Fire Perimeter Mapping
at
The Alaska Fire Service

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Website:
http://fire.ak.blm.gov

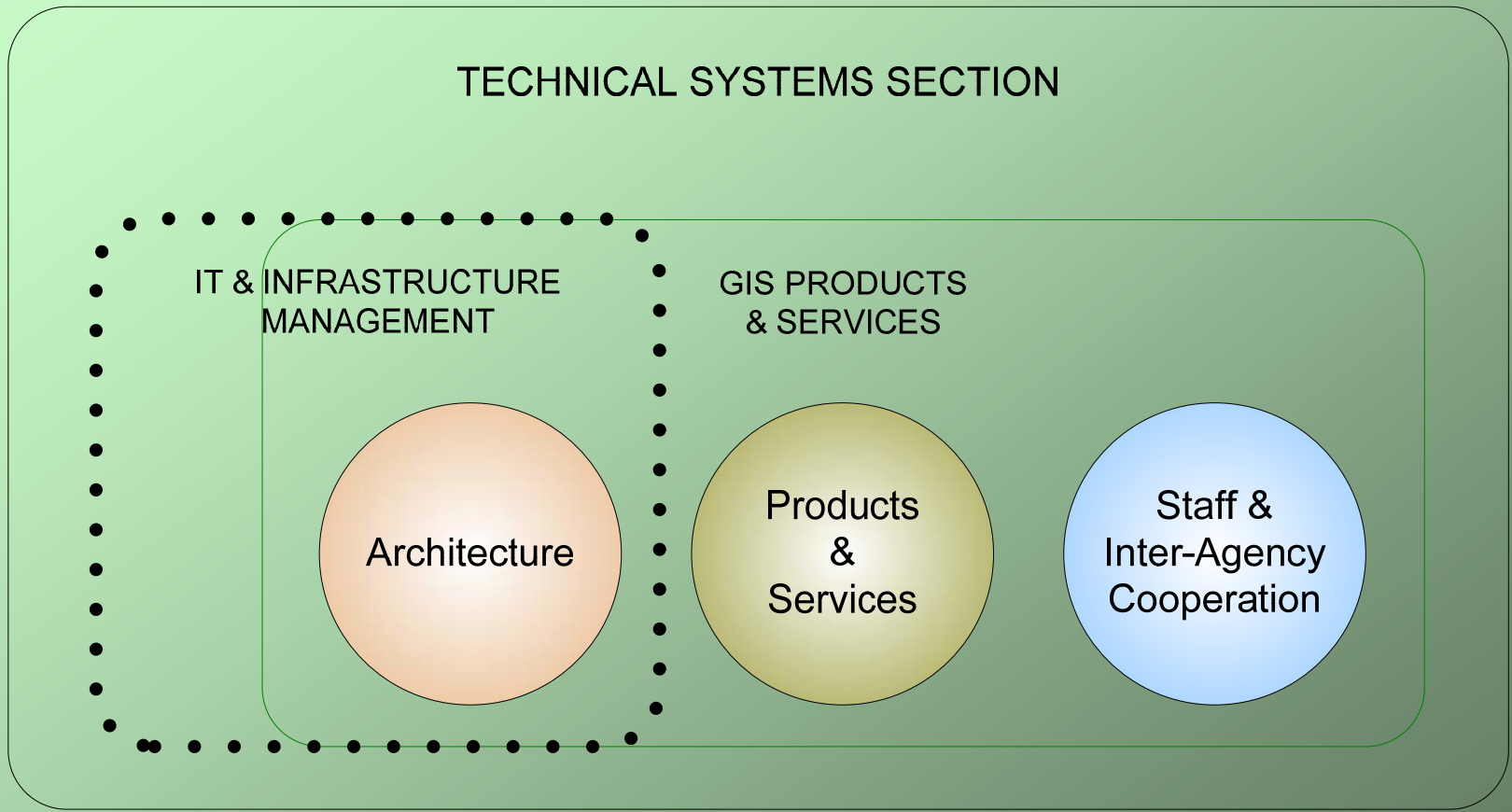
Talk Outline

- AFS GIS Overview
- Why we collect fire perimeters
- Collection Methods
- Data – Issues, concerns, considerations
- Possible AFS and MTBS Collaborations

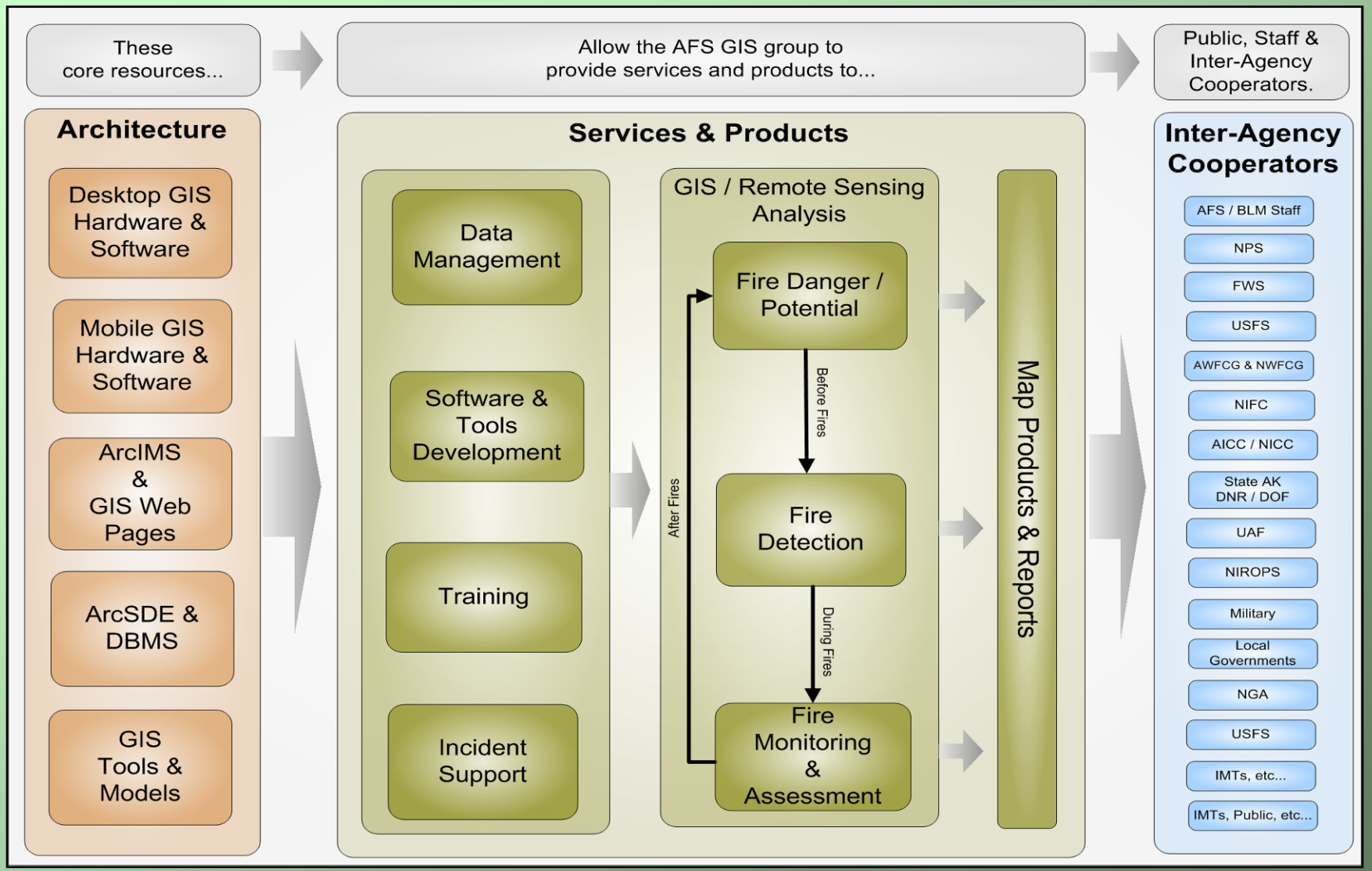
AFS GIS Overview

- Located at Fort Wainwright, Alaska
- **Provide wildland fire suppression services for all DOI and Native Corporation Lands in Alaska**
- Operate on an interagency basis in cooperation with:
  - BLM, AK DNR, USFS, NPS, BIA, FWS, AK Military
- Other statewide responsibilities include:
  - interpretation of fire management policy
  - oversight of the BLM Alaska Aviation program
  - planning, implementing, and monitoring fuels management projects
  - disposing of hazardous materials
  - operating and maintaining Alaska Lightning Detection System

Business & Technology Management Branch



AFS GIS Overview

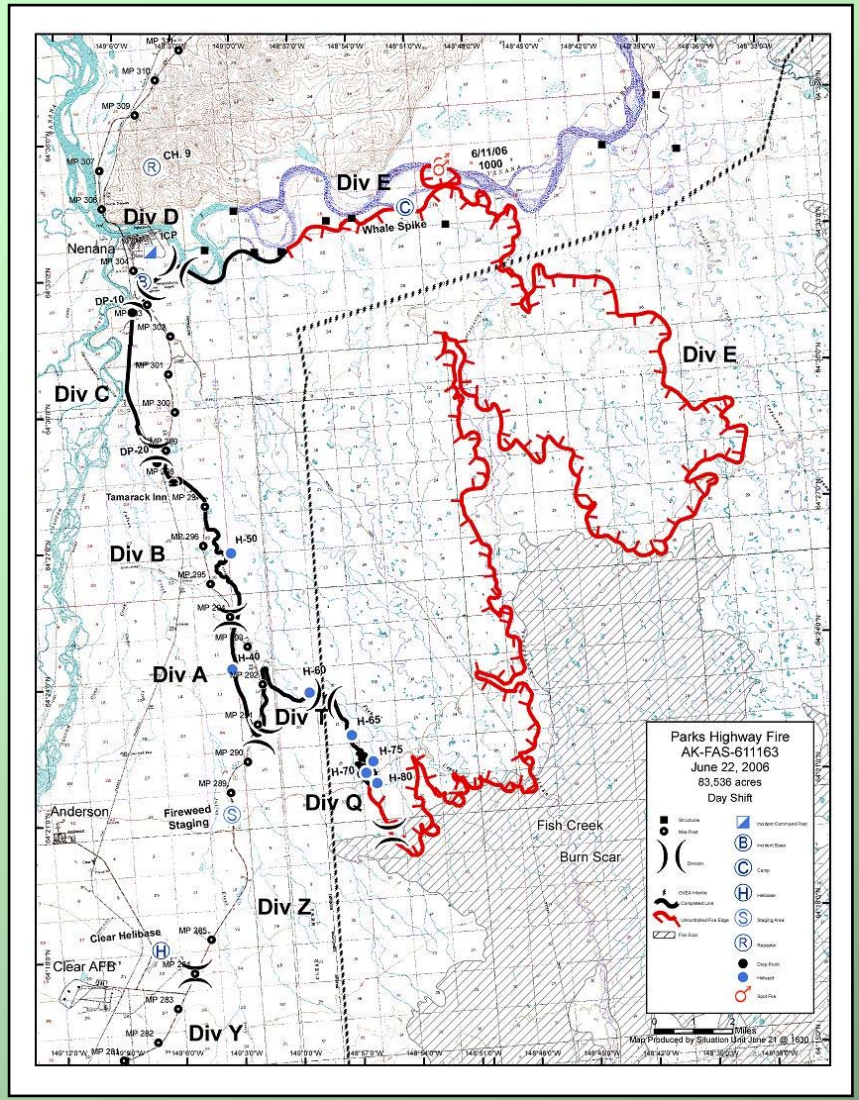


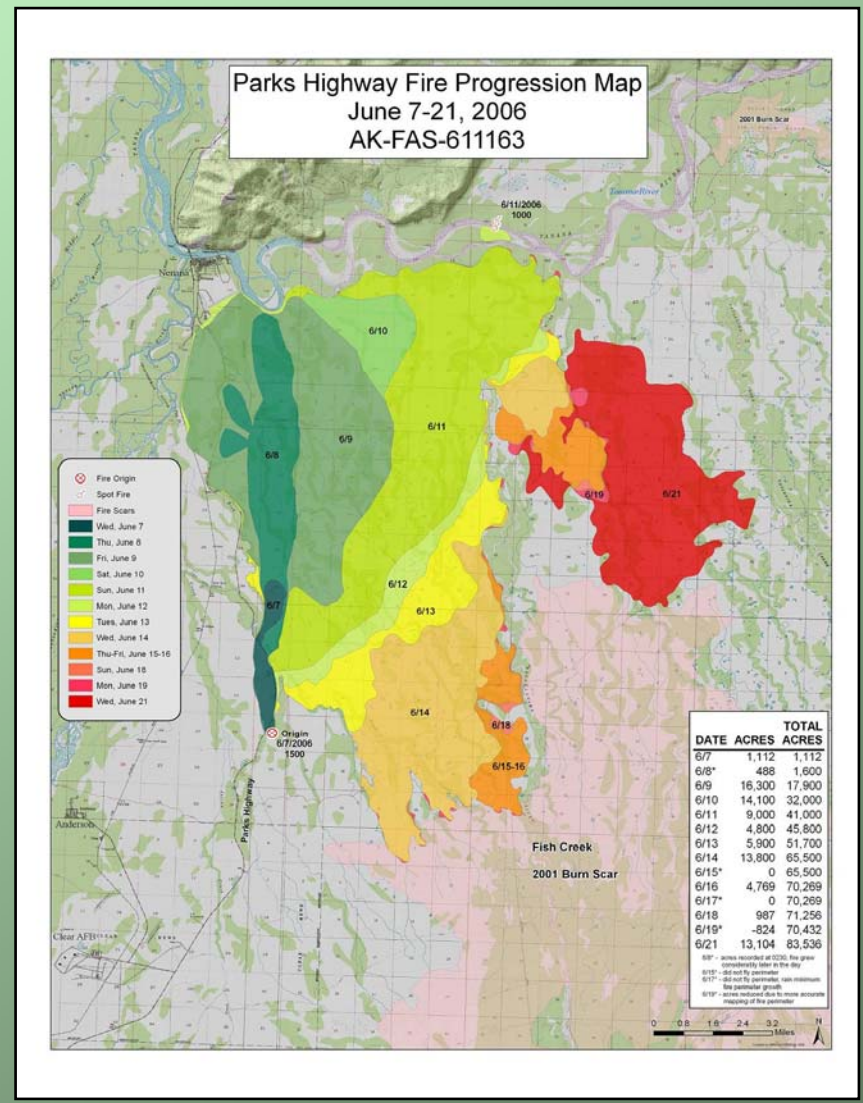
Why do we collect fire perimeters?

We Collect Perimeters for…

- Safety of firefighters and the public
- Research
- Fire Operations
- Media
- Fire Rehabilitation (Unburned Island)
- Fire Planning Activities

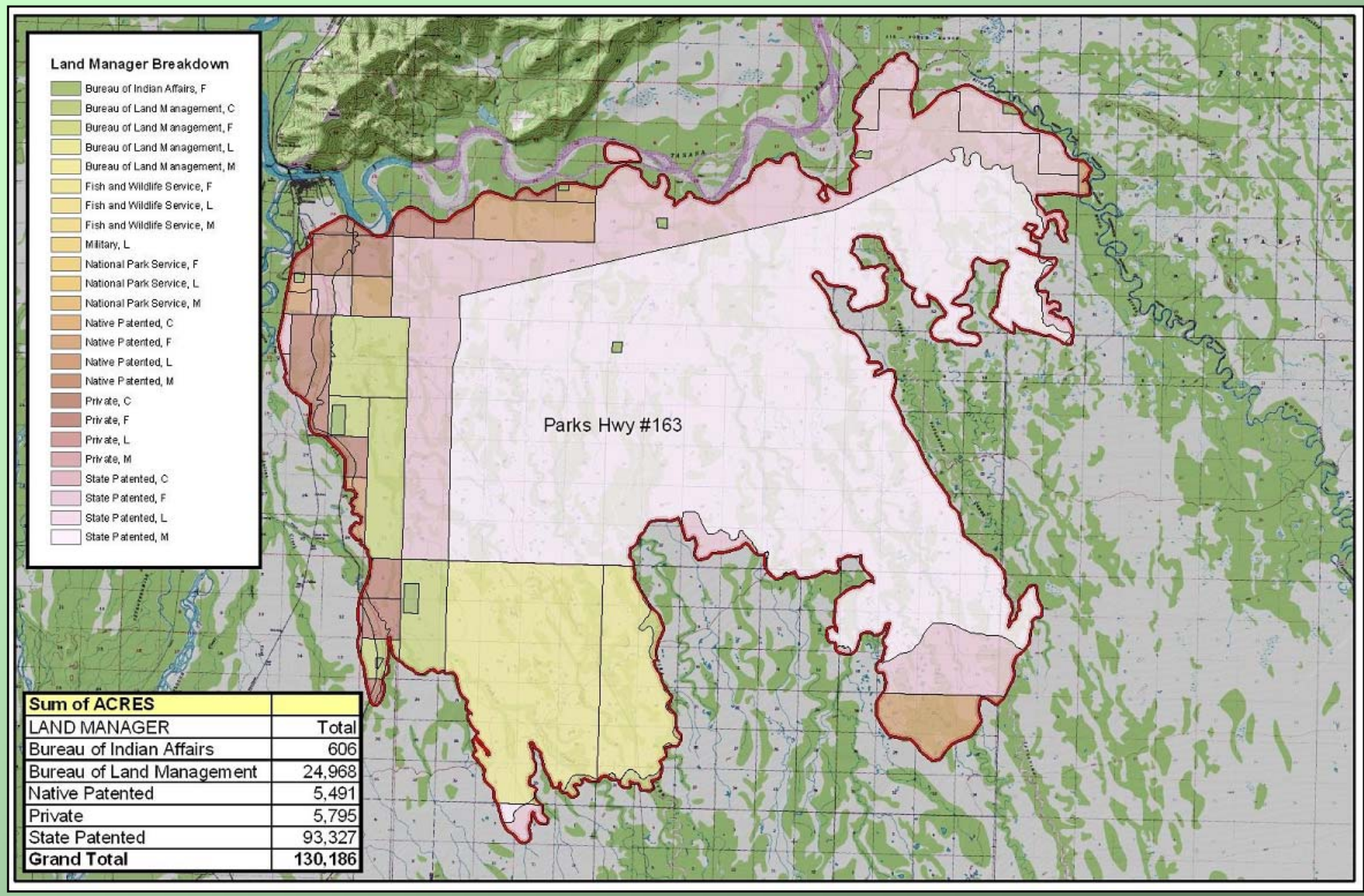
During Fire Activity





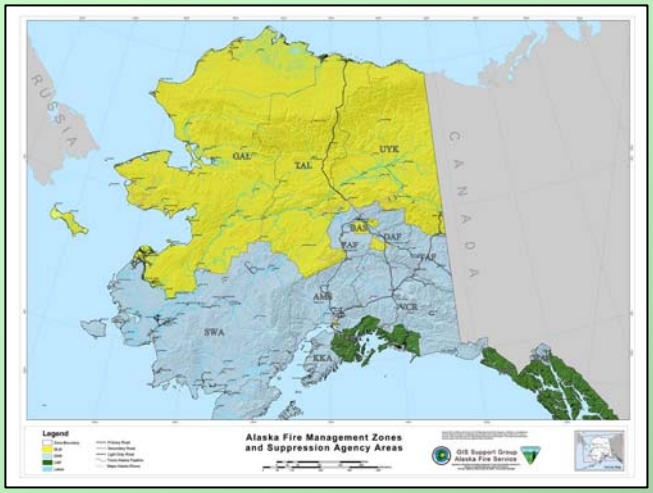
DATE	ACRES	TOTAL ACRES
6/7	1,112	1,112
6/8*	488	1,600
6/9	16,300	17,900
6/10	14,100	32,000
6/11	9,000	41,000
6/12	4,800	45,800
6/13	5,900	51,700
6/14	13,800	65,500
6/15*	0	65,500
6/16	4,769	70,269
6/17*	0	70,269
6/18	987	71,256
6/19*	-824	70,432
6/21	13,104	83,536

Land Manager Acres



Sum of ACRES	
LAND MANAGER	Total
Bureau of Indian Affairs	606
Bureau of Land Management	24,968
Native Patented	5,491
Private	5,795
State Patented	93,327
Grand Total	**130,186**

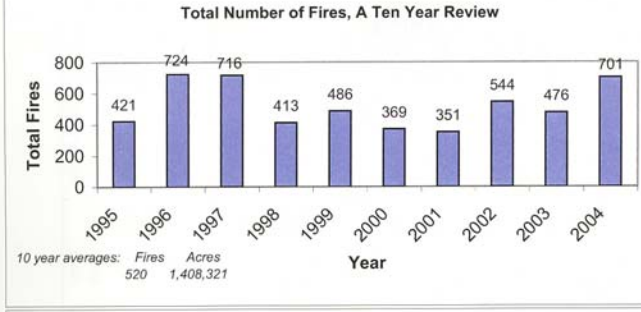
Year-end Accounting

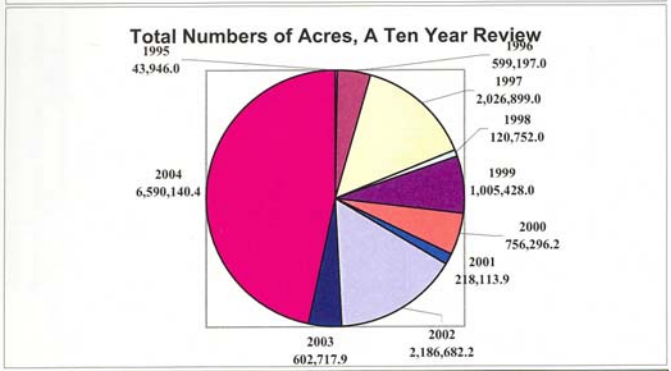


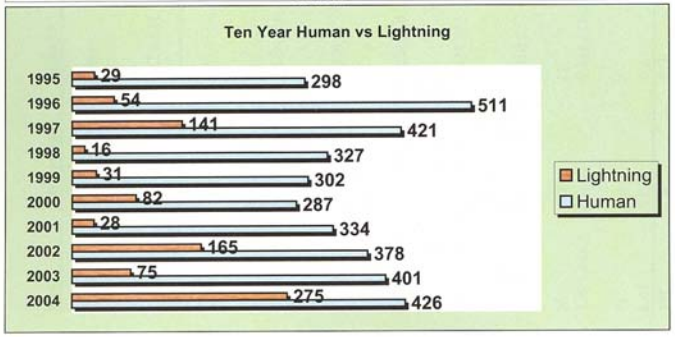
Fires and Acres Burned by Landowner and Management Option
2004

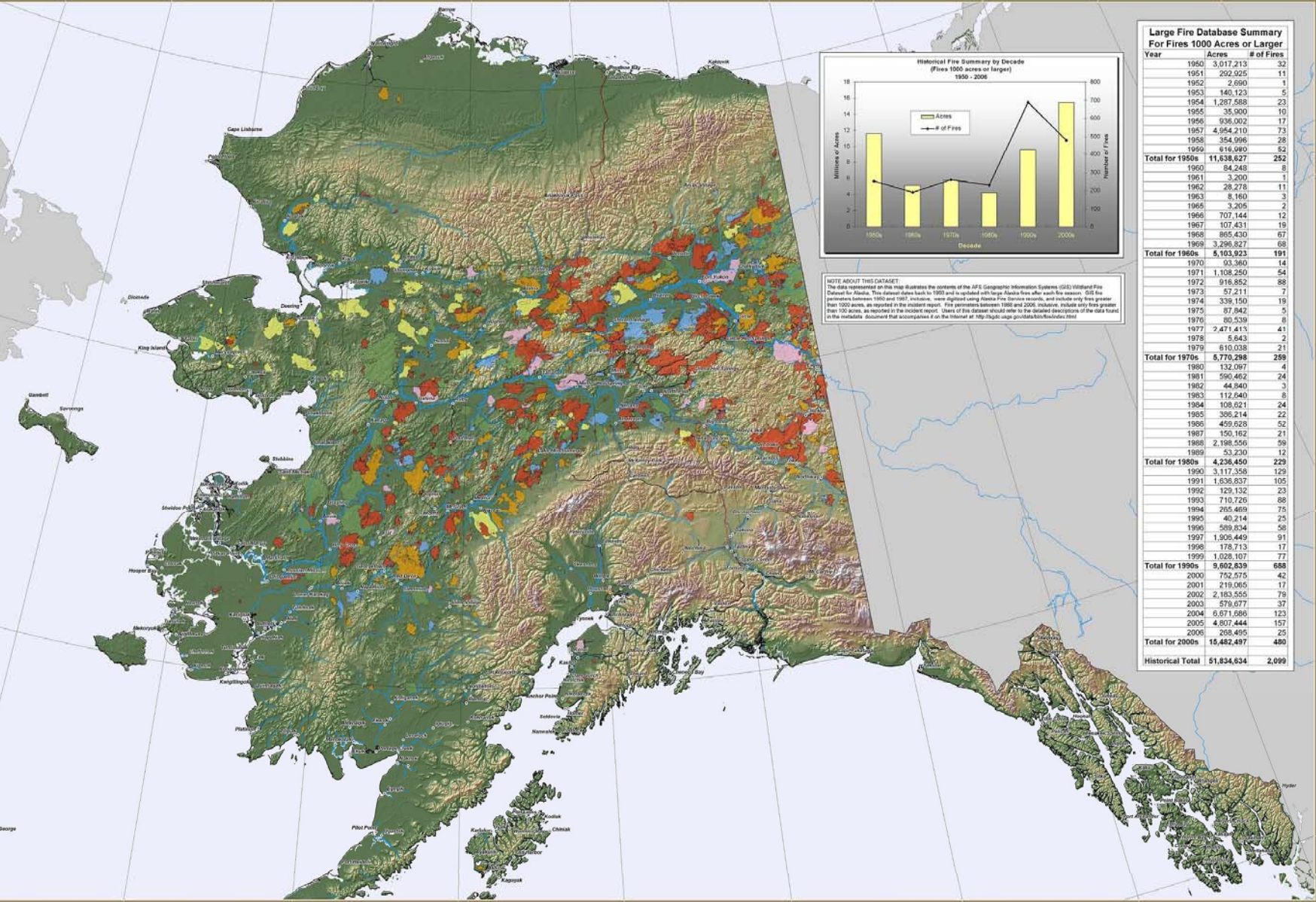
Owner		Critical	Full	Modified	Limited	Unplanned	Total
Bureau of Indian Affairs	fires	2	5	0	0	0	7
	acres	1.1	4,945.1	0.0	448.0		5,394.2
Bureau of Land Management	fires	1	3	16	40	0	60
	acres	0.1	24,147.3	21,051.7	1,553,472.0	0	1,598,671.1
City/Borough	fires	9	3				12
	acres	2.4	65.1	0.1	0.0	0.0	67.6
Fish and Wildlife Service	fires	0	21	16	42	0	79
	acres	199.0	32,689.0	162,683.3	1,458,432.2	0.0	1,654,003.5
Military Lands	fires	1	2	0	13	1	17
	acres	0.1	1,794.1	0.0	19,020.8	0.1	20,815.1
Native Claims Act Lands	fires	3	31	6	5	5	50
	acres	4,480.1	168,760.2	133,704.9	627,923.5	408,418.7	1,343,287.4
National Park Service	fires	0	5	1	15	0	21
	acres	0.0	429.6	81.8	136,756.3	0.0	0.0
Private	fires	211	20	3	0	0	234
	acres	179.3	1,116.1	509.5	4,616.0	0.0	6,420.9
State of Alaska	fires	49	48	24	53	0	174
	acres	151.7	264,093.0	135,435.6	1,424,516.2	0.0	1,824,196.5
U.S. Forest Service	fires	13	27	2	5	0	47
	acres	5.0	10.2	0.2	1.0	0.0	16.4
Total Fires		**289**	**165**	**68**	**173**	**6**	**701**
Total Acres Burned		**5,018.8**	**498,049.7**	**453,467.1**	**5,225,186.0**	**408,418.8**	**6,452,872.7**

Number of fires is based on ownership and management option at point of origin. Acreage shown is actual acres burned by owner and Management option, i.e. fires that burned on multiple ownerships are counted as fires based on the ownership at point of origin, but acreage burned is divided and appears based on the owner wher the acres bruned.









NOTE ABOUT THIS DATASET:
The data represented on this map illustrates the contents of the AFS Geographic Information Systems (GIS) Wildland Fire Dataset for Alaska. This dataset dates back to 1950 and is updated with large Alaska fires after each fire season. GIS fire perimeters between 1950 and 1987, inclusive, were digitized using Alaska Fire Service records, and include only fires greater than 1000 acres, as reported in the incident report. Fire perimeters between 1988 and 2006, inclusive, include only fires greater than 100 acres, as reported in the incident report. Users of this dataset should refer to the detailed descriptions of the data found in the metadata document that accompanies it on the Internet at: http://agdc.usgs.gov/data/blm/fire/index.html

Large Fire Database Summary
For Fires 1000 Acres or Larger

Year	Acres	# of Fires
1950	3,017,213	32
1951	292,925	11
1952	2,690	1
1953	140,123	5
1954	1,287,588	23
1955	35,900	10
1956	936,002	17
1957	4,954,210	73
1958	354,996	28
1959	916,980	52
Total for 1950s	**11,638,627**	**252**
1960	84,248	8
1961	3,200	1
1962	28,278	11
1963	8,160	3
1965	3,205	2
1966	707,144	12
1967	107,431	19
1968	865,430	67
1969	3,296,827	68
Total for 1960s	**5,103,923**	**191**
1970	93,360	14
1971	1,108,250	54
1972	916,852	88
1973	57,211	7
1974	339,150	19
1975	87,842	5
1976	80,539	8
1977	2,471,413	41
1978	5,643	2
1979	610,038	21
Total for 1970s	**5,770,298**	**259**
1980	132,097	4
1981	590,462	24
1982	44,840	3
1983	112,640	8
1984	108,621	24
1985	386,214	22
1986	459,528	52
1987	150,162	21
1988	2,198,556	59
1989	53,230	12
Total for 1980s	**4,236,450**	**229**
1990	3,117,356	129
1991	1,636,837	105
1992	129,132	23
1993	710,726	88
1994	265,469	75
1995	40,214	25
1996	589,834	58
1997	1,906,449	91
1998	178,713	17
1999	1,028,107	77
Total for 1990s	**9,602,839**	**688**
2000	752,575	42
2001	219,065	17
2002	2,183,555	79
2003	579,677	37
2004	6,671,686	123
2005	4,807,444	157
2006	268,495	25
Total for 2000s	**15,482,497**	**480**
Historical Total	**51,834,634**	**2,099**

Legend

Fire History
- 1950 - 1959
- 1960 - 1969
- 1970 - 1979
- 1980 - 1989
- 1990 - 1999
- 2000 - 2006

- Primary Road
- Secondary Road
- Light Duty Road
- Trans-Alaska Pipeline
- Major Alaska Rivers

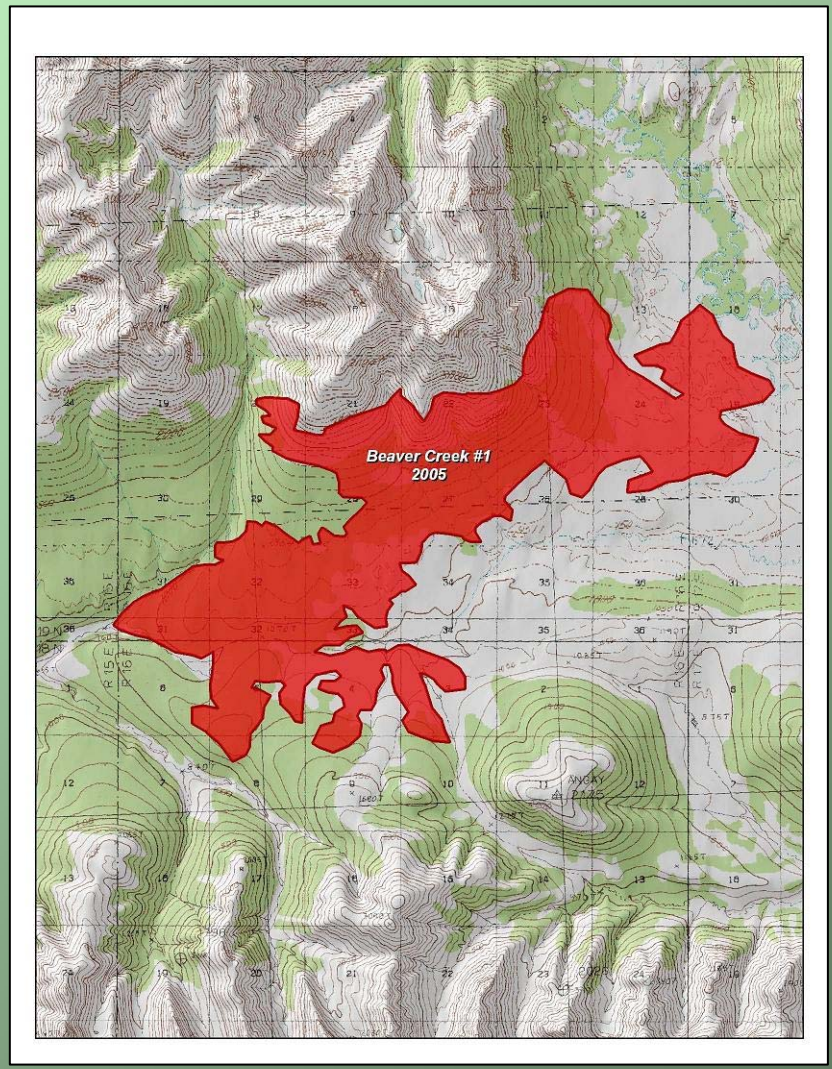
Perimeters shown are for fires 100 acres in size or larger. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Alaska Fire History
1950 - 2006

0 50 100 150 200 250 300 Kilometers
0 50 100 150 200 250 300 Miles

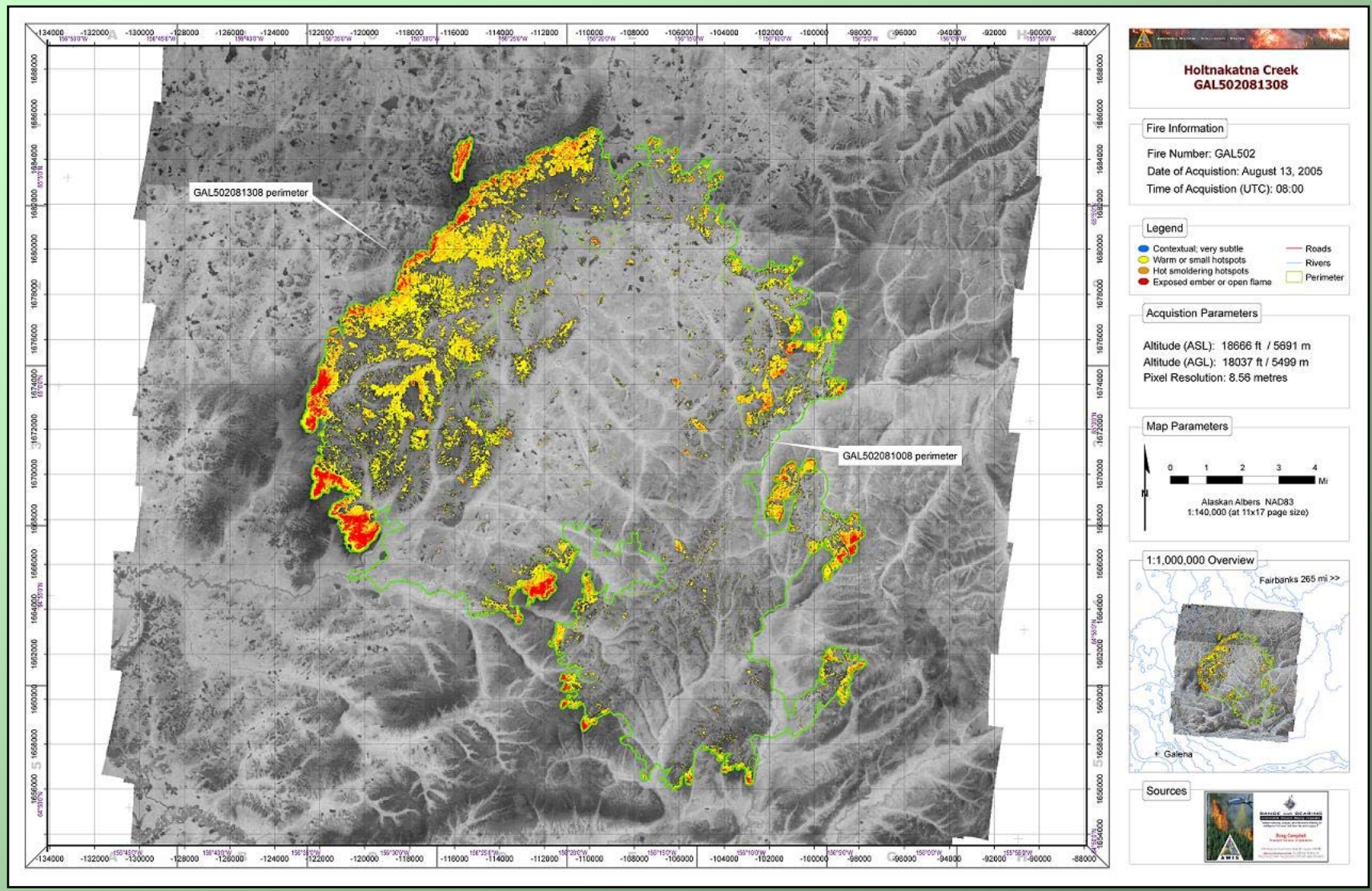
Alaska Fire Service
GIS Group
Questions about the information displayed on this map should be directed to:
Bureau of Land Management, Alaska Fire Service
P.O. Box 35005, Ft. Wainwright, AK 99703. Phone (907) 356-5592

Collection Methods: Aerial Observer

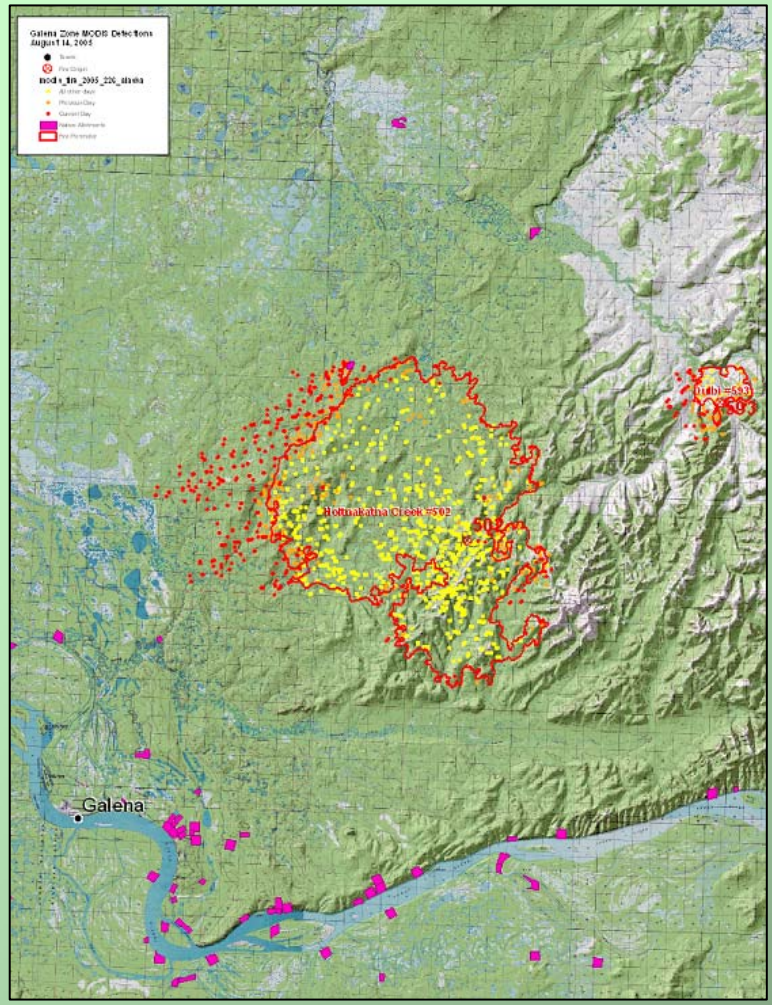


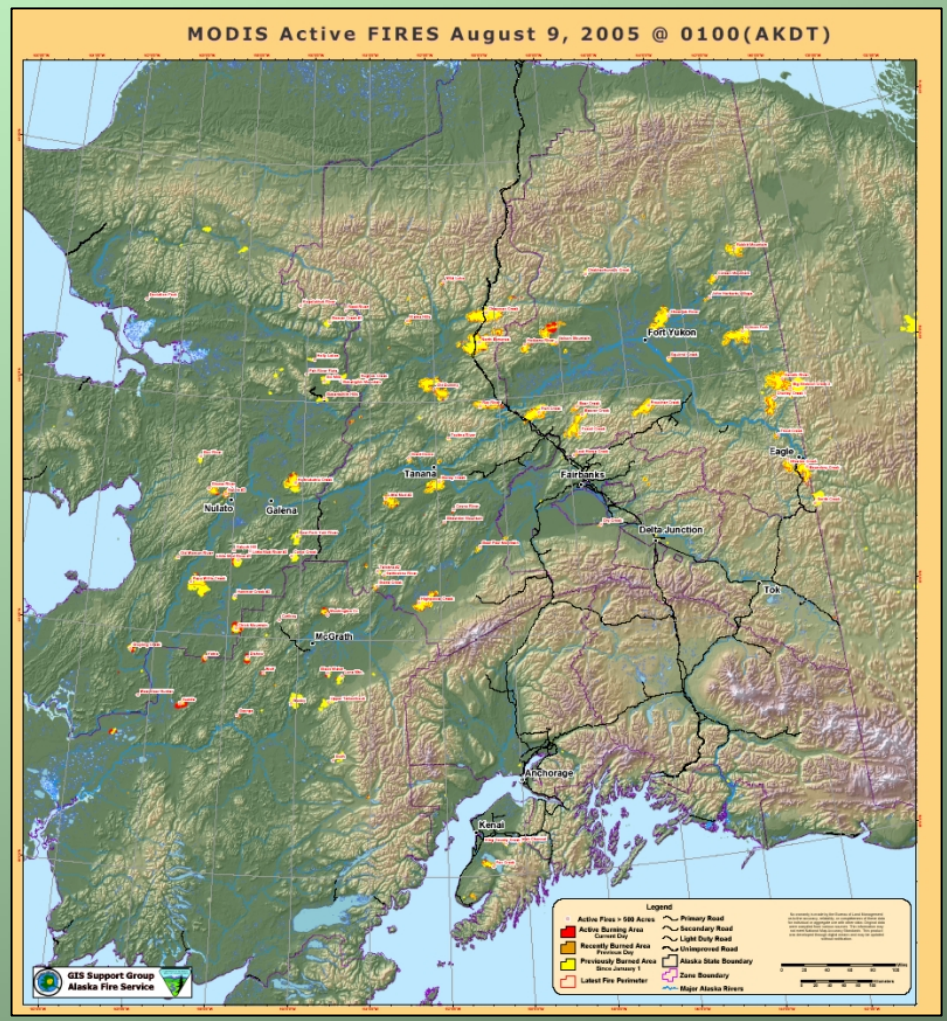
GPS

IR (Infrared Detection)

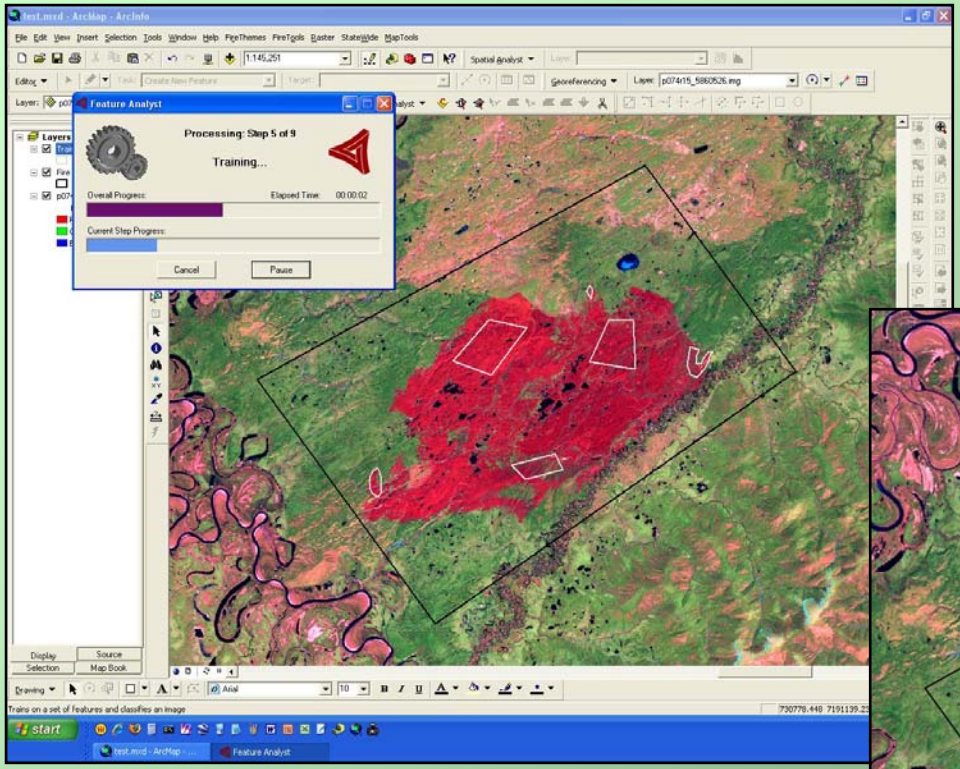


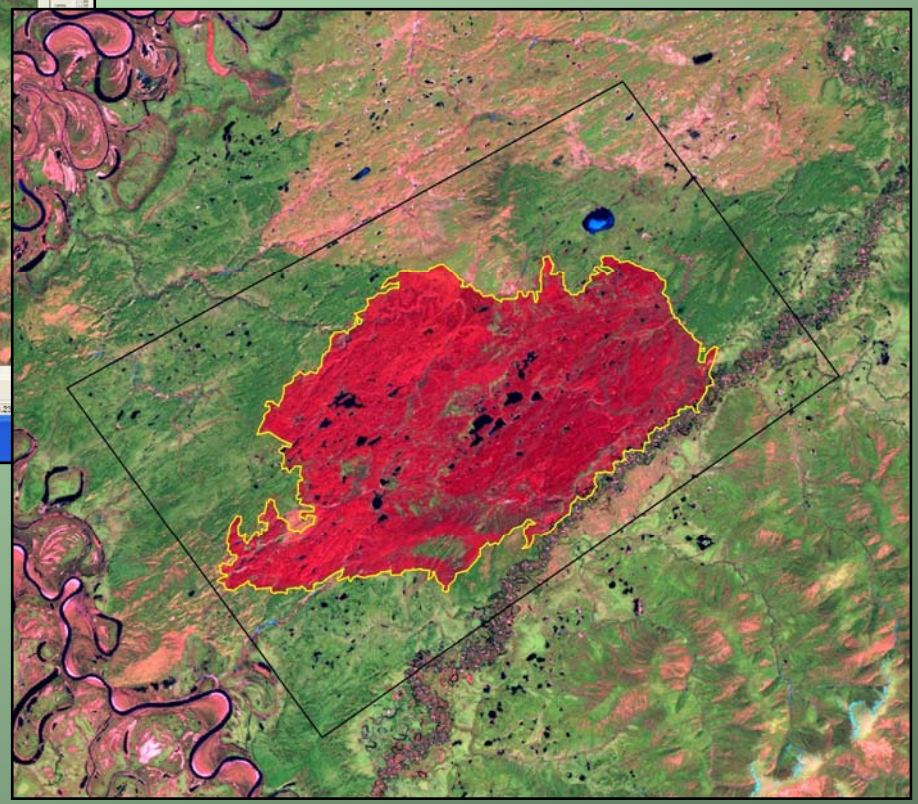
MODIS


Galena Zone MODIS Detections
August 14, 2005
Hoffmakatha Creek #592
Galena


MODIS Active FIRES August 9, 2005 @ 0100(AKDT)
Fort Yukon
Eagle
Tanana
Fairbanks
Nulato
Galena
Delta Junction
Tok
McGrath
Anchorage
Kenai
Legend
GIS Support Group
Alaska Fire Service

Landsat

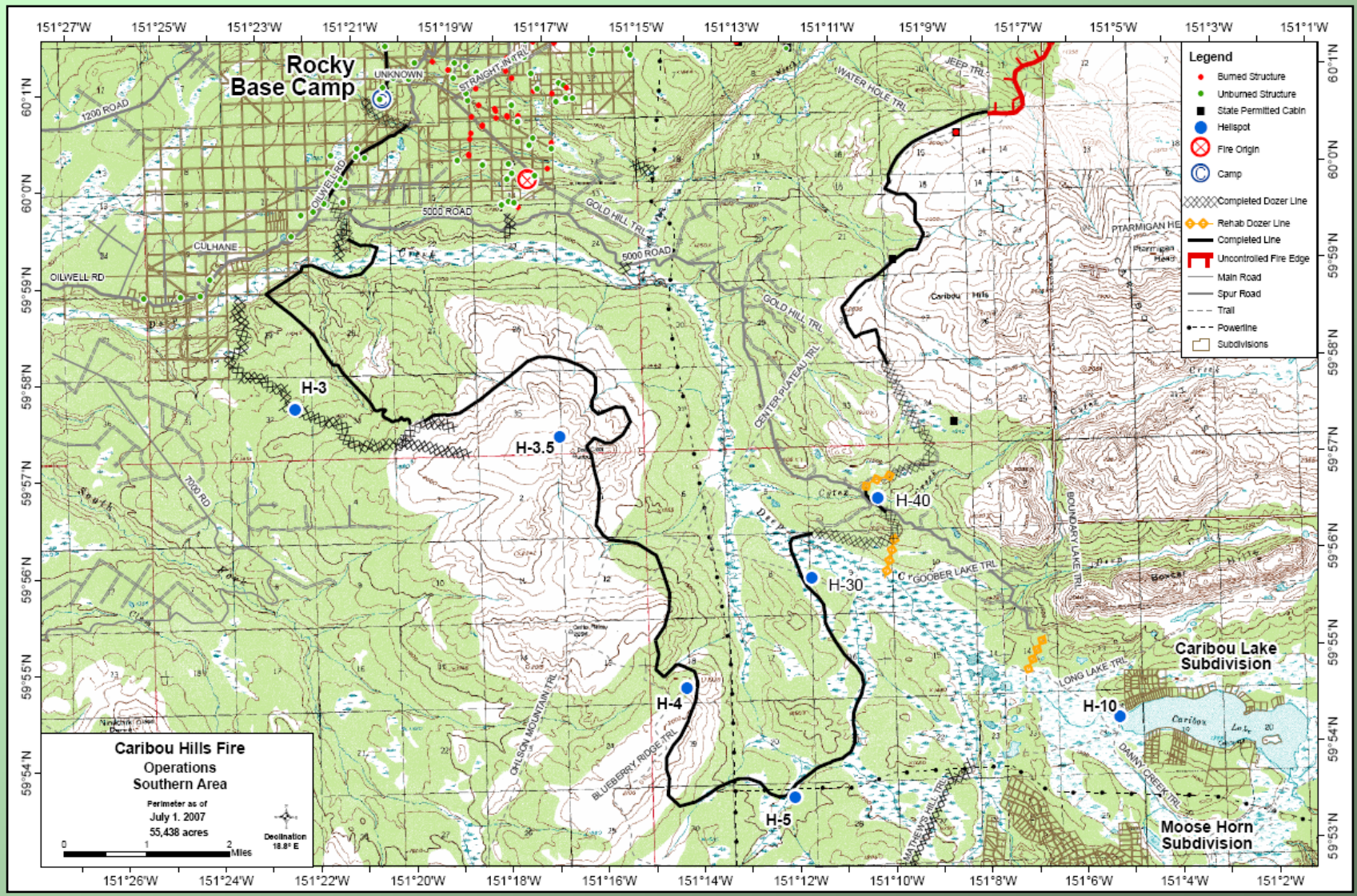

Feature Analyst
Processing: Step 5 of 9
Training...
Overall Progress:
Elapsed Time: 00:00:02
Current Step Progress:
Cancel
Pause



Perimeter Data: Issues, Concerns, Considerations

- Incident Data vs. Burned area
  - Perimeters are often a combination of multiple “best” sources used at the time of the incident and don’t always match “burned area” (i.e., dozerlines generalize fingers of burn)
- Perimeters, Lumpers, and Splitters
  - Interpretation of burned area varies fire to fire, person to person, and method to method
  - No national accuracy standards exist for mapping perimeters
- Alaska Large Fire Database
  - Most comprehensive source for large wildfire perimeters for Alaska
    - Pre-1988: >= 1000 acres
    - After 1988: >= 100 acres
  - Older perimeters not as accurate as recent perimeters
  - Errors are getting fixed as data becomes available (MTBS will help)
- Year-end fire perimeter mapping
  - Final perimeter mapping has short timeline and data collection window (usually Aug. – Sept.)
  - Data source influences quality of perimeter (i.e., SLC-off missing data)
  - Synthetic Aperture Radar (SAR) could be used as another tool for the toolbox

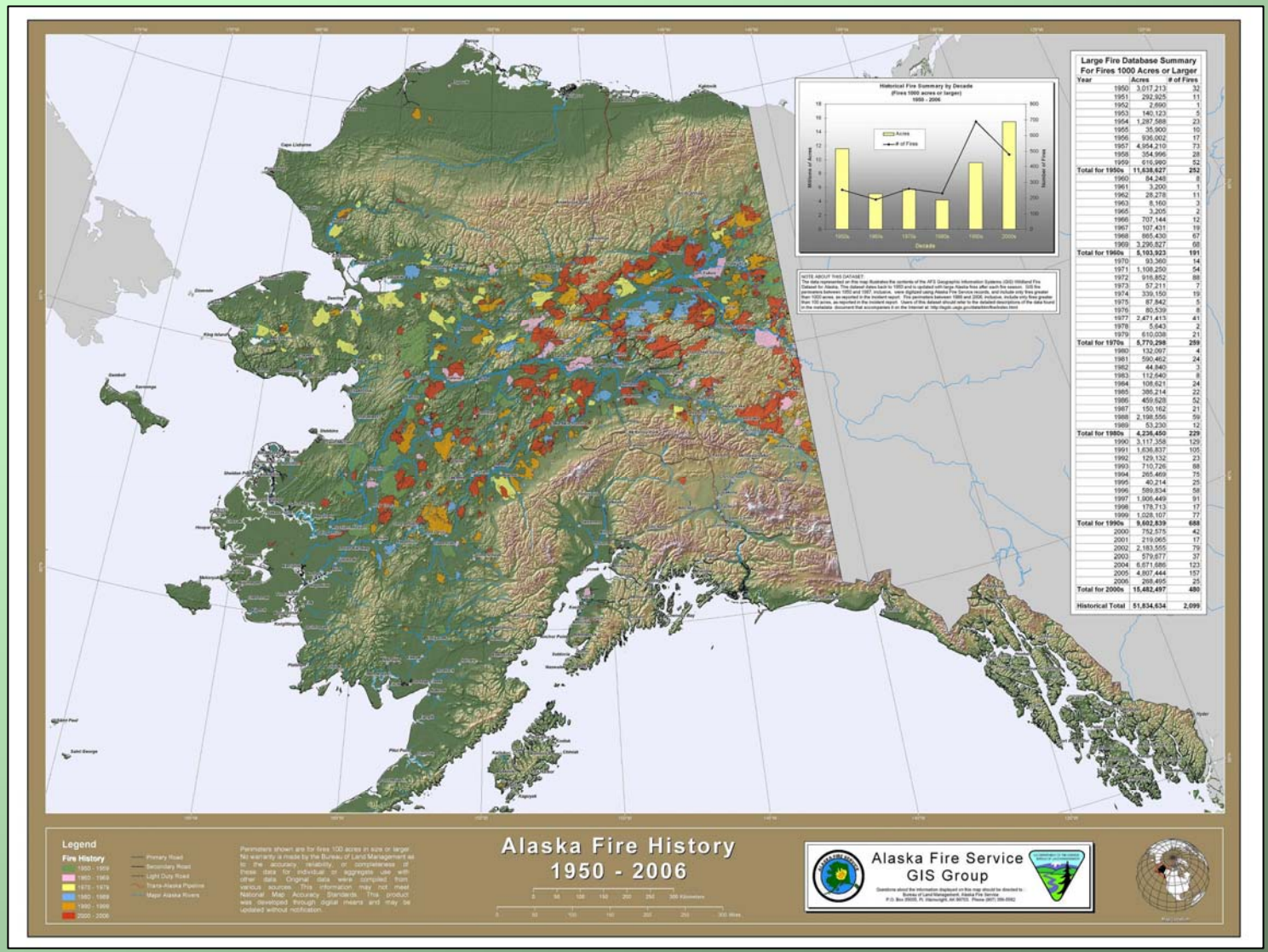
Dozerline & Handline ≠ Burned Area



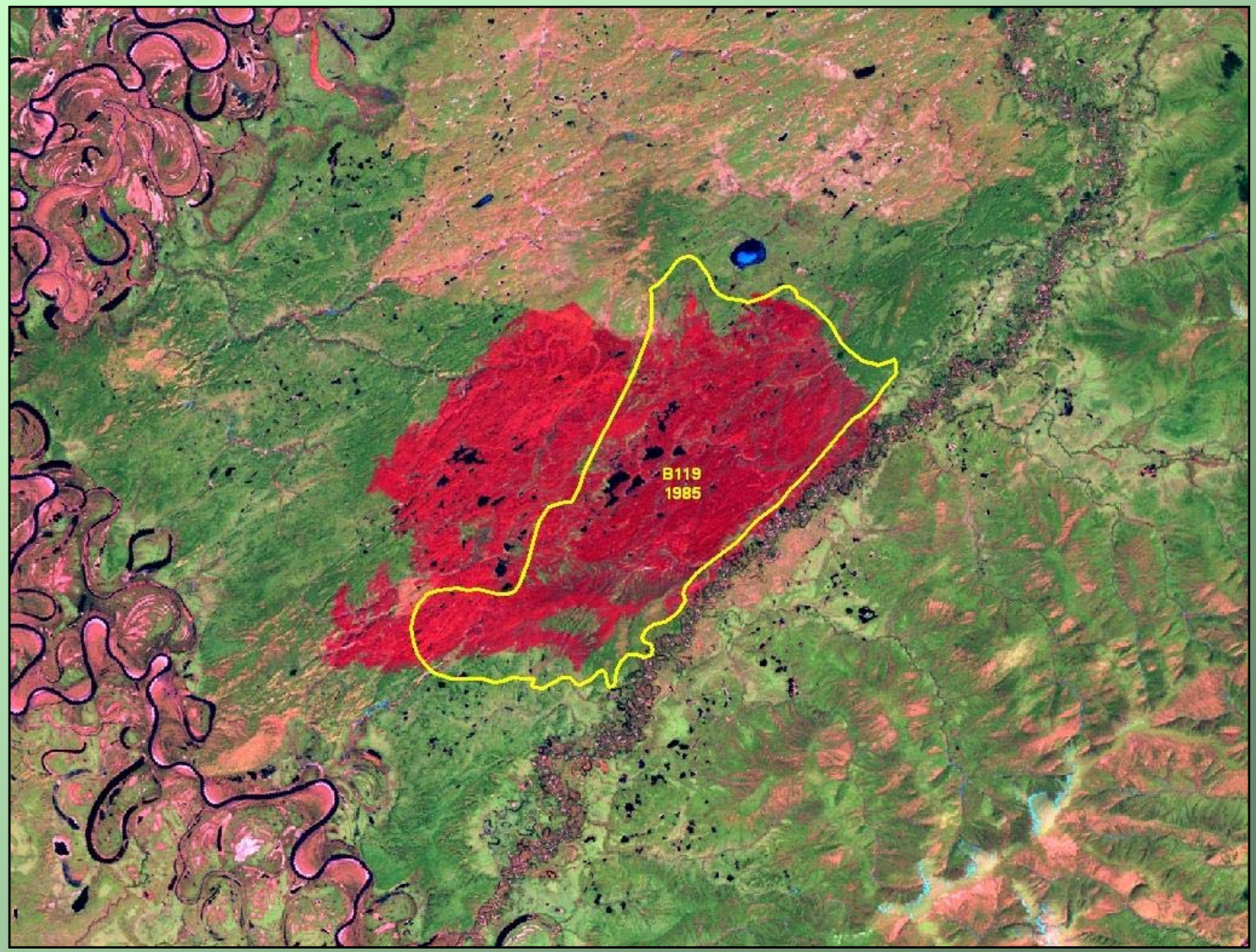
Easy to Map…

Are you a lumper or splitter?

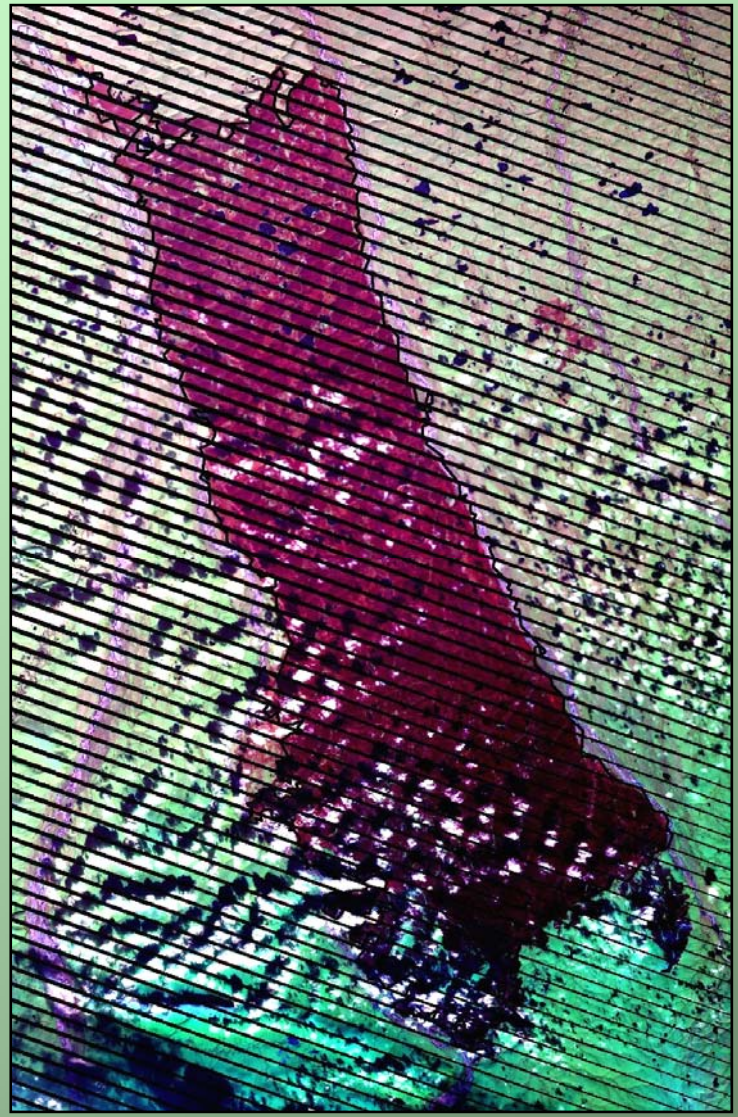
Large Fire Database



Comprehensive, but incomplete…

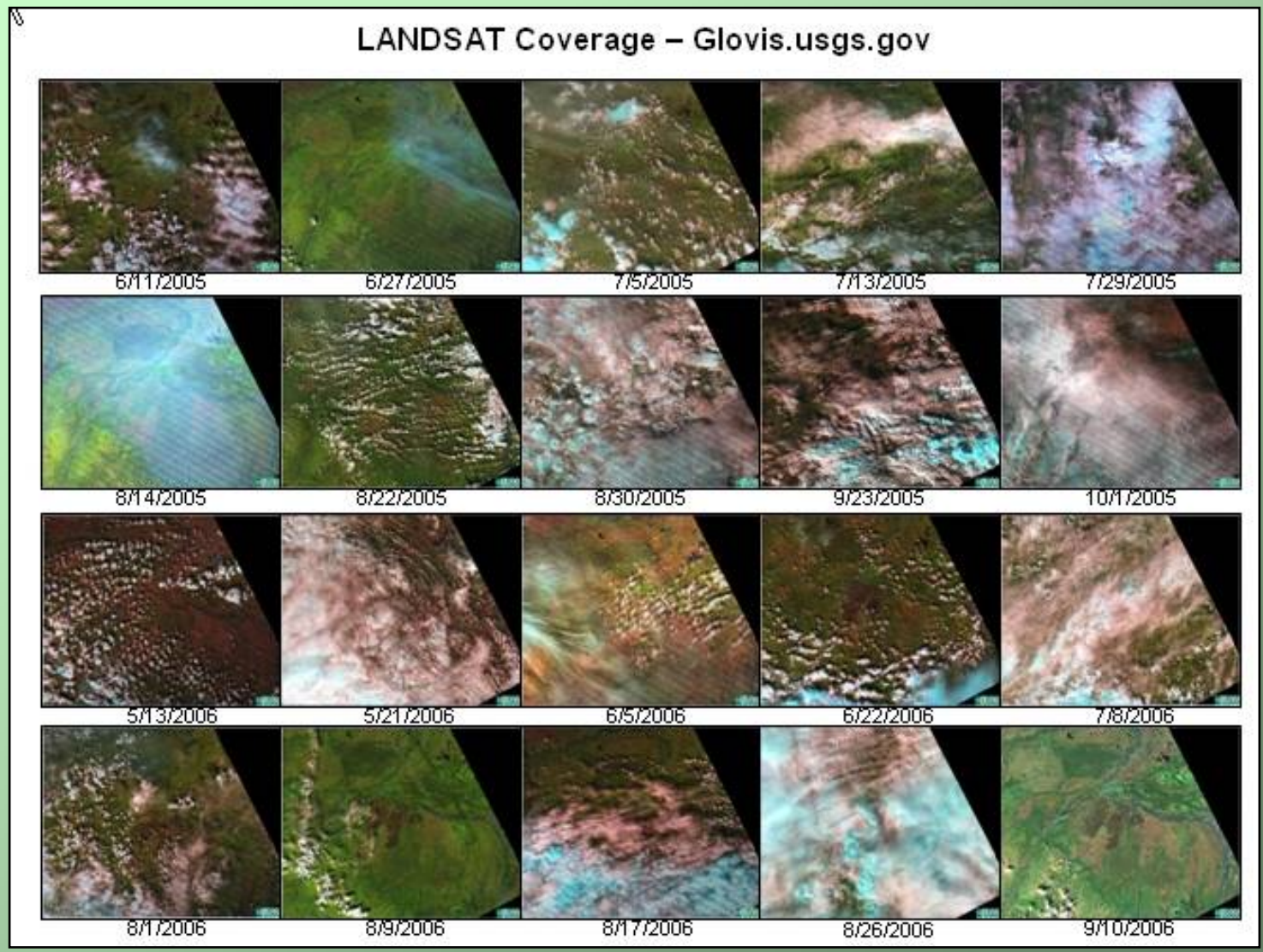


Year-End Mapping: Landsat



Missing Data in SLC-Off Images

How many passes will it take?



Soil Moisture and SAR

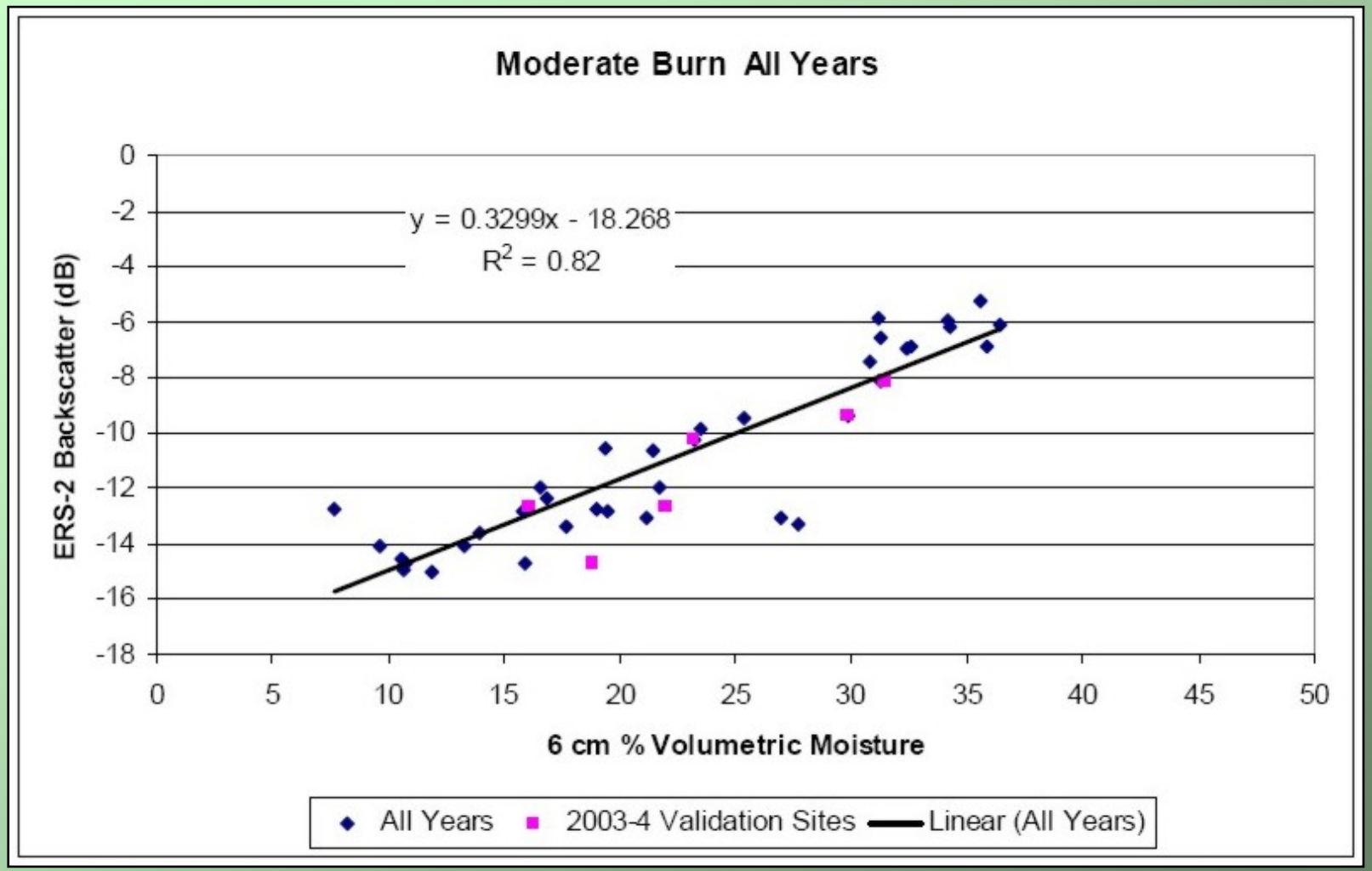
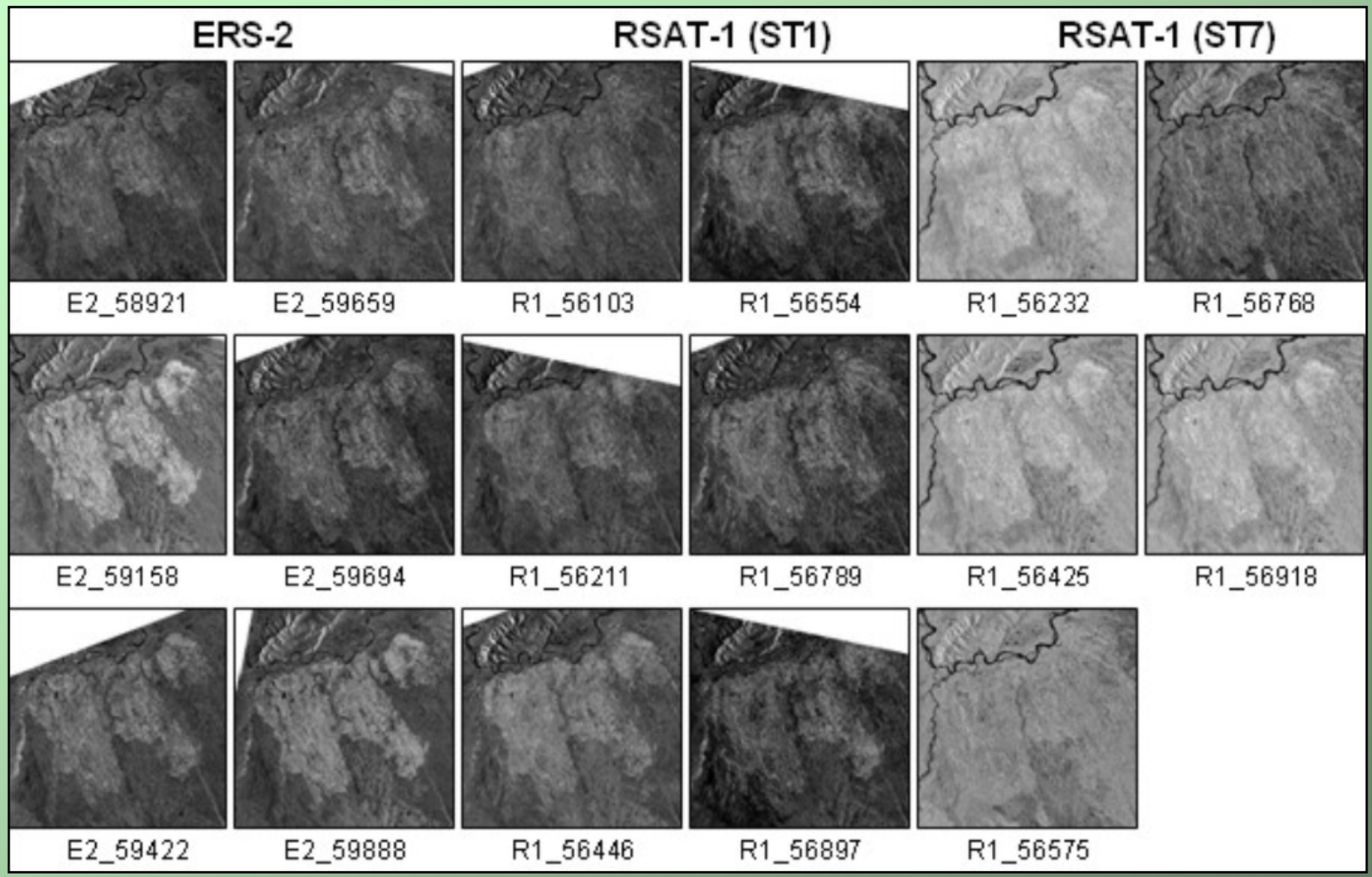


Figure courtesy Laura Bourgeau-Chavez

SAR Data – An Alternative?



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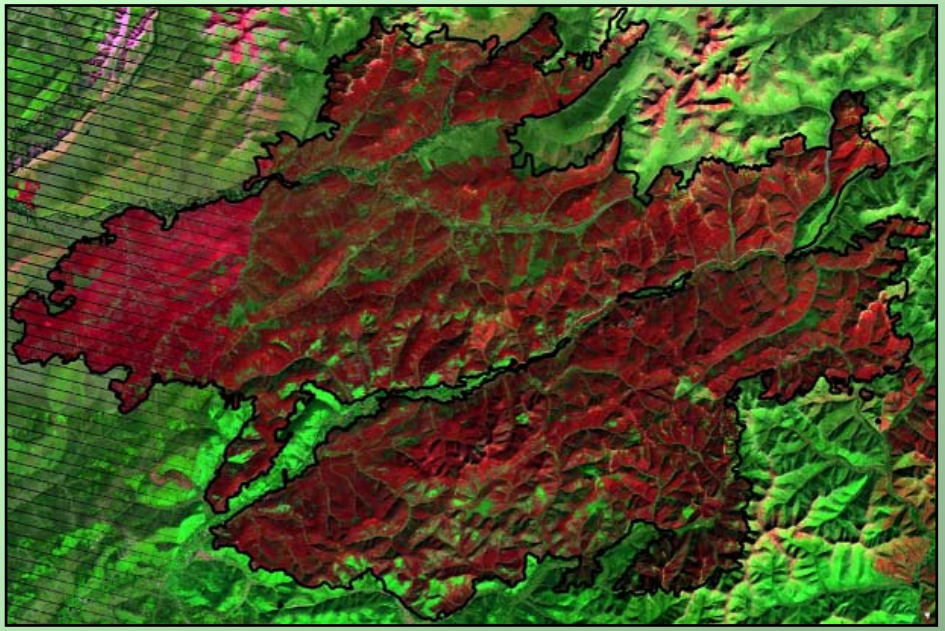
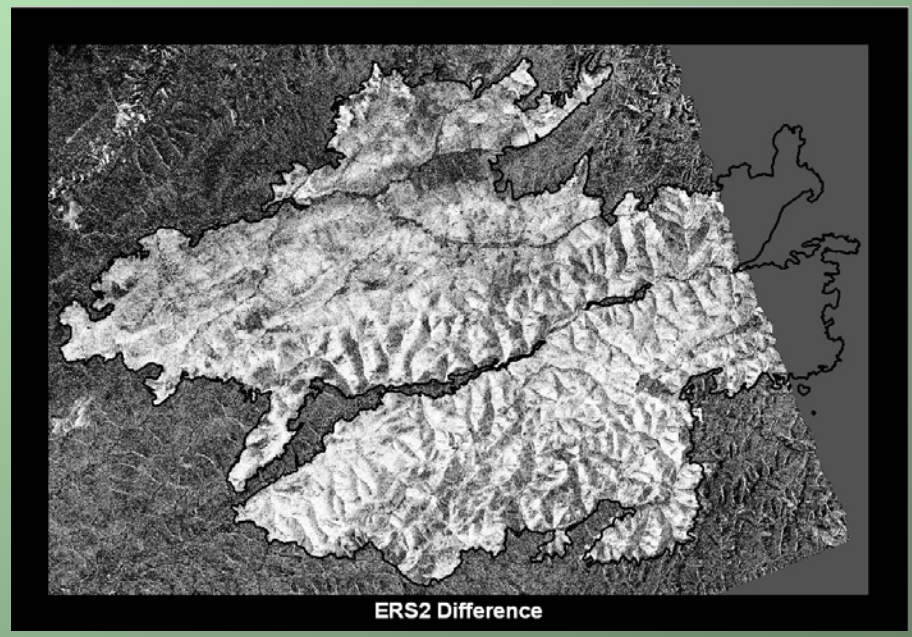
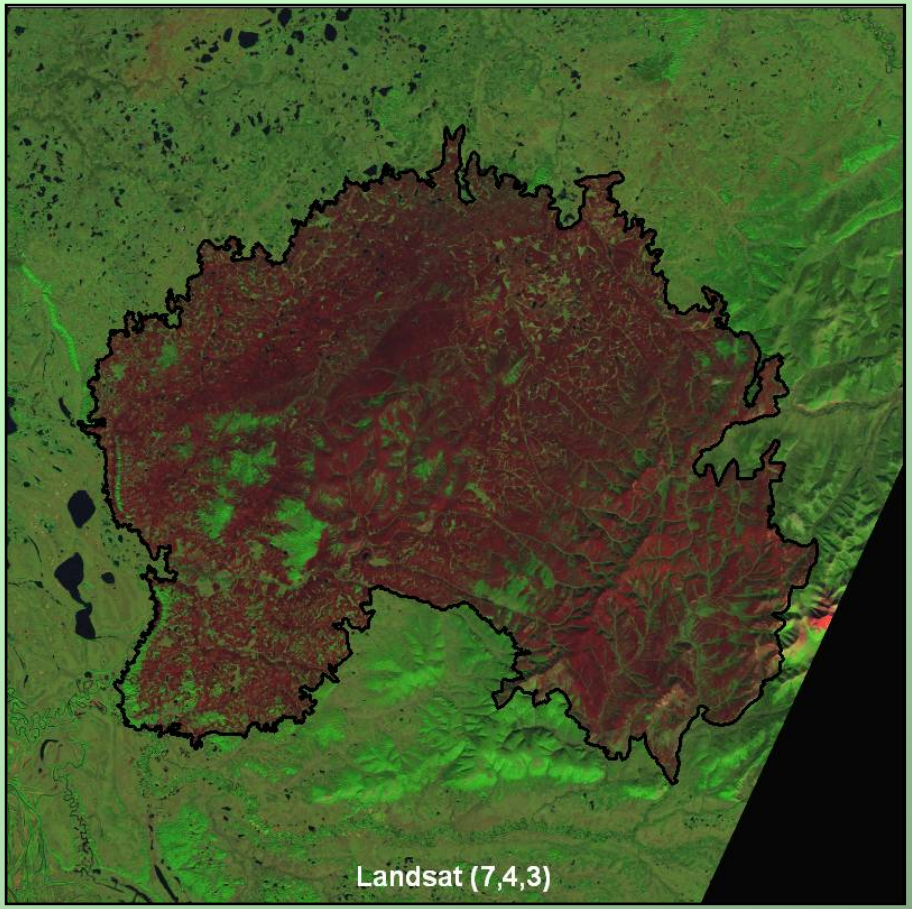
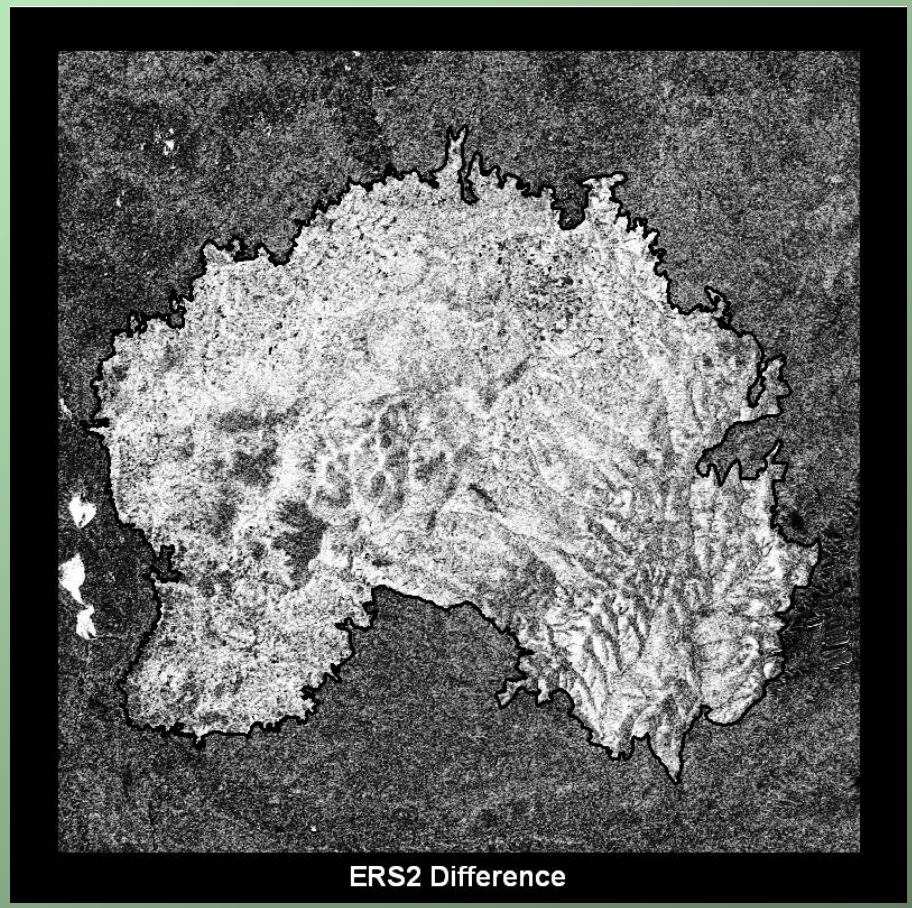
Boundary Fire - 2004



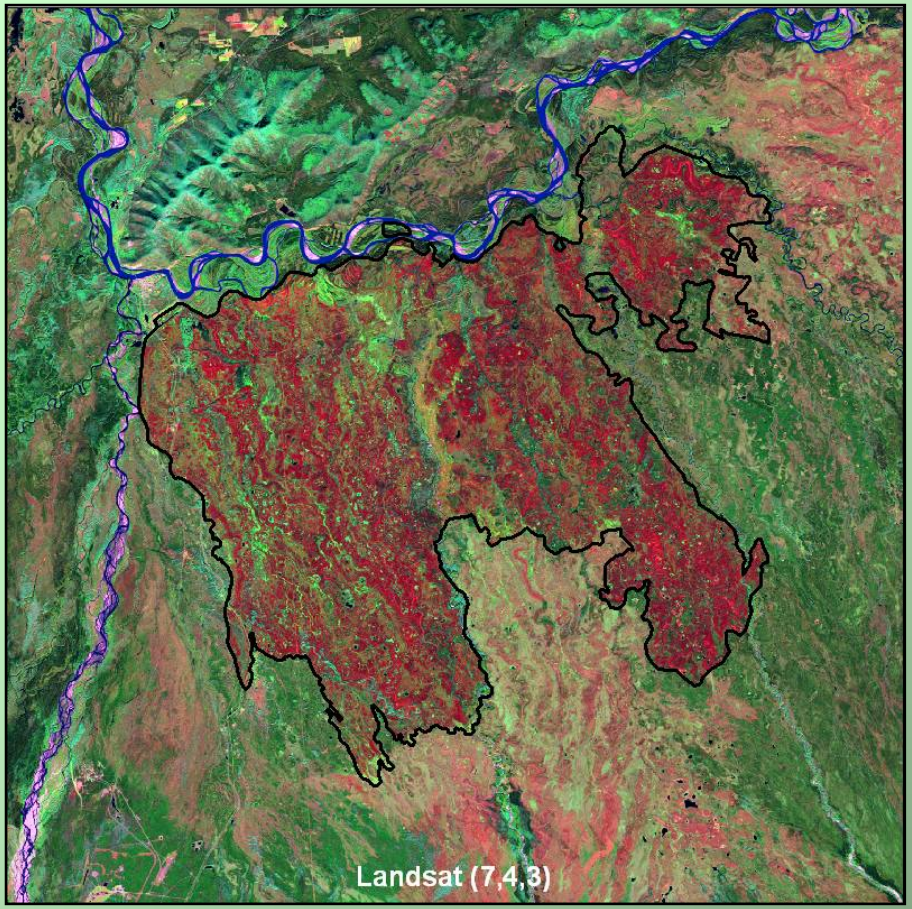


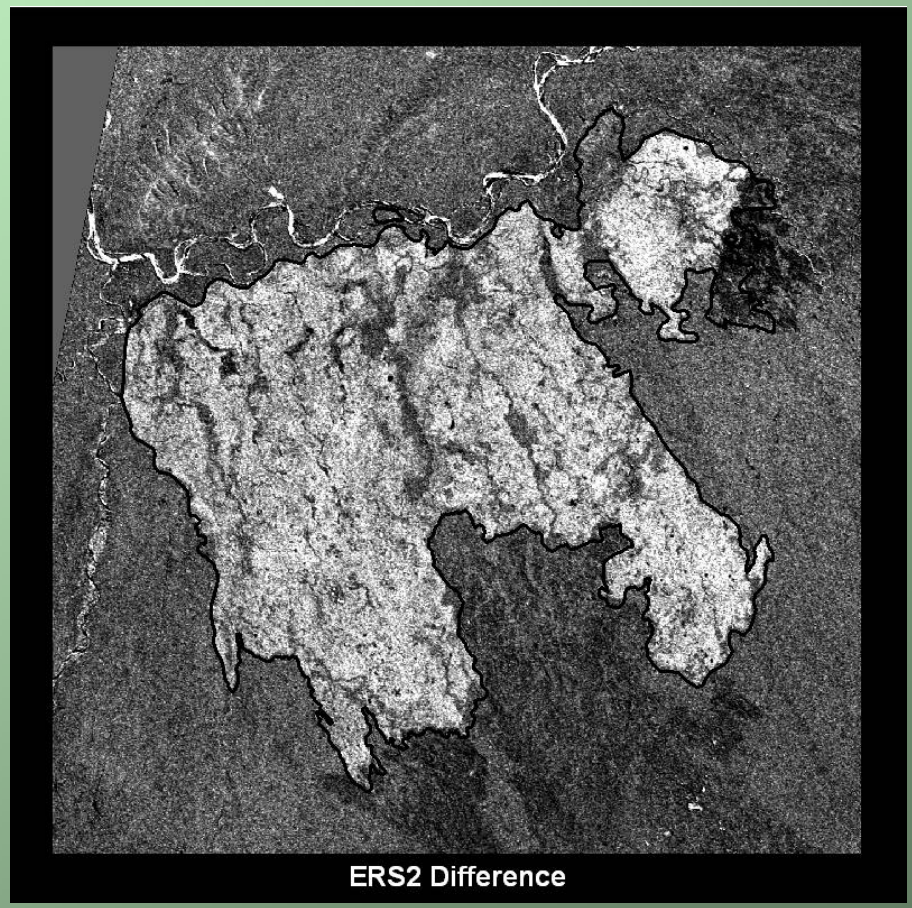
Holtnakatna Creek Fire - 2005





Parks Highway Fire - 2006



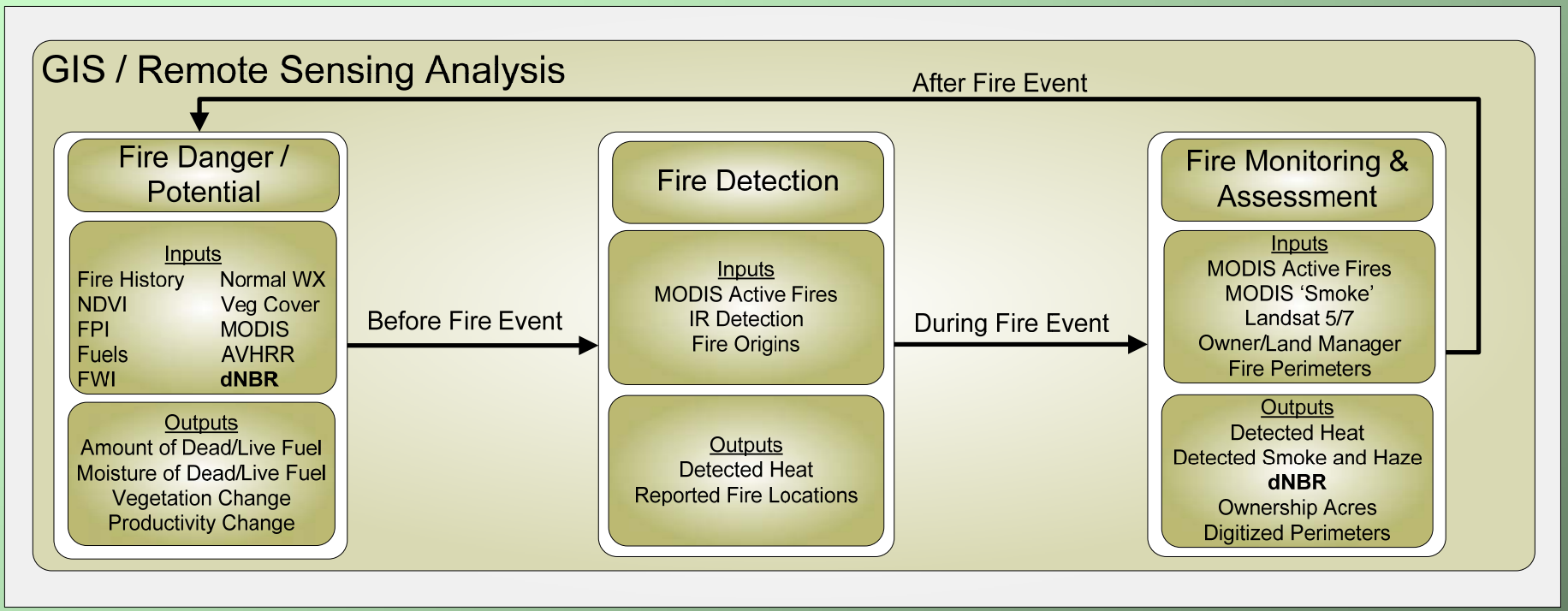


AFS and MTBS Collaborations?

Yearly Mapping Cycle

Data Sources for AFS Fire Perimeter Mapping Cycle												
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Pre-Fire Season			**Fire Season**					**Post Fire Season / Year-End Mapping**			
Data	**Source**		**Data**			**Source**		**Data**		**Source**	
Landsat 1-7	USGS EROS (Glovis Archive)		Aerial Detection/Recon Flights			Zone/Agency Aircraft		Aerial Recon Flights		Zone/Agency Aircraft	
Agency Updates	AWFCG Agencies		IR			USFS-NIROPS		Landsat 5/7		USGS-EROS	
Research	Fire Records		Ground/Air Based GPS			IMTs & Agencies		RADARSAT-1		UAF-ASF	
MODIS 250m (Terra/Aqua)	UAF-GINA		Landsat 5/7			USGS-EROS		ERS-2		UAF-ASF	
			MODIS Active Fires			UAF-GINA & RSAC		MODIS 250m (Terra/Aqua)		UAF-GINA	
			MODIS 250m (Terra/Aqua)			UAF-GINA		Agency Updates		AWFCG Agencies	
			Agency Updates			AWFCG Agencies					

GIS / Remote Sensing



MTBS & AFS Relationships

- Near-term
  - Imagery cost share
  - Fix errors in AK fire history dataset
  - Mapping unburned islands
  - Ancillary data collection
    - Alaska needs DEM
    - Current Veg Cover & Fuels
    - More Wx Stations

- Longer-term
  - Fire danger & potential modeling
    - Estimating fire activity in old burns (dNBR + Wx, FWI)
  - Post fire monitoring & assessment modeling

Questions?