

Burn Severity in Ham Lake and Cavity Lake Fires

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Cloquet Forestry Center

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USDA Forest Service Remote Sensing Applications Center



Overview

- What kind of fire support does RSAC provide?
- Fire Severity mapping theory and example
- Prescribed fire burn severity
- Wildfire burn severity
- Prescribed fire impact on severity and extent of wildfire
- Ham Lake severity in U.S. vs. Canada

What is RSAC?

Remote Sensing Applications Center

- Technical support - evaluating and developing remote sensing, image processing, GPS, and related geospatial technologies.
- Project support and assistance using remote sensing technologies.
- Technology transfer and training to field users.
- Operational support to tactical and strategic fire information needs.



Operational Fire Support

Active Fire

USDA FOREST SERVICE REMOTE SENSING APPLICATIONS CENTER

MODIS Active Fire Mapping Program

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The locations are based on data provided by the National Interagency Fire Center and are subject to change. Please view alerts under the "Fire Detectors" link to see additional information (updates required).

Large Incidents - June 08, 2007

Wildland Fire - MT1
 Wildland Fire - MT2
 Wildland Fire - Other
 Urban Fire

RECOVERARY
 LAWRENCE
 OAKLAND
 WYCKOFF

GREAT HORN ROAD
 CHICKADEE HOME 2
 BIG TURKEY/KADE COMPLEX
 CANYON ROAD

AREA OF RECOVERY
 DELANDO COMPLEX
 BOY COMPLEX
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National Infrared Operations

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Post Fire

Monitoring Trends in Burn Severity (MTBS)

Home | Background and Patterns | Background and Patterns | Data Access | Tools | Overview | Related Web Sites | Contact Us

Monitoring Trends in Burn Severity (MTBS) is a multi-year project designed to consistently map the burn severity and persistence of fire across all areas of the United States for the period spanning from through 2010. The data generated by MTBS will be used to identify national trends in burn severity, providing information necessary to monitor the effectiveness and effects of the National Fire Plan and Healthy Forest Restoration Act. MTBS is sponsored by the Wildland Fire Leadership Council (WFLC), a multi-agency oversight group responsible for implementing and coordinating the National Fire Plan and Healthy Forest Restoration Act. The project will be conducted through a partnership between the U.S. Geological Survey National Center for Earth Resource Observation and Science (NCEOS) and the USDA Forest Service Remote Sensing Applications Center (RSAC).

The MTBS project requires a 20-meter resolution burn severity data and fire perimeter that will serve our primary user groups:

1. National policy and policy makers such as the National Fire Plan and WFLC which require information about ecosystem health and forest management activities.
2. Field management units that benefit from real-time broad-scale, high-resolution maps and data for fire- and post-fire assessment and monitoring. Field units that require fire-severity data will also benefit from increased efficiency, reduced costs, and data consistency by storing with MTBS data.
3. Existing datasets from other comparable scaled systems, such as the Forest and Condition Class (FFCC) with LANDFIRE, that will benefit from fire-severity data for validation and updating of geospatial data sets.
4. Academic and agency research studies related to the severity data over important geographic and temporal periods.

MTBS is a data-driven portal and temporal analysis platform and includes a technical transfer component. See the schedule map to view analysis schedule by mapping zone. Current fires, beginning with 2004, will be mapped for the entire United States on an annual basis. Historical fires (1984-2003) will be mapped according to the schedule.

MTBS is based on image processing and analysis methods currently utilized by the USGS and USFS for creating post-fire burn severity mapping efforts. The USGS Landsat Thematic Mapper image archive will provide a consistent and continuous source of 30-meter resolution data going back to 1984 for mapping burn severity of all fire-prone (over 2000 miles in the west and 500 miles in the east).

MTBS

Vegetation Conditions

Power Sensing National Data

USDA FOREST SERVICE

Vegetation Conditions on the National Forests

lets an initial description of post-fire vegetative conditions using the best of Remote Sensing (under the National Fire Plan) sensors. RAVG is a first approximation of areas that due to severity of the fire may attain [post-fire](#). These information treatments would re-establish of regions associated [post-fire](#). This initial approximation could a site-specific diagnosis and development of a [vegetation](#) webform needs.

Wildfire summaries using the [Select Wildfires...](#) "My Year..." "By National Forest/Grasslands..." menus (does not allow multiple criteria). Lots of wildfires, or you may select an individual wildfire using the "selection" menu. You may also select a Forest Service Region on the map of a wildfire list for that region of the United States.

Fires...

800-250-4547
 202-294-0550 fax
 EPLG Website

RAVG

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Wild Area Emergency Response (BAER) Imagery Support

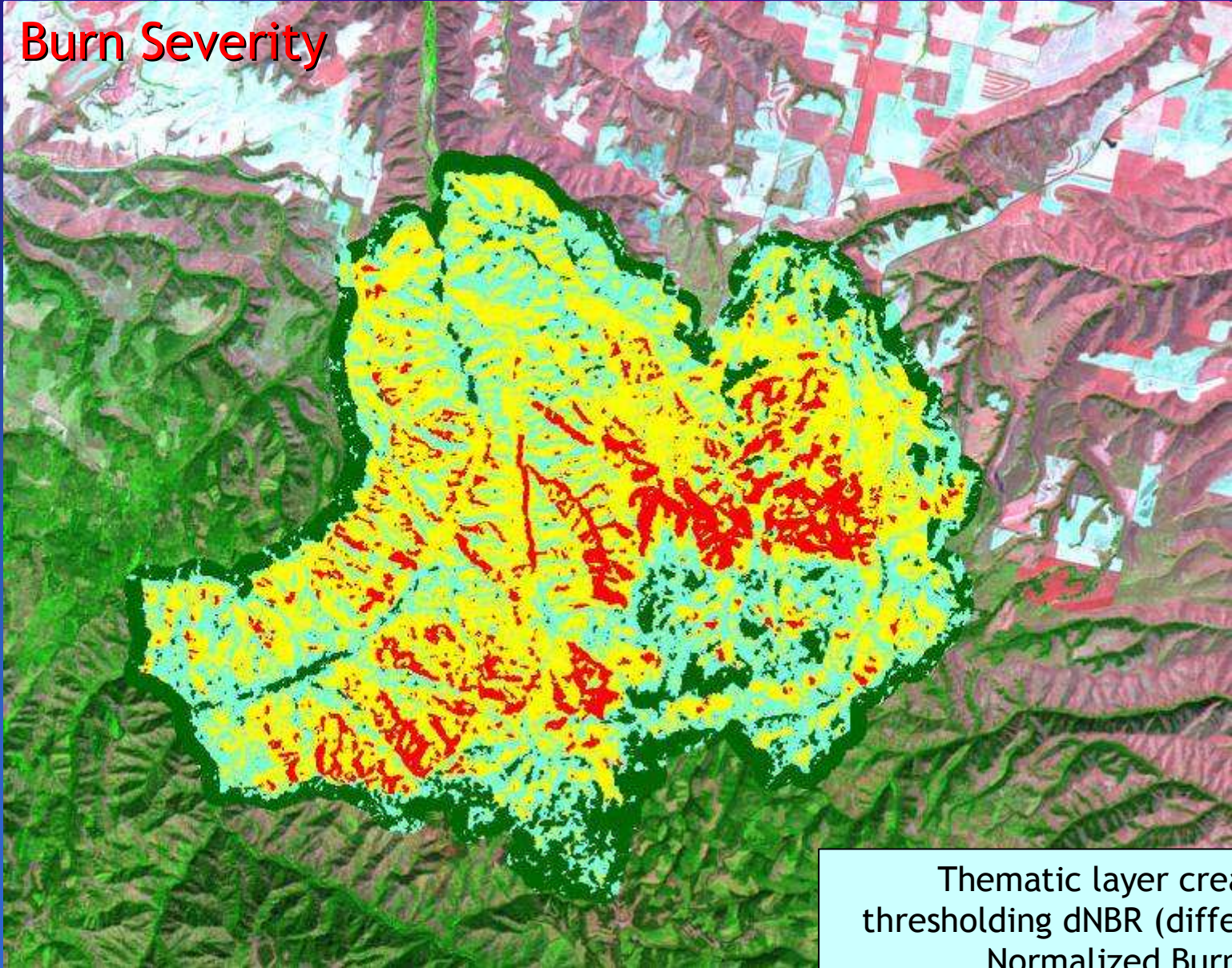
Imagery Support program is a cooperative effort between the USGS Remote Sensing Applications Center and the US Geological Survey Center for Earth Resources and Science. The Centers have teamed up to provide rapid delivery of operational area reference classification (BAER), and other geospatial data to forest DOI BAER teams.

800-250-4547
 202-294-0550 fax
 EPLG Website

BAER

Creation of Burn Severity Maps

Burn Severity



Thematic layer created by thresholding dNBR (differenced Normalized Burn Ratio)

BWCAW Blowdown

Superior National Forest
July 4, 1999 Storm Damage
Scale 1:900,000



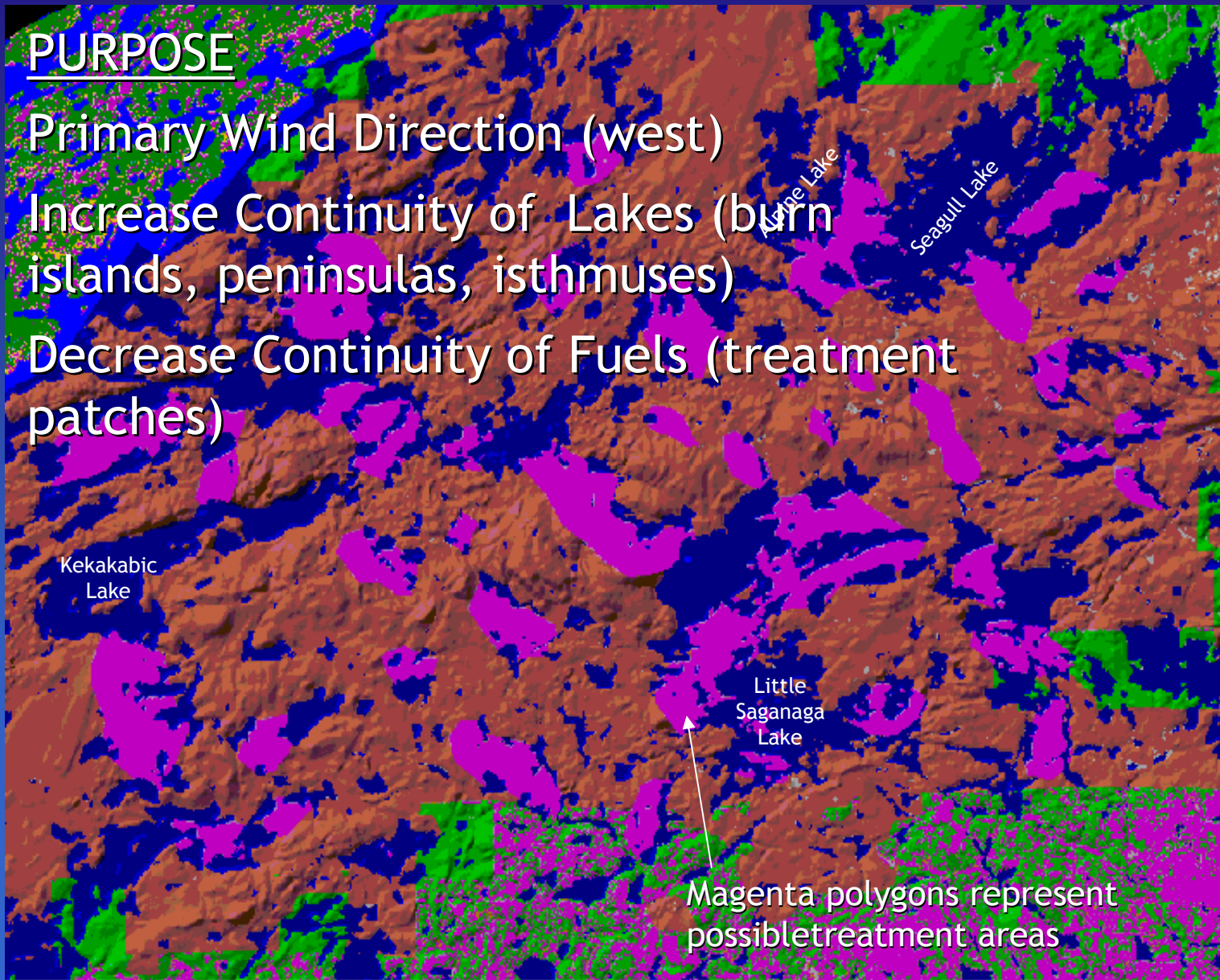
BWCAW Fuel Treatments

PURPOSE

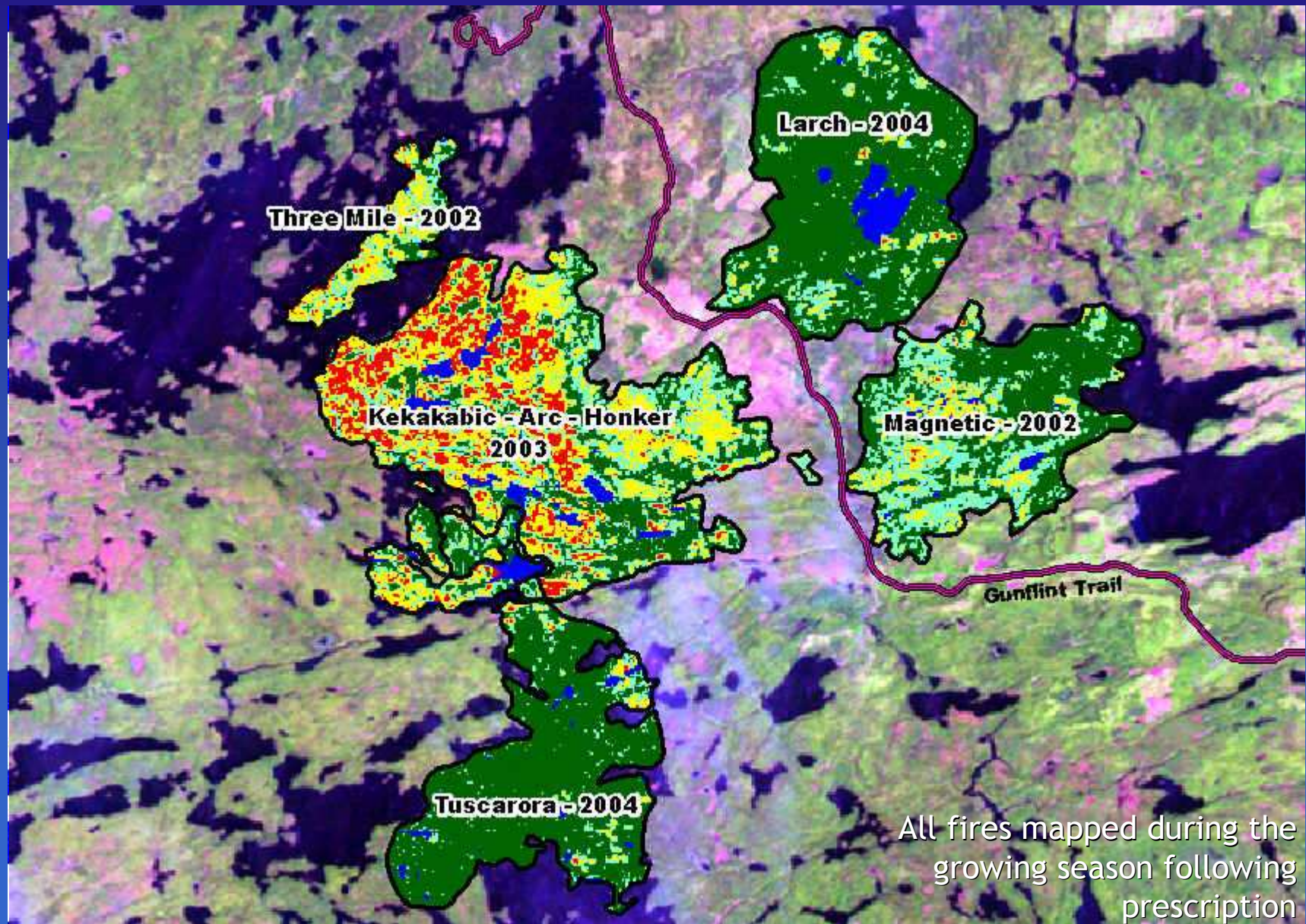
Primary Wind Direction (west)

Increase Continuity of Lakes (burn islands, peninsulas, isthmuses)

Decrease Continuity of Fuels (treatment patches)



Prescribed Fire 2002 - 2004

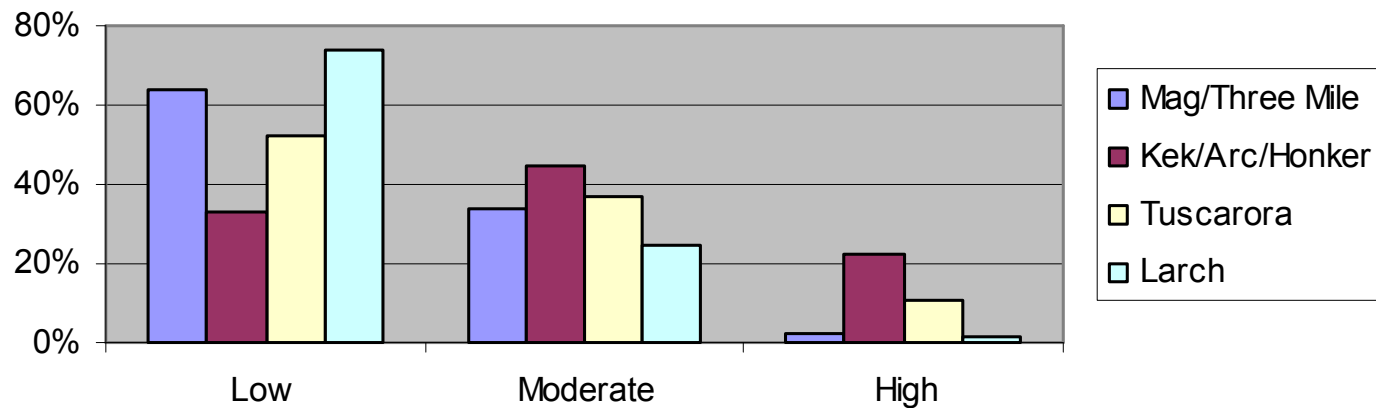


All fires mapped during the growing season following prescription

Prescribed Fire 2002 - 2004

	2002 Magnetic / Three Mile	%	2003 Kek / Arc / Honker	%	2004 Tuscarora	%	2004 Larch	%
Unchanged	1,352		1,315		2,351		2,405	
Low	1,007	64%	1,118	33%	297	52%	296	74%
Moderate	529	34%	1,514	45%	208	37%	101	25%
High	35	2%	757	22%	61	11%	6	1%
Water	109		213		199		156	
TOTALS	3,031	100%	4,917	100%	3,117	100%	2,964	100%

Prescribed Fire Severity Percentages

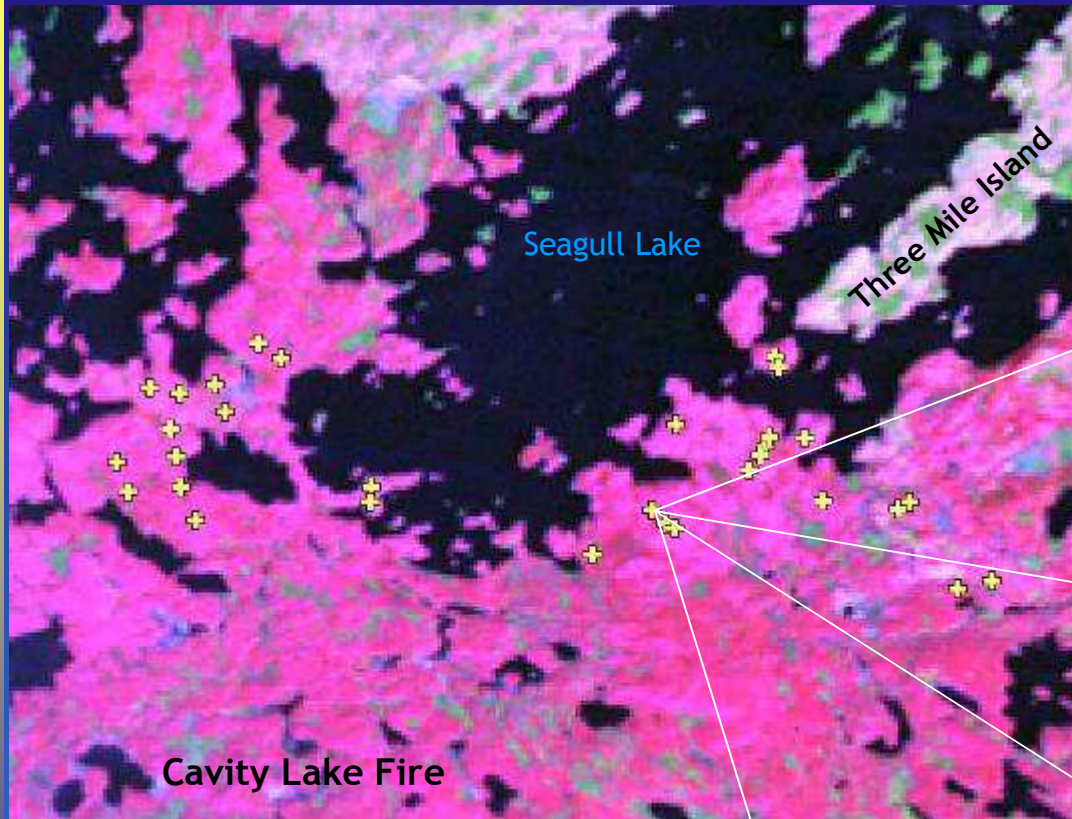


Field Work

- We gathered Composite Burn Index (CBI) plots
 - ◆ Mostly Cavity Lake
- Field observations qualitatively helped drive thresholds
- Not a representative sample that would allow regression models

- Dates of field visit: August 7 and 8, 2007

Field Work





Rog Lake

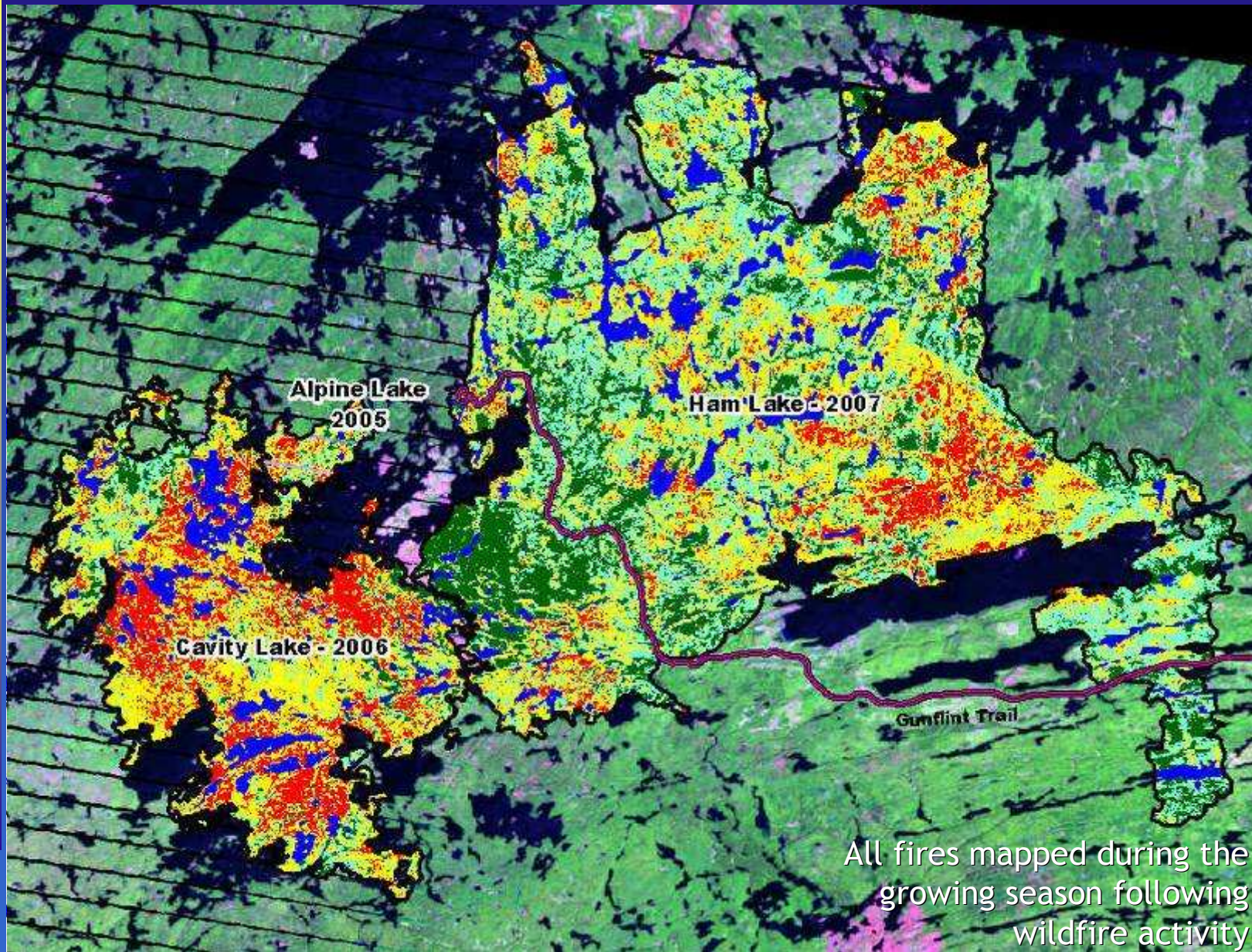
Alpine Lake

Seagull Lake

Paulson Lake
Portage

Cavity Lake Burn

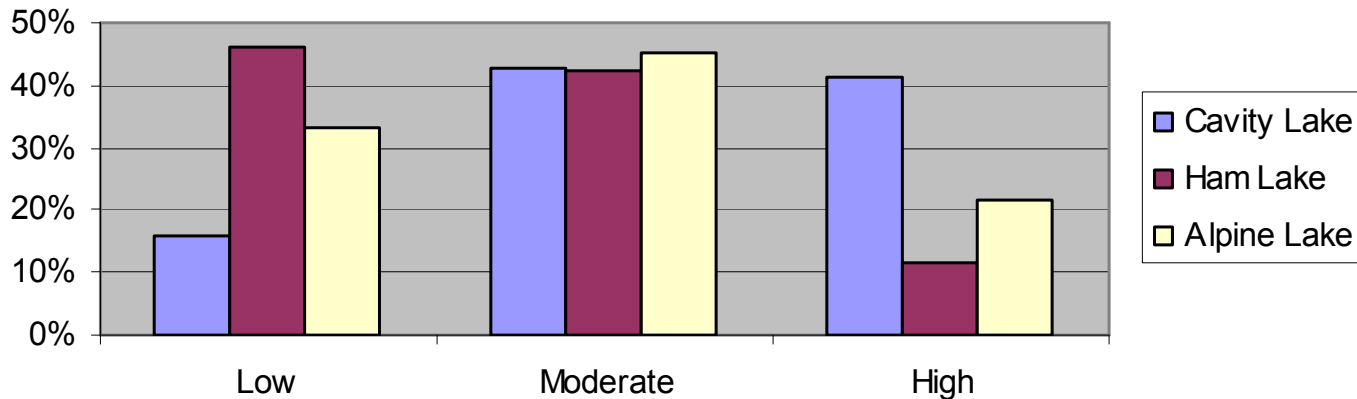
Wildfire Activity 2005 - 2007



Wildfire Activity 2005 - 2007

	2005 Alpine Lake	%	2006 Cavity Lake	%	2007 Ham Lake	%
Unchanged	210		2,319		15,264	
Low	305	33%	3,962	16%	22,190	46%
Moderate	419	45%	10,173	43%	20,316	42%
High	202	22%	6,360	41%	5,607	12%
Water	72		3,416		6,137	
TOTALS	1,209	100%	26,231	100%	69,515	100%

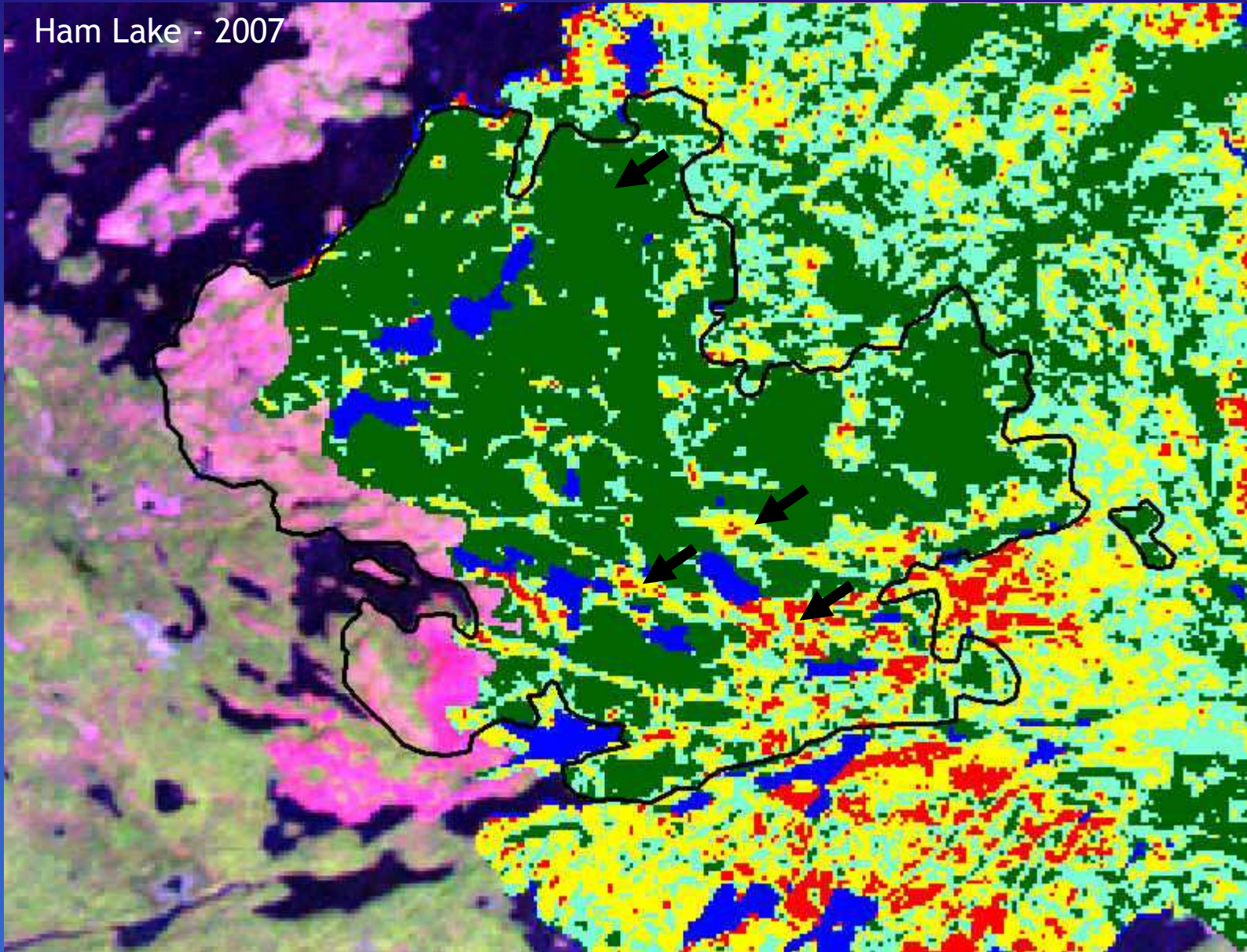
Wildfire Severity Percentages



Prescribed Burn Effects on Wildfire

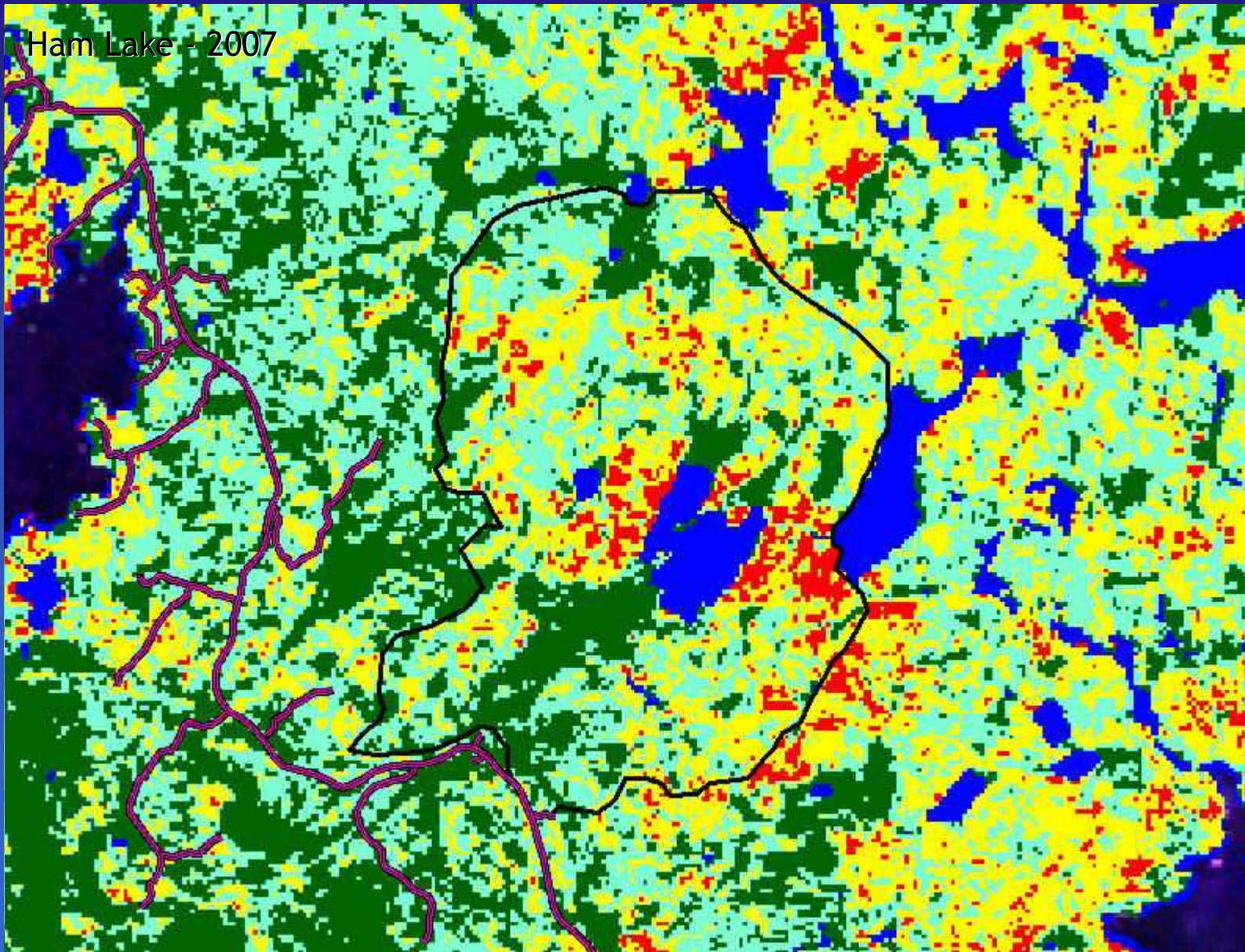
Kek-Arc-Honker

Ham Lake - 2007



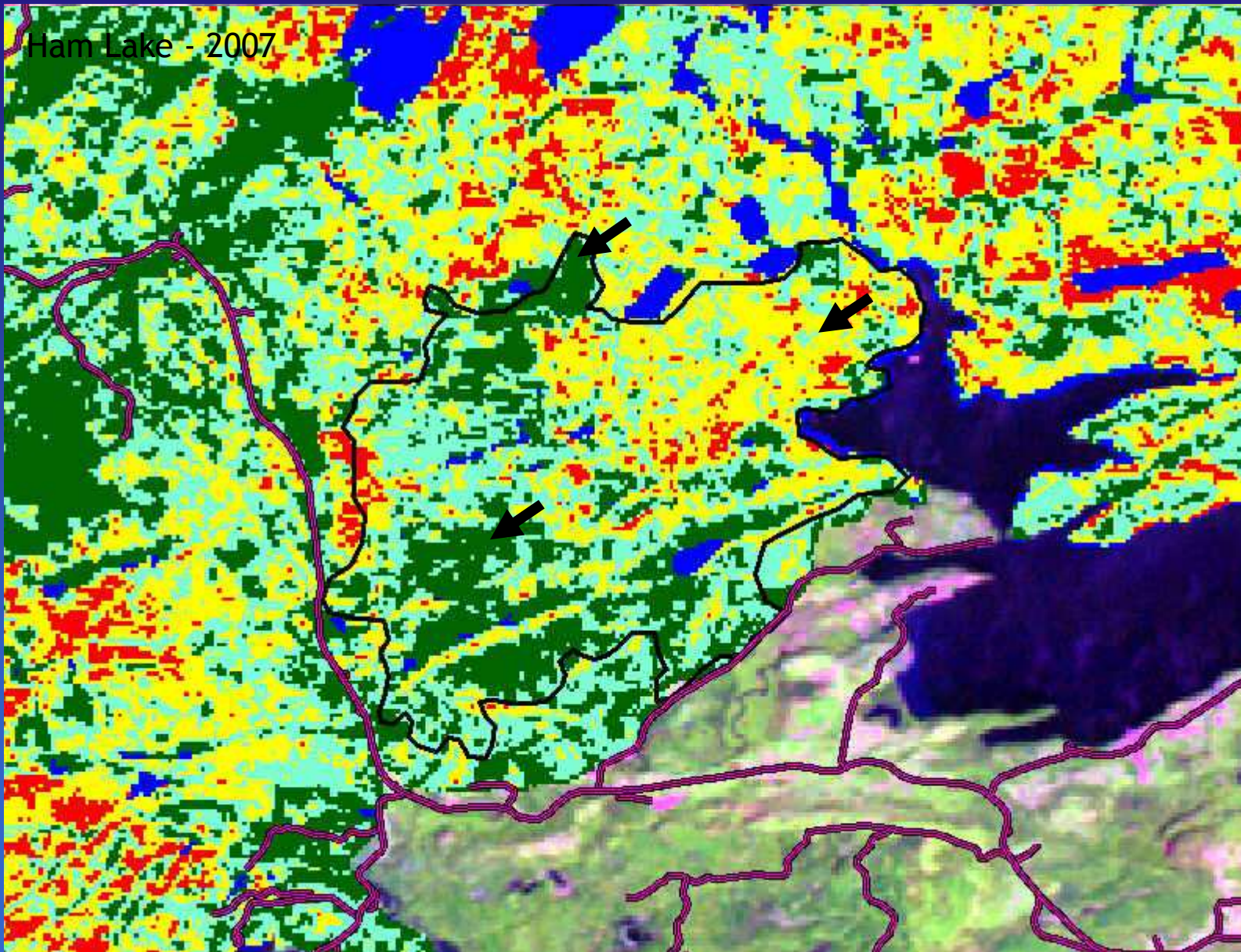
Prescribed Burn Effects on Wildfire

Larch

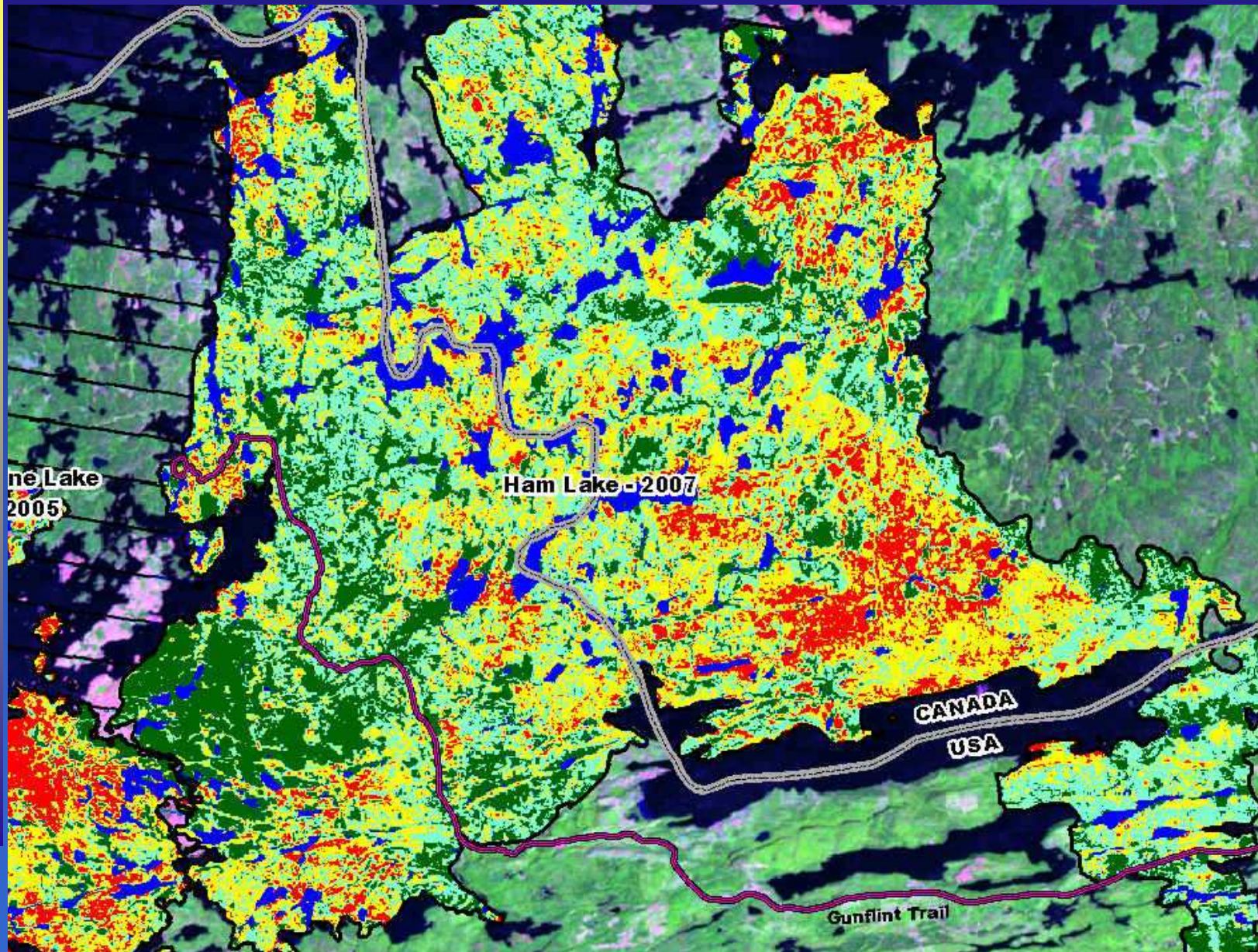


Prescribed Burn Effects on Wildfire

Magnetic Lake

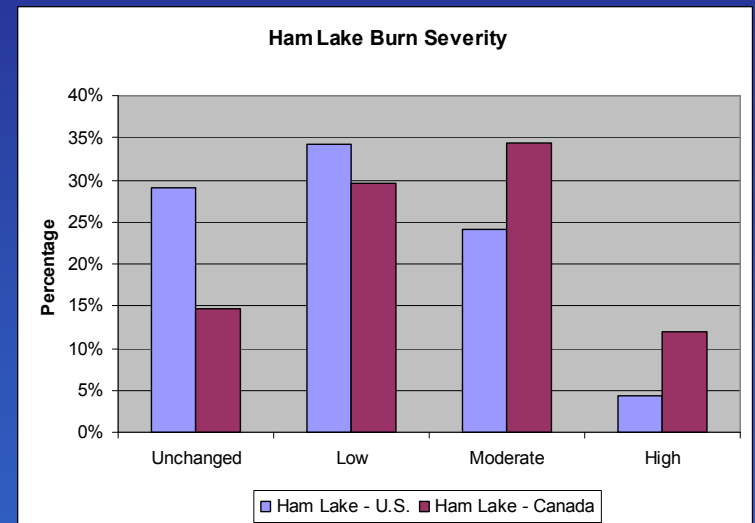


Comparison of Burn Severity - Treatments

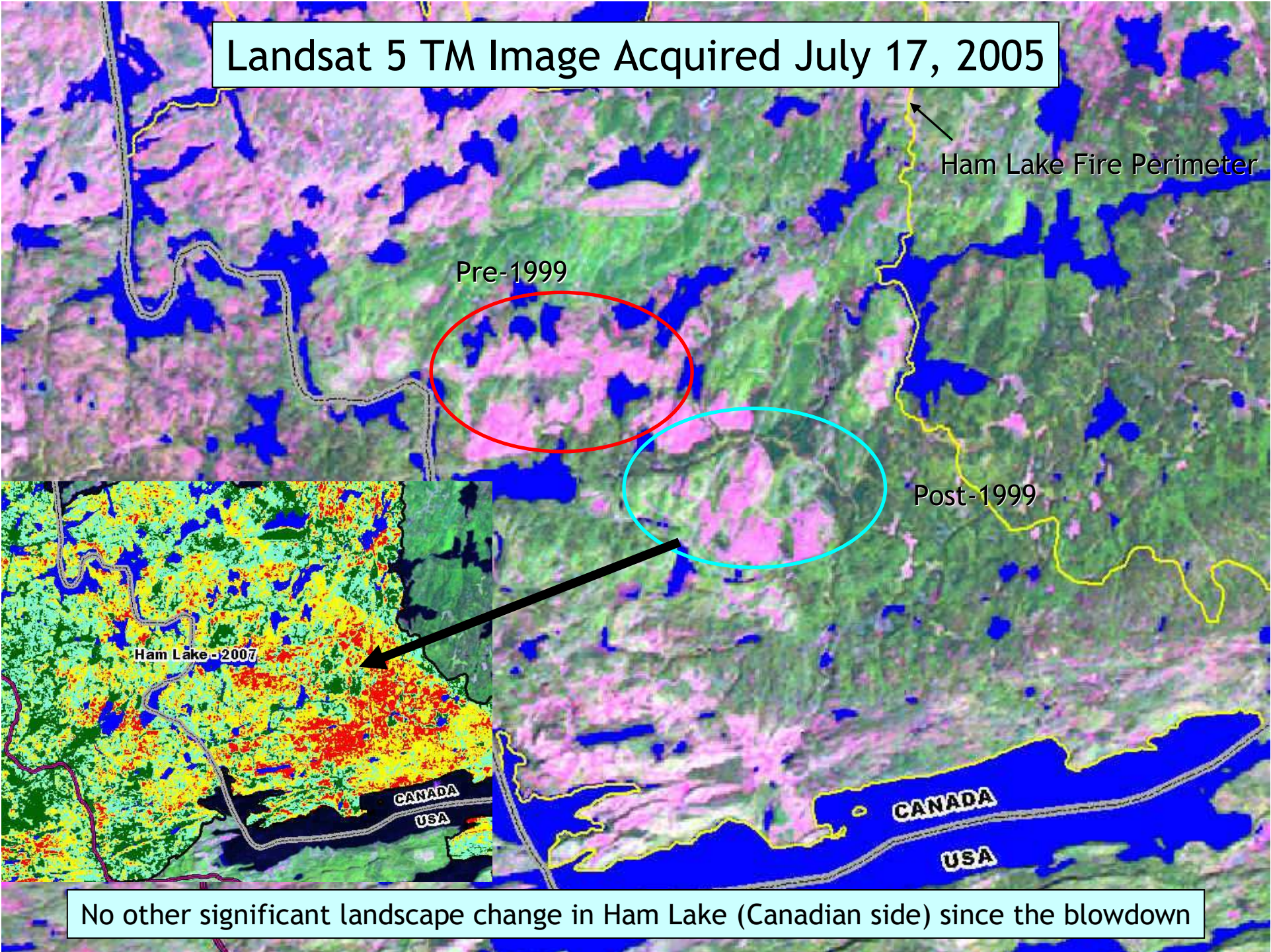


Comparison of Burn Severity - Treatments

- Observations:
 - ◆ Higher % of moderate and high severity on Canadian side
 - ◆ Little evidence of prescribed or wildfire on Canadian side since blowdown
 - ◆ Evidence of other fuel treatments / logging
 - Pre- and post-blowdown
- Can't necessarily say U.S. prescribed burns were the difference (fire behavior, weather, etc.)



Landsat 5 TM Image Acquired July 17, 2005



No other significant landscape change in Ham Lake (Canadian side) since the blowdown



Ham Lake Fire Perimeter

CANADA

USA

Summary

- Wildfires generally have higher burn severity when compared to prescribed burns
- Cavity Lake burned more severely than Ham Lake
 - ◆ Time of year, blowdown damage huge factors
- Canadian Ham (lake) burns more severely than American Ham (lake)
- Prescribed fire can be an effective fuel treatment
 - ◆ Find a balance between not enough (Larch) and too much (Kek-Arc-Honker?)



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www.fs.fed.us/eng/rsac/

www.mtbs.gov

All data are available on RSAC's internal FS FTP site:
<ftp://fsweb.rsac.fs.fed.us/baer/SuperiorNF/>