Bad River Watershed Culvert Program Monitoring

Providing meaningful monitoring data in a management context

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and

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BRW Culvert Program Monitoring

Background on the BRW Culvert Program

Describe process for developing monitoring protocols

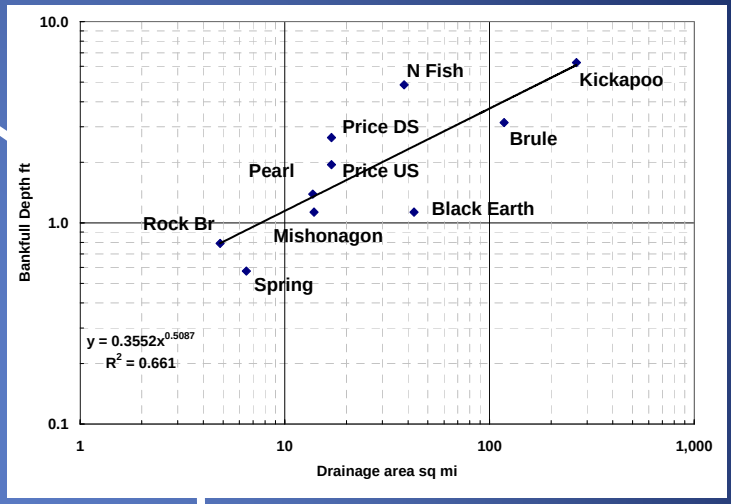
Preliminary results

Next Steps

BRWA mission is to promote a healthy relationship between the people and natural communities of the Bad River watershed by involving all citizens in assessing, maintaining and improving watershed integrity for future generations.

Connections

Local citizens



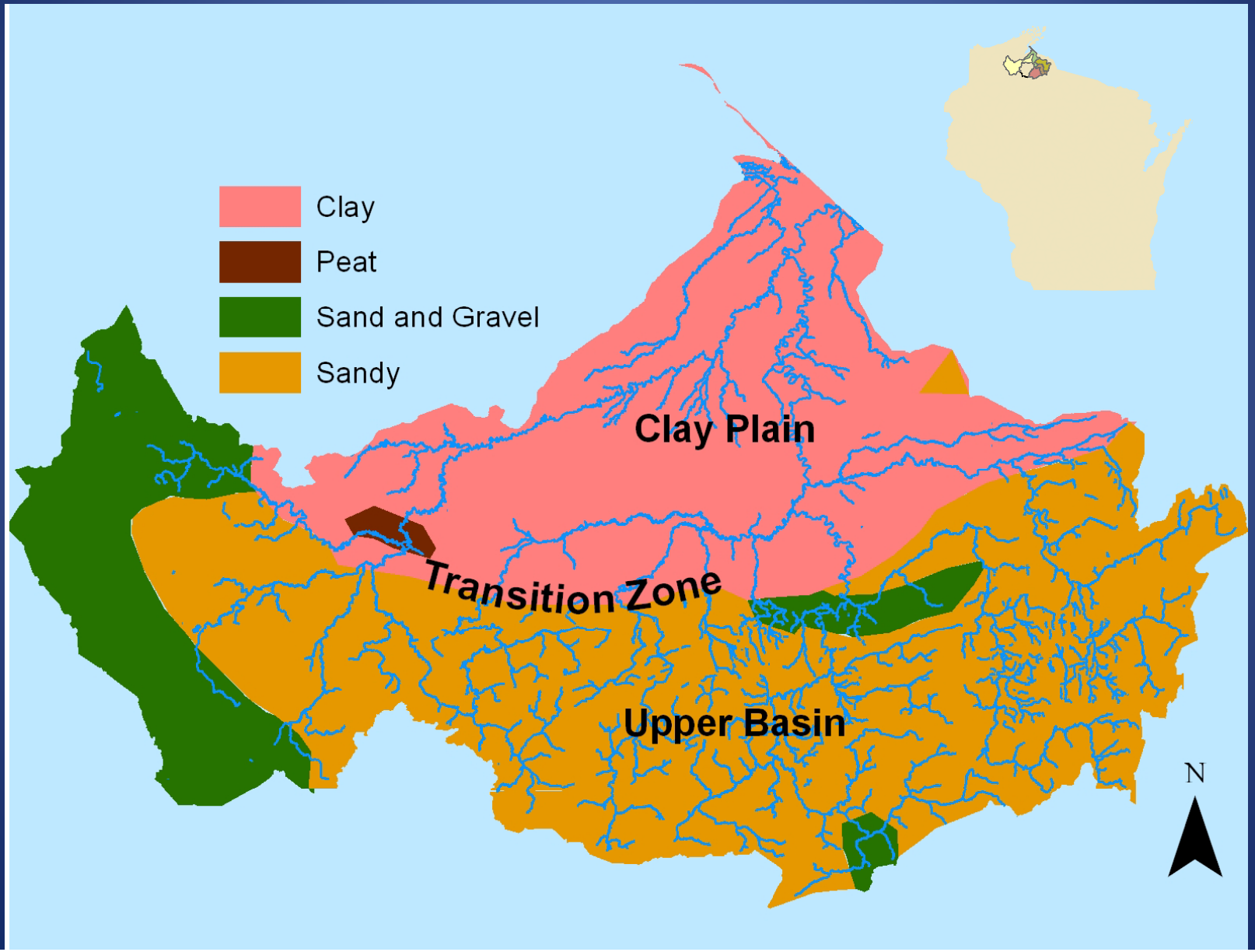
Research

Management

USFWS Fish passage program

- Restore natural flows and fish migration by removing or bypassing barriers
- Partnership efforts by providing funding and technical assistance.

The Bad River Watershed



The Bad River is the largest producer of Lamprey to Lake Superior

BRW Culvert Program

From site scale

to watershed scale

BRWA Culvert Program Objectives

Identify and inventory all road/ stream crossings in the basin

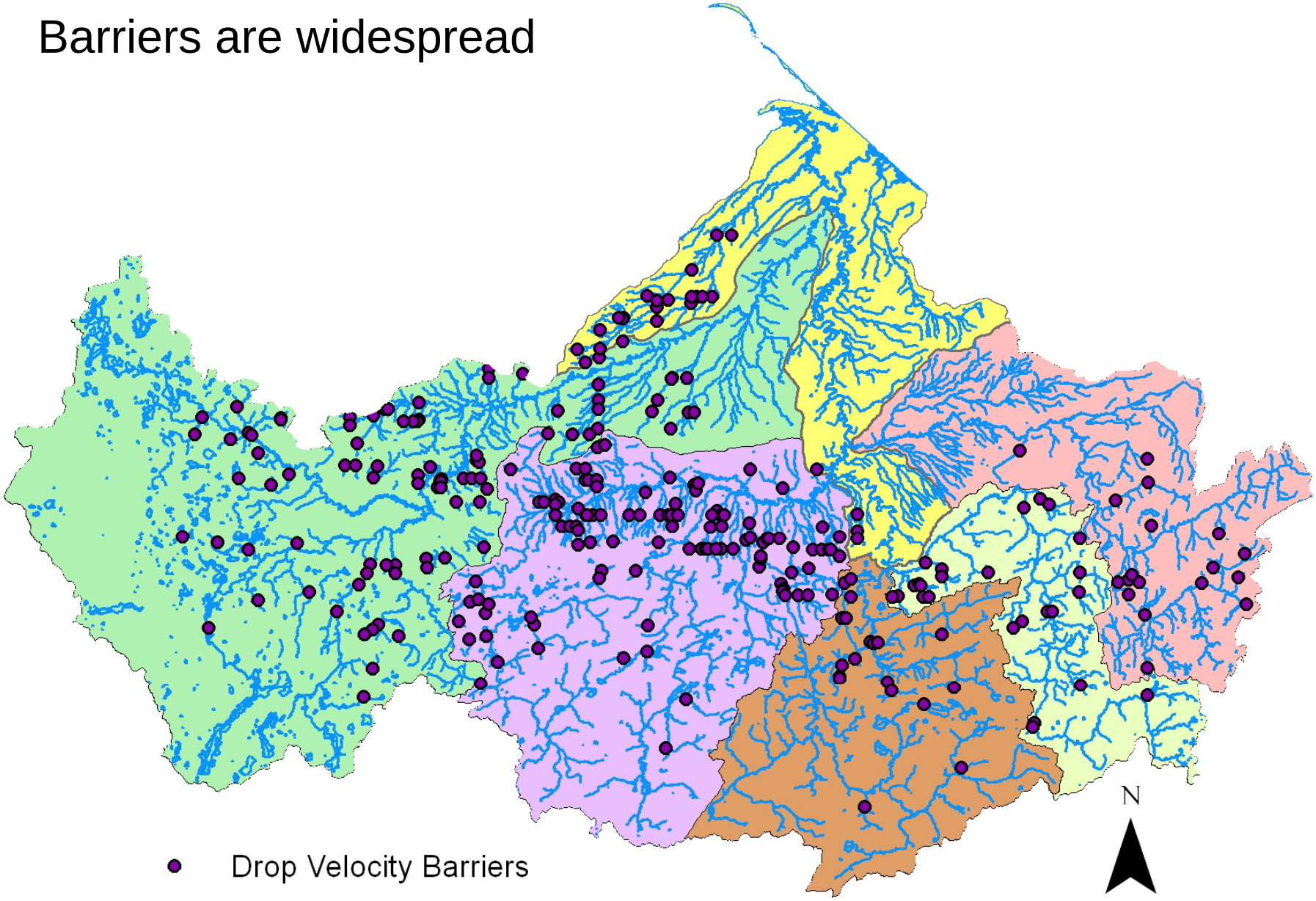
Prioritize w.r.t. fish passage and sedimentation

RAD RIVER WATERSHED ASSOCIATION

Culvert Restoration Project

Preliminary Needs Assessment

Barriers are widespread



BRWA Culvert Program Objectives

Coordinate local efforts to remediate

Sites Selected for 2009 Culvert Projects

Duties for Culvert Replacement	*Site 1* *618 Hager Rd*	*Site 2* *619 Hager Rd*	*Site 3* *392 Taylor Lane*	*Site 4* *392.5 Taylor Lane*	*Site 5* *637 Troutme Creek*	*Site 6*	*Site 7*
Engineering	*Bayfield County LWCD*	*Bayfield County LWCD*	*Bayfield County LWCD*	*Bayfield County LWCD*	*Ashland County LWCD*		
Permitting	*BRWA/ Town Lincoln*	*BRWA/ Town Lincoln*	*USFWS/ Town Grand View*	*USFWS/ Town Grand View*	*Ashland County LWCD/ Town Marengo*	*Anderson*	
Funding (pipe)	*BRWA $5,000 USFWS Coastal*	*BRWA $5,000 USFWS Coastal*	*USFWS $5,000*	*USFWS $5,000*	*BRWA $5,000 USFWS Coastal*	*BRWA $10,000 NFWF*	

Accomplishments to date

13 sites restored to date – > 15 miles of habitat reconnected, funding secured for 4 sites in 2010

How are these culvert replacements working?


Monitoring
Management
Local

Achievable

Meaningful

Monitoring

Management

Local

Achievable

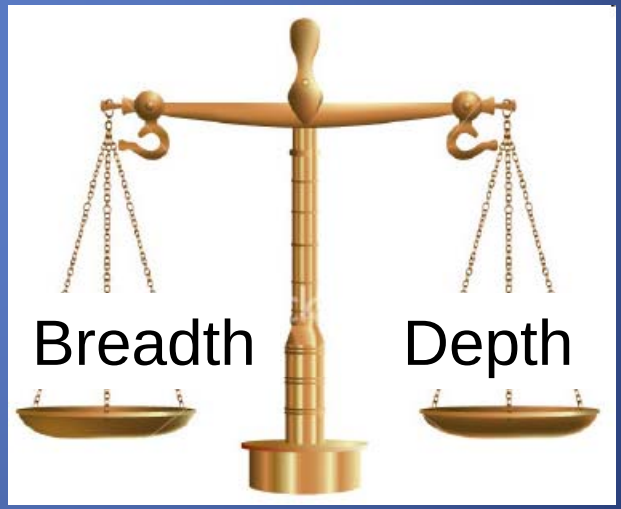
Meaningful

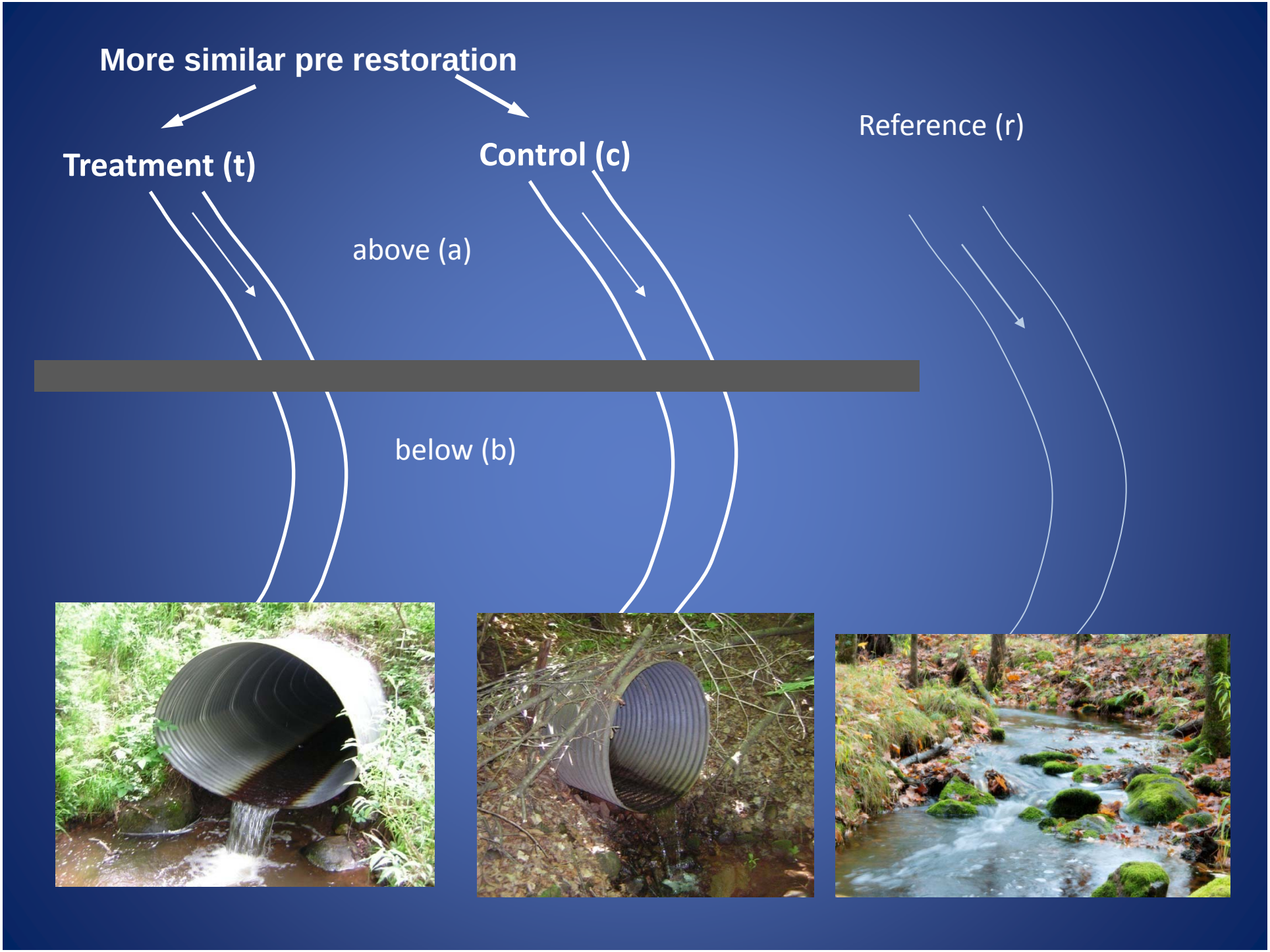
Where/How/What to measure?

January 2009 workshop developed a broad suite of protocols – habitat and fisheries

Summer 2009 sampling implemented all monitoring possible

Follow up workshop will select most meaningful protocols, refine questions to be answered




More similar pre restoration
Treatment (t)
Control (c)
Reference (r)
above (a)
below (b)

More similar post restoration

Treatment (t)

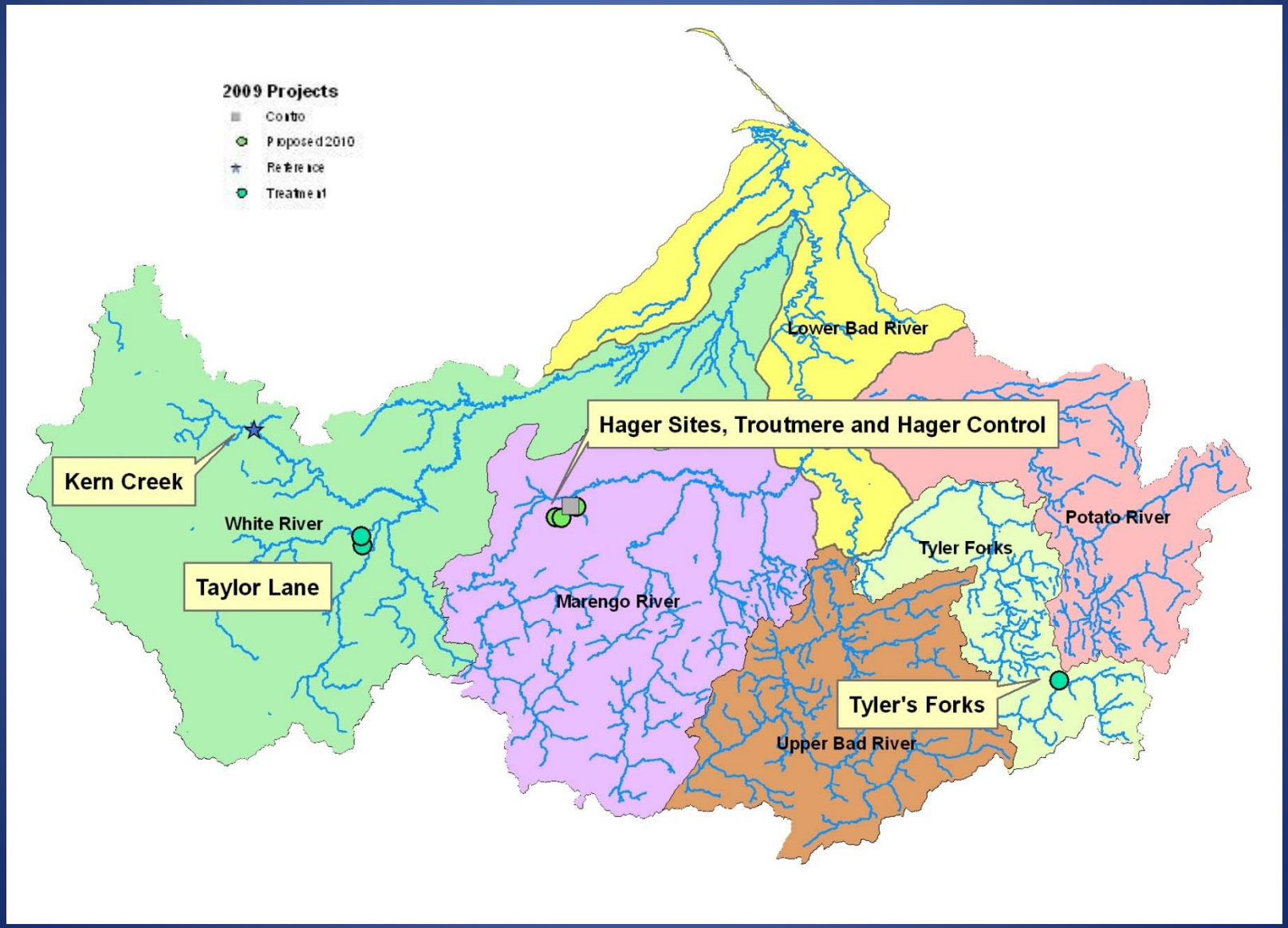
Control (c)

Reference (r)

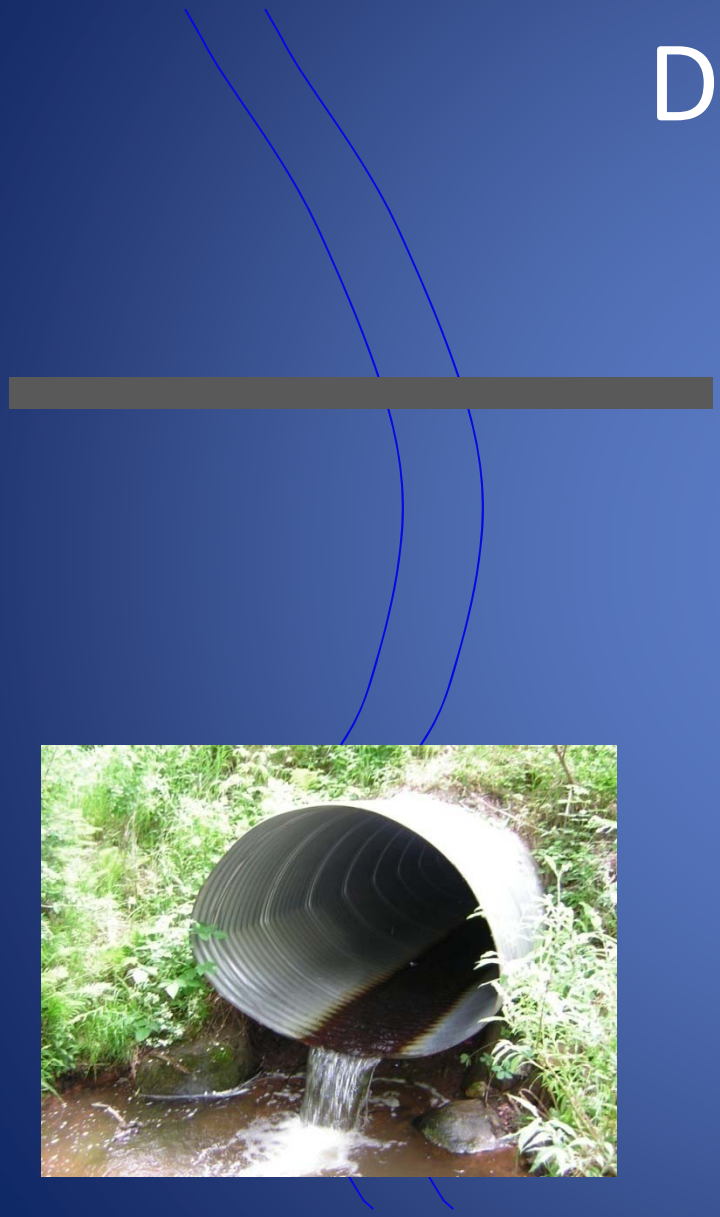
above (a)

below (b)

BRW Monitoring Program Sites



Fishery Assumptions Driving Monitoring



- Limit movement
- Recolonization potential
- Decline species richness
- Lower density
- Shift in size/species structure

Fisheries Monitoring Questions

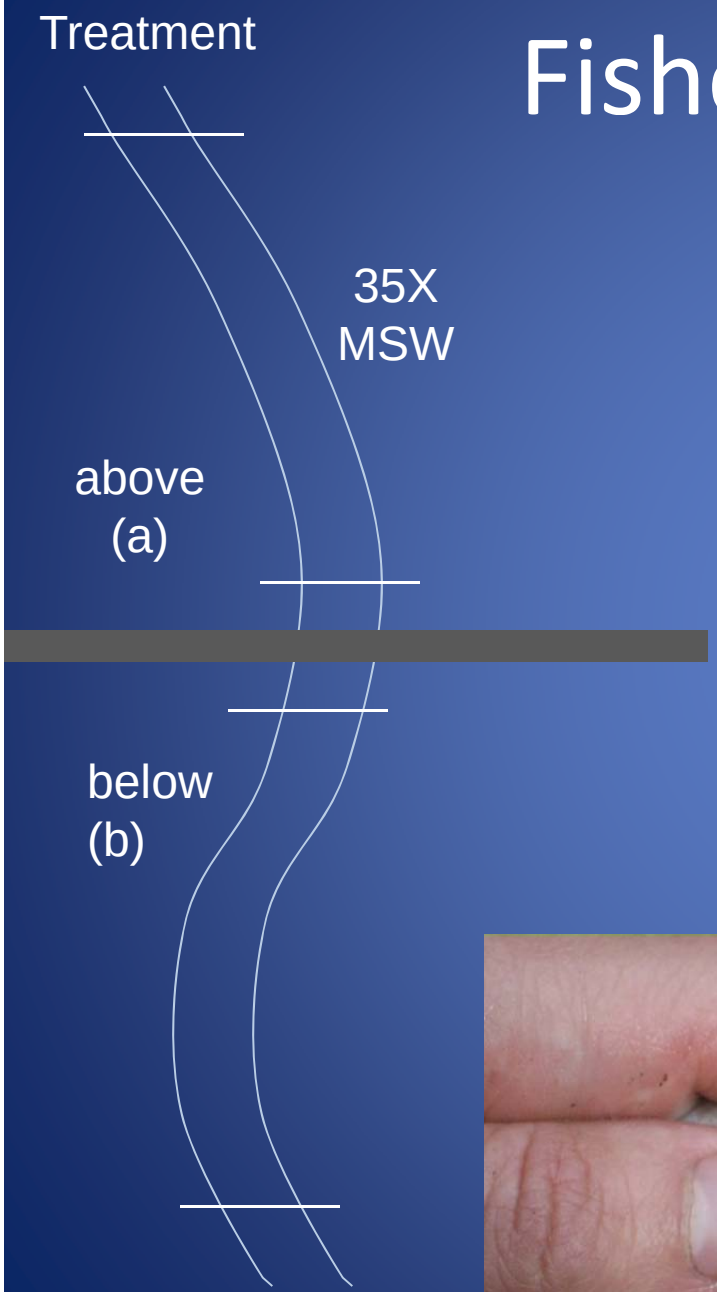
1) Reconnect artificially fragmented stream channels

Have we restored fish passage?

2) Determine species assemblages associated with culvert replacements

What is the fish community response to culvert restoration?

Fisheries Protocols



Metrics:

Species Richness

Movement

Fish assemblage (Lyons coldwater IBI)

CPE

Color denotes time (pre/post restoration) and location (above/below) For fish > 75 mm

Have We Restored Passage?
Upper Basin Sites Recap Summary

	Site		Original Mark Location		% Movement
			Below	Above	
Recapture Location	Taylor Ln 1135 Treatment	Below	6	0	0%
		Above	0	17	0%
	Taylor Ln 392 Treatment	Below	1	1	33%
		Above	0	1	0%
	Kern Creek Reference	Below	0	0	0%
		Above	1	1	50%

Pre restoration recap summary – Transition zone sites

	Site		Original Mark Location		% Movement
			Below	Above	
Recapture Location	Hager Rd - Treatment	Below	0	1	50%
		Above	0	1	0%
	Troutmere Cr. - Treatment	Below	15	0	0%
		Above	0	3	0%
	Marengo Trib - Control	Below	4	0	0%
		Above	0	1	0%
	Trout Brook - Reference	Below	5	0	0%
		Above	0	6	0%

Recapture Rates

Site	Percent recap	# marked	Days between sampling	Station Length
Taylor Lane #392	6	21	87	200
Taylor Lane #1135	28	104	86	243
Kern Cr - reference	13	15	49	200
Hager #619	11.1	18	89	200
Troutmere	20.9	86	60	277
Trout Brook reference	8.7	126	84	240
Marengo Trib control	10.6	47	76	290
18 Mile #392	3.5	57	56	200
18 Mile	20	58	42	200
18 Mile	15.1	172	42	200

Fish Movement Program Components to Review

Protocols developed with overlap in sampling among fish assemblage and habitat data collection in mind

If movement metrics are determined to be meaningful – consider adjusting protocols specifically to capture movement

Fish community response to restoration?

Upper Basin Sites

Site	Reach	# fish	IBI	Richness	% Bkt
Taylor Ln 392	Above	28	80	2	57
Pre	Below	27	80	2	63
	Above	37	80	2	24
Post	Below	23	80	2	57
Taylor Ln 1135	Above	58	80	2	16
Pre	Below	45	80	2	27
	Above	74	90	3	11
Post	Below	77	90	3	17
Kern Cr	Above	86	90	3	6
Pre	Below	47	90	3	9
	Above	85	90	3	9
Post	Below	72	80	3	3

Fish Community - Transition Zone

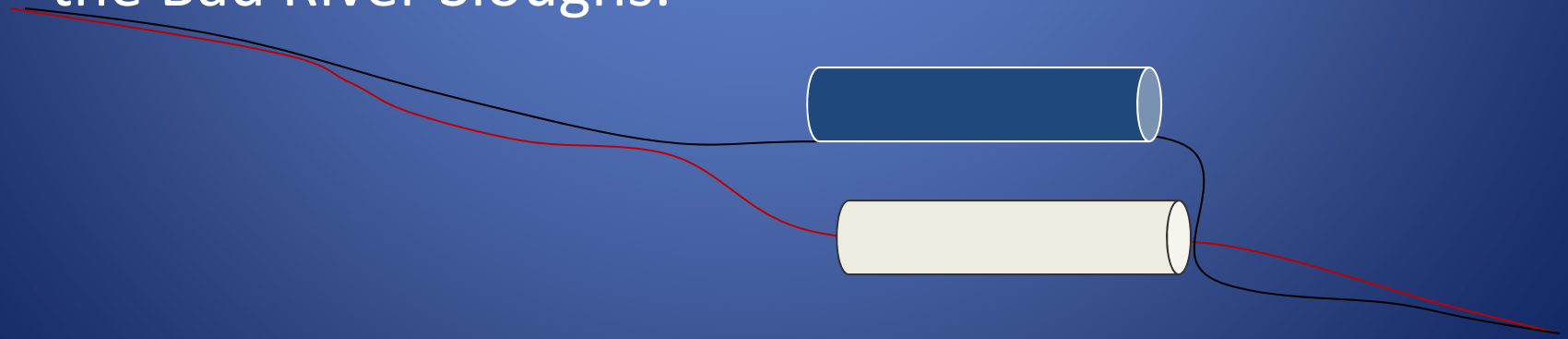
Site	Reach	# fish	IBI	Richness	% Bkt
Hager Rd 619	Above	7	100	2	100
Pre	Below	61	100	2	100
	Above	28	90	1	100
Pre2	Below	37	90	2	97
Troutmere	Above	63	90	4	20
Pre	Below	97	90	4	22
	Above	102	90	4	9
Pre 2	Below	135	90	5	18
Trout Brook - reference	Above	117	70	8	19
Pre	Below	117	50	6	8
	Above	85	50	10	15
Pre 2	Below	110	50	8	5
Control	Above	31	90	3	33
Pre	Below	73	90	4	61
	Above	43	90	3	24
Post	Below	71	90	5	40

Fish Assemblage Program Components to Review

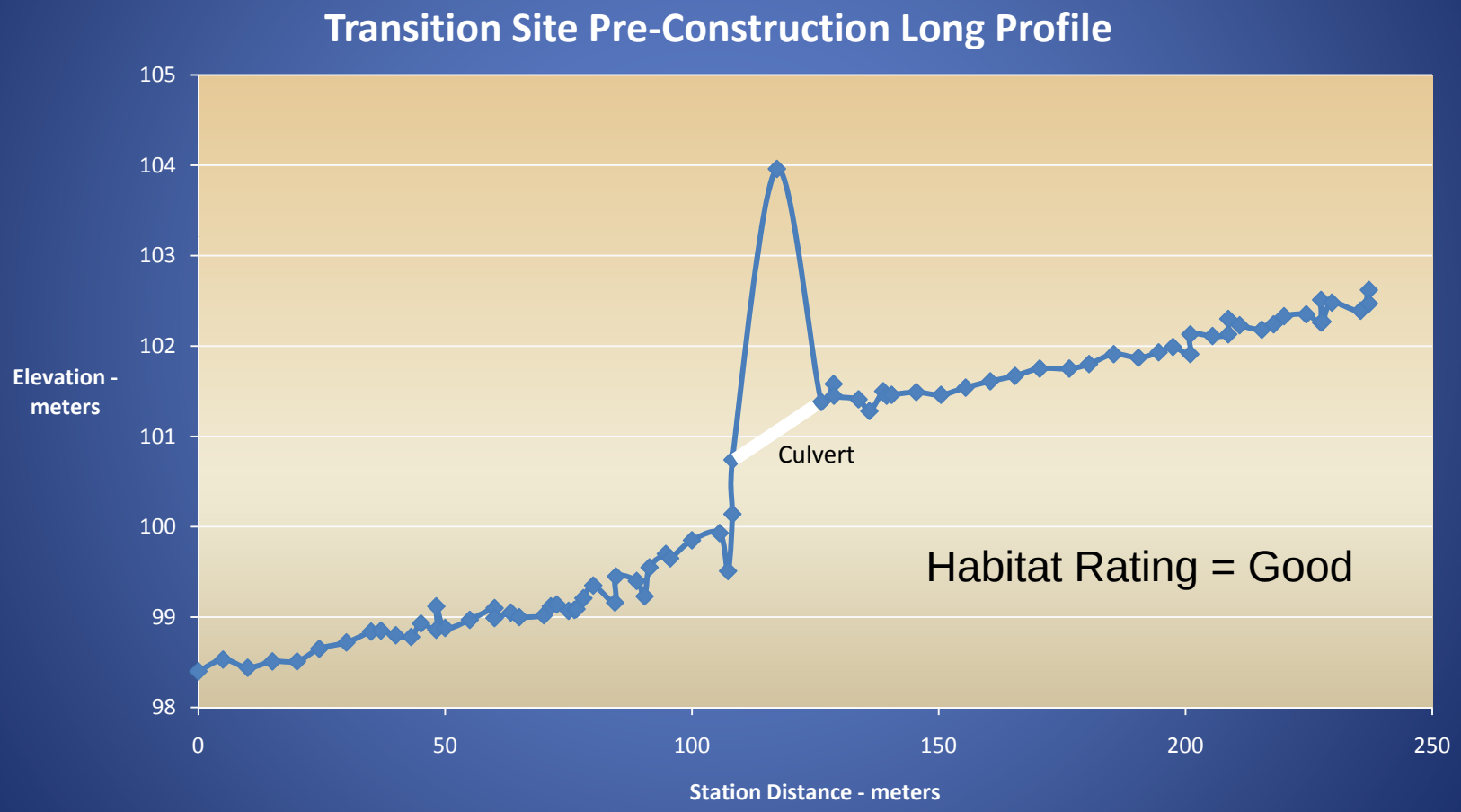
- Lyons IBI intends to characterize fish community in response to broad scale habitat conditions. Is this metric appropriate and sensitive enough for our purposes.
- Consider stream size in applying this metric to ensure adequate number of fish in hand.
- Pre sampling on treatment, control and reference reaches

Habitat Assumptions Driving Monitoring

- Erosion from sites has decreased
- Sediment from upstream head-cuts move effectively through the culvert and are carried downstream, improving habitat.
- Mobilized sediment from culvert replacement is not negatively impacting downstream habitat, such as the Bad River Sloughs.



Future Construction Site



Habitat Monitoring Question

- Has the channel morphology, slope, and sediment characteristics improved or restored (relative to reference reach), upstream, downstream and within the culvert and does this result in quality habitat?

Metrics and Protocols

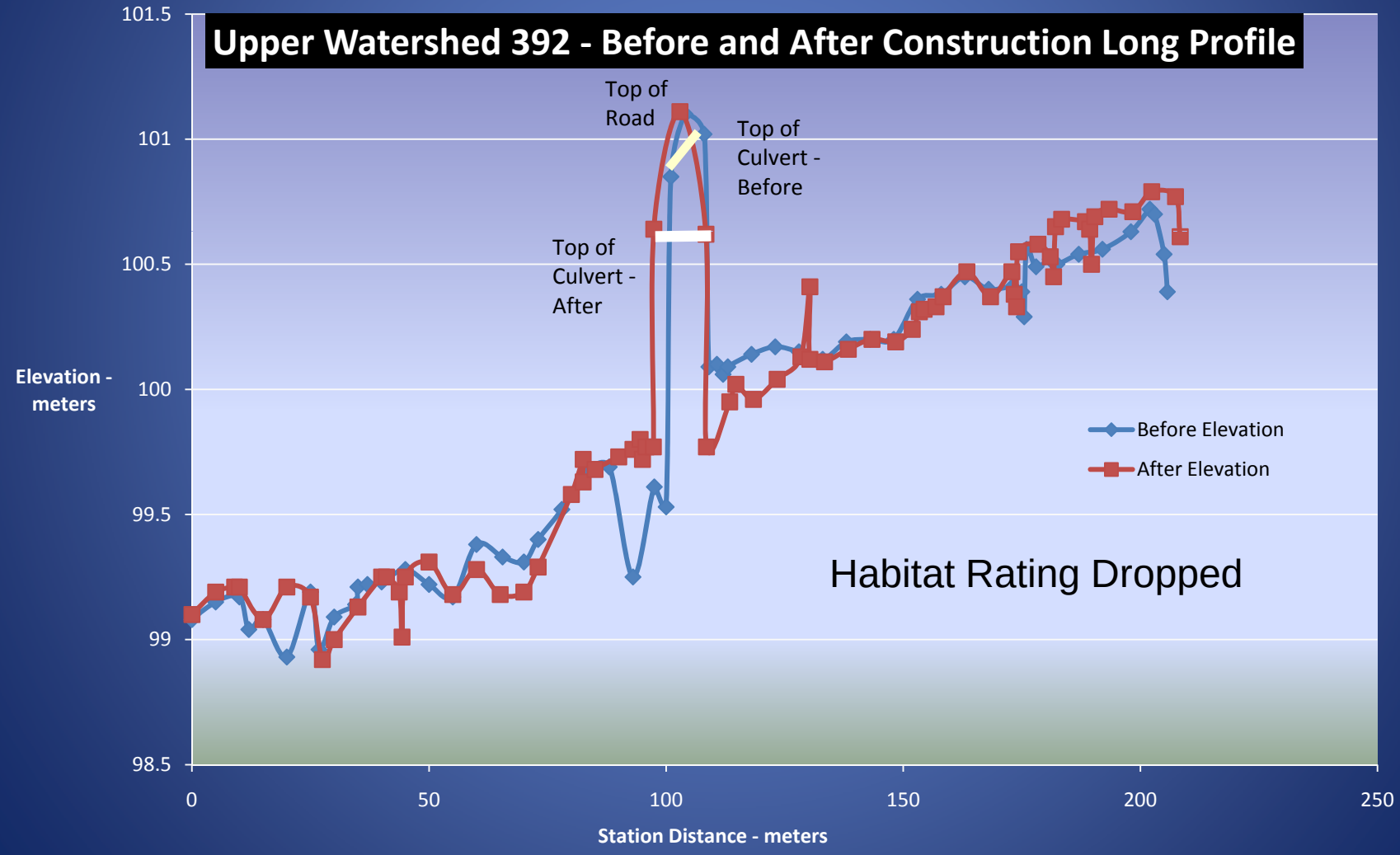
Metrics

- Channel Gradient
- Channel Dimensions
- Streambed Substrate Composition
- Fish Habitat Cover
- Habitat type
- Amount of Bank Erosion
- Depositional Bars

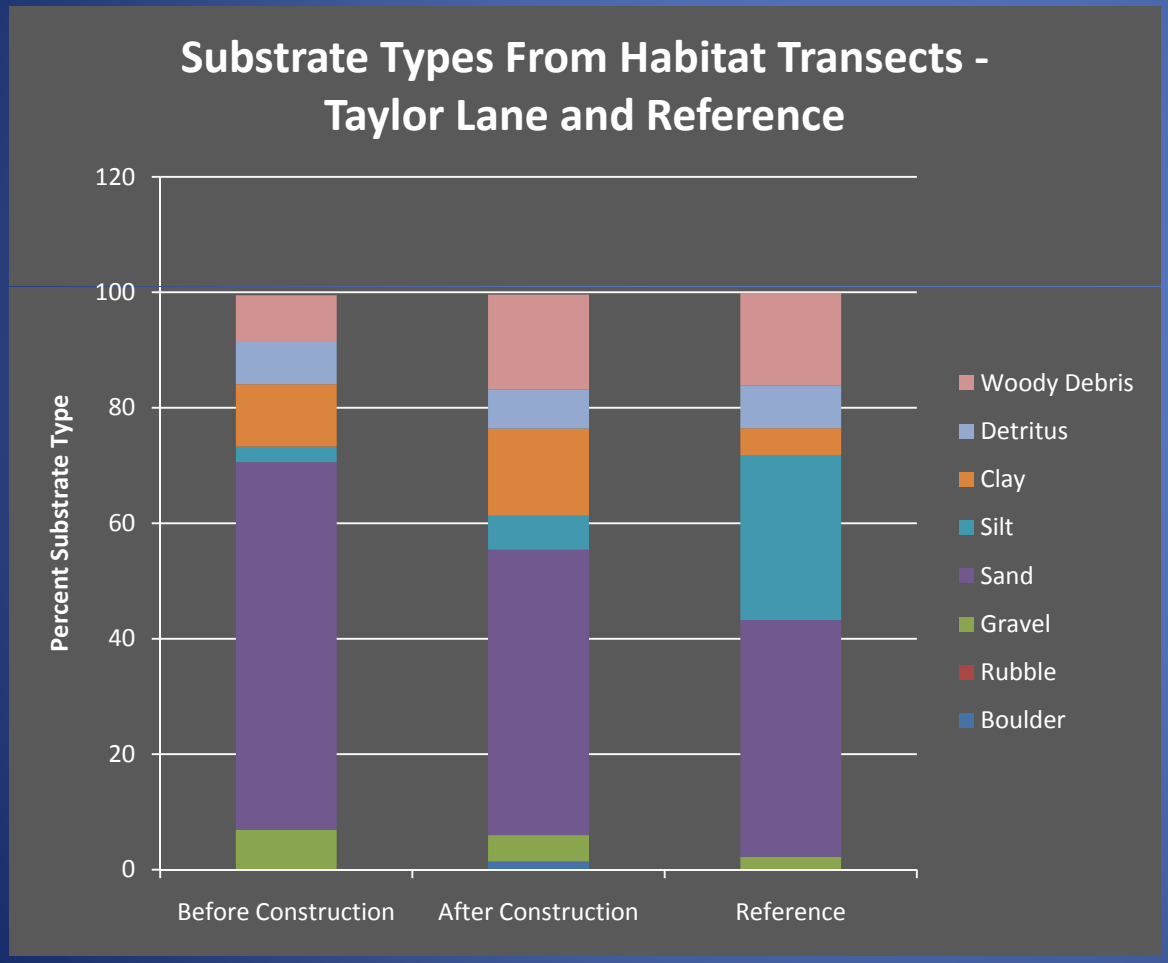
Protocols

- Longitudinal Profile
- Monumented Cross Sections
- Pebble Counts
- DNR WI DNR wadable stream guidelines for habitat
- Stream Map
- Photo Points

How Has Habitat Changed?
Fish Habitat and Sediment Movement



Substrate Changes – Upper Watershed Sites



Program Components to consider: Compare substrate data and pebble count

Overall Habitat Rating
Upper Watershed Sites

	Taylor Lane	Reference
Pre-Construction		
Above	55	35
Below	60	35
Post-Construction		
Above	45	NA
Below	50	NA

Rating from 0 to 75

- Summary data might not be as applicable as detailed data.
- Is this a good reference?

Next steps

Continue monitoring in summer 2010

Reconvene monitoring workshop attendees to evaluate program in fall 2010

1. Balance breadth and depth of monitoring questions/protocols
2. Revisit criteria for selecting reference and control sites
3. Consider separate protocols at different sites depending on watershed location and pre-construction site conditions
4. Duplication

Thanks to our Funders

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Questions?