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Environmental Site Assessment at CFB Gagetown, N.B. – Assessing 50 Years of Historical Herbicide Applications

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Presentation Outline

- Background/Aim
- Timeline
- Task 2B (2005)
 - Key challenges
- The Approach
- The Field Implementation
- Conclusion

Background

Jacques Whitford Limited (Jacques Whitford) was retained by PWGSC, on behalf of DND, to conduct an ESA related to herbicide use in the Range and Training Area (RTA) at Canadian Forces Base Gagetown (CFB Gagetown) in Oromocto, New Brunswick (NB), Canada. The ESA formed part of a commitment made by the Federal Government of Canada to identify and report on the historical use of herbicides applied at CFB Gagetown between 1952 and 2005.

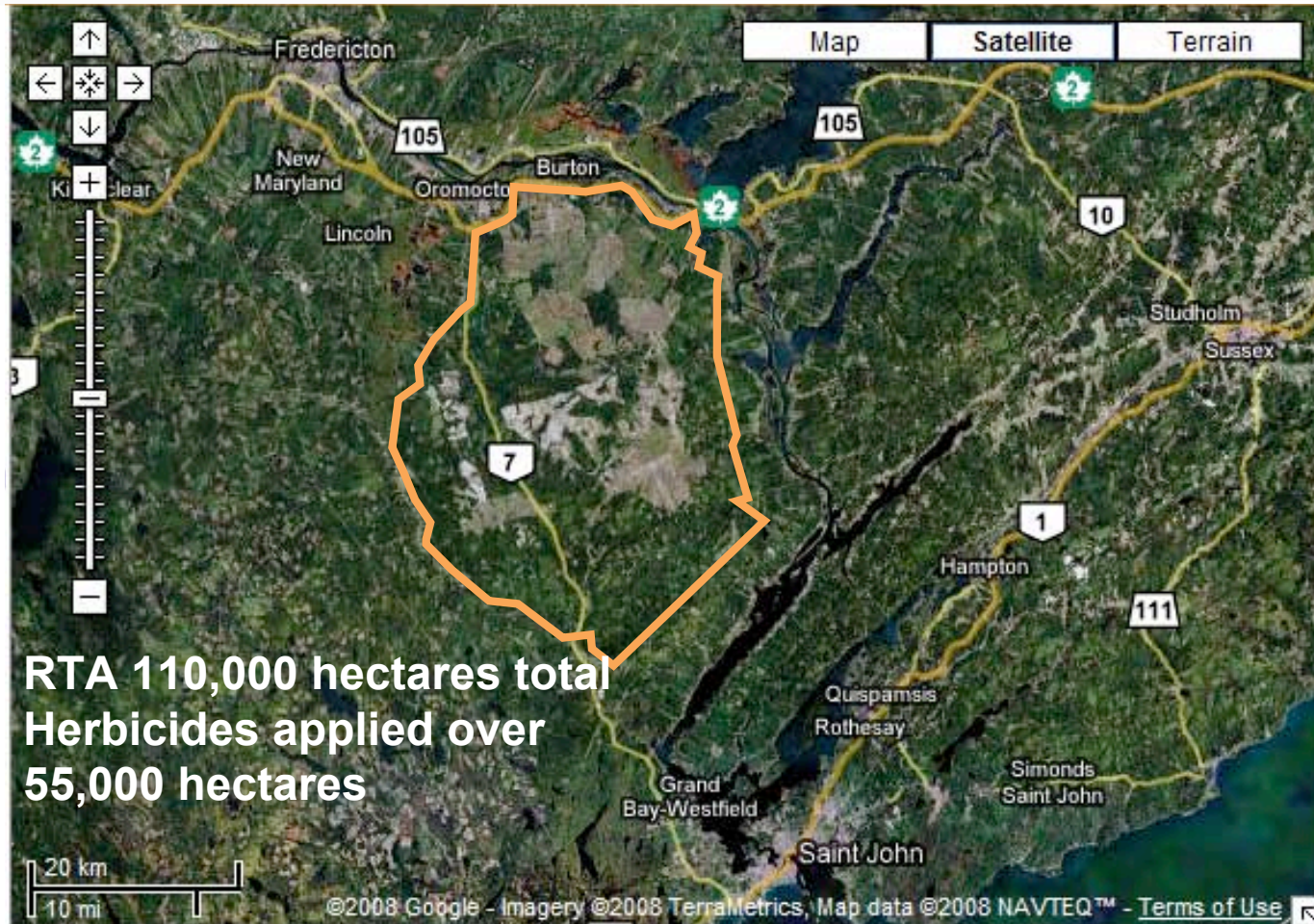
Aim of the ESA

- The overall aim of the ESA was to gain a better understanding of existing environmental conditions in the CFB Gagetown RTA in consideration of historical herbicide applications (presence/absence)
- The approach was to be robust enough to satisfy a potential follow-on risk assessment and had to be scientifically and statistically defensible

CFB Gagetown, N.B.



CFB Gagetown RTA



Timeline

- 1952 CFB Gagetown opens
- 1956 Herbicide applications begin
- **August 16, 2005** – DND names an Outreach Coordinator and three fact-finding tasks to be contracted out.



Why Use Herbicides?

- CFB Gagetown houses a significant amount of live-fire military training within designated Impact Areas. As a result, there is a requirement to keep open areas free of softwoods and hardwoods to provide the military with line-of-sight during operations and reduce the risk of wildfires resulting from live firing.



Task 2B – ESA Approach

- Approach based on CSA Standards, CCME Guidance (fed site), 10-step Approach, US EPA, and relevant studies by others.
- First Step:
 - Detailed historical review
 - APECs (categorized)
 - COPCs (prioritized)

Done in the context of preparing for an environmental risk assessment

Key Challenges

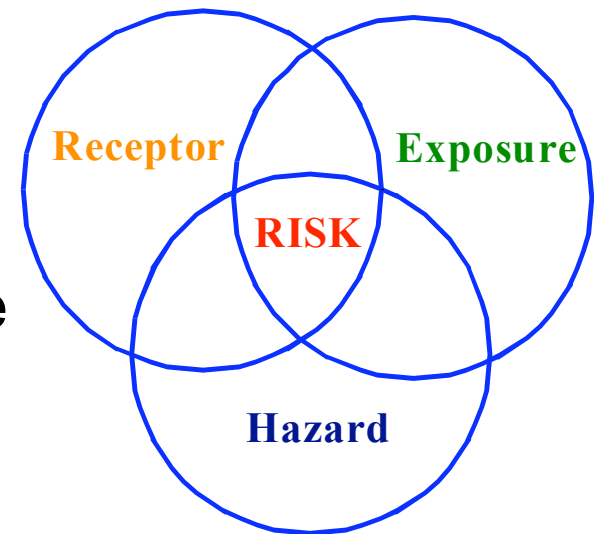
- 50 years of records...
- Over 55,000 hectares to consider (500M m²)
- UXOs
- Wildlife
- Off-road work
- Short timelines (6 week field program)
- Media/Social interest
- Scientific and statistical robustness for a comprehensive 3rd party review

The Approach – Prioritization of COPCs

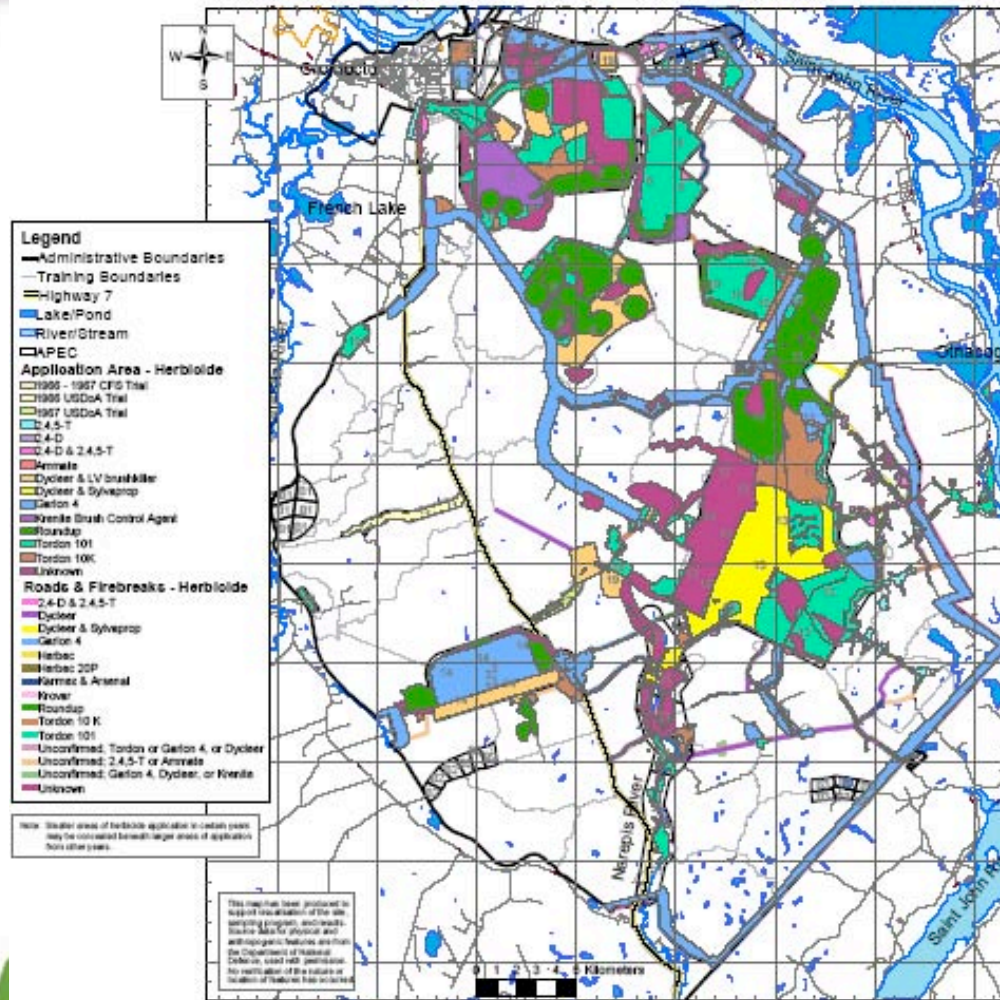
- Priority Ranking 1 COPCs were those chemicals that have a combination of toxicological and physical properties which indicate greatest concern to either human or ecological health (# of samples submitted per unit surface area more than Priority 2 COPCs)
- Priority 1 COPCs included: Hexachlorobenzene, 2,4-D, 2,4,5-T, Picloram, and 2,3,7,8-tetrachlorodibenzo-pa-dioxin (TCDD)
- All other chemicals were considered Priority 2 COPCs

The Approach – Categorization of APECs

- A categorization system was developed for areas of potential environmental concern (APECs) focusing on the three aspects of the risk triad – hazard, receptor, and exposure. Independent of the fundamentals of the scientific approach, the social importance placed on COPCs and valued ecosystem components (VECs – such as species at risk) was also considered.



APECs



From 1956 to 2005, 24 herbicide products and 14 active ingredients were applied throughout the RTA. Over 55,000 hectares of the RTA received one or many applications throughout the years.

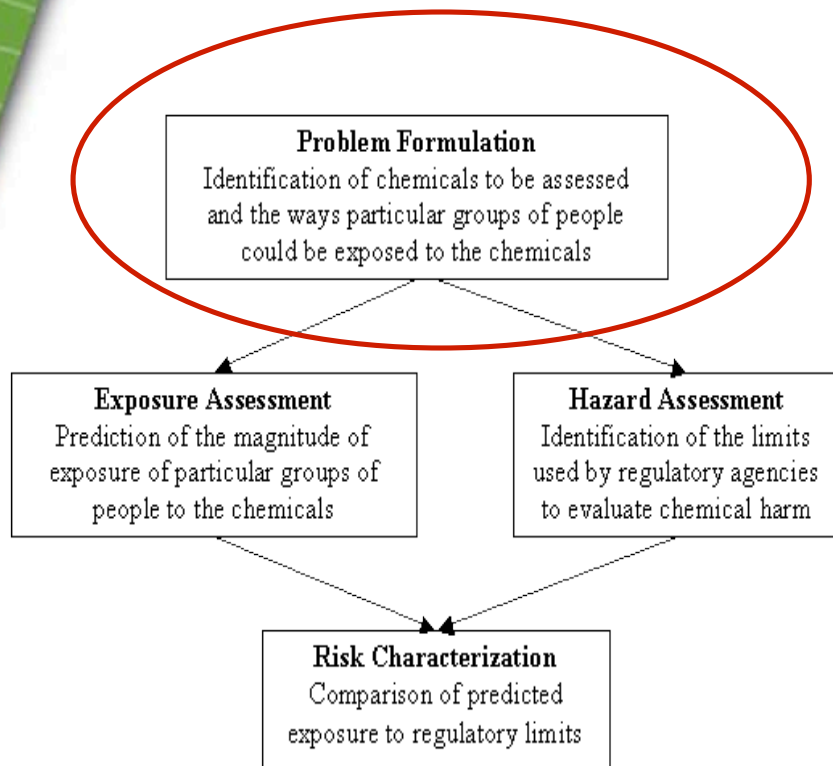
Strategic Approach – The Field

- Some considerations:
 - Much of the area is not accessible by road (in terms of exact sampling locations) and all of the area is potentially impacted by UXOs
 - Need a scientifically and statistically representative “presence / absence” approach
 - The majority of COPCs identified in the historical review are organic herbicides or chemicals that are relatively immobile in the soil environment
 - High priority COPCs were likely to be found in the top 10 cm of soil cover at the CFB Gagetown (Hatfield)

Strategic Approach – The Field

- There are three basic approaches to sampling: random, judgmental, and systematic (CCME, 1993)
- Media to sample included:
 - Surface soils (including soil cores)
 - Surface water
 - Sediments
 - Vegetation
 - Potable water (from wells)
 - Did NOT include air...

The Basic Steps of a Risk Assessment



Assumptions:

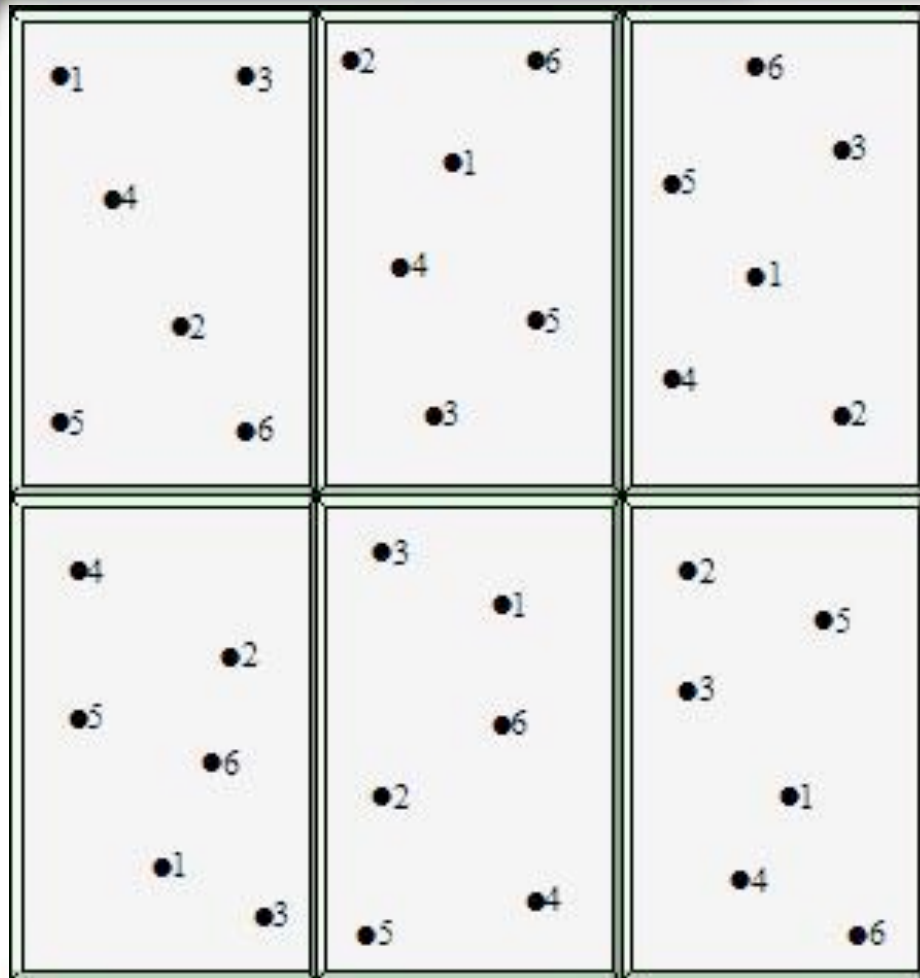
- It is the average exposure across an area that is important, rather than the maximum concentration (e.g., existence of localized “hot spots”);
- COPC concentrations can be expected to be similar across the defined sampling area, i.e., the area does not unnecessarily combine areas of high and low COPC concentrations (e.g., an area that was sprayed with herbicide combined with an area that was not sprayed); and
- Human use and occupancy of the defined sampling area can be assumed to be random or averaged over the sampling area over time.

Typical Military Activities in the RTA

Judgmental samples were influenced by potential for exposure

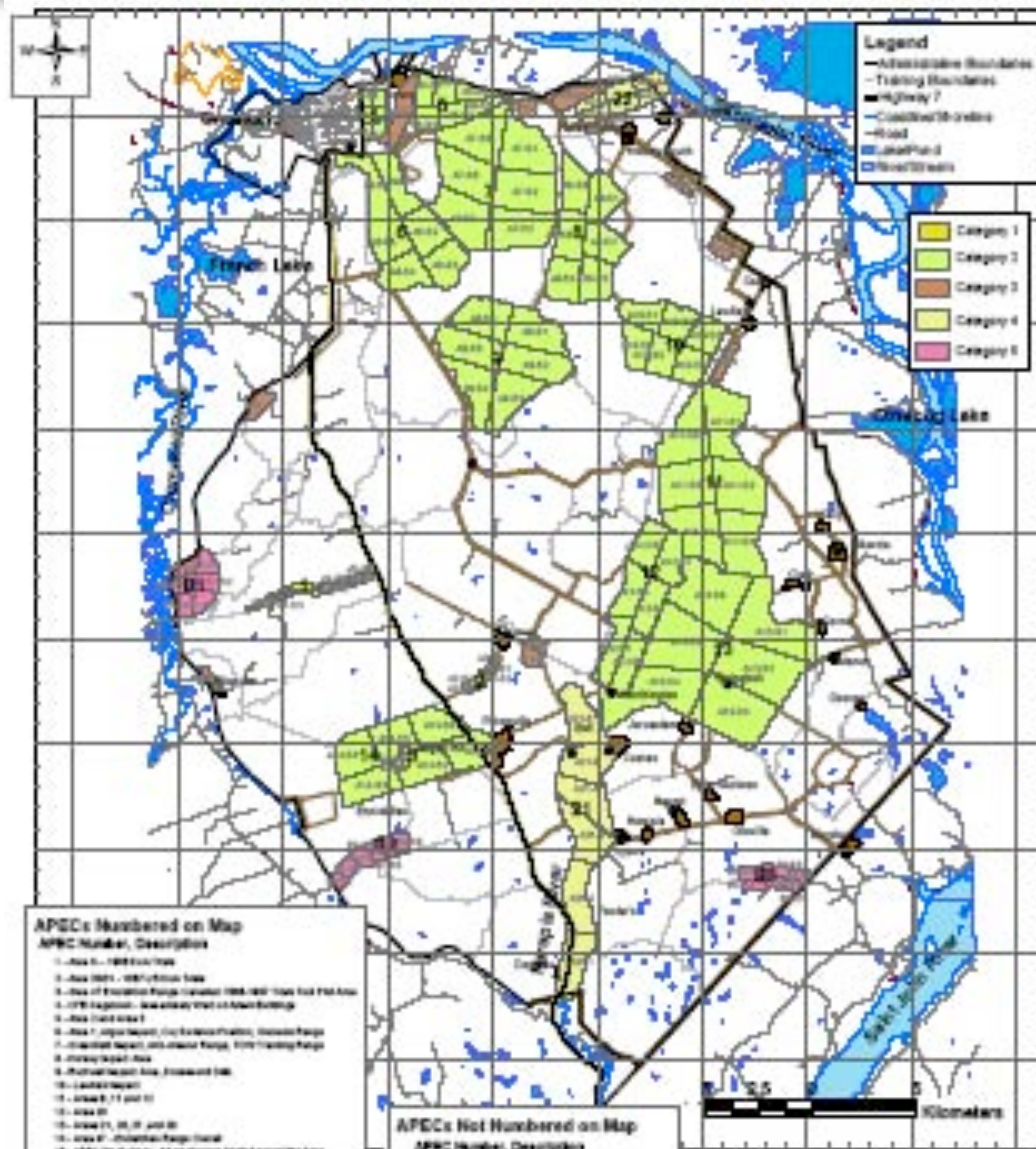


Composite Sampling Approach



Based on the earlier assumptions, a soil screening methodology developed by the United States Environmental Protection Agency (US EPA, 1996) was adapted to the APECs at CFB Gagetown

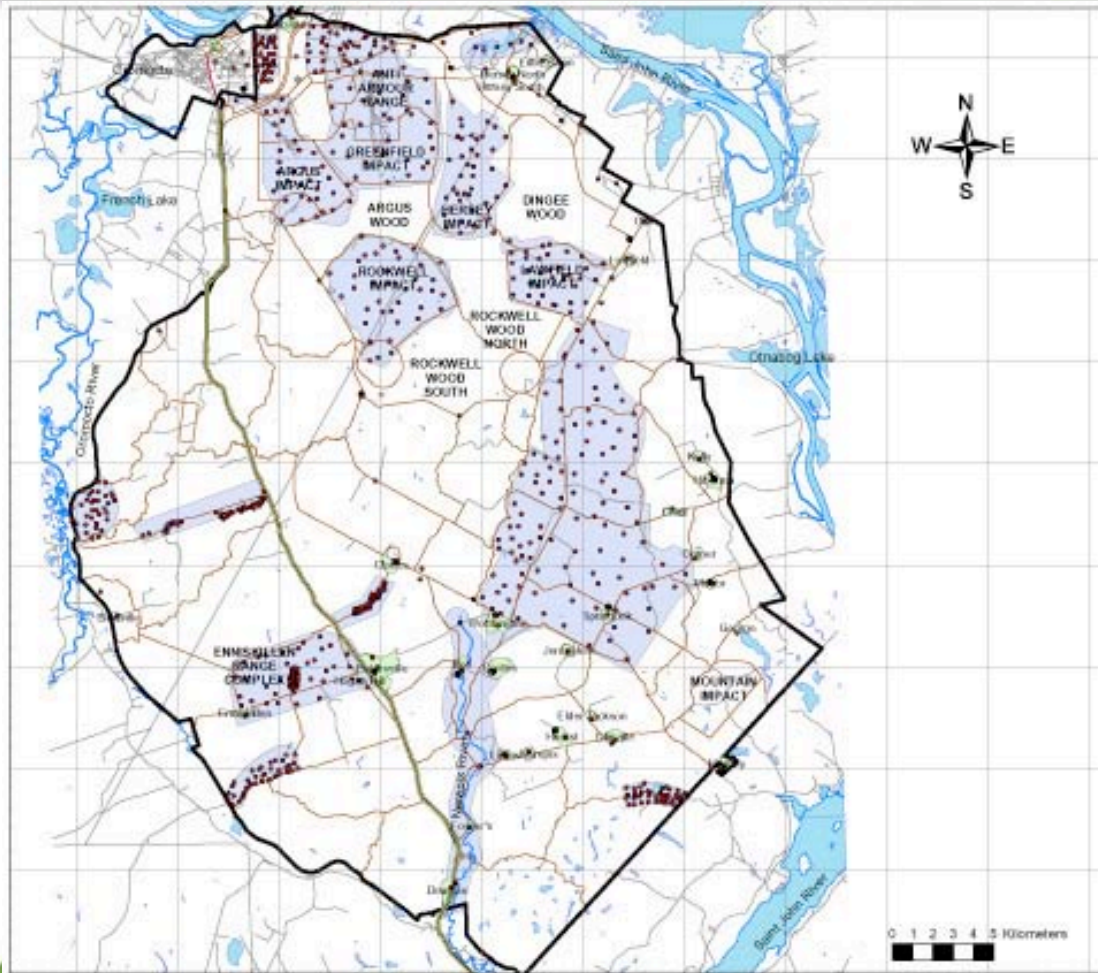
Sampling Grid on the RTA



A total of 22 APECs and 3 Background Sampling Areas were determined based on the Categorization system, the COPCs, and historical considerations. Some of these APECs were non-point in nature (fence line, firebreaks)



Sampling Points (1063)



In total, of the 1063 discrete soil samples collected in the RTA, 296 surface soil samples (119 discrete and 177 composite), 30 sediment samples, 30 surface water samples, 12 groundwater samples, and 81 composite vegetation samples were submitted for analysis. Almost 6000 analytical results were interpreted.

Conclusion

- The Strategic Approach ultimately provided the rationale for the selection of COPCs, APECs, sampling plan by media, laboratory detection limits/method detection limits, and criteria.
- Overall, the objective of the ESA to estimate mean concentrations of COPCs across defined sampling areas for comparison with federal screening criteria and background concentrations was achieved in a sustainable and scientifically defensible manner while being cost-effective and comprehensive enough for a subsequent risk assessment.

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