The West River Acid Mitigation Program

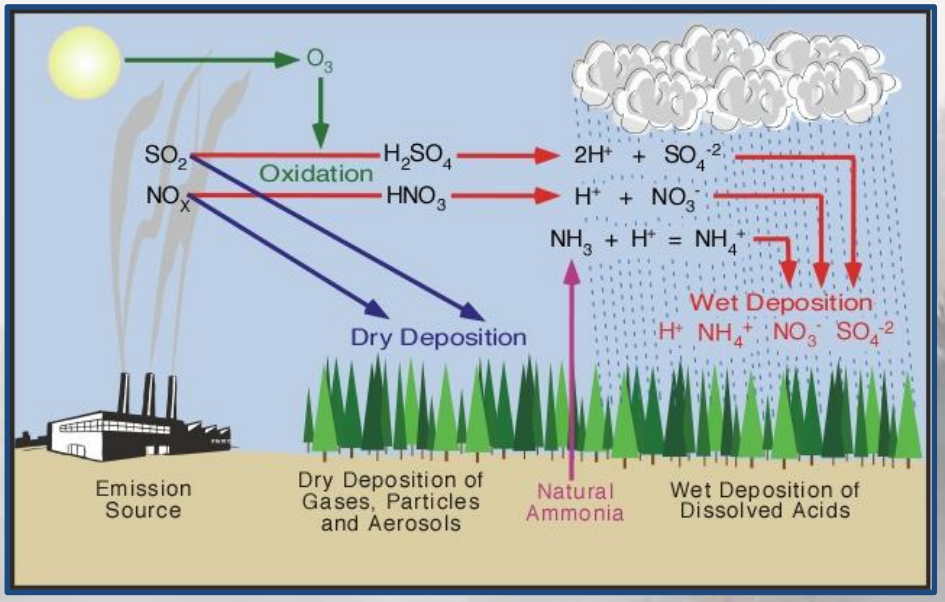
iBoF Salmon Workshop

February 15, 2017

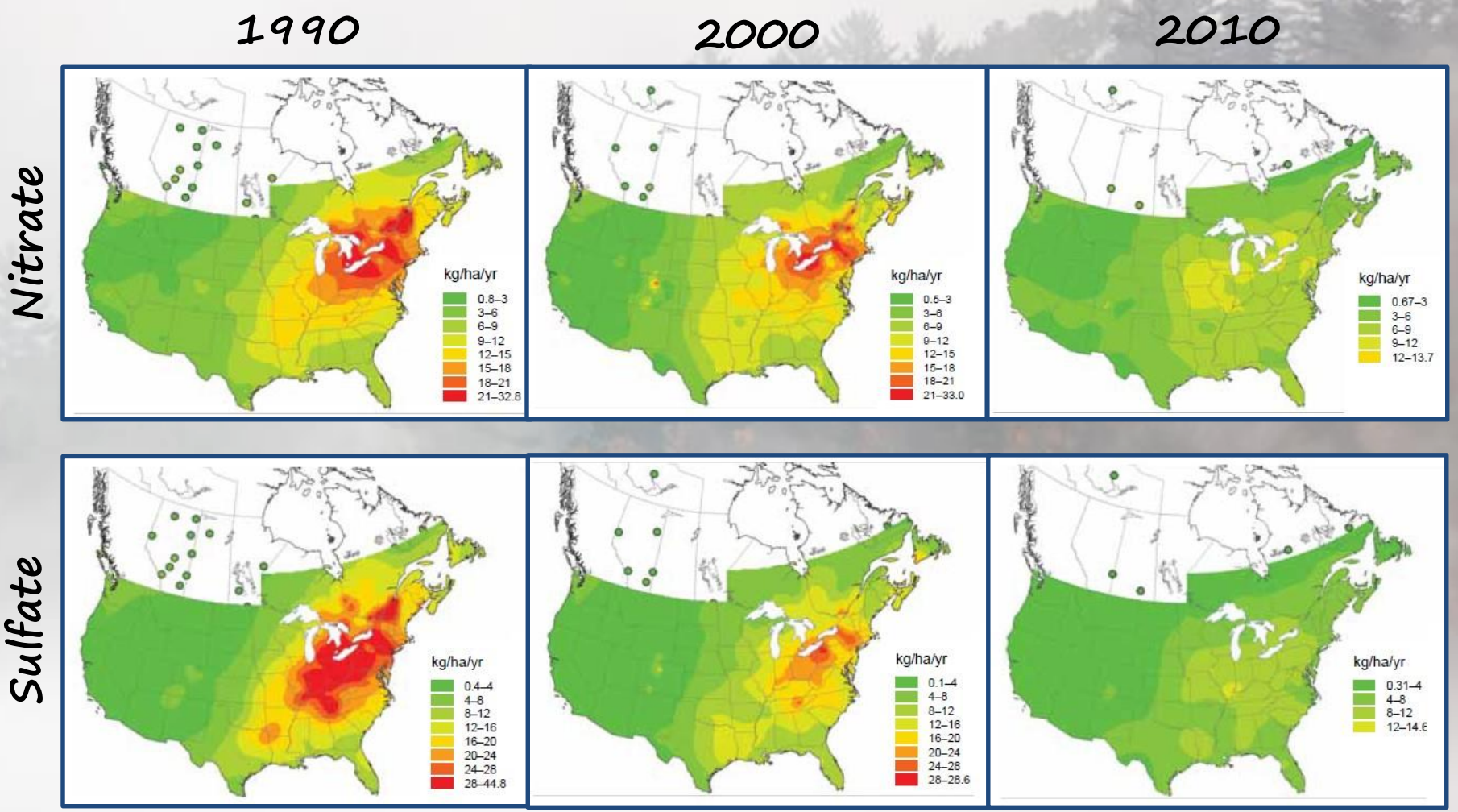
Overview

1. History and background of West River project
2. Results and successes
3. Recent project expansion
4. Insights on challenges and successes

Acid Rain Movement – 1980s

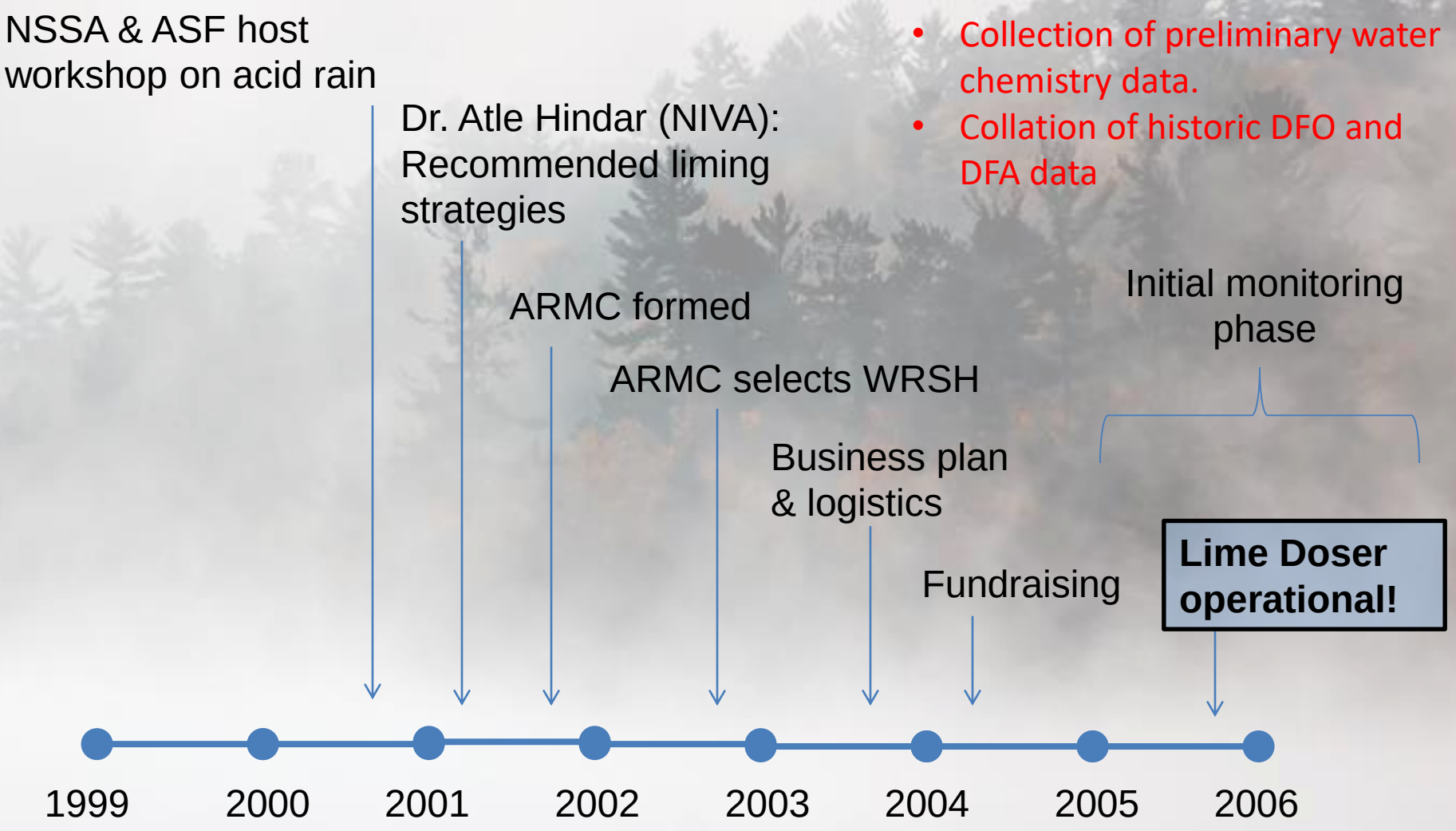


Acid Rain Has Declined!



Credit: Environment Canada

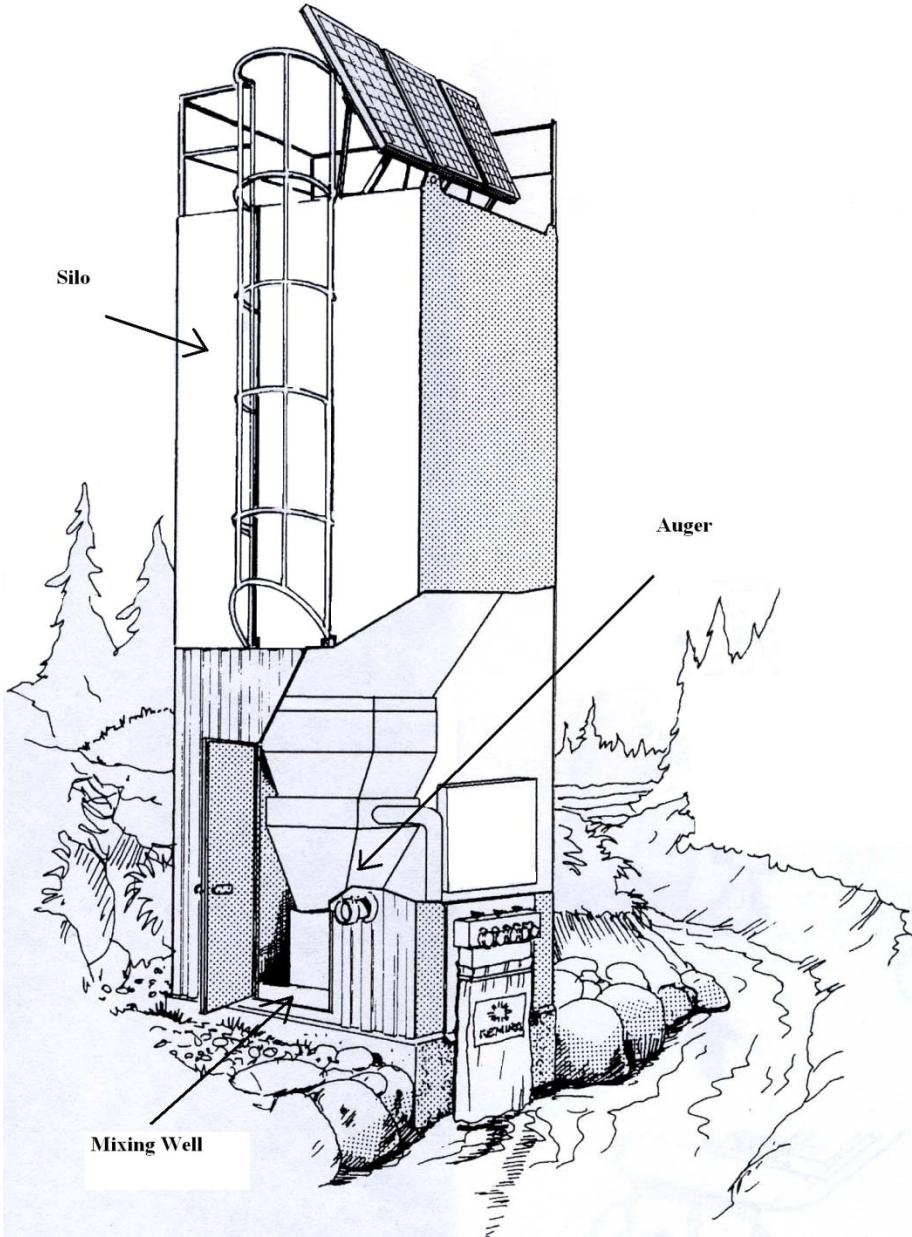
Project Overview – Impetus & Formation



- Collection of preliminary water chemistry data.
- Collation of historic DFO and DFA data

What is a Lime Doser?

- Silo
- Auger
- Crock or Well
- Automated Dose Control



Stream pH

Linear Habitat	Former pH	Current pH
4.5 km	4.3 – 5.0	5.5 - 7.5
14.0 km	4.5 - 5.5	4.8 - 6.0
10.4 km	4.5-5.5	*unchanged*
16.0 km	4.5-5.5	*unchanged*

Smolt Production – Unlimed Control

Year	Little River Estimate	90% CI
2007	1470	(1220 - 1840)
2008	205	(130 - 860)
2009	690	(440 - 2140)
2010	1280	(1000 - 1810)
2011	462	(404 - 550)
2012	1240	(1016 - 1600)
2013	1078	(892 - 1372)
2014	n/a*	n/a*
2015	*Not attempted*	
2016	951	(724 - 1178)

*too few fish caught

Smolt Production - Limed

Year	Smolt Wheel Estimate	90% CI
2007	3460	(2500 - 6040)
2008	2950	(2110 - 5260)
2009	2455	(1600 - 6415)
2010	8920	(5500 - 36280)
2011	11240	(9240 - 14360)
2012	n/a*	n/a*
2013	11780	(8810 - 18350)
2014	9740	(7820 - 13040)
2015	*Not attempted*	
2016	10323	(8517 – 12130)

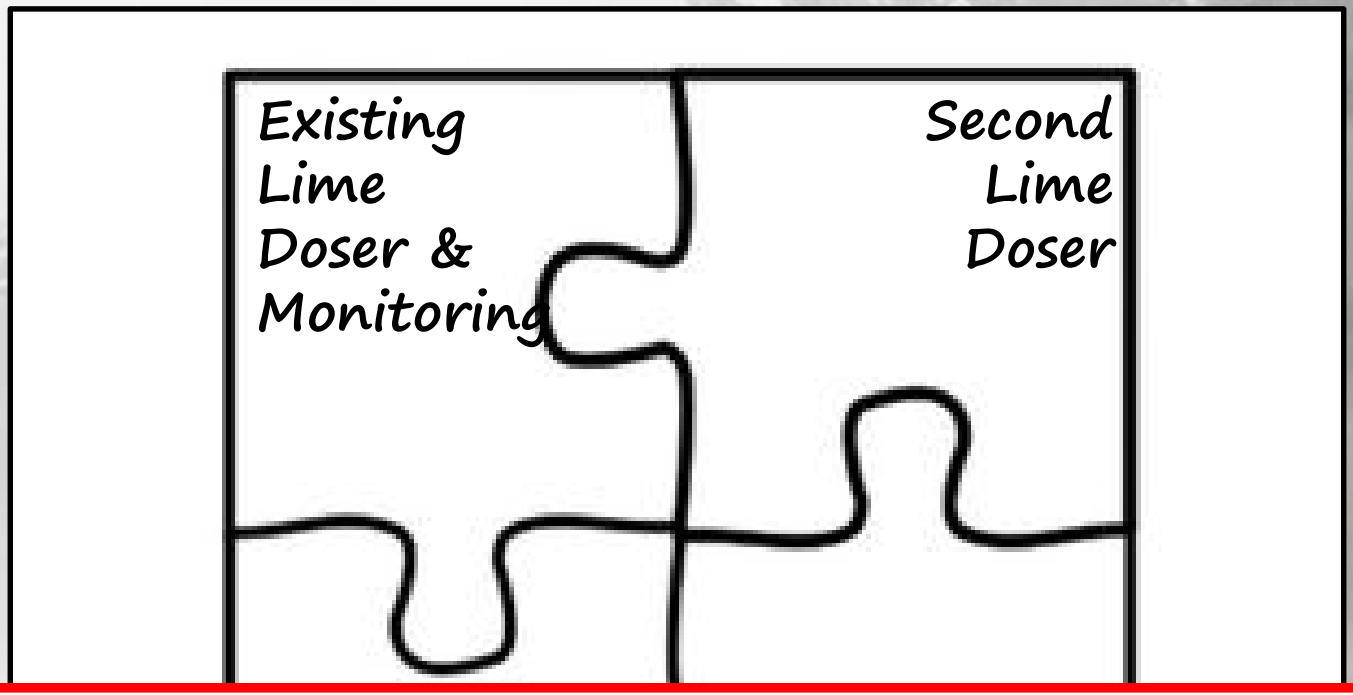
*due to floods

Other Monitoring

- Smolt assessment
- Electrofishing
- Adult Salmon Count Facility (July 2015)
- Stream invertebrates

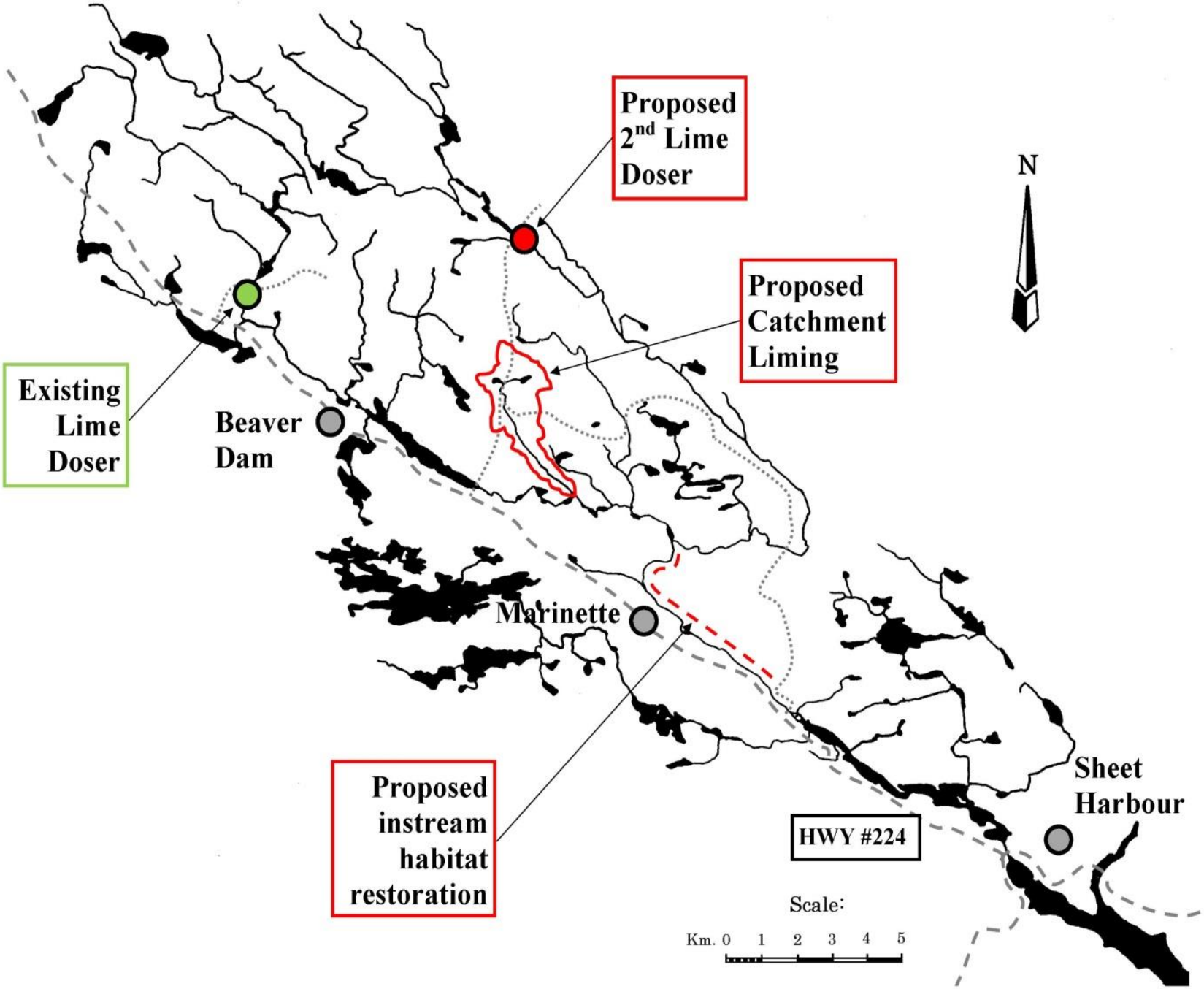
Project Expansion 2016-2018

Four Core Activities



Additional goal of expansion:

Rebuild fish populations in support of sportfishing – rural economic development!

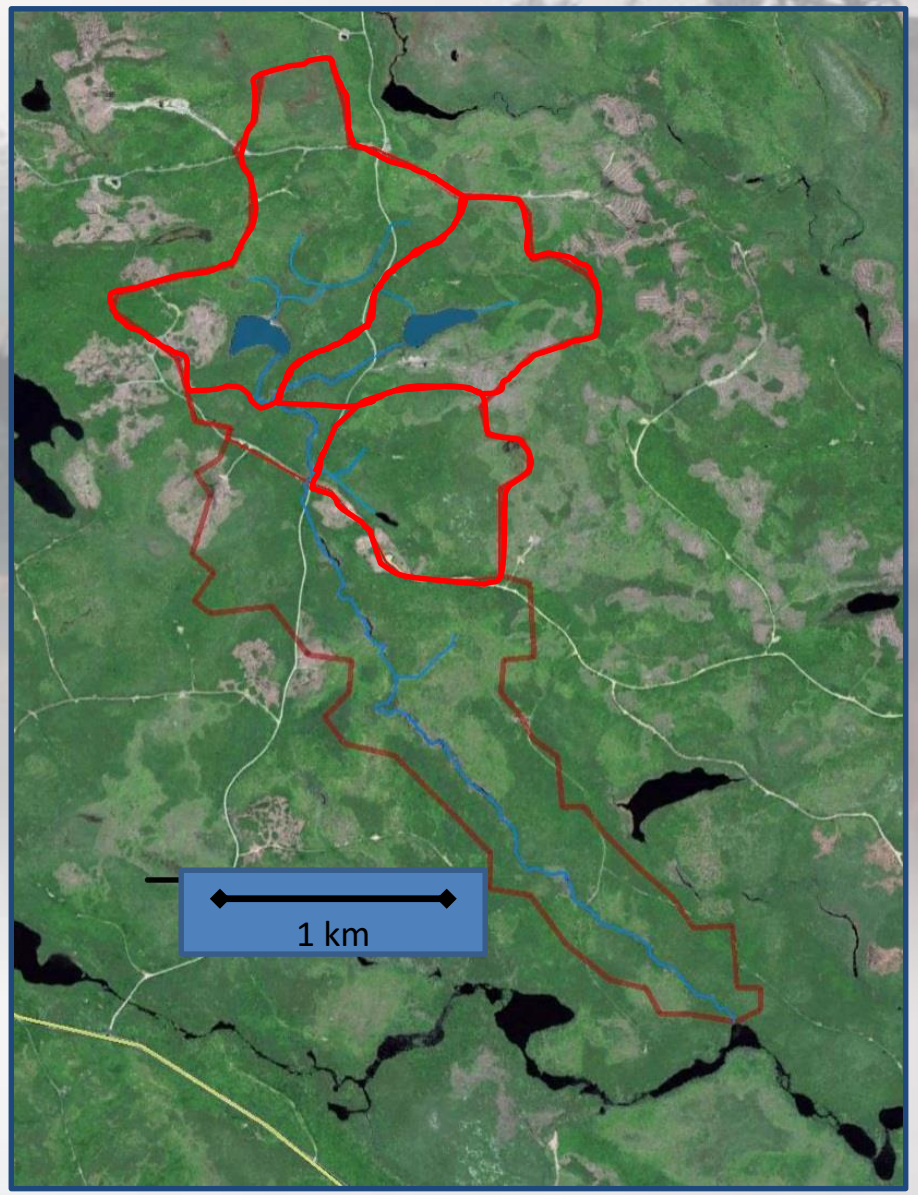

Proposed 2nd Lime Doser
N
Proposed Catchment Liming
Existing Lime Doser
Beaver Dam
Marinette
Sheet Harbour
Proposed instream habitat restoration
HWY #224
Scale:
Km. 0 1 2 3 4 5

Catchment Liming

1. Conduct a proof-of-concept catchment liming project :
    a) demonstrate the potential of this approach, and
    b) provide immediate benefit to fisheries in the WRSH
2. Carefully monitor the effects of liming on:
    a) stream chemistry (Fish)
    b) soil chemistry (Forests)
3. Develop a framework for catchment liming in Nova Scotia
4. Develop local knowledge and expertise

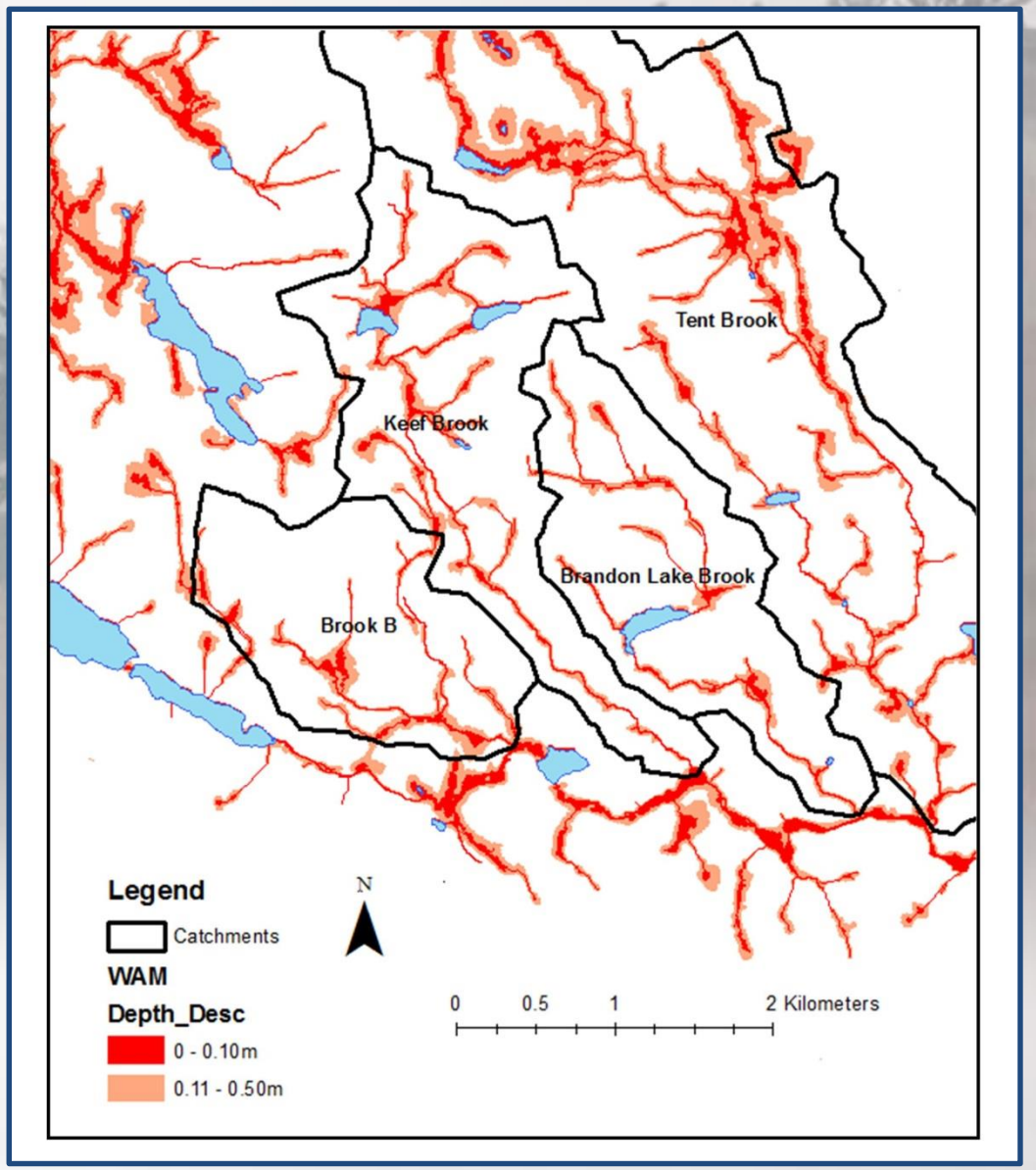
Keef Brook Overview

- Total catchment (384 ha)
- Focus on upper catchment
- Three sub-catchments
  - Colwell Brook
  - McGregor Brook
  - Cope Brook

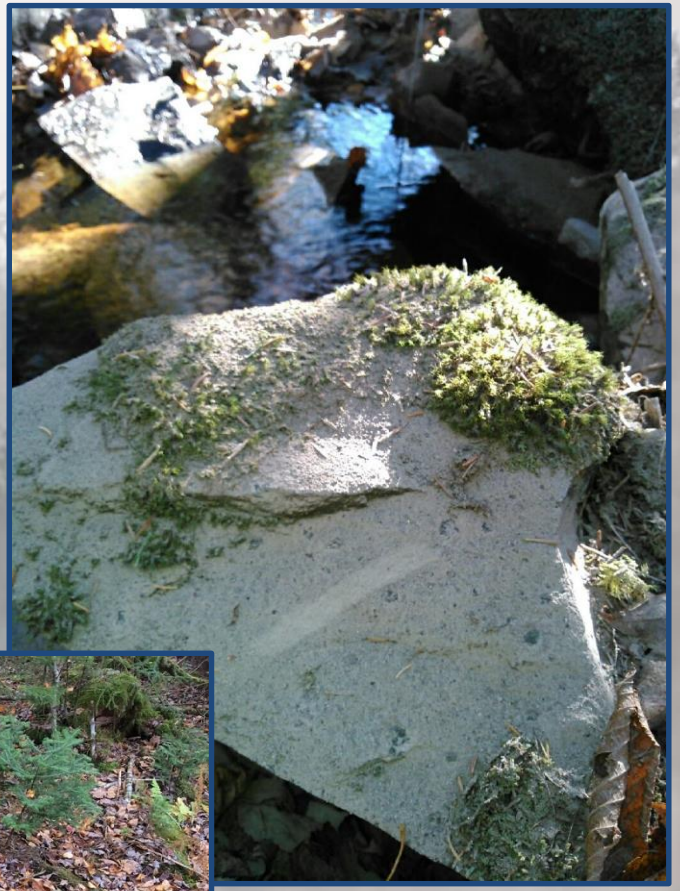


Catchment Liming

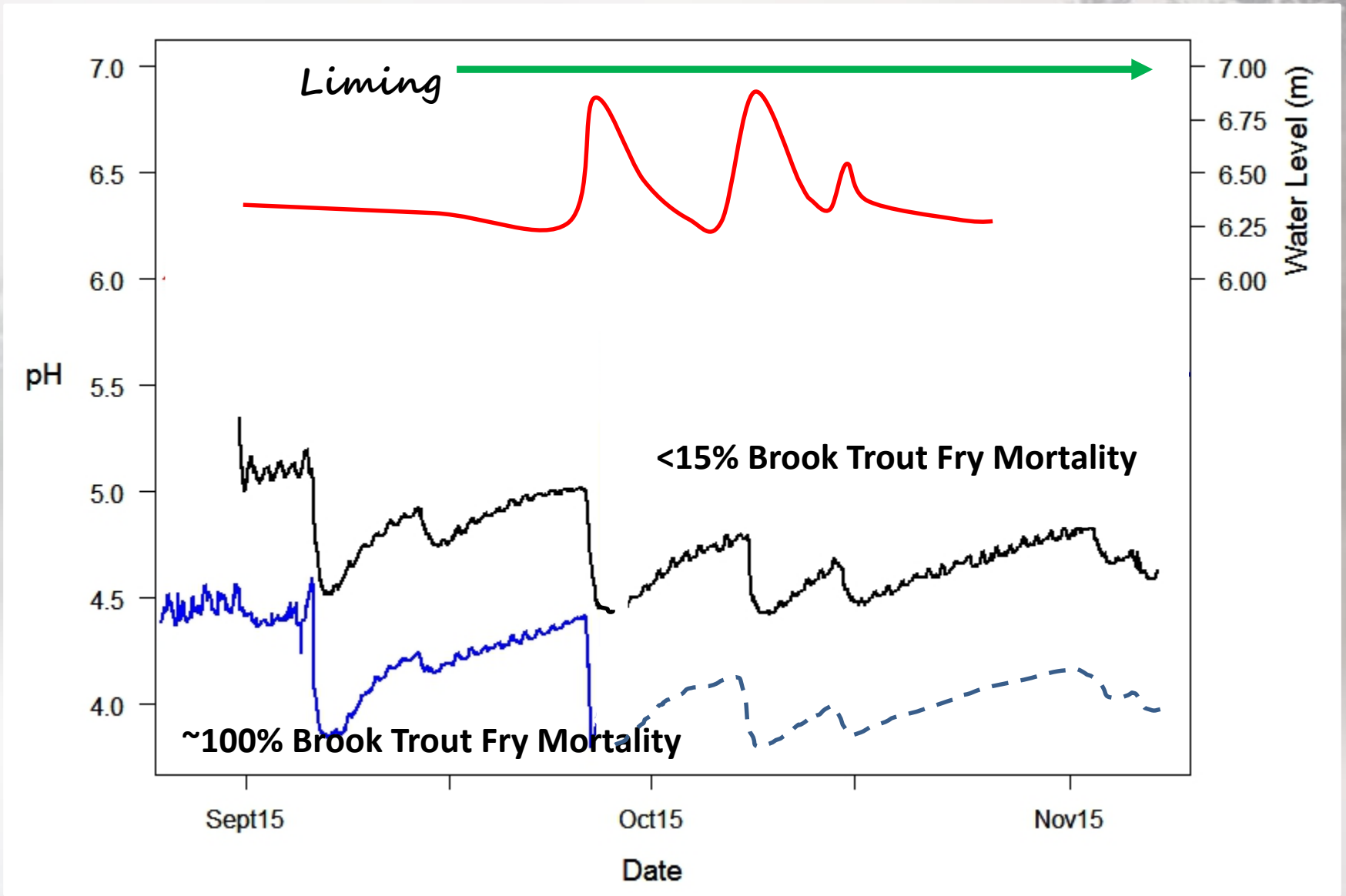
- Applied only to selected portions of drainage
- Focus on ‘recharge areas’
- 10t / ha




Aerial Application of Lime
in West River Sheet Harbour
CatchmentArea, Marinette, NS
Though edited, the length of this video
represents real time between loads of lime
delivered.



Catchment Liming: Preliminary Results



Second Lime Doser

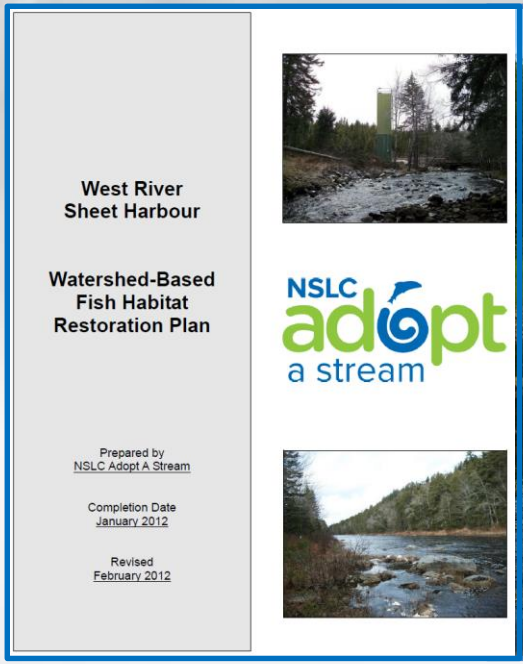
- Ordered late Dec.
- Headwaters of Killag River
- Will treat 214 000m^2
- 2:1 dilution to conf. with West

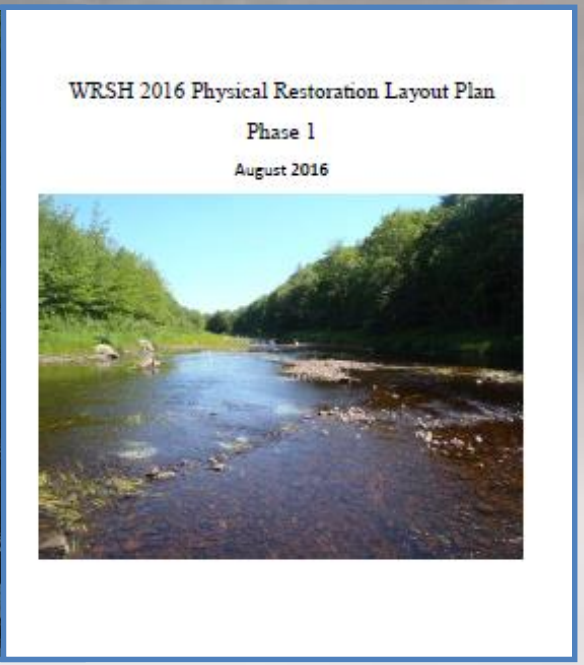
<u>WR Doser</u>

- 108 000 m^2
- 5:1 dilution to conf. with Killag

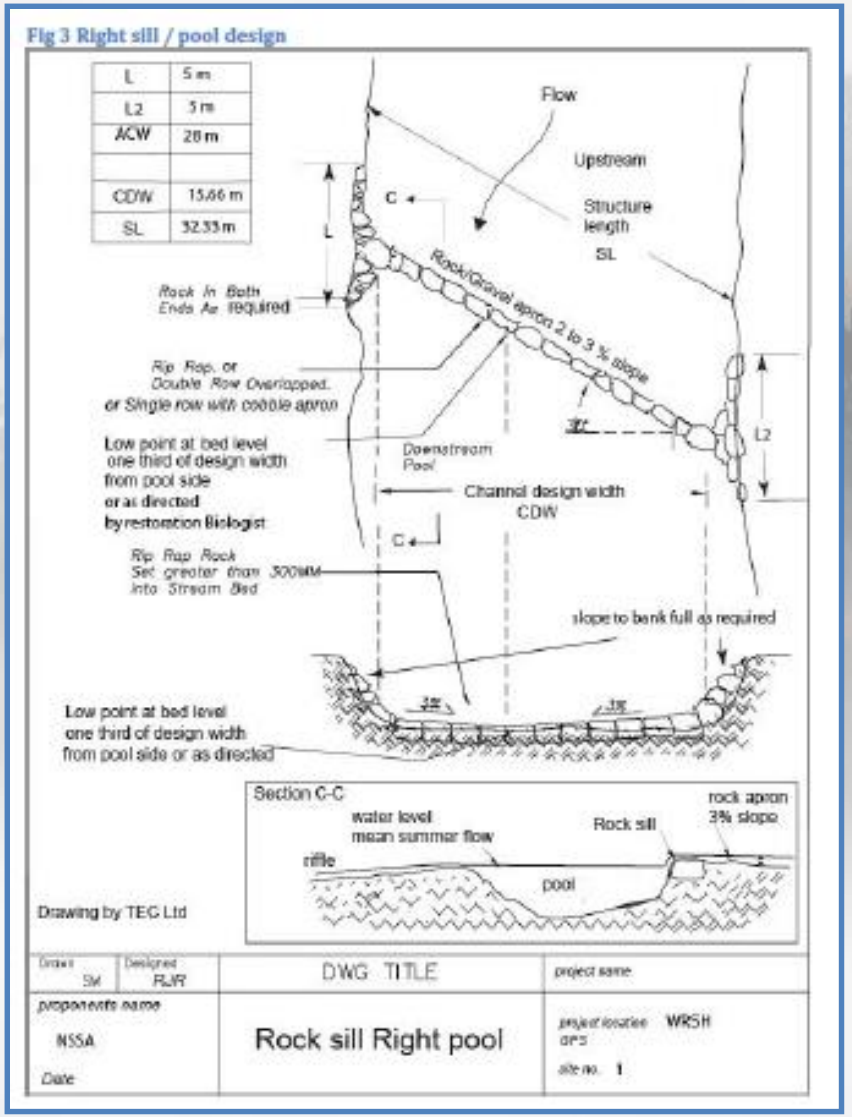
Physical Habitat Restoration

- Much of physical habitat degraded due to land-use practices
- Addressing biggest threat: over-widened, shallow and warm
- Focusing on 7km of main river – LARGE structures

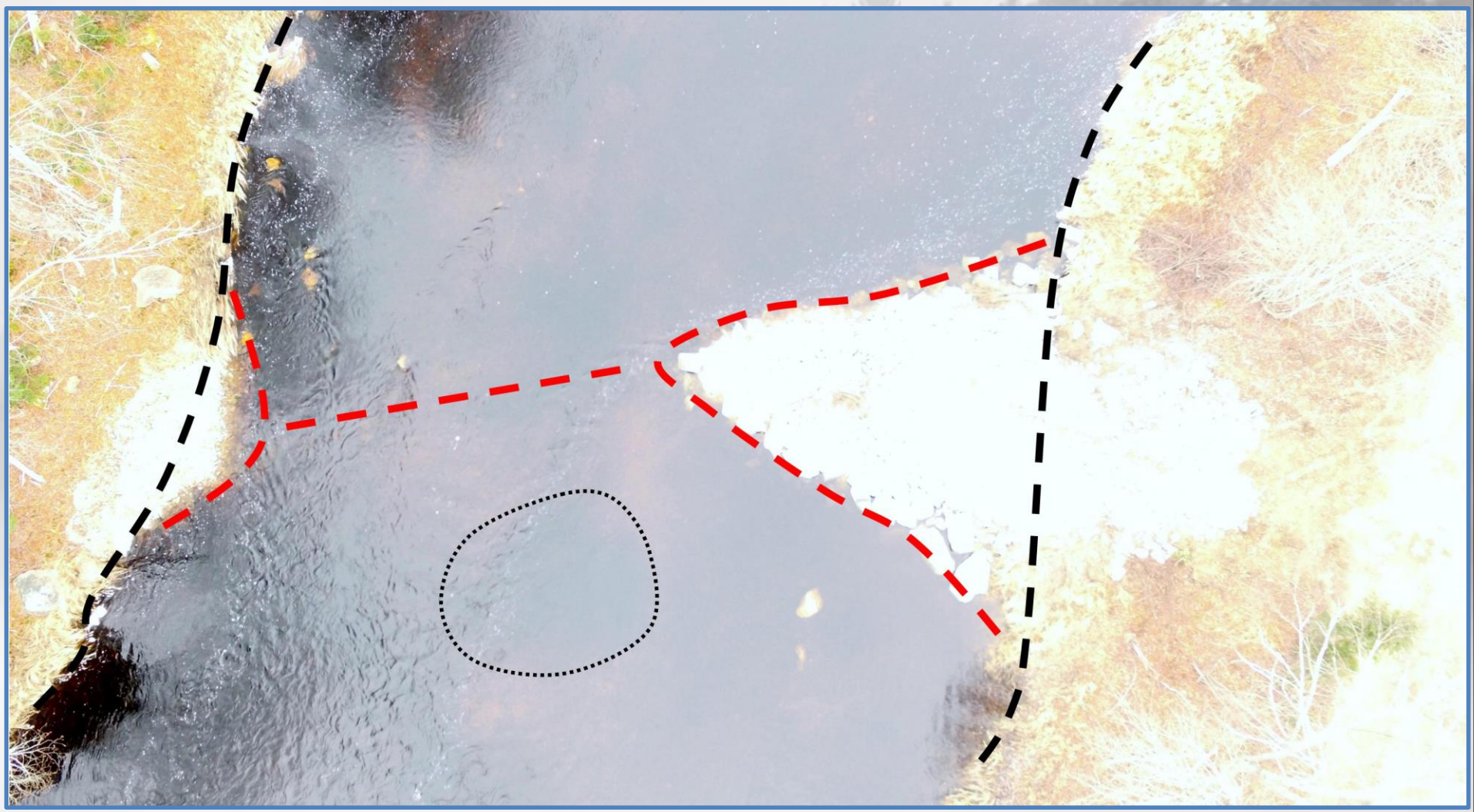




Physical Habitat Restoration

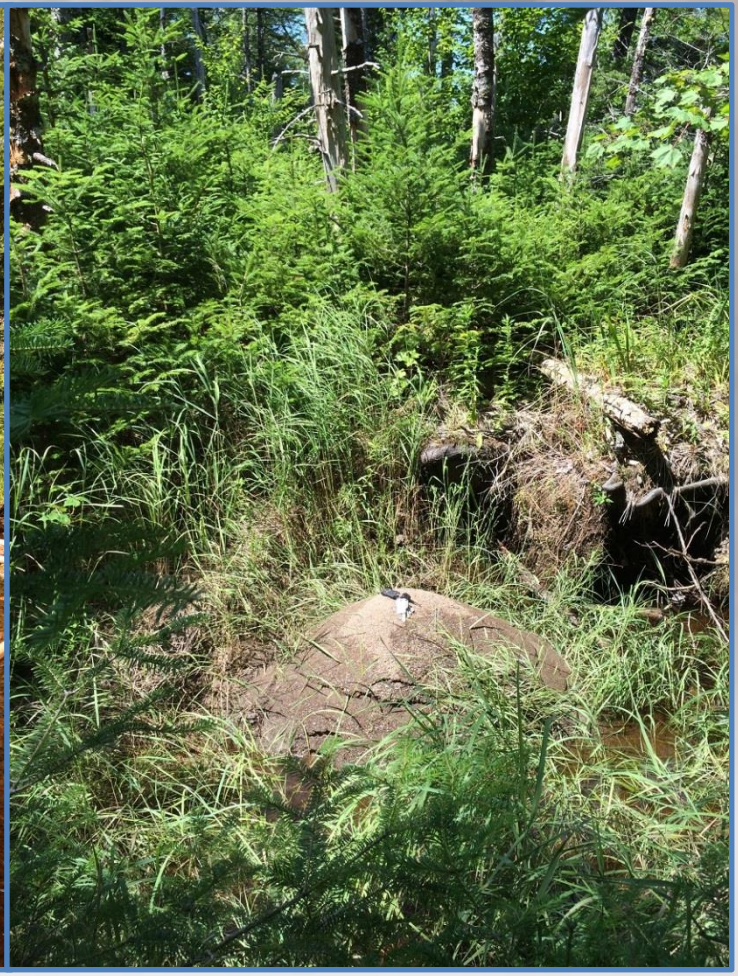


Physical Habitat Restoration



Physical Habitat Restoration

- ‘Sand Wand’ restoration of spawning riffles



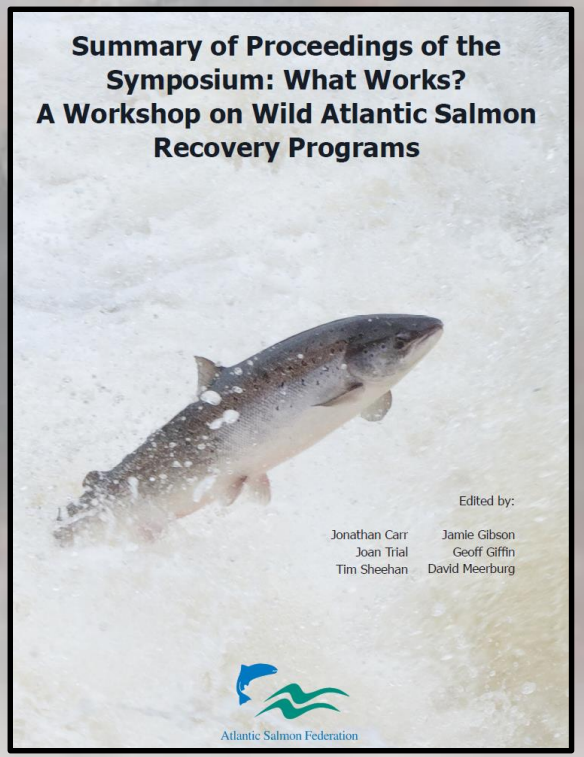
Directed Scientific Research

- Focus on monitoring and evaluation of dosers and catchment liming
- Physiology and pH/Aluminum-mediated behaviour of salmon smolts
- In-situ egg-to-fry survival of salmon and trout in relation to acid mitigation strategies
- Identification of cold-water refugia using GIS mapping

Key Pieces to WRSH Project

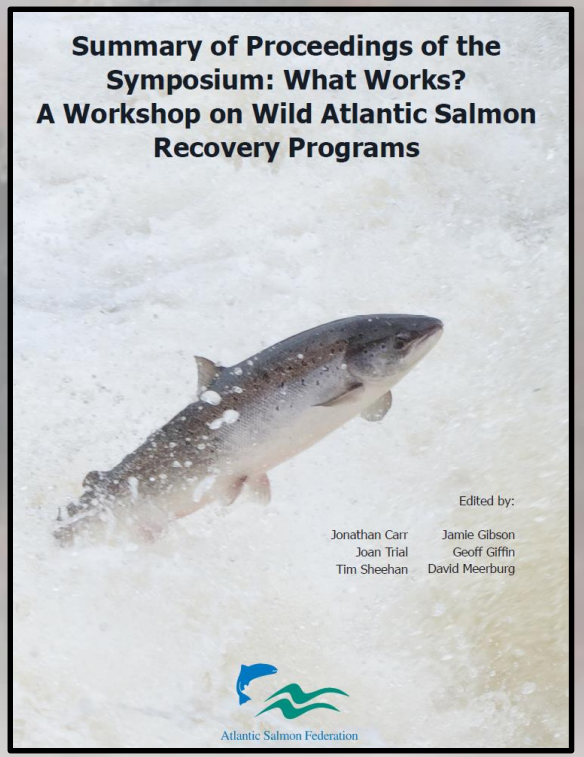
Recommendations

1) Team
2) Holistic Approach
3) Long-term commitment
4) Monitoring and evaluation
5) Outreach and communication



Decision Matrix

- General paucity of data
- Urgency to act vs. collection of data
- Identifying root causes vs. limiting factors\ action vs. inaction



Final advice from WRSH experience

- Achievable targets (vs. ultimate goals)
- Measure interim progress
- Frame goals, methods and results in language of managers
- Create ‘ownership’