Skeena Climate Change & Communities Adaptation Project

Developing a Watershed-Based Fisheries Values Monitoring Protocol

Skeena Climate Change & Communities Adaptation Partnership
World Wildlife Fund Office, Vancouver, B.C.
February 17th & 18th, 2011

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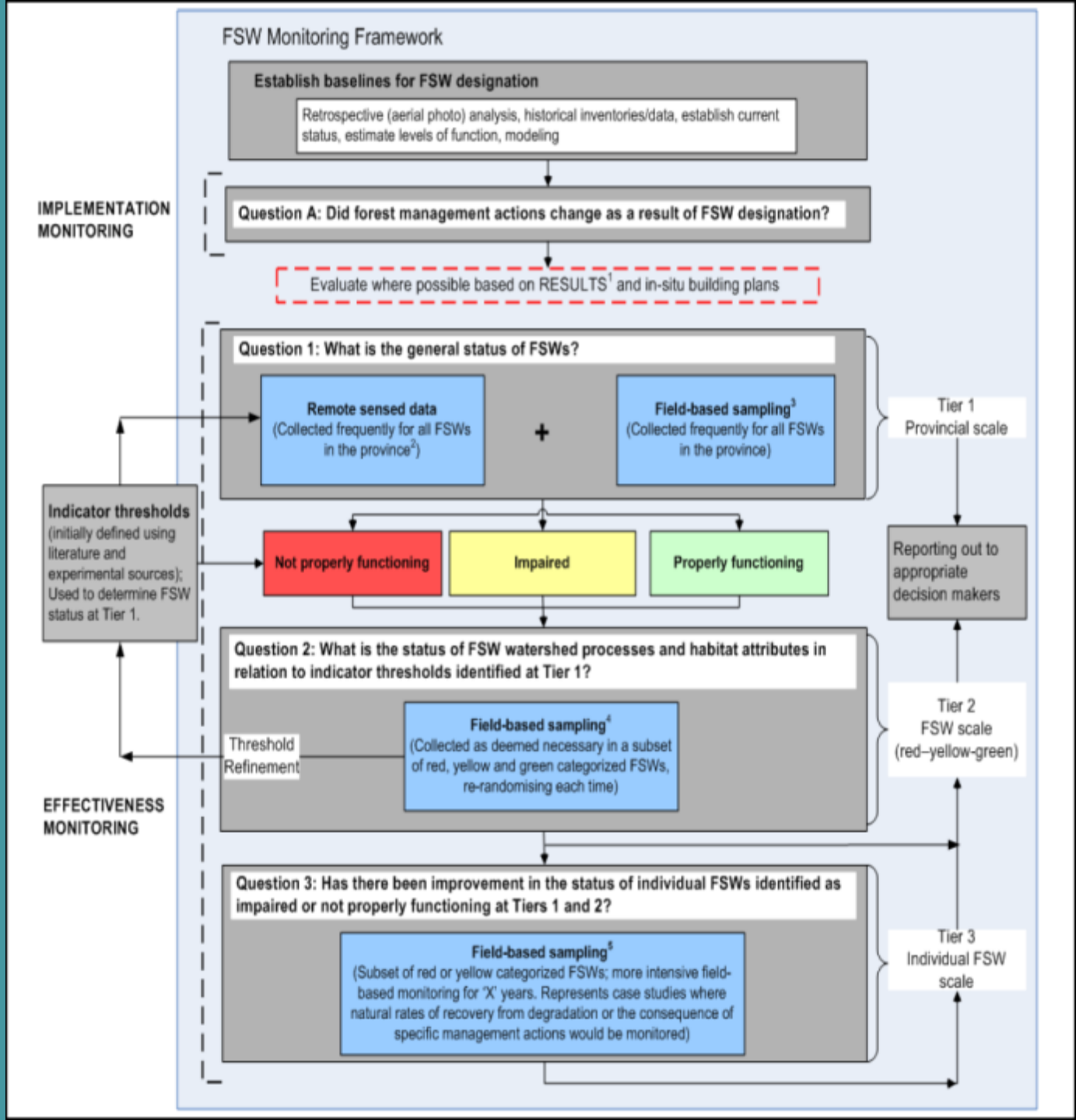
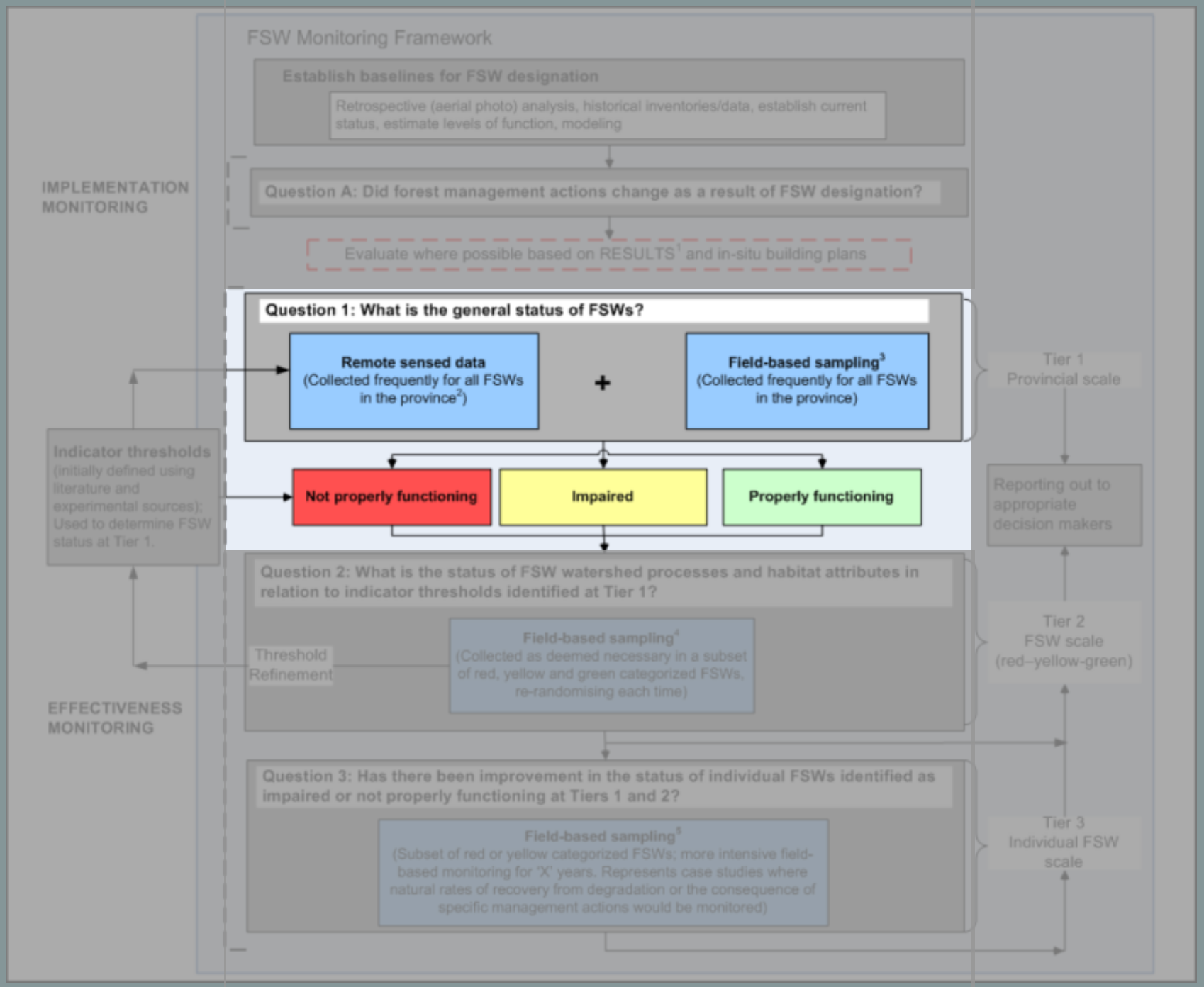
- And many others…

FSW monitoring multi-tier framework




FSW Monitoring Framework
Establish baselines for FSW designation
Retrospective (aerial photo) analysis, historical inventories/data, establish current status, estimate levels of function, modeling
IMPLEMENTATION MONITORING
Question A: Did forest management actions change as a result of FSW designation?
Evaluate where possible based on RESULTS[1] and in-situ building plans
Question 1: What is the general status of FSWs?
Remote sensed data (Collected frequently for all FSWs in the province[2])
+
Field-based sampling[3] (Collected frequently for all FSWs in the province)
Tier 1 Provincial scale
Indicator thresholds (initially defined using literature and experimental sources); Used to determine FSW status at Tier 1.
Not properly functioning
Impaired
Properly functioning
Reporting out to appropriate decision makers
Question 2: What is the status of FSW watershed processes and habitat attributes in relation to indicator thresholds identified at Tier 1?
Field-based sampling[4] (Collected as deemed necessary in a subset of red, yellow and green categorized FSWs, re-randomising each time)
Threshold Refinement
Tier 2 FSW scale (red–yellow-green)
EFFECTIVENESS MONITORING
Question 3: Has there been improvement in the status of individual FSWs identified as impaired or not properly functioning at Tiers 1 and 2?
Field-based sampling[5] (Subset of red or yellow categorized FSWs; more intensive field-based monitoring for 'X' years. Represents case studies where natural rates of recovery from degradation or the consequence of specific management actions would be monitored)
Tier 3 Individual FSW scale

Tier I indicators. Key indicators with levels of risk (associated with development) to aquatic habitat.*

#	Indicator	No concern	Moderate concern	Concern
1	Sediment – landslides (natural)	<2x	2-3x	>3x
2	Sediment – # stream rd xings (density)	<0.7km^2	0.7-0.9km^2	>0.9km^2
3	Sediment – rd length on unstable terrain (density)	<0.1 km/km2	0.1-0.14km/km^2	>0.14km/km^2
4	Sediment/mass wasting/cum. impact – rd length/ wsd (density)	0.9-1.2km/km^2	0.9-1.2km/km^2	0.9-1.2km/km^2
5	Hydrology (peakflow) – % forest clearcut (ECA)/wsd	<15%	15-25%	>25%
6	Hydrology (low flow) – % 2nd growth/wsd**	<35%	35-45%	>45%

* Metrics displayed here are provided for illustrative purposes and do not reflect protocol values.

** Climate change mitigation (indicator).

Tier I indicators. Key indicators with levels of risk (associated with development) to aquatic habitat.*

	Indicator	No concern	Moderate concern	Concern
7	Riparian – rd length < 100m from stream (density)	<0.14km/ mk^2	0.14-0.18km/mk^2	>0.18km/mk^2
8	Riparian – % removed above a point-of-interest (POI)	<25%	25-30%	>30%

* Metrics displayed here are provided for illustrative purposes and do not reflect protocol values.

Currently developing the draft **FSW Tier 1 monitoring protocol document**

Fisheries Sensitive Watersheds – Tier 1 monitoring protocol rationale

Prepared for:

British Columbia Ministry of Environment
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Victoria, BC, V8W 9M1

Prepared by

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March 31, 2011

Identifying agency GIS data sources that can inform our **Tier I** remote-sensed monitoring of FSW condition indicators

Using historical provincial WAP indicators as our basis for selection (i.e. a WAP-lite)

Data Source: Digital Road Atlas (DRA)

Summary table of indicators informed by the data source:

Indicator	Metric	Comments
Peak Flow	Peak Flow Index	
	Road Density for Entire Sub-Basin	
	Road Density Above the H60 Line	
	Road Density on Erodible Soils	
Surface Erosion	Road Density <100m from a Stream	
	Road Density on Erodible Soils <100m from a Stream	
	Density/Number of Stream Crossings	
	Roads on Unstable Slopes	
Riparian Buffer	Road Density <100m from a Stream	
Mass Wasting	Road Density on Unstable/Potentially Unstable Terrain	

Description of Data Source

Data Source

Contact: Carol Ogborne, Team Lead – Base-Mapping: BCGOV/ILMB Crown Registry and Geographic Base Branch (CRGB).
Telephone: 250-952-6557
Email: carol.ogborne@gov.bc.ca

References: GeoBC
Website:
https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?recordUID=45674&recordSet=ISO19115

For information on the fully attributed and up-to-date DRA data, please visit:
http://ilmbwww.gov.bc.ca/bmgs/products/mapdata/digital_road_atlas_products.htm

Data Availability
Available for public access.

Relative Cost
Data purchase / collection: Free.

Data / indicator maintenance: Data Custodian Organization: Base Mapping and Cadastre Section (ILMB).

Total cost: Low (1 week): Estimated Cost of Data Interpretation/ Extraction: Low.

Spatial extent/ resolution
Full provincial coverage.

Temporal extent/ frequency
Published on 11/15/2004, last revised on 05/01/2010.
This dataset is revised on an annual basis to provide a complete and accurate road networking database for the entire province of British Columbia.

Data Source: Vegetation Resource Index (VRI)

Summary table of indicators informed by the data source:

Indicator	Metric	Comments
Peak Flow	Peak Flow Index	
	Equivalent Clear-Cut Area (ECA)	
Surface Erosion	Stream Banks Logged on Slopes >60%	
Riparian Buffer	Portion of Streams Logged	Assuming stream buffers applied per Forest Practices Code (1995). Some may not be included; cross-check necessary in some cases.
	Portion of Fish-Bearing Streams Logged	Assuming stream buffers applied per Forest Practices Code (1995). Some may not be included; cross-check necessary in some cases.
	Riparian Forest Logged (%)	
Mass Wasting	Stream Banks Logged on Slopes >60%	
Low Flow Regime	Second Growth Forest (25-75 yrs)	

Description of Data Source

Data Source

Contact: Tim Salkeld, BCGOV FOR Forest Analysis and Inventory Branch.
Telephone: 250 387-6736
Email: Tim.Salkeld@gov.bc.ca

References: GeoBC
Website:
https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?recordUID=47574&recordSet=ISO19115

http://www.for.gov.bc.ca/his/vridata/standards/datadictionary/tp1_vri_datadic0505_draft1.0d.pdf
VRI Data Dictionary

https://apps.gov.bc.ca/ml/llmbrobread
ILMB Oracle Designer 10g CASE Repository

Data Availability
Available for public access.

Relative Cost
Data purchase / collection: Free.

Data / indicator maintenance: Data Custodian Organization: BCGOV FOR Forest Analysis and Inventory Branch. Ongoing resource status.

Total cost: Low (1 week): Estimated Cost of Data Interpretation/ Extraction: Medium to High because of large size of dataset and complexity of monitoring metrics.

Spatial extent/ resolution
Full provincial coverage.

Temporal extent/ frequency
Created on 10/15/2006, resource status is ongoing.
This dataset is revised on an annual basis to provide a complete and accurate VRI database for the entire province of British Columbia.

Etc.

Data Source: Digital Elevation Model (DEM)

Summary table of indicators informed by the data source:

Indicator	Metric	Comments
Peak Flow	Road Density Above the H60 Line	
Surface Erosion	Stream Banks Logged on Slopes >60%	
	Roads on Unstable Slopes	
Mass Wasting	Stream Banks Logged on Slopes >60%	

Description of Data Source

Data Source

Contact: GeoBase Technical Support.
Telephone: +01-819-564-4857 / 1-800-661-2638 (Canada and USA)
Fax: +01-819-564-5698
Email: SupportGeoBase@nrcan.gc.ca

References: GeoBase
Website:
http://geobase.ca/geobase/en/find.do?produit=cded

Data Availability

Relative Cost
Data purchase / collection: Free.

Data / indicator maintenance: Data Custodian Organization: Government of Canada, Natural Resources Canada, Earth Sciences Sector.

Total cost: Low (1 week): Estimated Cost of Data Interpretation/ Extraction: Medium, due to multiple data operations required for the above monitoring metrics.

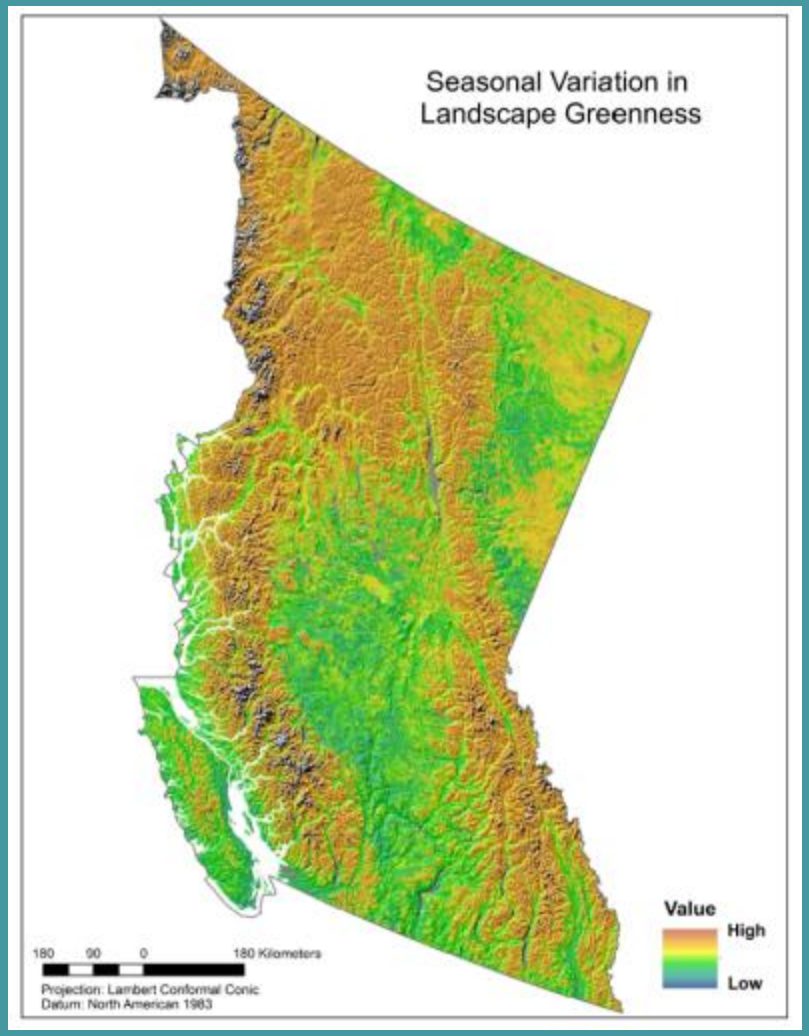
Spatial extent/ resolution
Full provincial coverage. Two available scales: 1:250 000 and 1:50 000.

Temporal extent/ frequency
Published on 09/01/2000. Update period intervals: Unknown.

Beginning to search for new GIS layers that can relate specifically to climate change Impacts***

***Satellite imagery provided courtesy: Integrated Remote Sensing Studio, UBC

While single data sets can have value combinations may yield more information…



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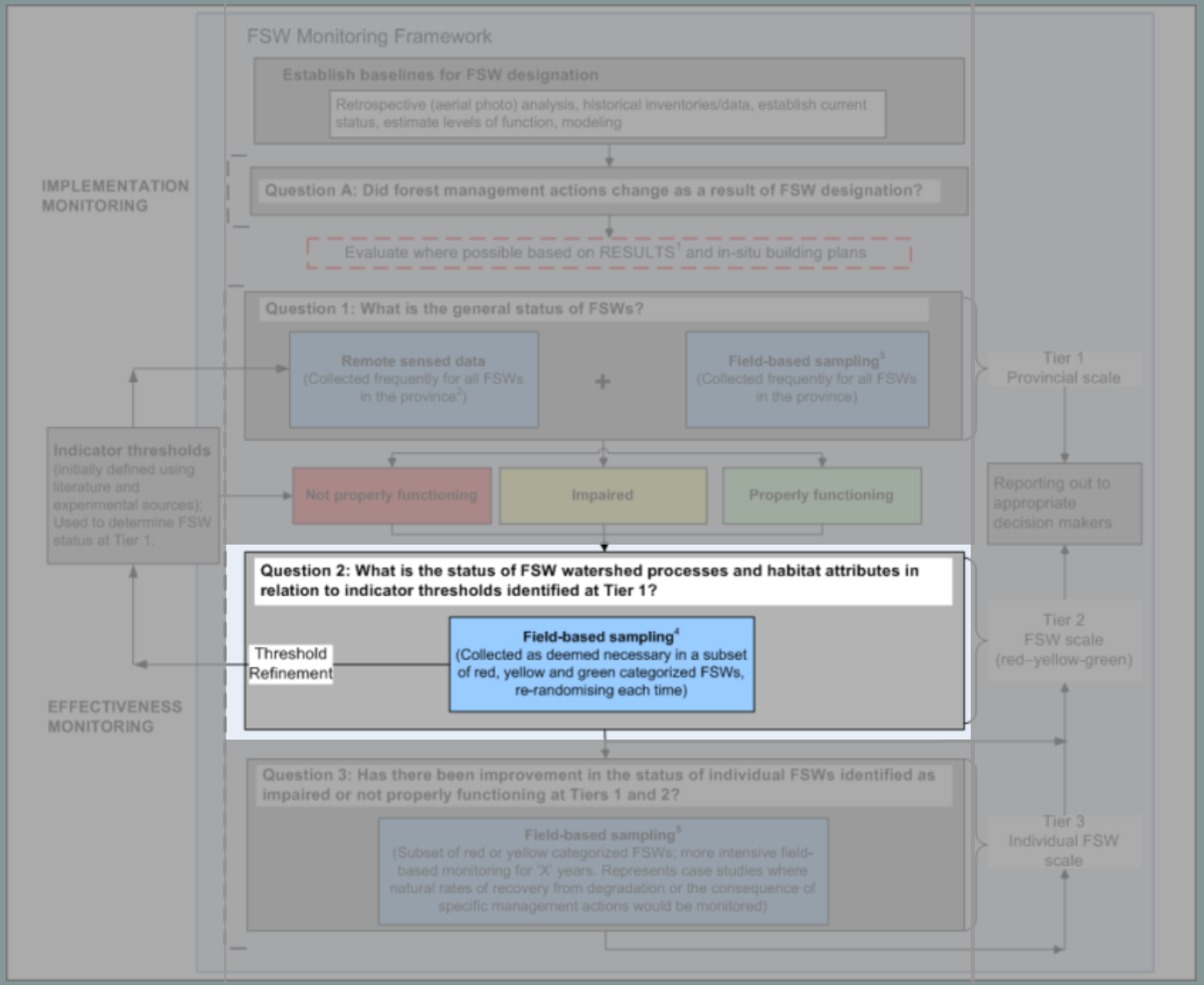
Overview of Tier I completion status.

#	Task	Complete?	Est. Date of Completion
1	Conceptual design	Y	Spring 2010
2	Select indicators:	Y	Summer 2010
	1.Hydrology 2.Surface erosion 3.Riparian buffer 4.Mass wasting		
4	Establish benchmarks for indicators	50%	Spring 2011
5	Assemble WAPlite in GIS environment	75%	Spring 2011
6	Input/apply data	50%	Spring 2011
7	Write up 1st iteration of draft Tier I methods	50%	Spring 2011
8	Climate change indicators	10%	Fall 2011
9	Validate/calibrate	N	Fall 2011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Tier 3 Individual FSW scale

Developing a sampling frame and associated Protocols for **Tier II** field-based monitoring

Sampling Design Elements for Lakelse FSW Tier II Field Monitoring

Monitoring Target: 4 FSW designation units for the Lakelse Study Area

Sampling Frame: BC's 1:20K Freshwater Atlas stream hydrology network.

Sample Site Selection – based on GRTS design

Timing of field work: May/June 2011

Objective I) Riparian Habitat Assessment

Objective II) Water Quality Assessment

Objective III) Fish Passage Assessment

FREP riparian & water quality protocols and MOE Fish Passage protocols will be used at each selected sample site

Strata for sampling:

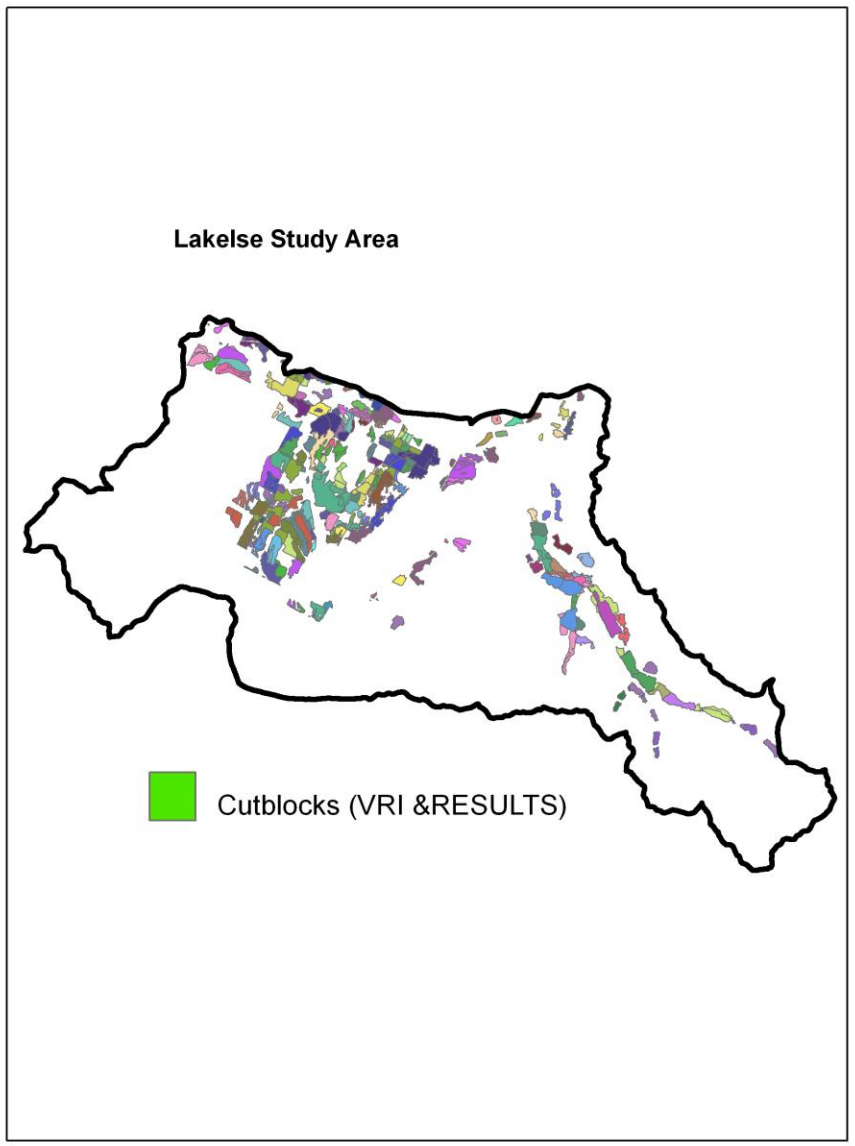
1) Logging influence (cutblocks)
2) Fish habitat criteria (habitat vs. non-habitat)
3) Proximity to road

Number of samples

- Minimum of 3 samples / strata category combination.
- Suggested target of 9 samples / strata category combination (or even more if possible; oversampling is useful for initial development of power analyses).

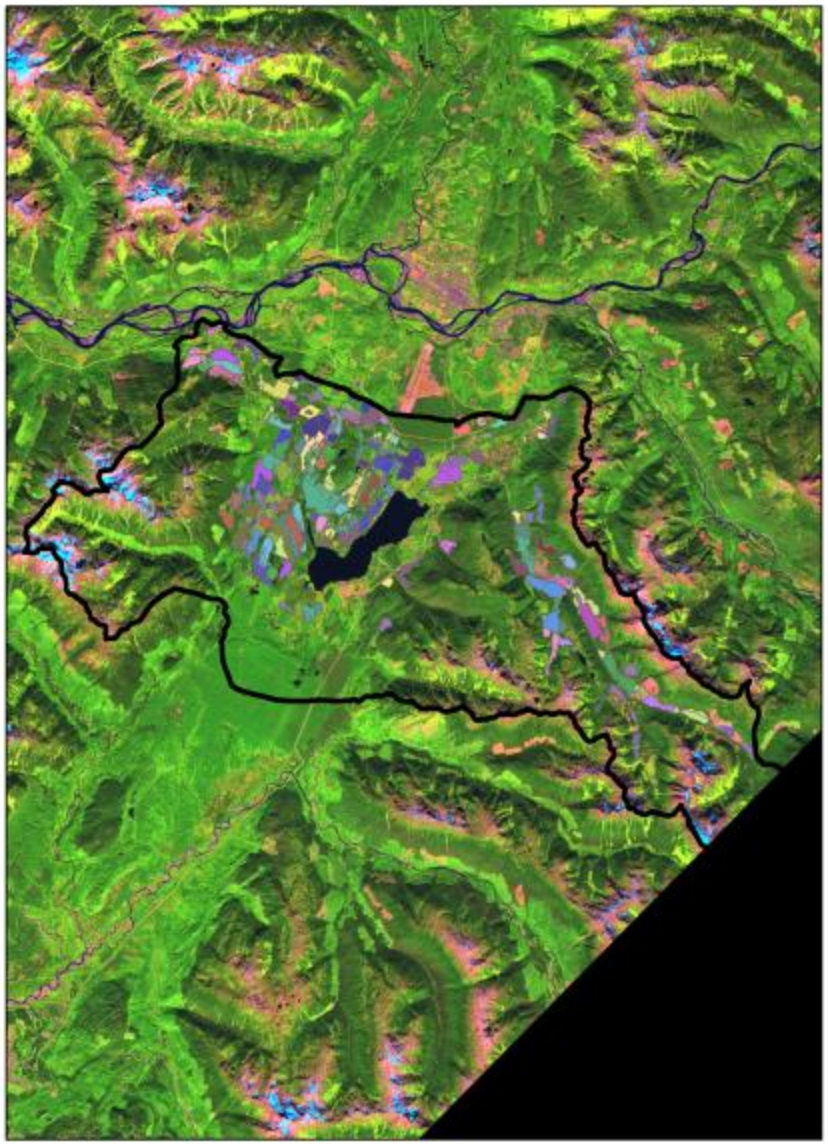
Developing the **sampling frame** for Tier II field-based monitoring

Strata: **cutblock age** categories (not cut, cut pre-1995, cut post-1995)



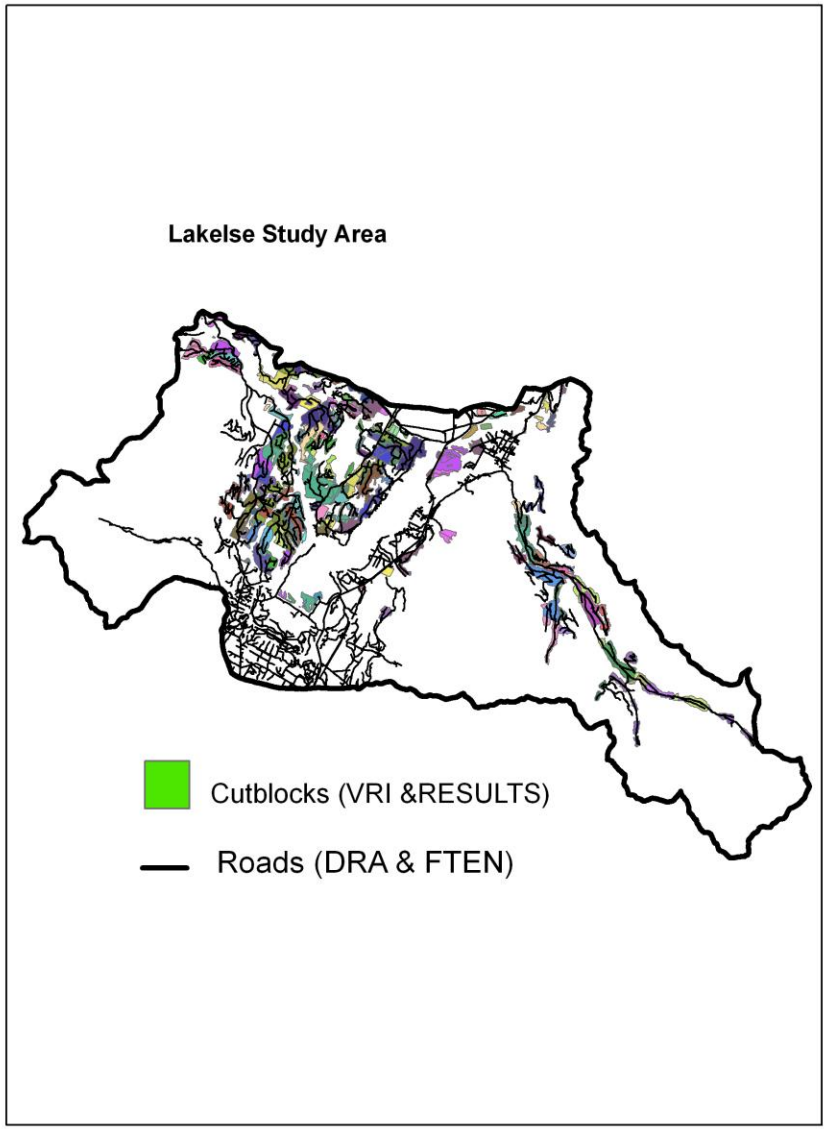
Developing the **sampling frame** for Tier II field-based monitoring

Examining and validating agency GIS layers as possible through LandSat imagery overlays



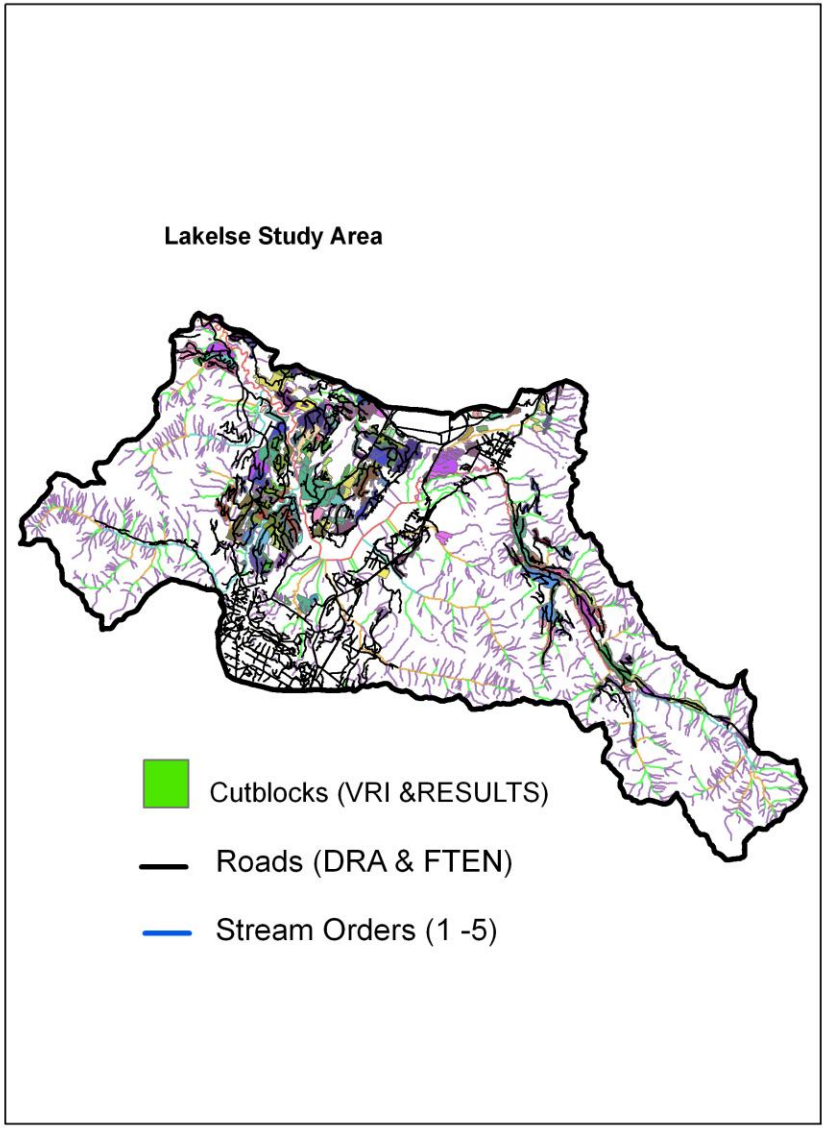
Developing a **sampling frame** for Tier II field-based monitoring

Strata: **roads**



Developing a **sampling frame** for Tier II field-based monitoring

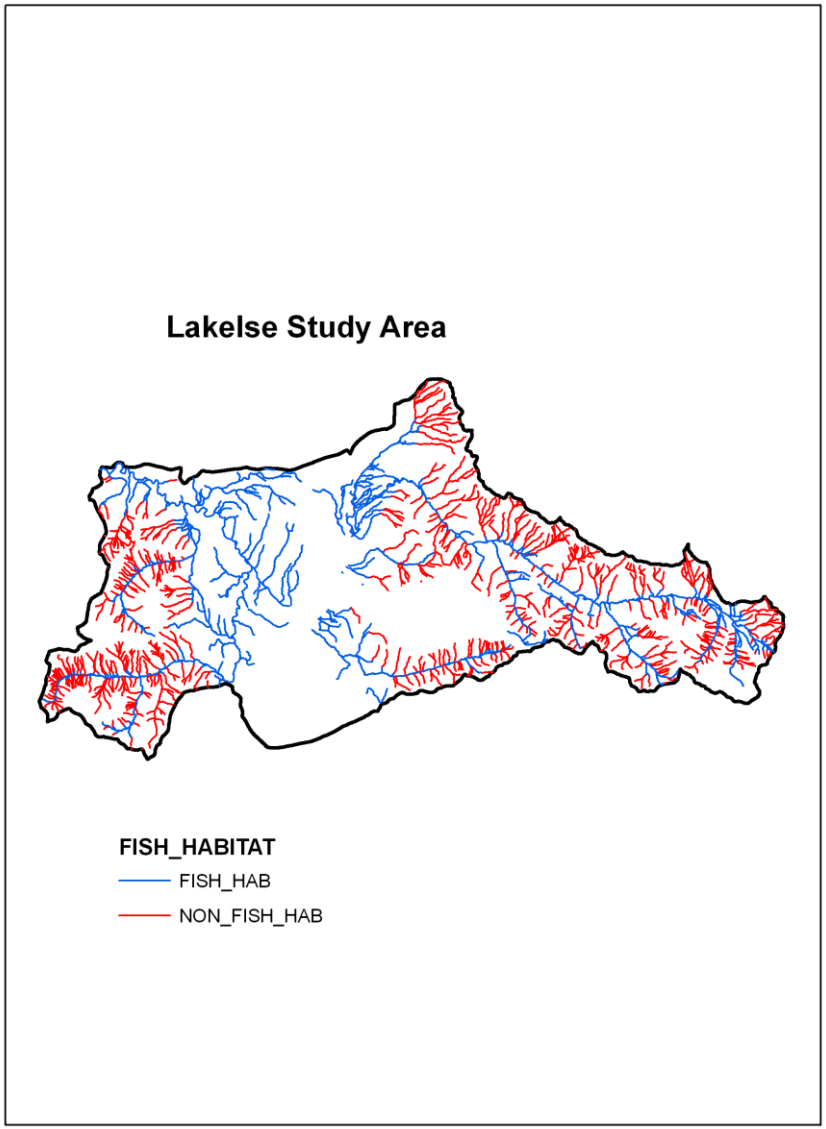
Strata: **stream orders**



Developing a **sampling frame** for Tier II field-based monitoring

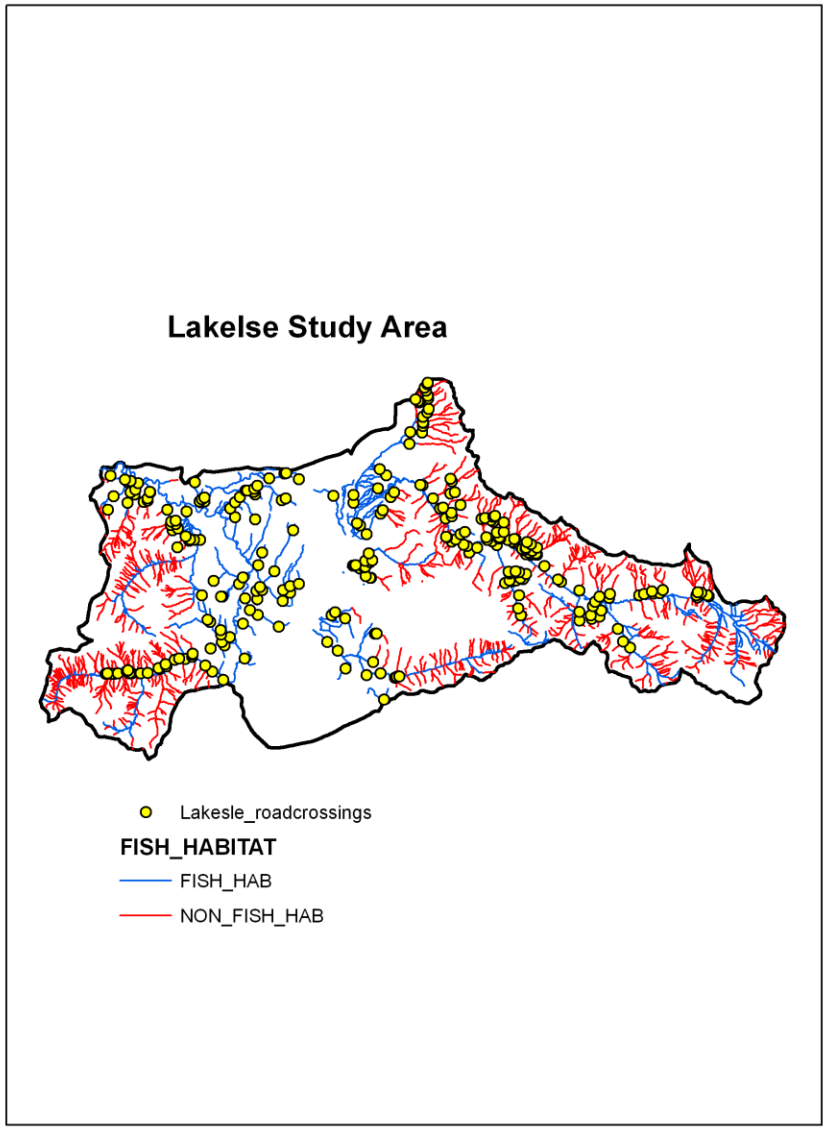
Strata: **fish habitat** (yes or no)

Based on 1:20K stream hydrology layer



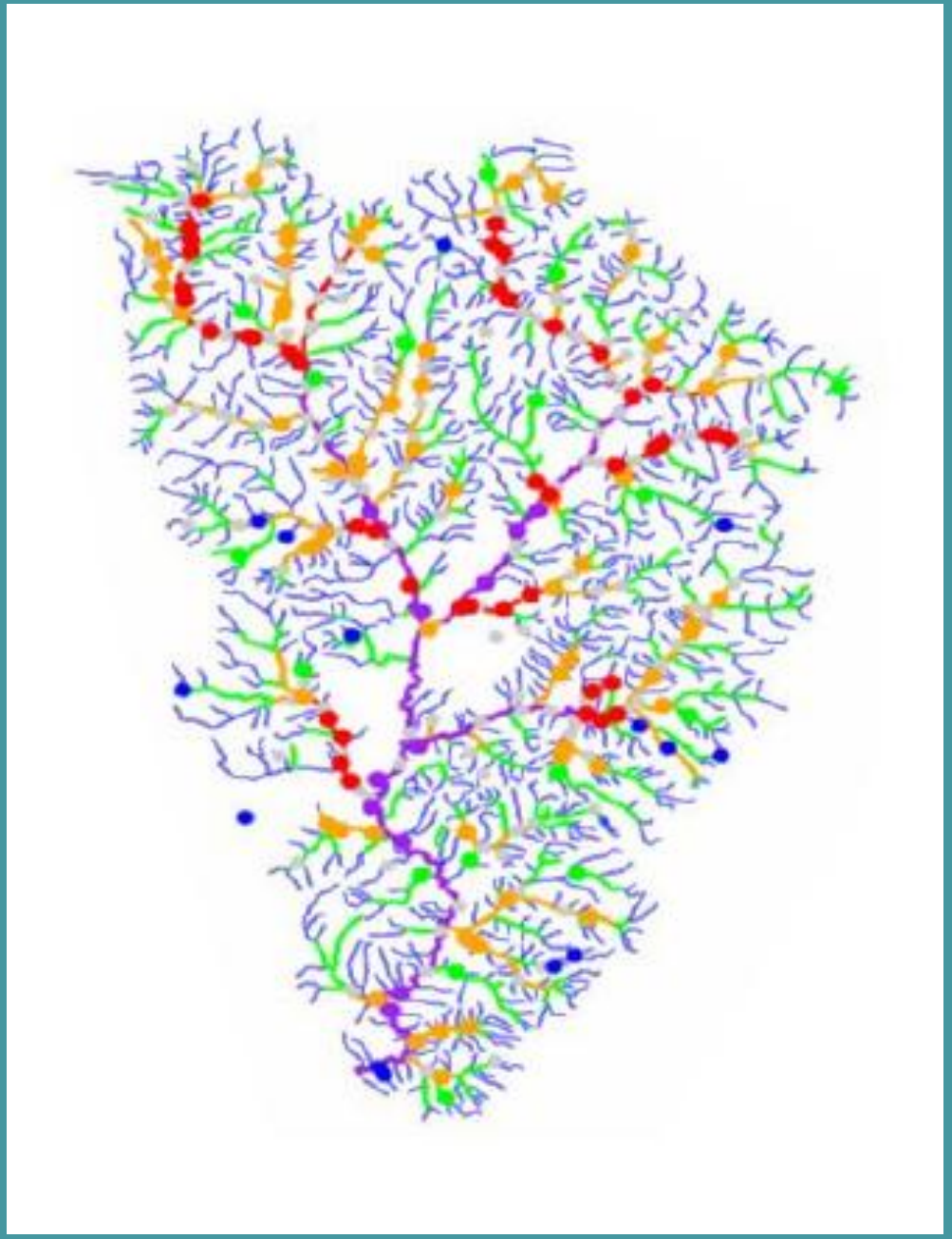
Developing a **sampling frame** for Tier II field-based monitoring

Strata: **road crossings**



Developing a **sampling frame** for Tier II field-based monitoring

Ultimately – produce spatially balanced, statistically valid GRTS-selected sampling points along the stream network, weighted by our chosen strata



Overview of Tier II completion status.

#	Task	Complete?	Est. Date of Completion
1	Using Tier I data, establish field sampling design scheme (GRTS)	70%	Spring 2011
2	Field sampling work-plan (3 to 4+ crews x 2 weeks)	20%	Spring 2011
	a. RMREE b. WQ c. fish passage		
3	Field sampling	N	May 2011
4	Roll up and analysis	N	Summer & Fall 2011
5	Reporting	N	Winter 2011