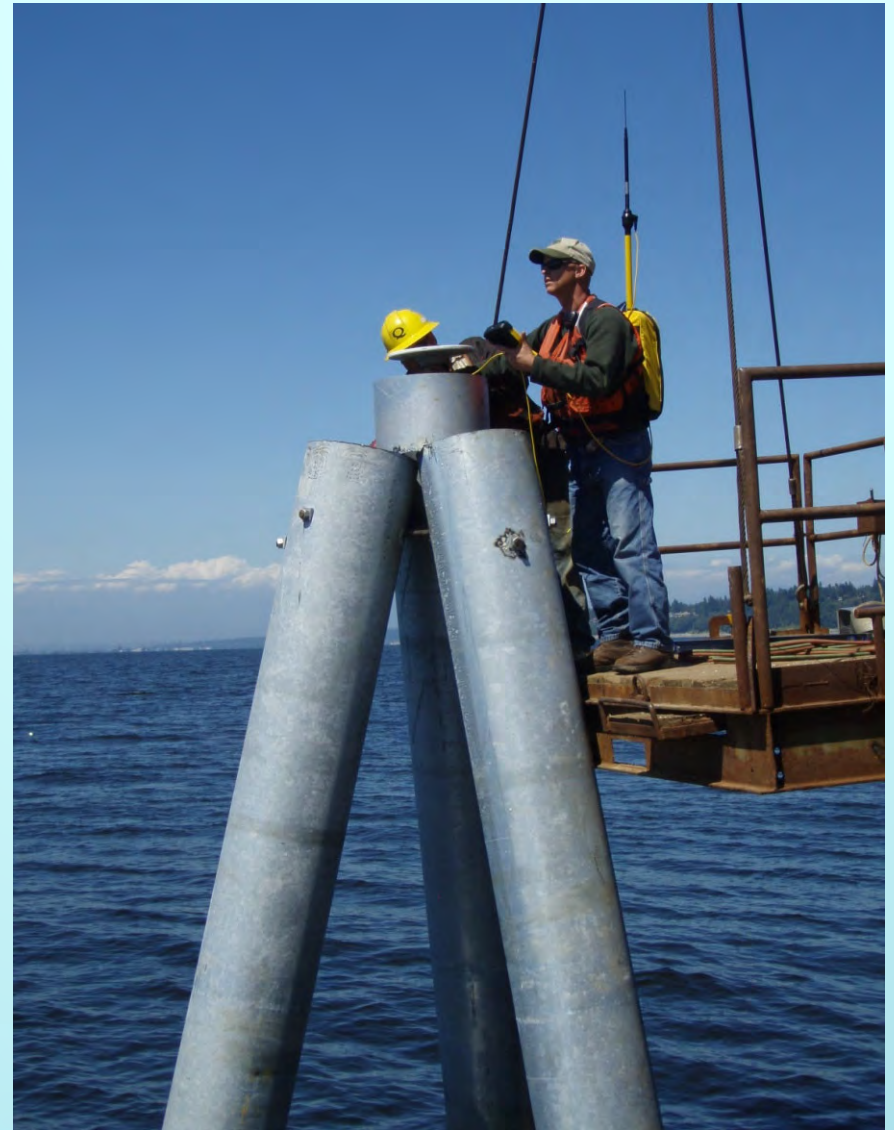
- GENERALLY A 5 PERSON CREW

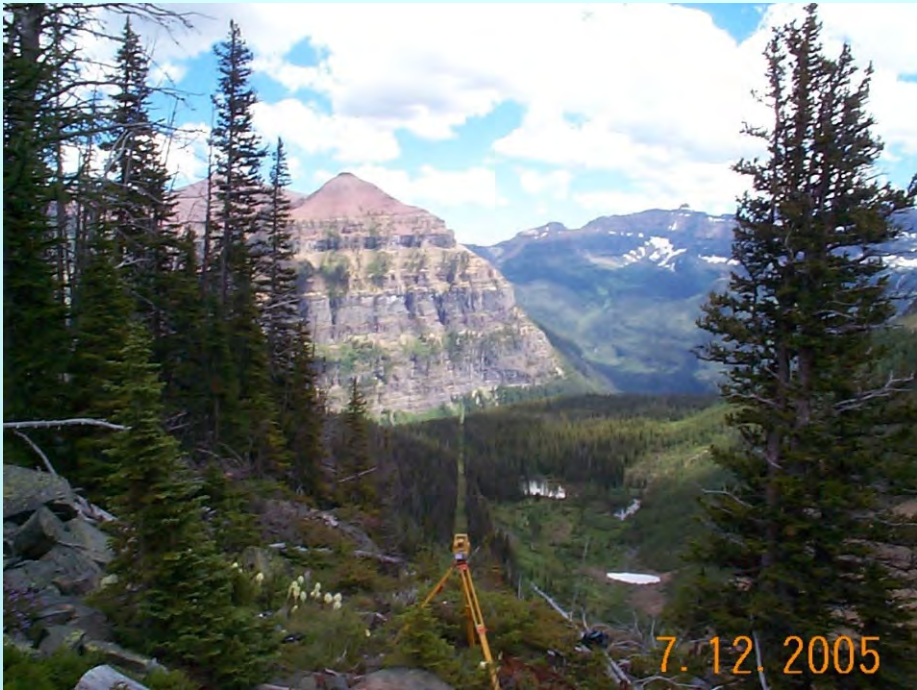




# TYPICAL SURVEYING CREW

Typically a 5 or 6 person crew







# ADDITIONAL TOOLS

- ▶ ORIGINAL REPORTS
- ▶ ANNUAL FIELD OFFICER REPORTS
- ▶ ASSISTANCE FROM STAKEHOLDERS
- ▶ GIS

# Monthly Field Reports

UNITED STATES DEPARTMENT OF STATE International Boundary Commission, U.S.-Canada <b>FIELD OFFICE MONTHLY REPORT AND JOURNAL</b> (See IBC Form FO-1A for instructions before completing form.)						
I. GENERAL INFORMATION <i>(Complete all items.)</i>						
1. FIELD OFFICE: <b>Houlton, Maine</b>		2. REPORTING PERIOD: <b>May 2012</b>			5. ACTUAL / ESTIMATED DATE OF COMPLETION	
3. TASK NUMBER: 01-12 02-12		4. LOCATION: General Office Duties 45 <sup>th</sup> / West Line Clearing			01/01/2012-12/31/2012 06/09/2012-	
6. PARTY ORGANIZATION AND PERSONNEL REPORT AS OF LAST DAY OF MONTH						
A. Task number:		01-12	02-12			
B. Employees at the end of the Month		1	7			
C. Personnel / work days		FIELD	0	91 (3)		
		OFFICE	4	7		
		TRAINING	0	7		
		TRAVEL	0	7		
D. Lost to weather		0	21			
E. Annual and sick leave		0	0			
F. Holidays		0	0			
G. Total paid time this Month		4	133 (3)			
H. Total paid time YTD previous Month		86	0			
I. Total paid time year to date		90	133 (3)			
7. CHANGES IN PERSONNEL: <b>None.</b>						
8. PUBLIC RELATIONS / LIAISON: <b>Spoke with the various authorities in the Champlain, NY area of our upcoming field season. Met with Mr. and Mrs. James Leonard about clearing and removing stumps from their yard in Alburg, VT.</b>						
9. SAFETY						
Did any accidents occur during this reporting period?		No	Yes	X	Date:	05/28/2012
Were any safety meetings held?		No	Yes	X	Date:	05/07/2012
10. TRAINING: <b>First Aid / CPR class on the 8<sup>th</sup>.</b>						
11. VISTA ENCROACHMENTS NOTED / ACTION TAKEN: <b>None.</b>						
12. INSTRUCTION CHANGES: <b>None.</b>						
13. REMARKS AND RECOMMENDATIONS: <b>First week was spent preparing for the field season. All crews reported to work on the 7<sup>th</sup>. First few days we organized equipment and had a First Aid/CPR class. Once in Plattsburg, we began the clearing project. Progress was the normal 0.50 mile per day. The vista had heavy brush and heavy side clearing and was extremely wet. Did have a chainsaw "kickback" accident on the 28<sup>th</sup> to Dale Foley which needed stitches to close.</b>						
FIELD OFFICER: <b>Kevin W. Bagwell</b>						



Report data is carried forward each month.

The progress of each Engineer is easily gauged.

These forms are also useful in determining project planning.

19-II. MONUMENT / MARK SETTING, RECOVERY, MAINTENANCE								
TASK NO: 02-12	BDRY. MON.	REF. MON.	RANGE MARK	BRIDGE TABLET	HORIZ STATION	REF. MARK	TURNING POINT	LINE MARK
A. Recovered								
1. Good	13							
2. Poor	5							
3. Not Usable								
B. Not recovered								
C. Reestablished-Renewed-Rebuilt								
1. Poured Concrete (obelisk)								
2. Poured Concrete (disk)								
3. Drill Hole								
4. Other								
D. Repaired								
E. Painted / Cleaned	13							
F. Established								
1. Poured Concrete (obelisk)								
2. Poured Concrete (disk)								
3. Drill Hole								
4. Other								
5. Temporary Mark								
19-II. MONUMENT / MARK SETTING, RECOVERY, MAINTENANCE								
TASK NO.	BDRY. MON.	REF. MON.	RANGE MARK	BRIDGE TABLET	HORIZ STATION	REF. MARK	TURING POINT	LINE MARK
A. Recovered								
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1. Poured Concrete (obelisk)								
2. Poured Concrete (disk)								
3. Drill Hole								
4. Other								
D. Repaired								
E. Painted / Cleaned								
F. Established								
1. Poured Concrete (obelisk)								
2. Poured Concrete (disk)								
3. Drill Hole								
4. Other								
5. Temporary Mark								
20. Total recovered year to date	18							
21. Total not recovered year to date								
22. Total reestablished year to date								
23. Total repaired year to date								
24. Total painted / cleaned year to date	13							
25. Total established year to date								
ADDITIONAL COMMENTS:								

Information is compared to data reported in Appendix A for quality assurance.

ADDITIONAL COMMENTS:

**Monument Recovery:**

45<sup>th</sup> Parallel: 669(G)(Painted), 670(G)(Painted), 671(P), 672(G)(Painted), 673(G)(Painted), 674(G)(Painted), 674A(G)(Painted), 675(G)(Painted), 676(P), 676A(P), 677(P), 678(G)(Painted), 678A(G)(Painted), 679(P), 679A(G)(Painted), 680(G)(Painted), 681(G)(Painted), 682(G)(Painted).

Brief descriptions of each day's events are noted.

IV. JOURNAL		
DATE	DAY OF WEEK	OCCUPATION OF THE DAY
1	TUES	Worked on monthly paperwork and prepared for field season.
2	WED	Prepared for field season. Had trucks serviced.
3	THUR	Prepared for field season.
4	FRI	Prepared for field season.
5	SAT	Off
6	SUN	Off
7	MON	First day of field season. All crews showed up for work to organize and prepare equipment for travel. Held safety meeting. 56 hrs
8	TUES	First Aid/CPR class given by Paul Stewart of the Houlton EMS. 56 hrs
9	WED	Departed Houlton For Plattsburg, NY arriving late in the afternoon. 56 hrs
10	THUR	Went by the local saw shop to purchase safety gear and have one saw fixed. Started to rain but went out to the boundary to see the conditions. The line is very wet with standing water everywhere. 56 hrs
11	FRI	Started clearing 700 feet east of Mon 671 then west for 0.53 miles through monument 671 to a small stream 1000 feet east of Mon 672. Cleared moderate brush and heavy side clearing. 56 hrs
12	SAT	Worked on paperwork. (8 hrs)
13	SUN	Off
14	MON	Cleared west from 1000 feet east of Mon 672 through Mon 673 to Mon 674 at the English River, for a total of 0.60 miles. Cleared moderate brush and heavy side clearing. 56 hrs
15	TUES	Rain day. Very heavy rain. 56 hrs

**INTERNATIONAL BOUNDARY COMMISSION  
UNITED STATES AND CANADA  
Western Regional Field Office  
United States Section**



PDH-01-11 Rock cairn found next to Monument 118 Washington/British Columbia

**ANNUAL REPORT**

**Phillip D. Hargrove  
Engineering Technician  
January 01, 2011 thru December 31, 2011**

DETAILED MAINTENANCE AND SURVEY OPERATIONS

*Legend*

Boundary Monument Type	Mon	Boundary Monument or Boundary Turning Point
	RM	Reference Monument
	BP	Boundary Point (unmarked)
Reconnaissance:	G	Recovered in Good condition
	F	Recovered in Fair condition (requires minor repair)
	PO	Recovered in Poor condition (requires major repair)
	D	Destroyed (evidence found but Monument not in place)
	NR	Not Recovered (no evidence found or inadequate search)
Established:	NM	New Monument constructed (in new location)
	R	Renewed (in same location)
Repairs:	MI	Minor repairs to base (cracks patched, plumbed, dirt packed at base, etc.)
	MA	Major repairs (new marker installed, base partially replaced or recapped)
Painted	MP	Monument Painted
Description	DU	Description Updated
	ND	New Description (newly established monuments only)
Photo	P	Photographed
	NP	Not Photographed
Monument Surveyed	S	Survey performed to position the monument

*"Name of the section"*

Boundary Monument Type & Number	Reconnaissance	Established	Repairs	Painted	Description	Photo	Monument Surveyed
Mon 3	F		MA		DU		S
Mon 3A	G						S

Appendix A

Site visits to boundary points are tracked.

At the end of each field season, Engineers are required to provide this form for each section of boundary where work was performed.

These forms are in each of the Field Officer's annual report.



## Appendix B

Lists the totals for each section of boundary where work was performed.

### International Boundary Commission United States Section

#### Technical Appendix Summary 2008

##### MONUMENT MAINTENANCE

2008 – Highlands: Maine / Quebec – Jackman / Armstrong Crossing	
➤ Total Monuments recovered	= 8
➤ Total monuments painted/cleaned	= 0
➤ Total monuments surveyed	= 0
➤ Monuments repaired or re-established	= 0
2008 – West Line: New York / Quebec	
➤ Total monuments recovered	= 29
➤ Total monuments painted/cleaned	= 0
➤ Total monuments surveyed	= 0
➤ Monuments repaired or re-established	= 0
2008 – Gulf of Georgia to Northwesternmost Point of Lake of the Woods: Montana / B.C. – Glacier Park	
➤ Total Monuments recovered	= 3
➤ Total monuments painted/cleaned	= 0
➤ Total monuments surveyed	= 0
➤ Monuments repaired or re-established	= 0
2008 – Gulf of Georgia to Northwesternmost Point of Lake of the Woods – Boundary Bay	
➤ Total Monuments recovered	= 14
➤ Total Range Marks repaired or re-established	= 4
➤ Total New Range Marks established	= 5
➤ Total Control Points established	= 1
➤ Total Monuments Surveyed	= 14
➤ Total Range Marks Surveyed	= 9
2008 – Tongass Passage to Mt. St. Elias: Southeast Alaska / British Columbia	
➤ Total Monuments recovered	= 54
➤ Total monuments painted/cleaned	= 0
➤ Total monuments surveyed	= 20
➤ Monuments repaired or re-established	= 3
➤ Total New Monuments Established	= 1
2008 – Gulf of Georgia to Northwesternmost Point of Lake of the Woods – Cascades	
➤ Total Monuments recovered	= 232
➤ Total monuments painted/cleaned	= 5
➤ Total monuments surveyed	= 44
➤ Monuments repaired or re-established	= 0
➤ Total New Monuments Established	= 0

**141<sup>st</sup> MERIDIAN  
ALASKA-YUKON**







Unmarked Boundary Point  
Alaska / B.C.







# Remote Camping







Questions ???