

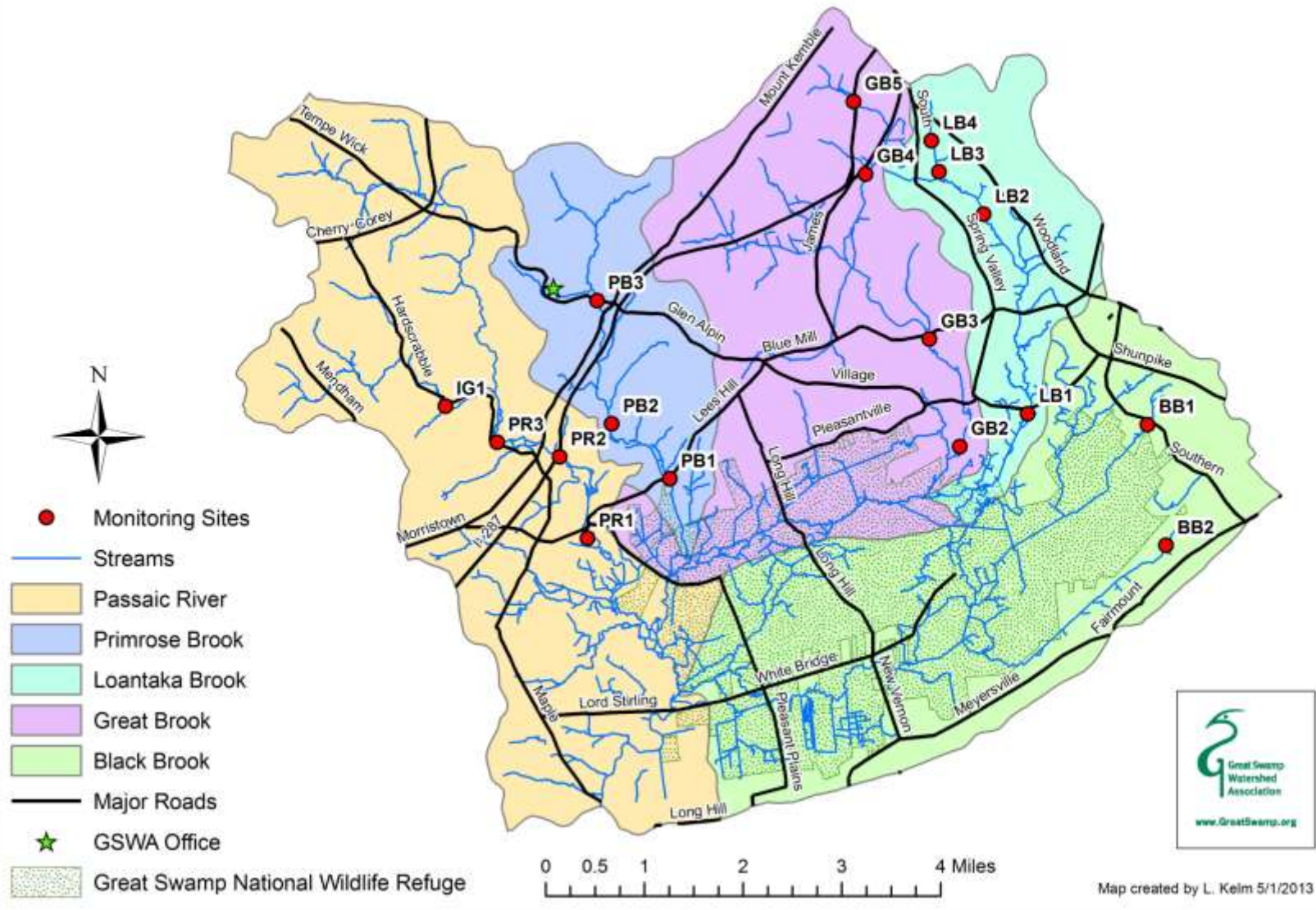
*** Macroinvertebrate
Communities of the Great
Swamp Watershed**

2012

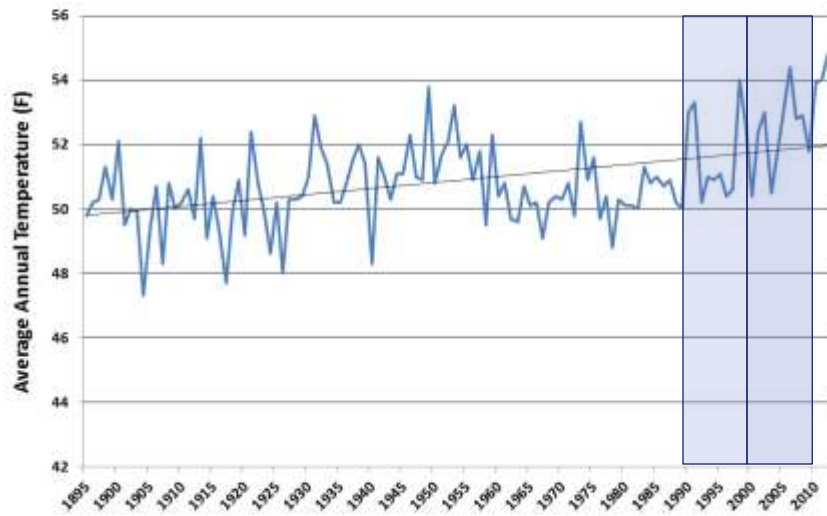
Lee Pollock

**Professor Emeritus
Drew University**

Macroinvertebrate Monitoring Sites in the Great Swamp Watershed

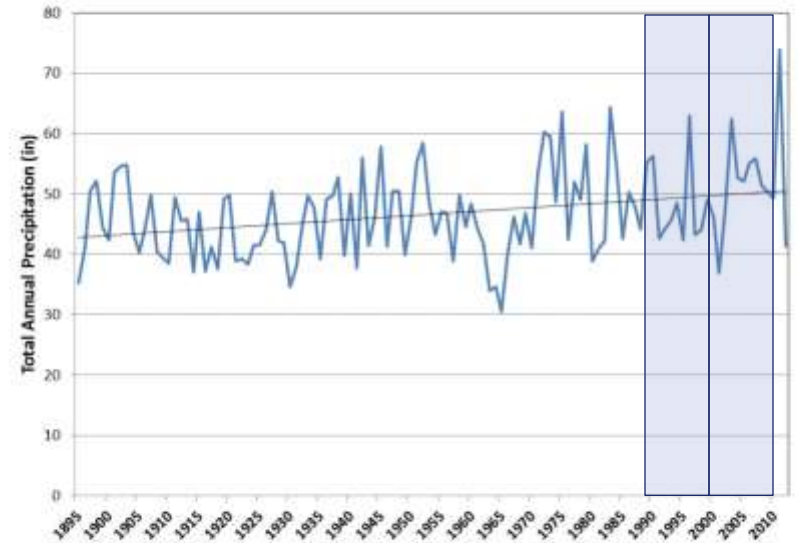


**Northern New Jersey
Average Annual Temperature (°F)**



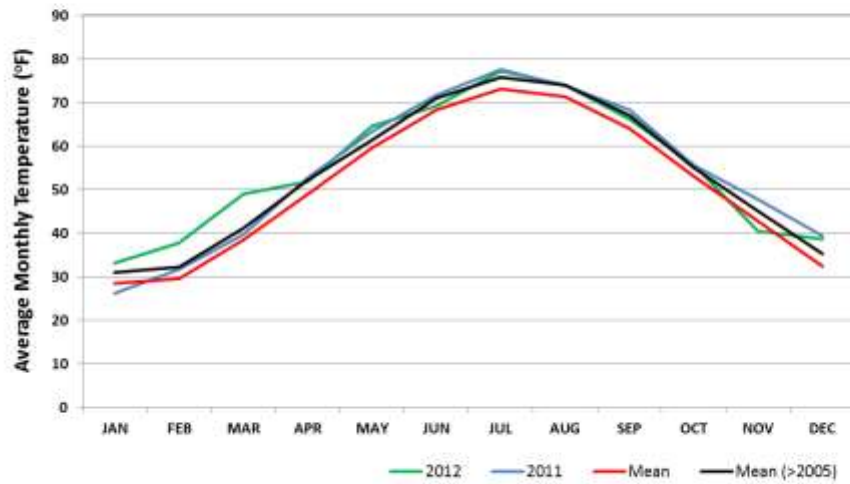
Source: http://climate.rutgers.edu/stateclim_v1/data/north_njhisttemp.html

**Northern New Jersey
Annual Precipitation (in)**



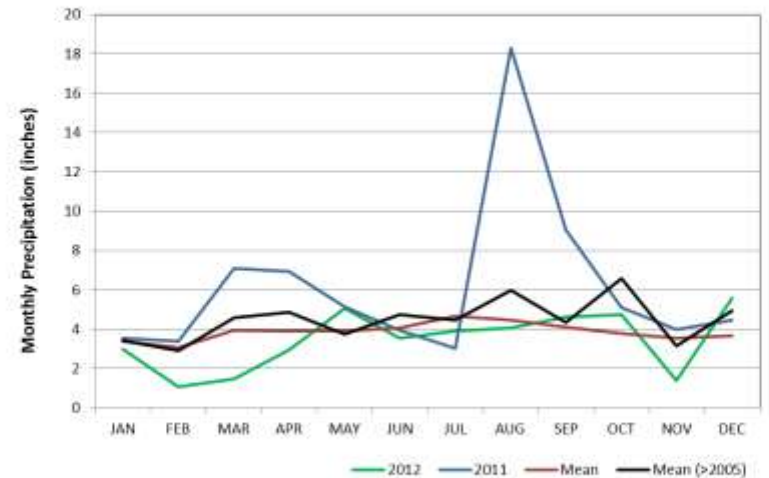
http://climate.rutgers.edu/stateclim_v1/data/north_njhistprecip.html

**Northern New Jersey
Average Monthly Temperature (°F)**



Source: http://climate.rutgers.edu/stateclim_v1/data/north_njhisttemp.html

**Northern New Jersey
Monthly Precipitation (inches)**



Source: http://climate.rutgers.edu/stateclim_v1/data/north_njhistprecip.html

Table 12-1. Great Swamp Watershed, May 25, 2012. Habitat Assessment

	B-IBI	temp	TDS	DO	pH	Turbidity	total	HabValue2
BB1	16	19.0	300.7	5.24	7.35	6.93	19.52	33
BB2	14	17.2	555	8.16	7.57	0.81	16.54	22
LB1	16	17.5	438.5	6.99	7.57	4.44	19	16
LB2	18	18.5	578	6.37	7.50	3.72	17.59	36
LB3	10	18.1	701	6.68	7.21	1.54	15.43	17
LB4	18	16.7	737	6.5	7.42	4.54	18.46	22
GB2	20	17.4	239.2	7.4	7.19	8.98	23.57	39
GB3	12	17.7	245.3	7.85	7.43	13.00	28.28	68
GB4	14	17.5	419.1	6.56	7.50	4.14	18.2	31
GB5	12	18.9	381	5.48	7.55	5.10	18.13	42
PB1	34	17.3	157.4	8.69	7.62	2.95	19.26	52
PB2	30	17.2	157.1	8.79	7.54	5.56	21.89	56
PB3	36	16.0	92.2	9.21	7.63	2.23	19.07	73
PR1	20	18.5	146	8.39	7.42	5.93	21.74	57
PR2	26	17.1	153.5	8.62	7.34	3.17	19.13	24
PR3	34	17.0	118.7	8.97	7.53	2.27	18.77	81
IG1	36	15.5	148.9	9.16	7.50	1.12	17.78	85

Fig. 03-4 Great Swamp Streams Bimonthly pH, 2003

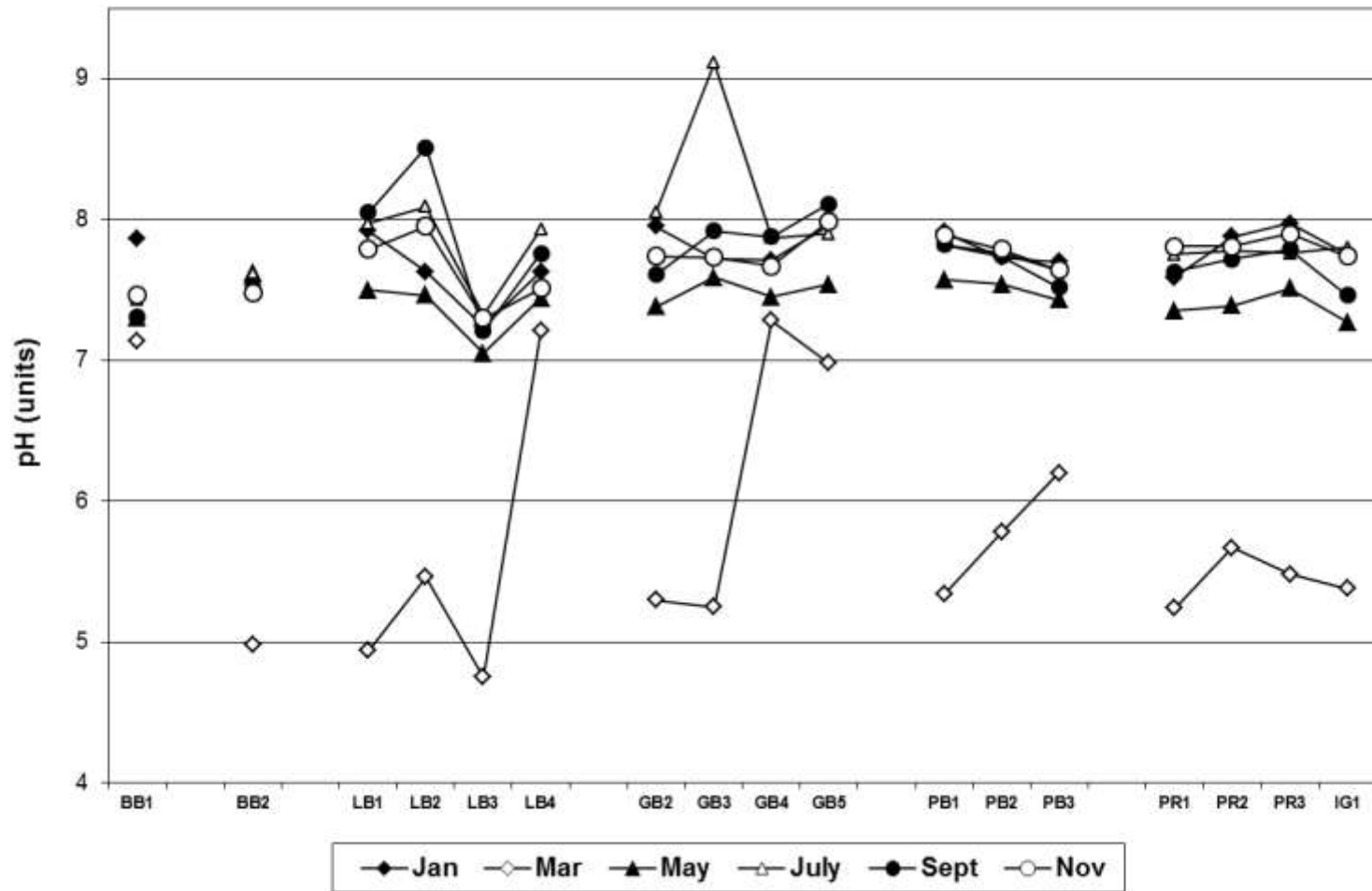
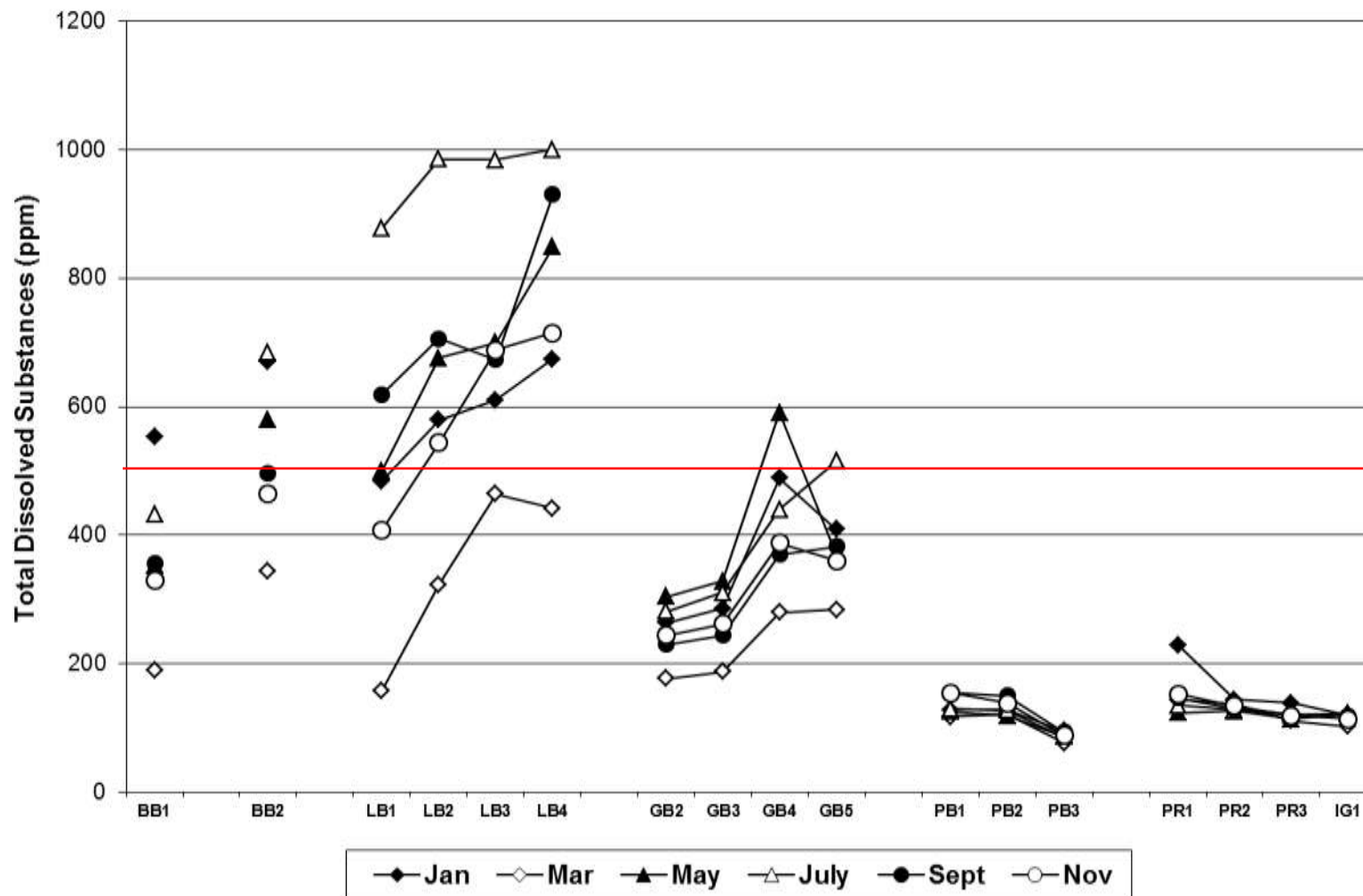


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PB3	36	16.0	92.2	9.21	7.63	2.23	19.07	73
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PR3	34	17.0	118.7	8.97	7.53	2.27	18.77	81
IG1	36	15.5	148.9	9.16	7.50	1.12	17.78	85

Fig. 03-2 Great Swamp Streams Bimonthly TDS, 2003



- Macroinvertebrates (MIVs)

- Direct, integrative measure of water quality
- Provide historical information
- Can be used to identify impairment sources
- Both broad dispersal as adults and limited mobility as nymphs/larvae
- Normally abundant
- Easy & inexpensive to sample and identify





riffle

pool

riffle

pool

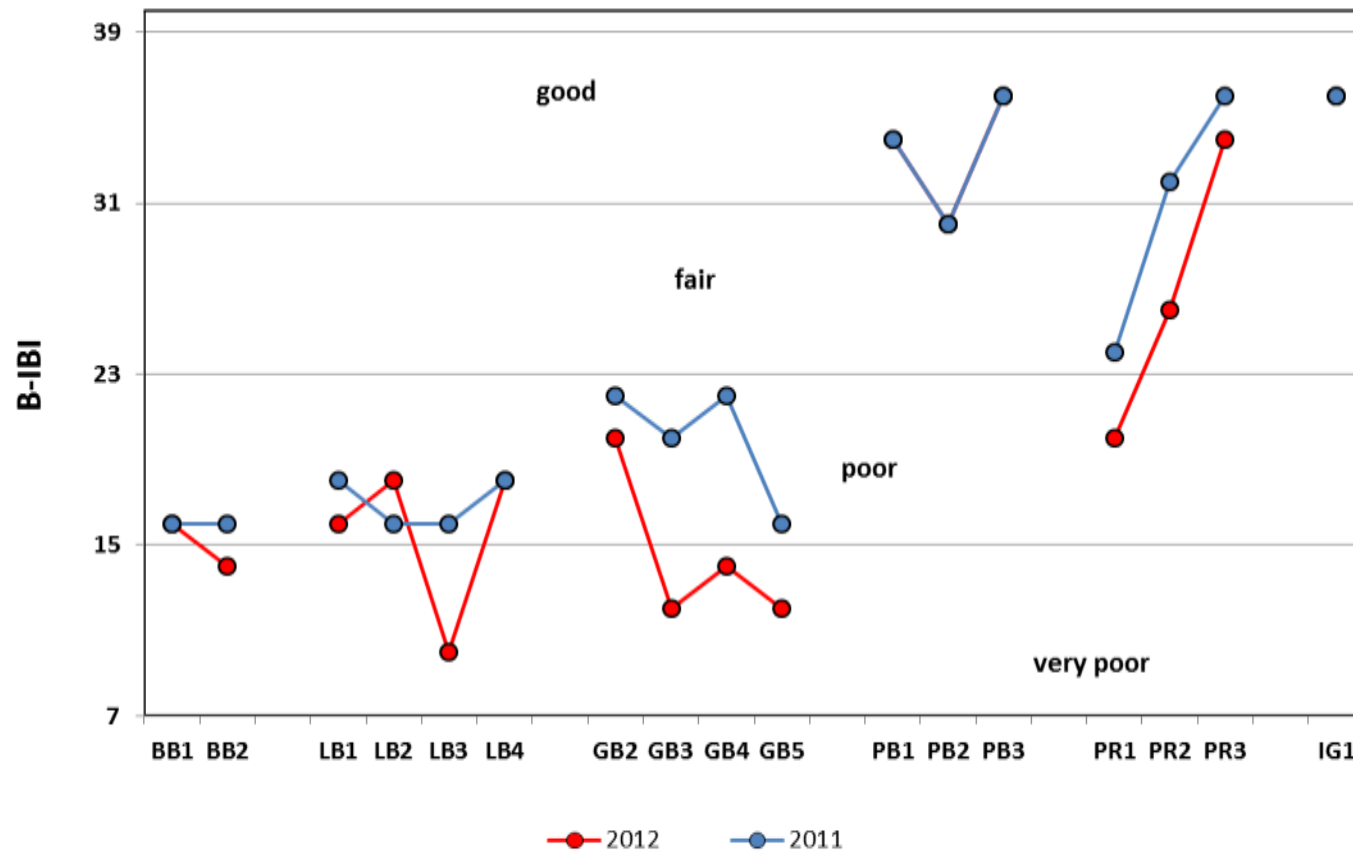


	BB1		RB1		Scoring Table		
	2008	2007	2008	2007	1	3	5
Dominance	0.485	0.724	0.310	0.590	>.75	.75-.5	<.5
Taxa	33	21	31	26	<12	12-20	>20
%Predators	0.051	0.008	0.138	0.067	<.025	.025-.1	>.1
Ind Intolerant	3	3	3	6	<2	2-4	>4
#Ephem	4	3	4	6	<2	2-5	>5
#Trich	6	4	9	5	<2	2-5	>5
#Plec	1	0	2	3	<2	2-4	>4
Ind Tolerant	3	3	2	2	>4	4-2	<2
					High	Low	
					Stress Level		
B-IBI Scores							
Dominance	5	3	5	3			
Taxa	5	5	5	5			
%Predators	3	1	5	3			
Ind Intolerant	3	3	<u>3</u>	5			
#Ephem	3	3	<u>3</u>	5			
#Trich	5	3	5	3			
#Plec	1	1	3	3			
Ind Tolerant	3	3	3	3			
B-IBI Total	28	22	32	30			
	BB1		RB1				

Calculating the Benthic Index of Biological Integrity B-IBI

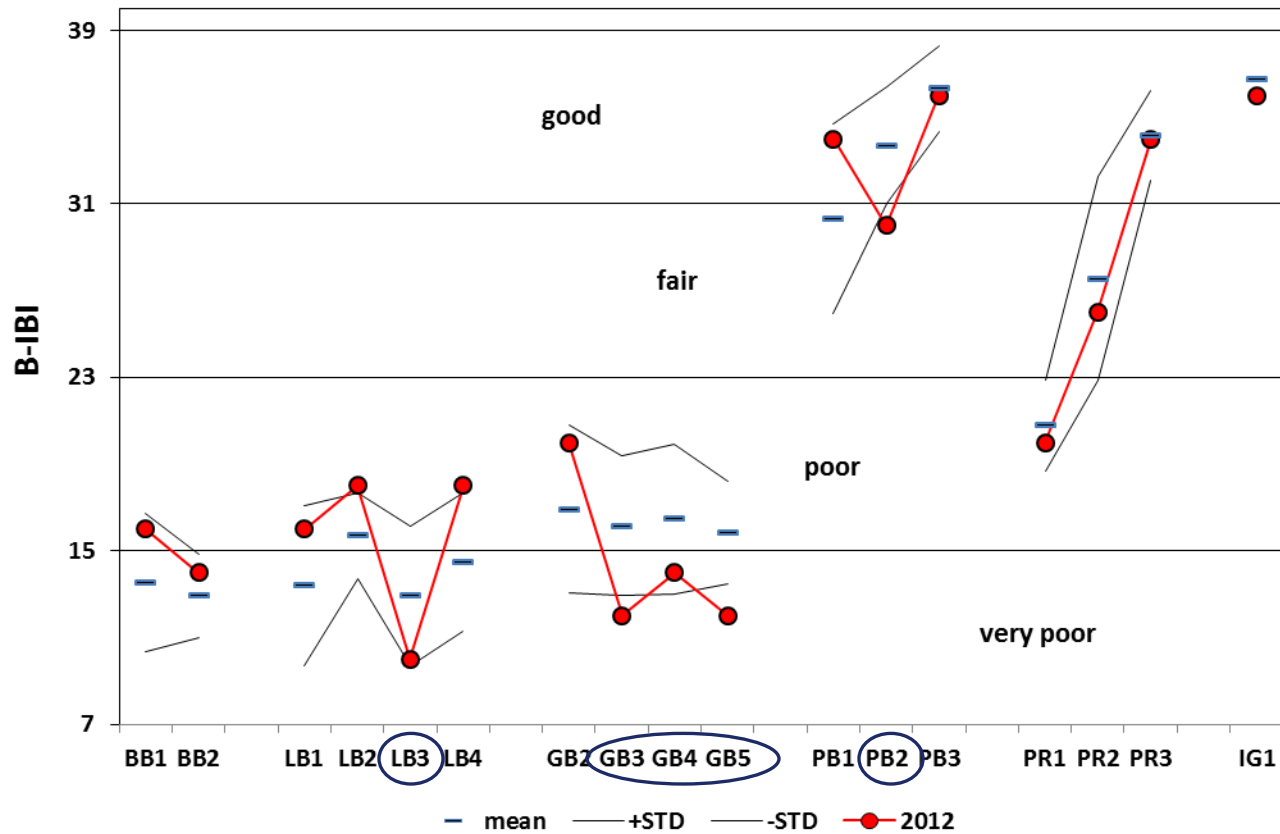
Great Swamp Streams

B-IBI Summer, 2012 vs Summer, 2011

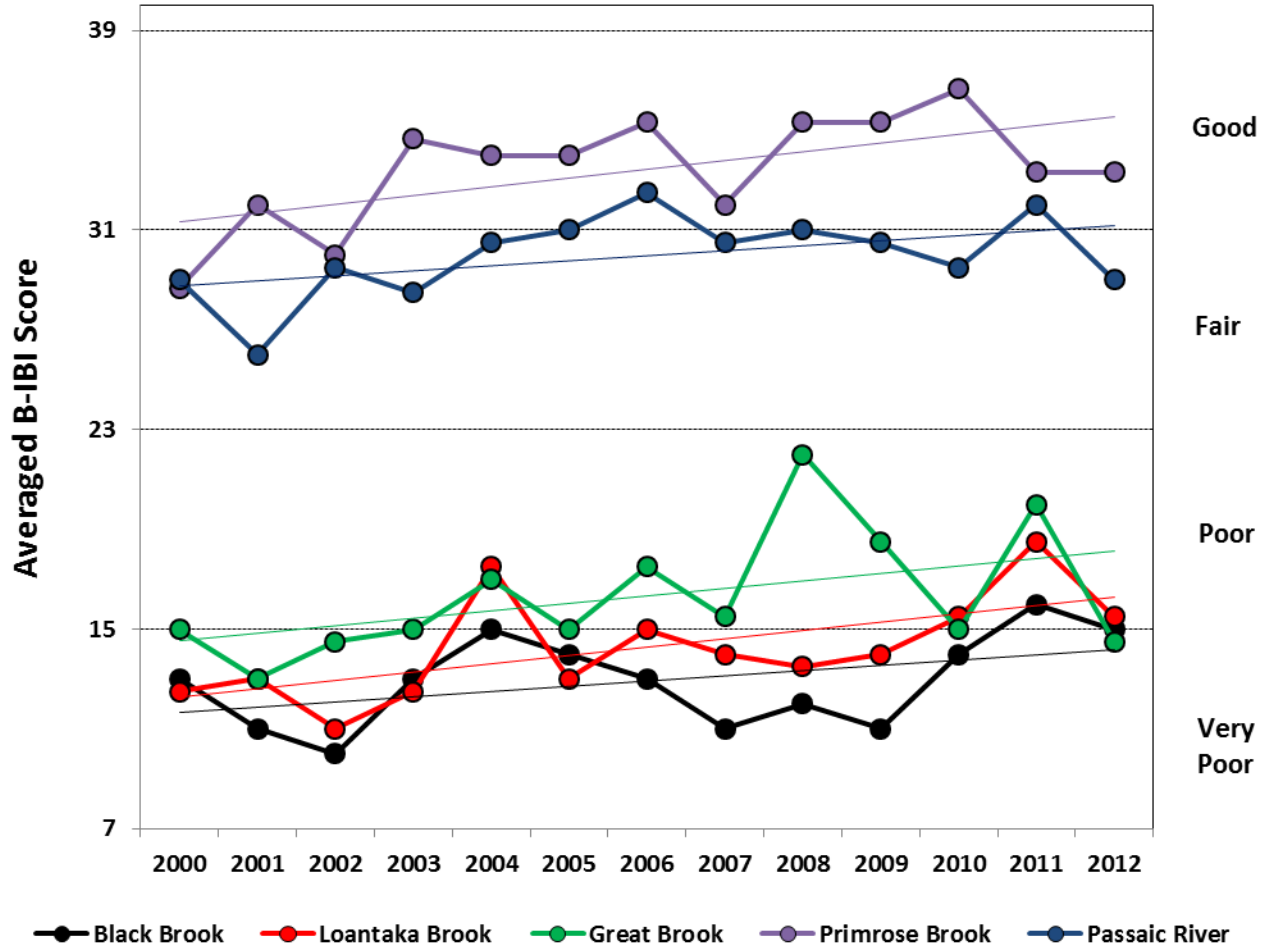


Great Swamp Streams

Summer 2012, Mean +/- STD (2000-2012)



Great Swamp Watershed Streams Averaged Annual B-IBI Scores, 2000-2012



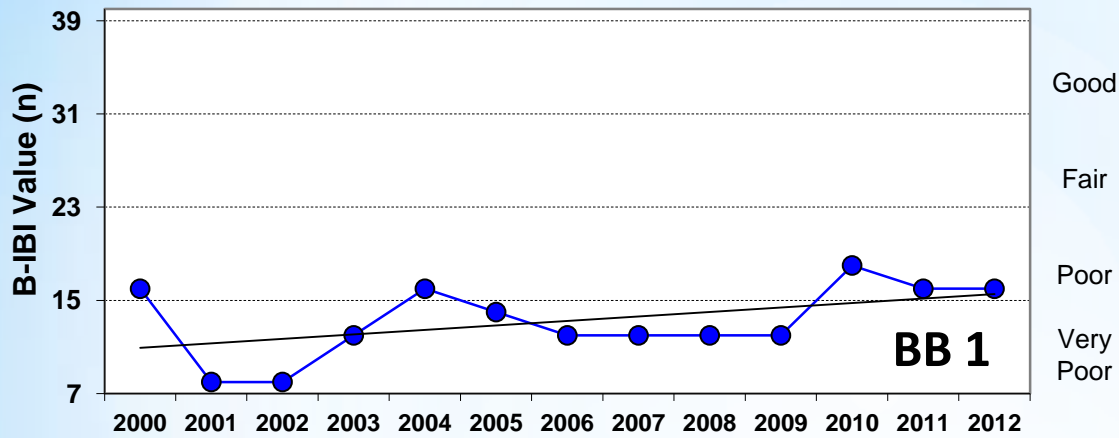
Southern Boulevard, Chatham Township
Golf course; heavily traveled roadway

* BB 1



Southern Boulevard, Chatham Township
Golf course; heavily traveled roadway





* **BB 1**

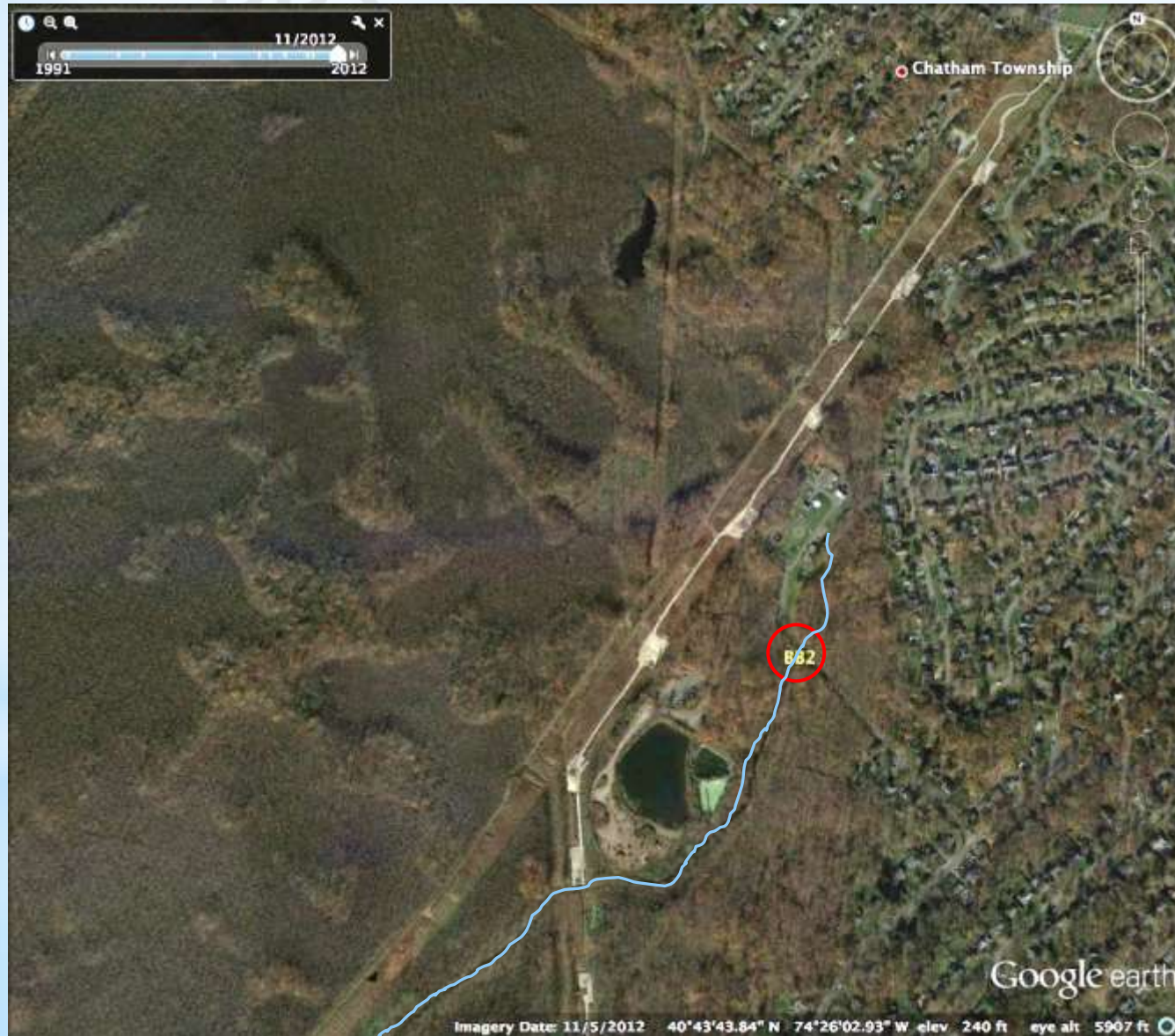
Small, slow flow
High temperature,
oil films

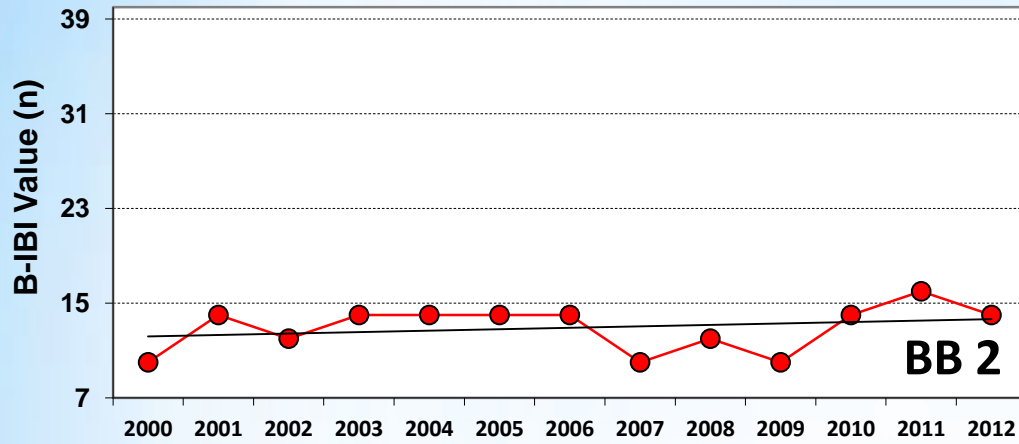
Good
Fair
Poor
Very Poor



*BB2

Drainage channel, STP





Good

Fair

Poor

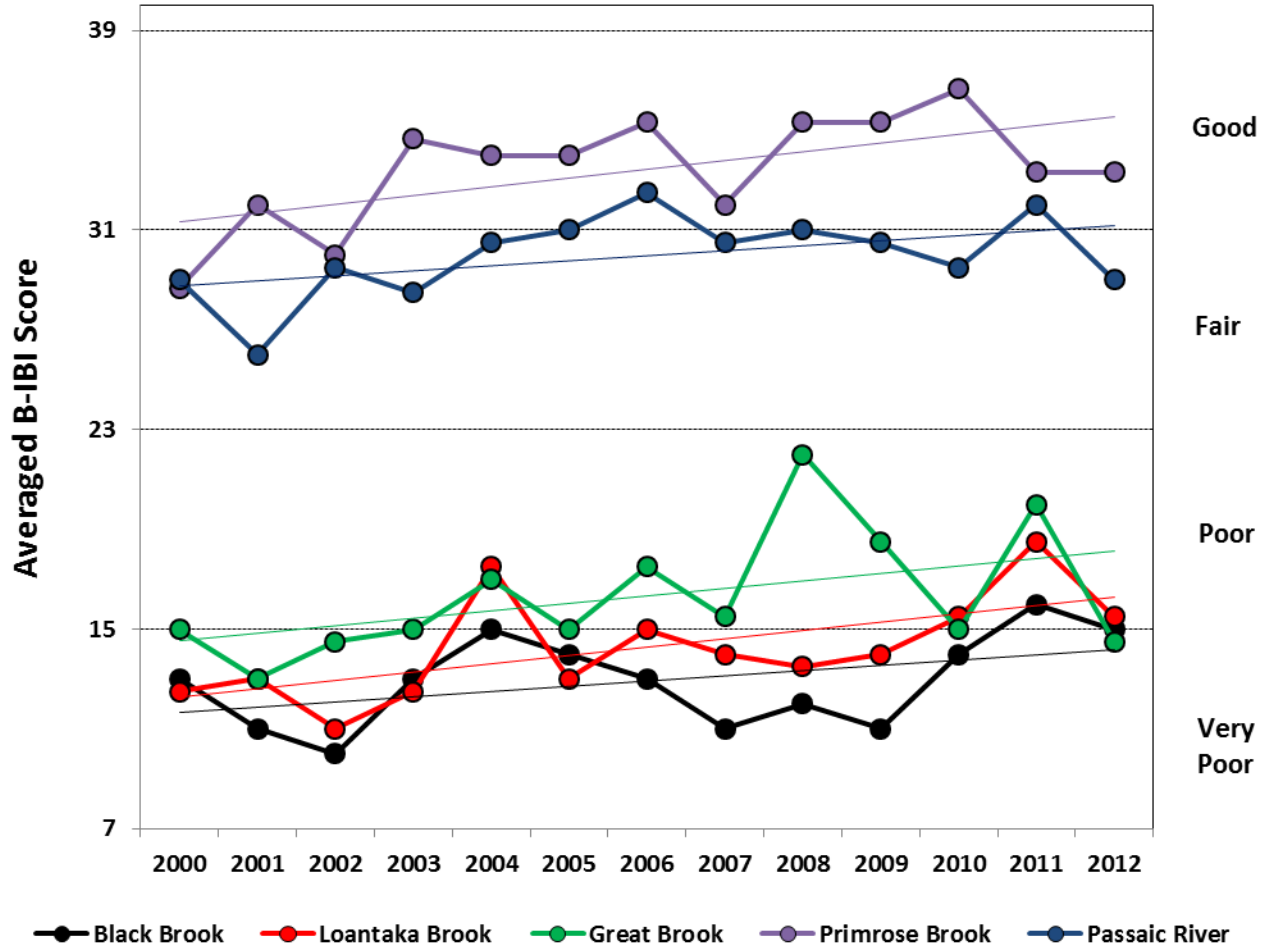
Very Poor

* **BB2**

Sandy, poor substrate
High TDS (> NJS)

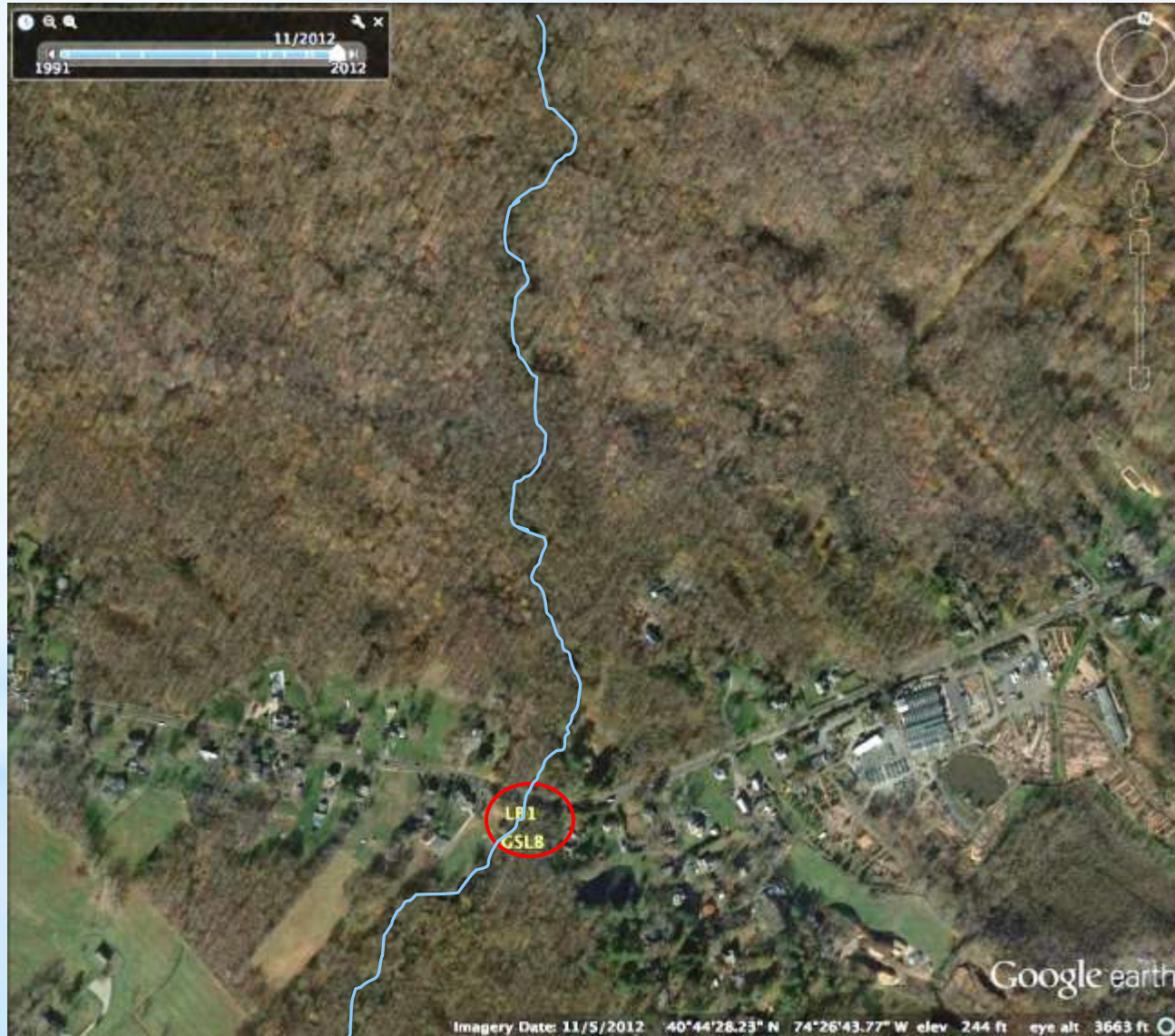


Great Swamp Watershed Streams Averaged Annual B-IBI Scores, 2000-2012



GSWA monitoring site
High turbidity, sediments
Diluted but high TDS

* LB1



GSWA monitoring site
High turbidity, sediments
Diluted but high TDS

* LB1
FBI

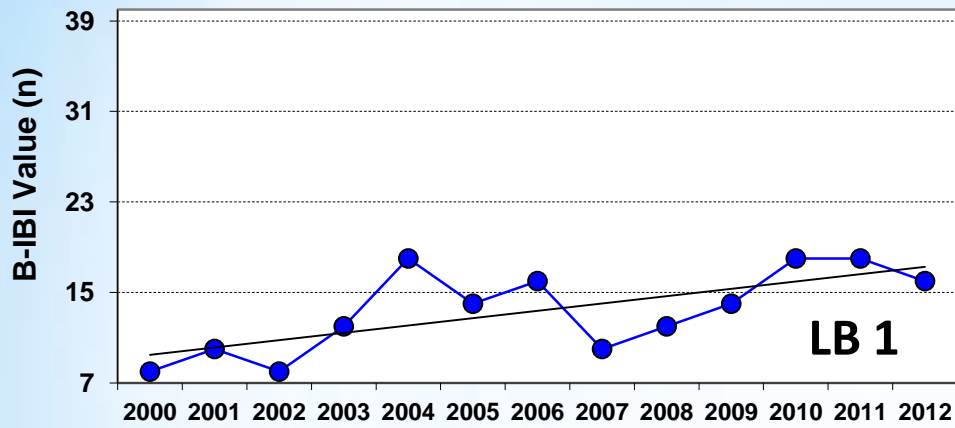


©2010 Google

Imagery Date: 6/17/2010 1991

40°44'19.21" N 74°26'39.36" W elev: 241 ft

Eye alt: 3790 ft



Good
Fair
Poor
Very Poor

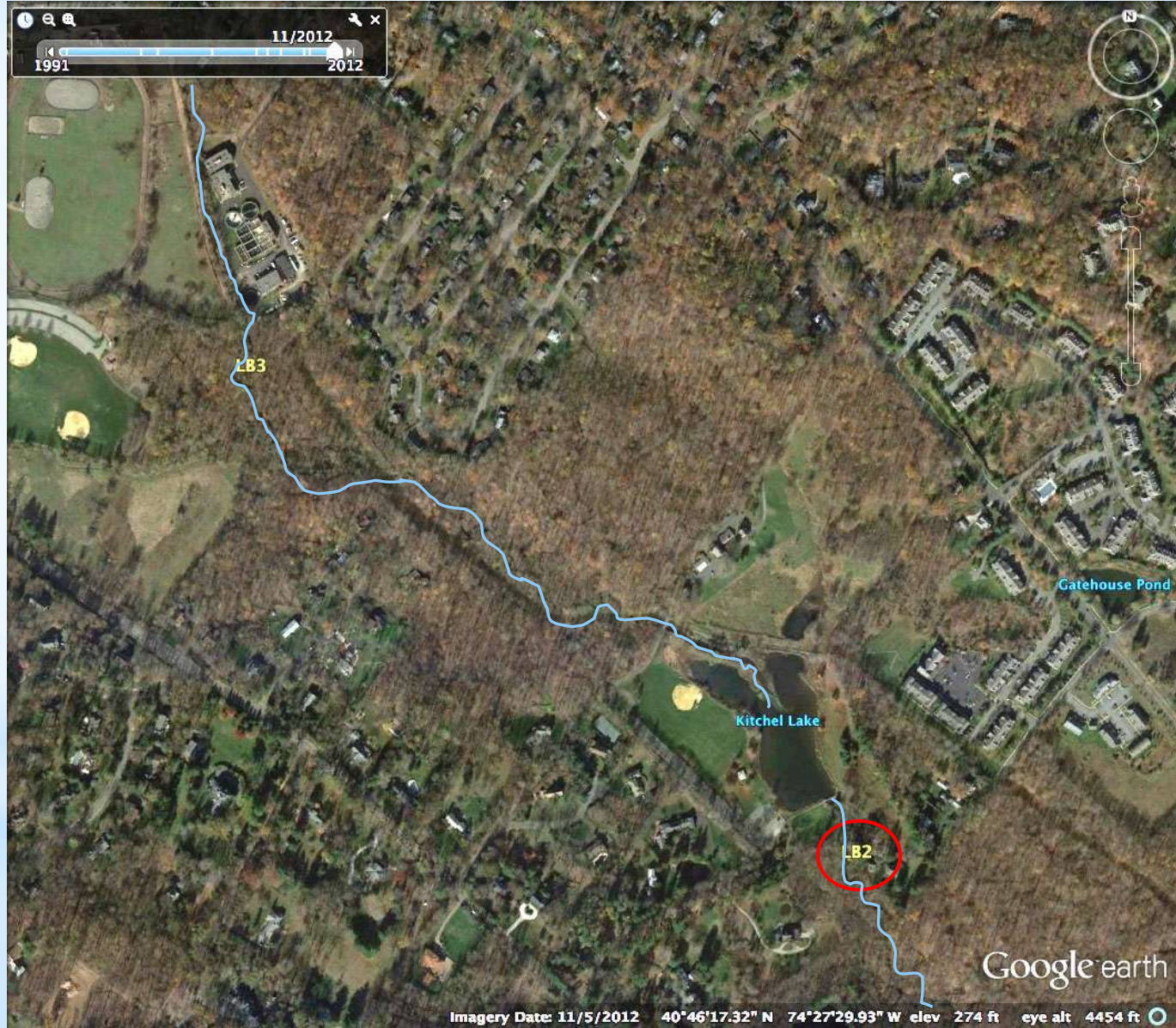


Limited substrate



Bank erosion

*LB2





LB2

Eutrophic Kitchell Pond

© 2008 Sanborn

© 2008 Tele Atlas

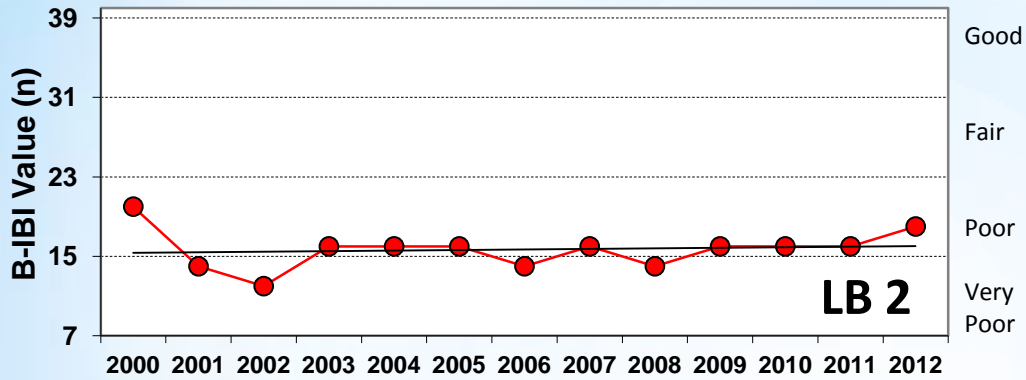
© 2007 Google

Pointer 40°46'06.32" N 74°27'17.33" W

Streaming 100%

Eye alt 1627 ft

*LB2

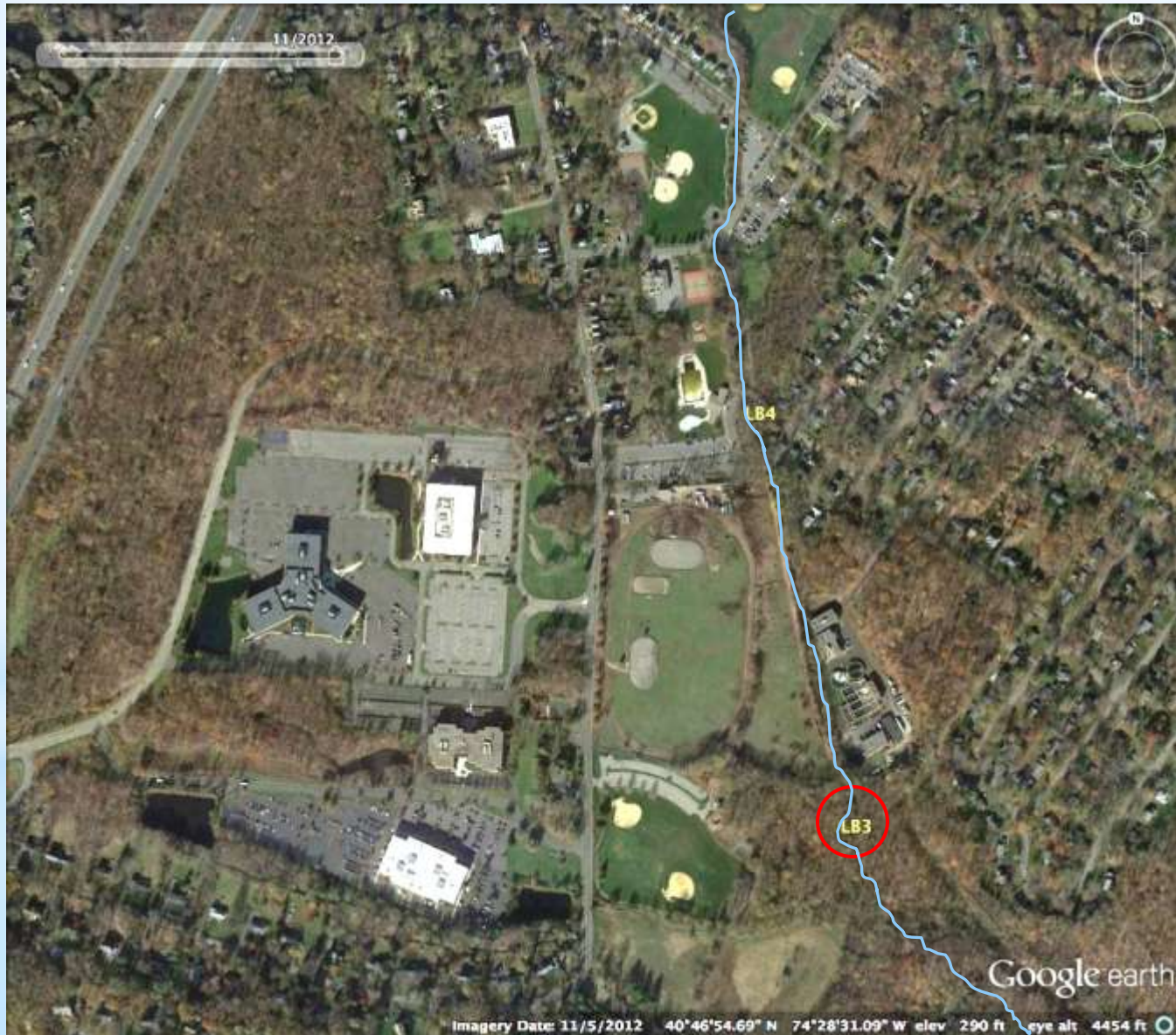


High temperature,
low DO, detritus
High TDS >NJS, chemical smell



Morris Township STP
Strong chemical smell
High TDS

 **LB3**





LB3

Image © 2007 State of New Jersey

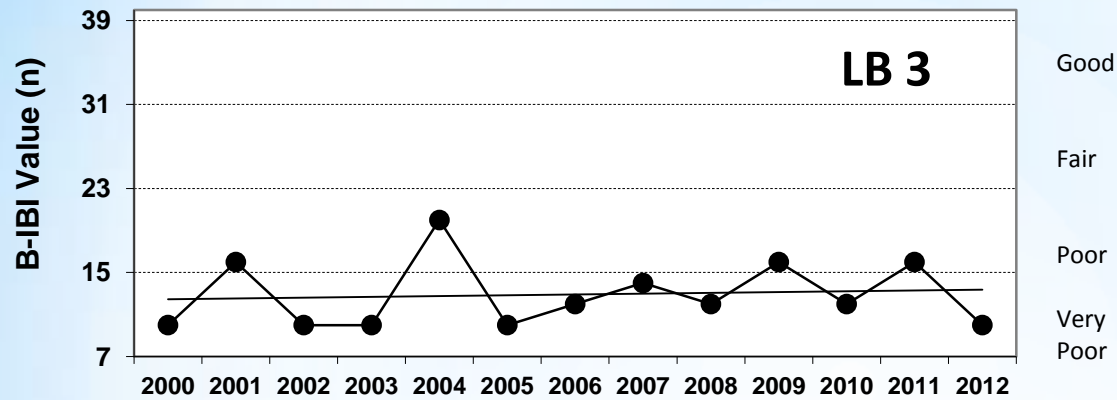
© 2006 Google™

Pointer 40°46'25.40" N 74°27'48.97" W elev 289 ft Streaming ||||| 100%

Eye alt 1860 ft

*LB3

Very limited substrate -
shifting sands,
TDS = 701 mg/L; >>NJS



Good

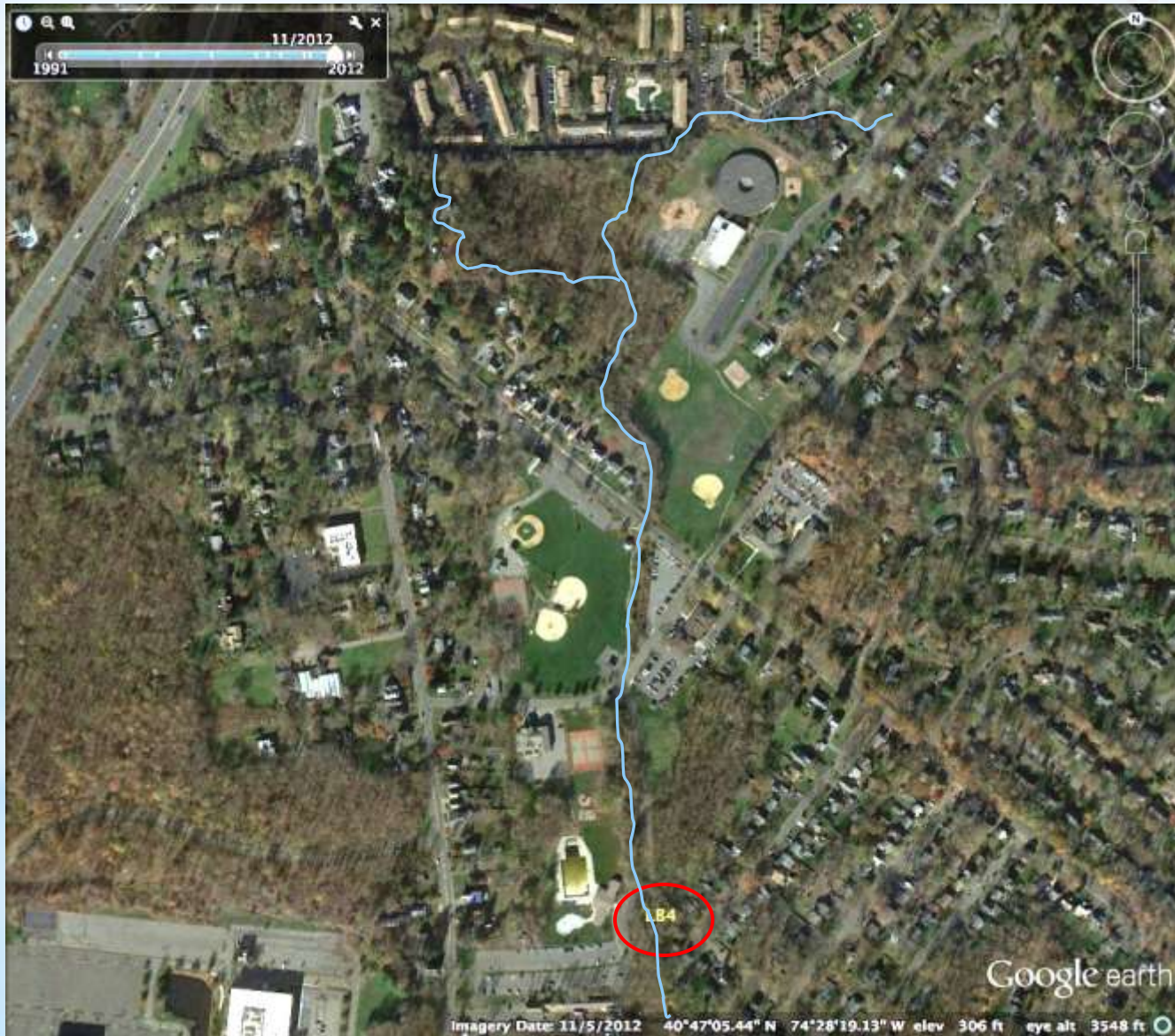
Fair

Poor

Very
Poor

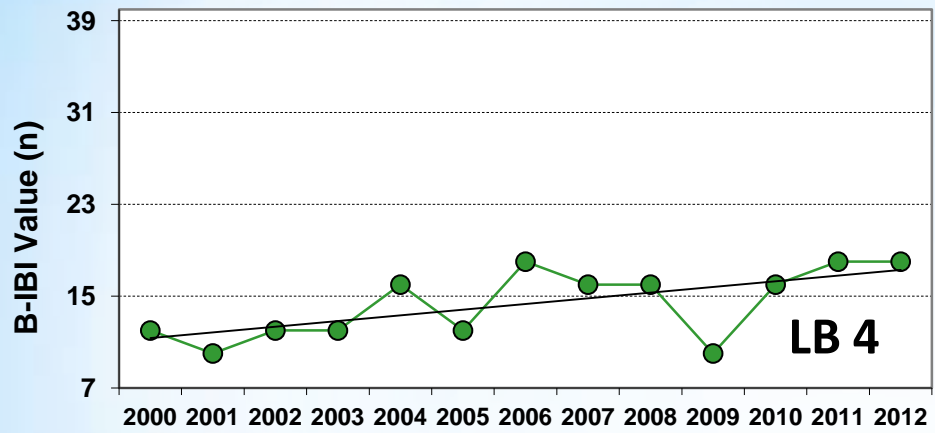


Fanok Road municipal pool
Channelized ditch



Fanok Road municipal pool
Channelized ditch





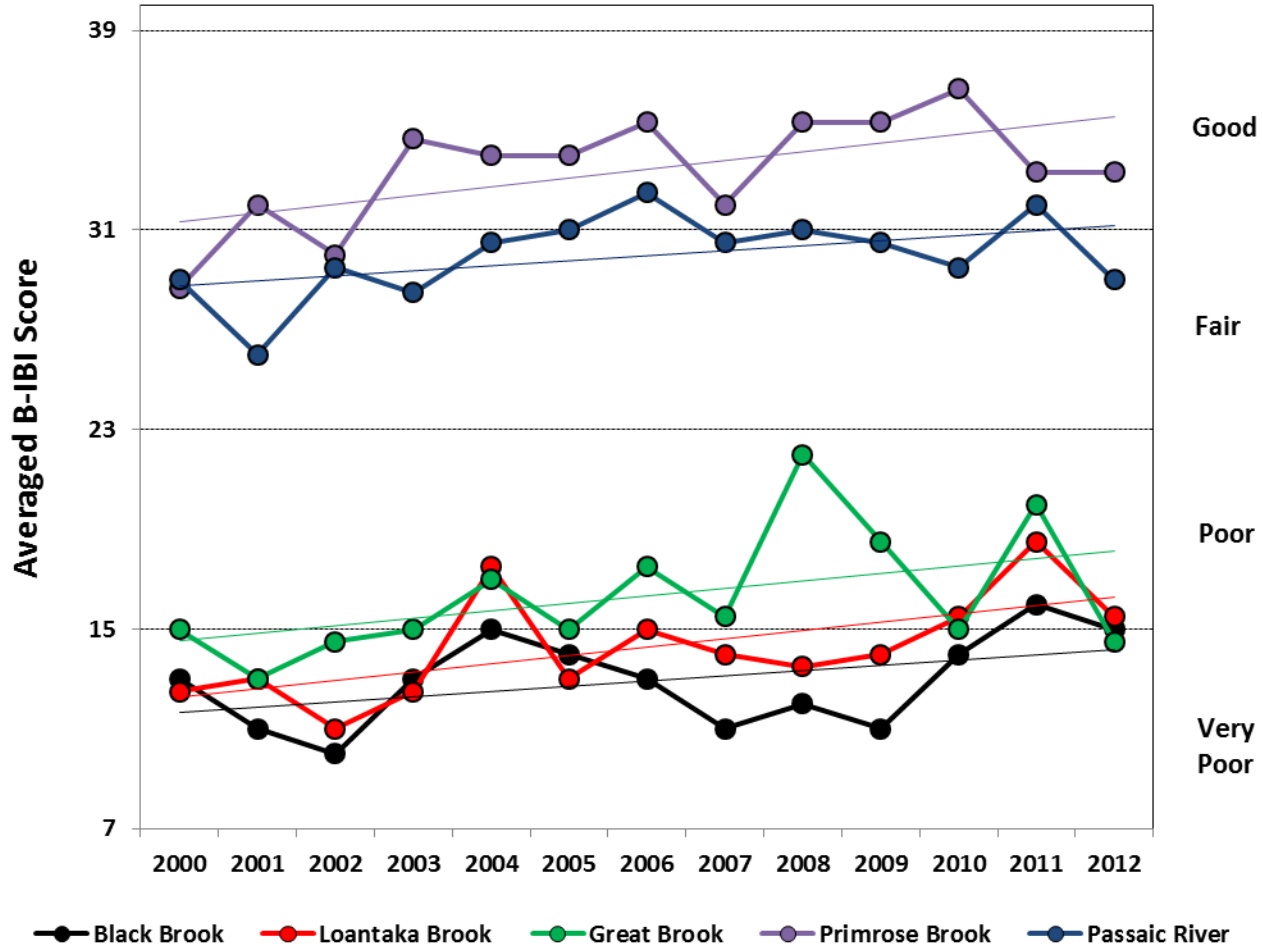
Good
Fair
Poor
Very Poor

* **LB4**

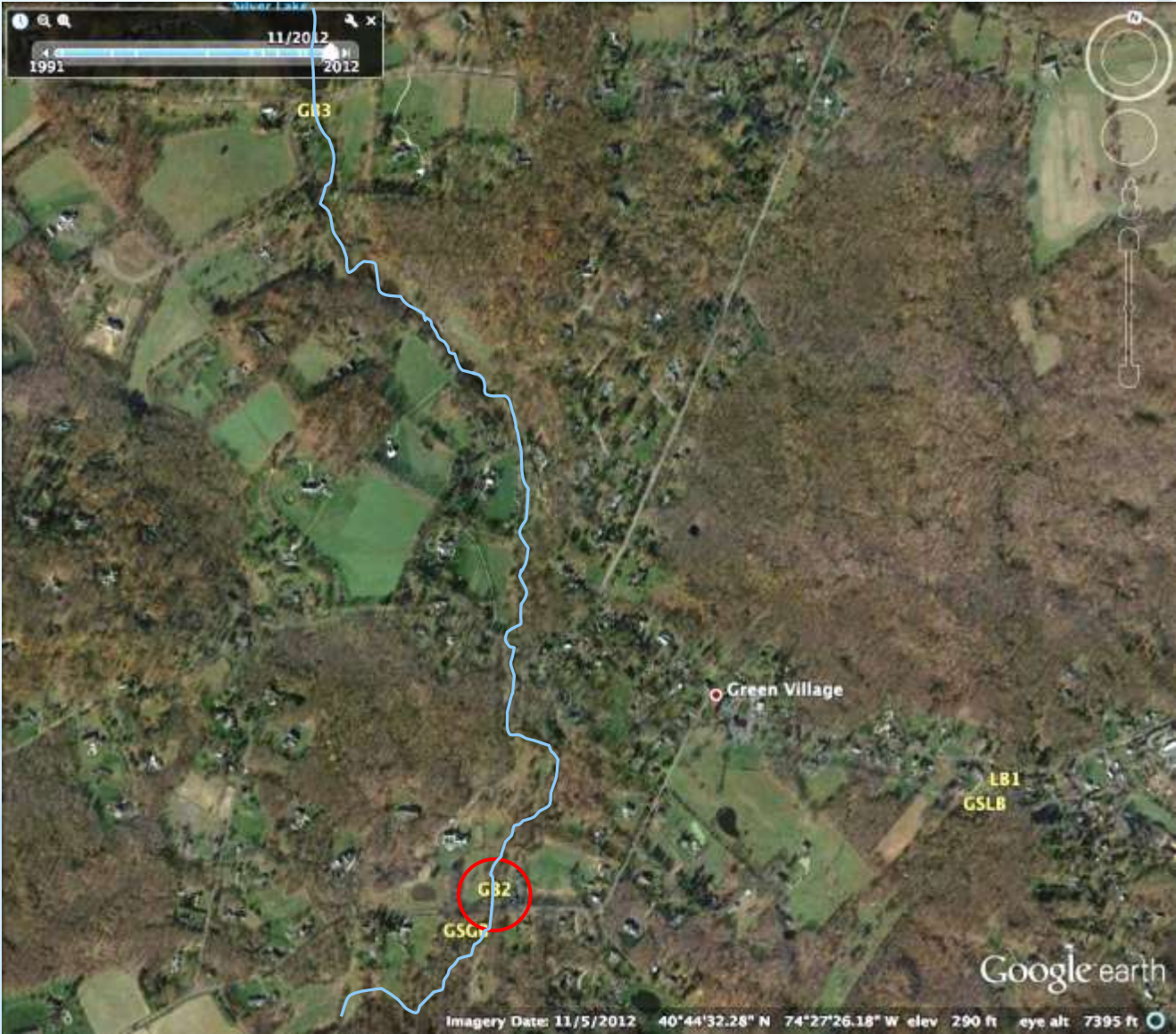
Little MIV substrate,
TDS = 737 mg/L
>>NJS



Great Swamp Watershed Streams Averaged Annual B-IBI Scores, 2000-2012

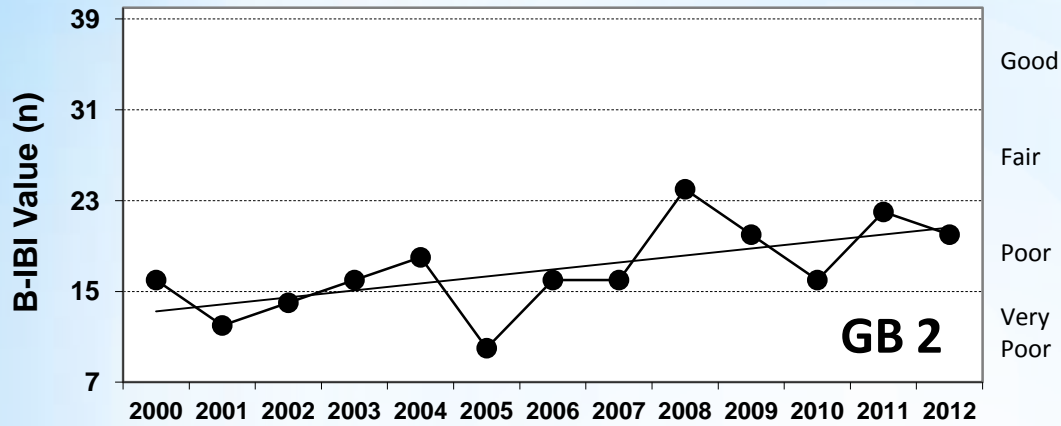


GSWA monitoring site



GSWA monitoring site
Sedimentation – but mussels





Poor substrate diversity,
 High turbidity –
 silt bar expanding

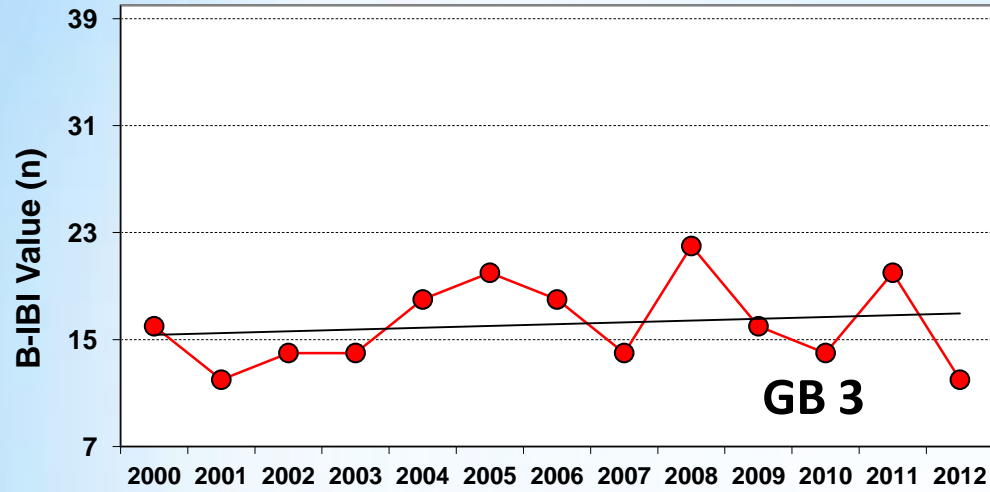


Below Silver Lake



Below Silver Lake





Good

Fair

Poor

Very Poor

 **GB3**

Good substrate
 High temperature,
 Very high turbidity –
 silt & debris

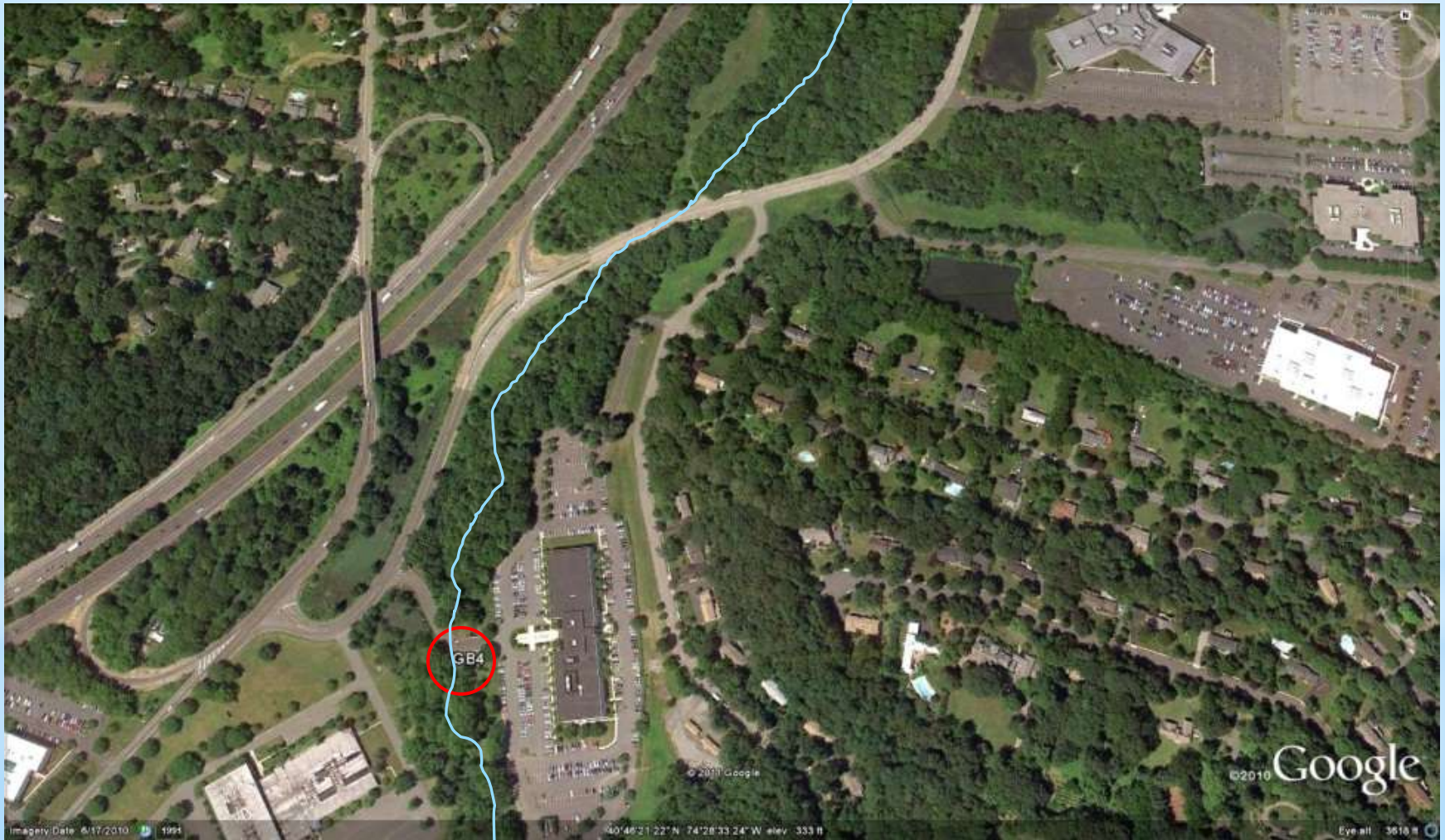


Office complex
Parking lots, retention ponds, I-287

*GB4

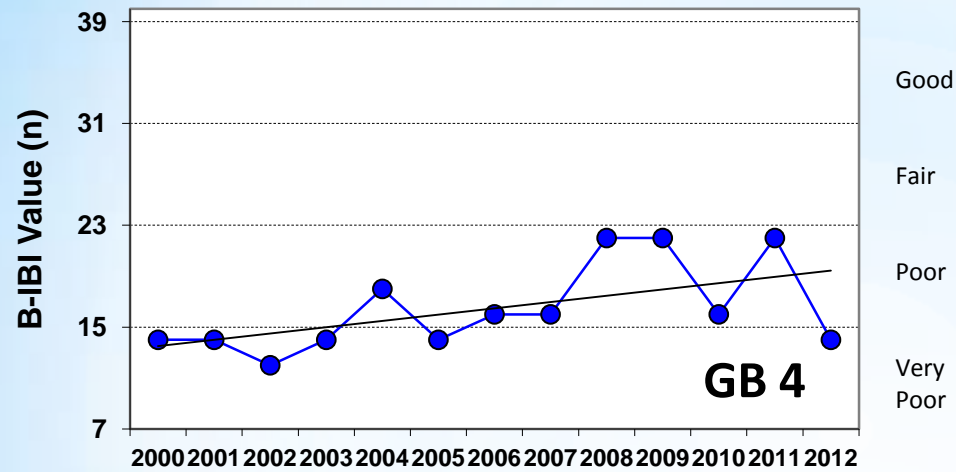


Office complex
Parking lots, retention ponds, I-287





Poor substrate,
High TDS & silt,
2012: 8 fewer Spp



Good

Fair

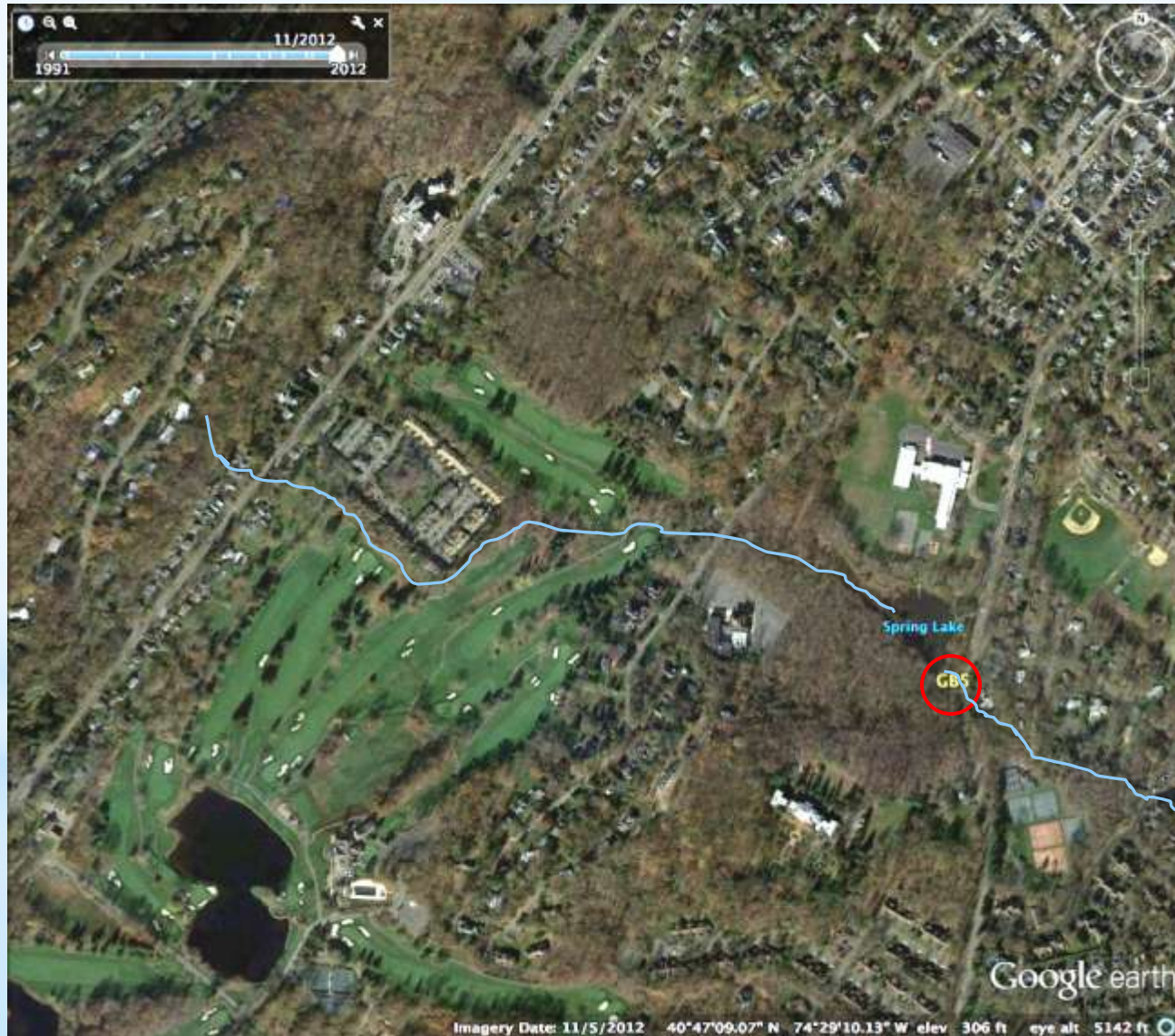
Poor

Very

Poor

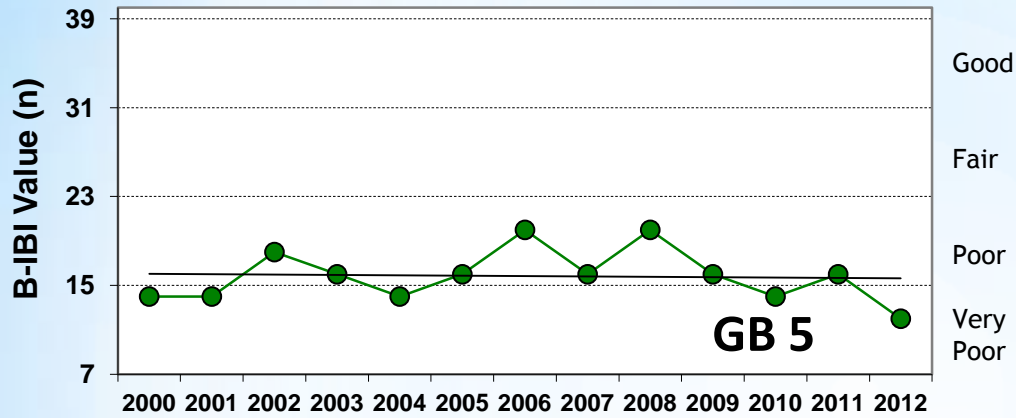


James Street, Footes Pond
Eutrophic, silty
Golf course upstream



James Street, Footes Pond
Eutrophic, silty
Golf course upstream





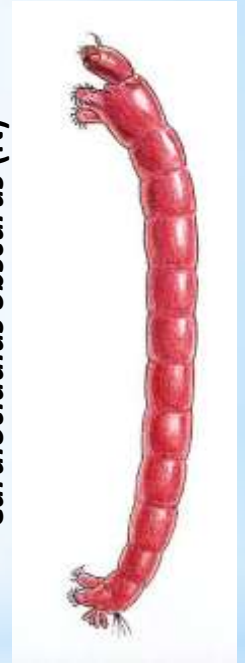
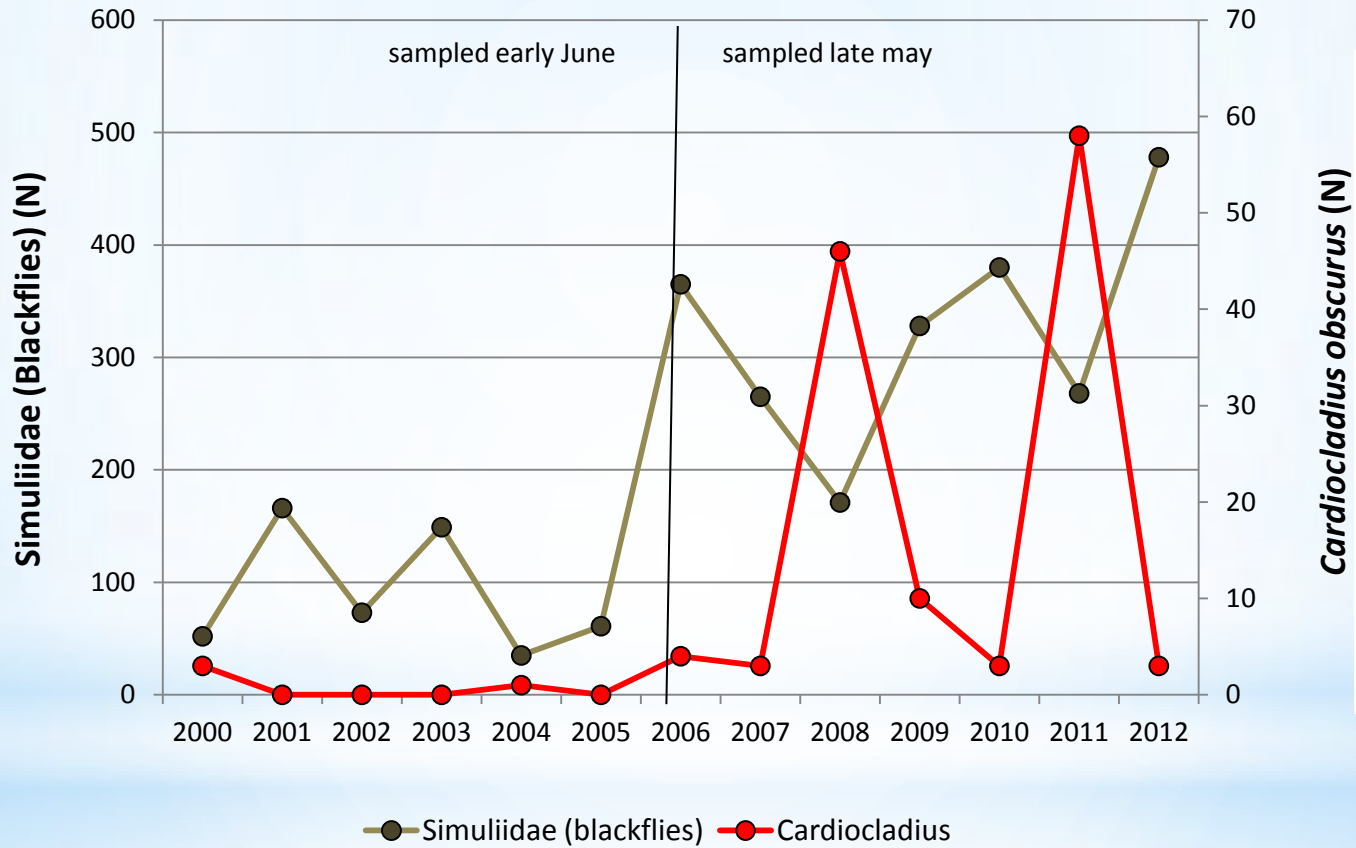
 **GB5**

Temperature high,
Low DO,
Thick silt & algae
cover substrate



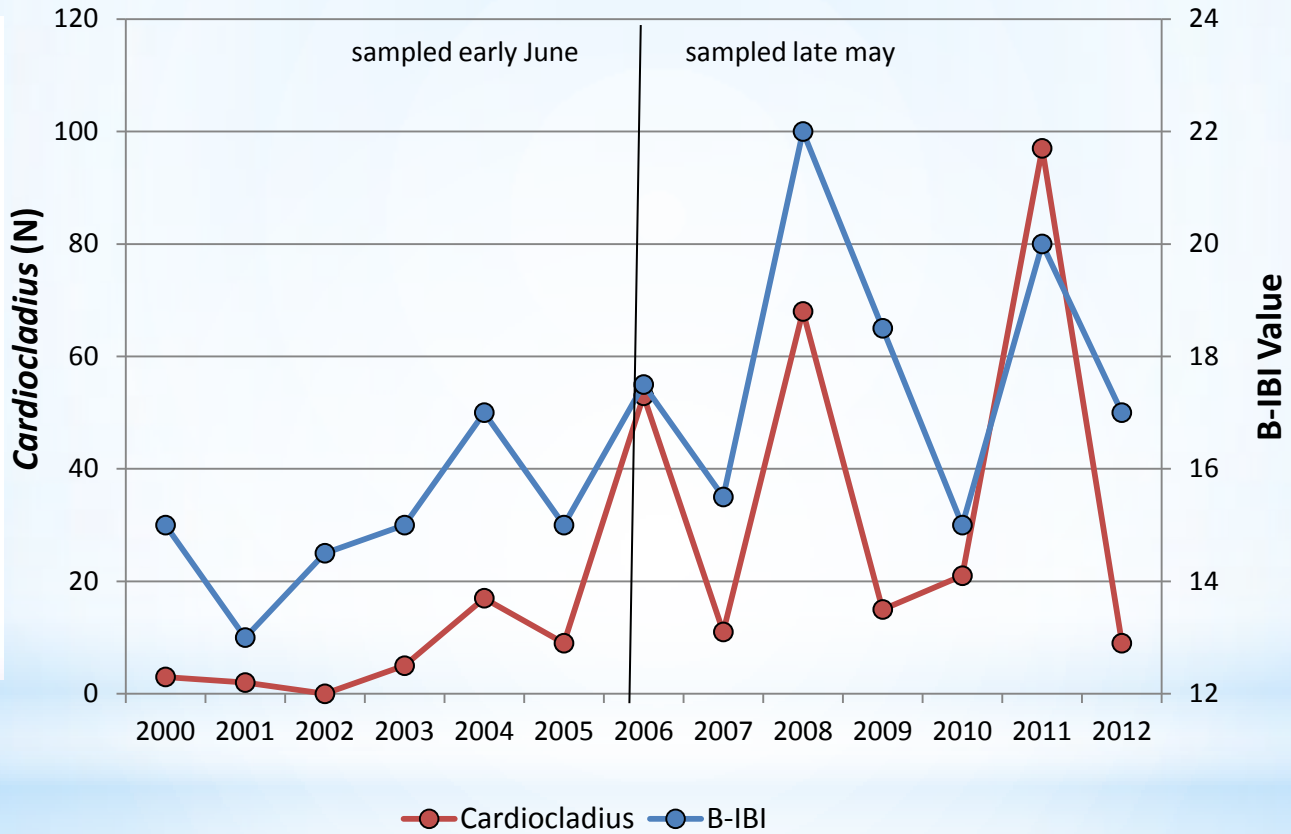
Great Brook, 2000-2012

Simuliidae vs *Cardiocladius obscurus*

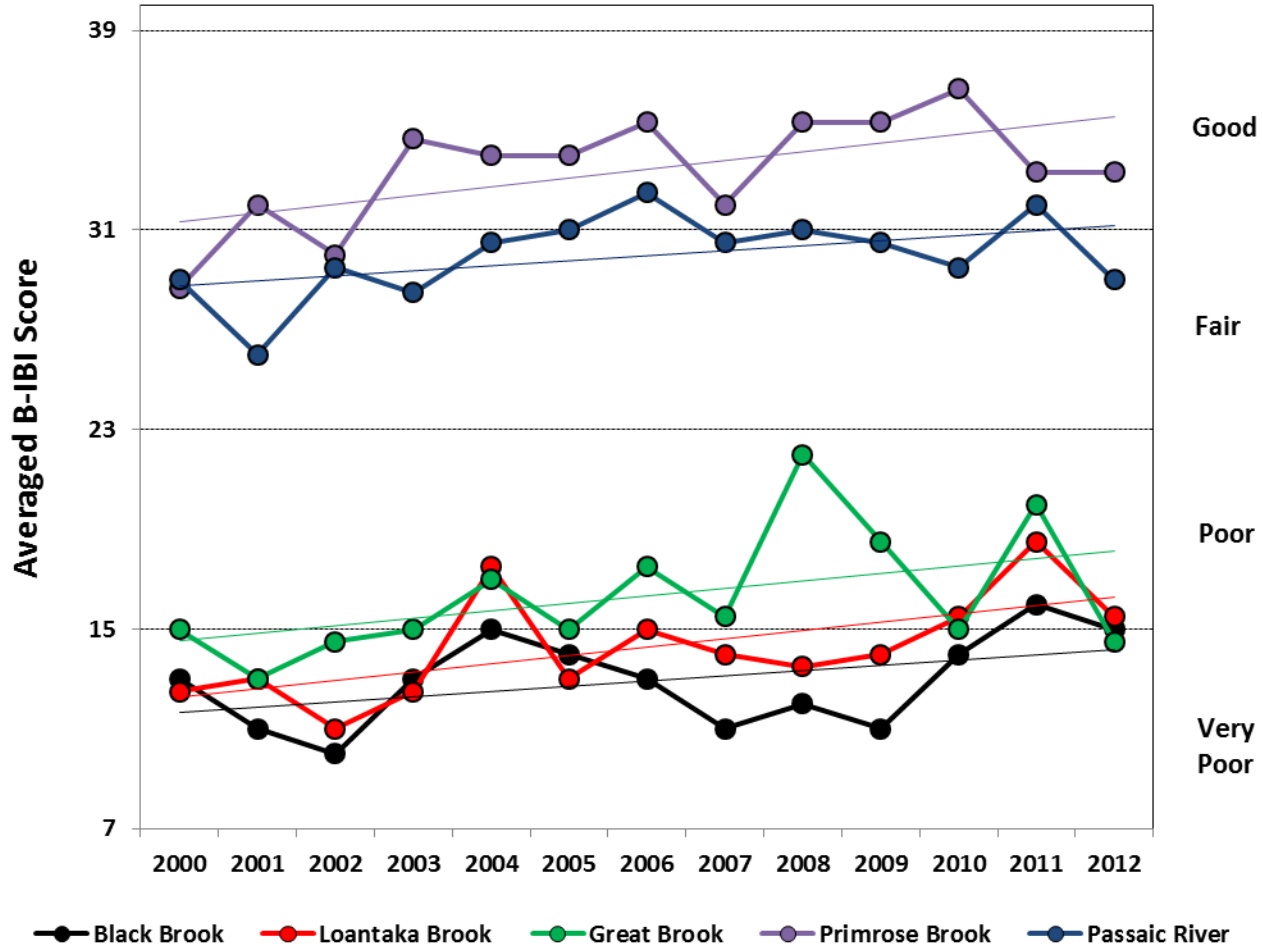


Great Brook , 2000-2012

Great Brook B-IBI vs *Cardiocladius obscurus*

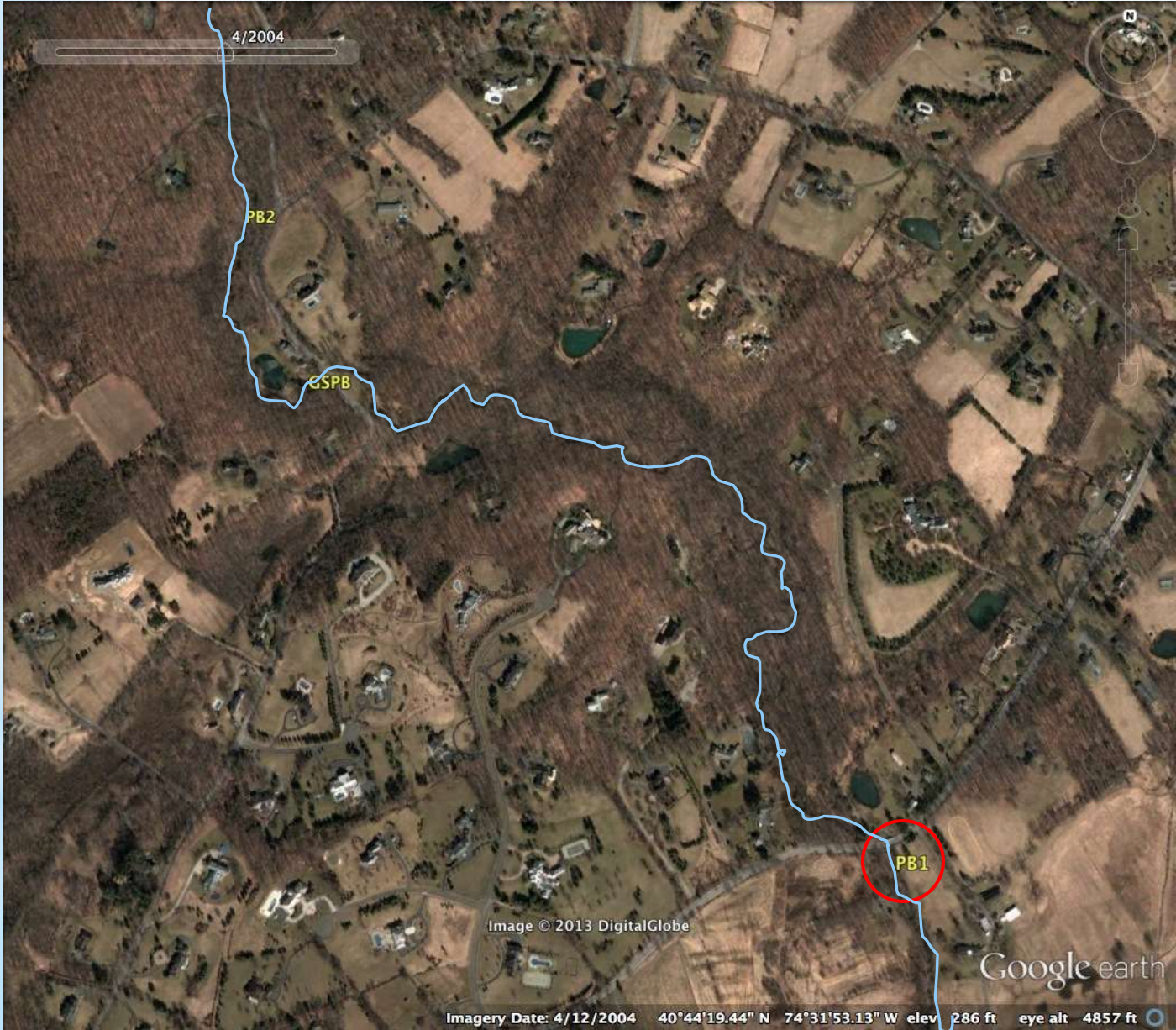


Great Swamp Watershed Streams Averaged Annual B-IBI Scores, 2000-2012



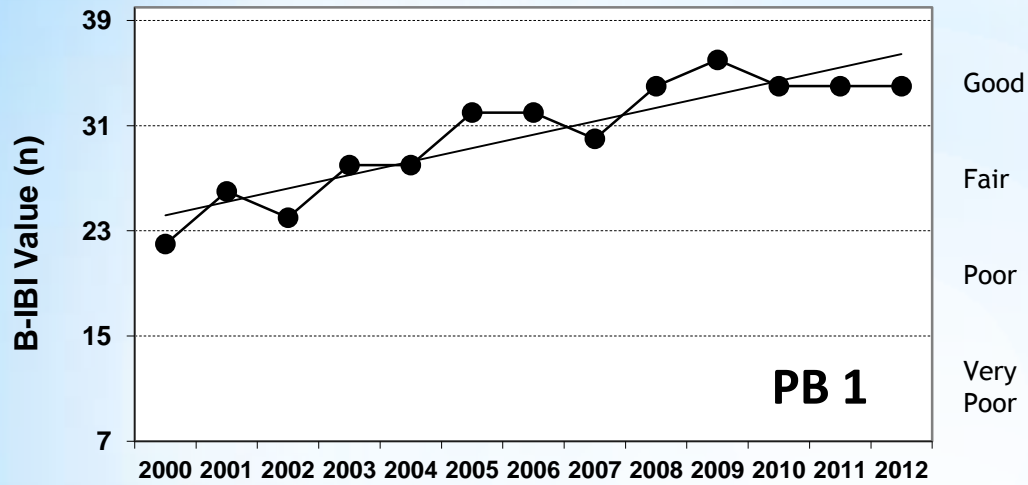
Lee's Hill Road

* PB1



Lee's Hill Road

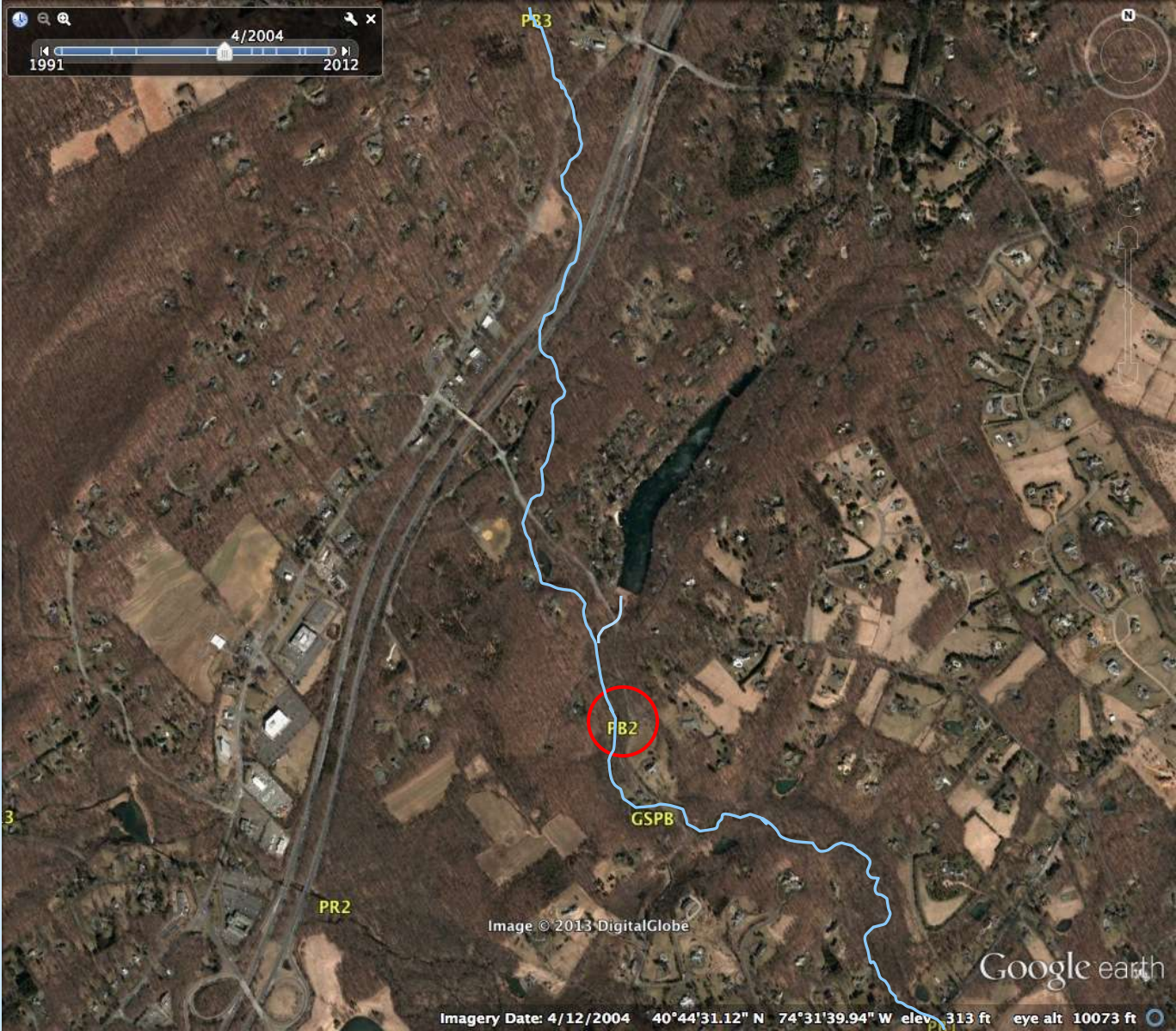




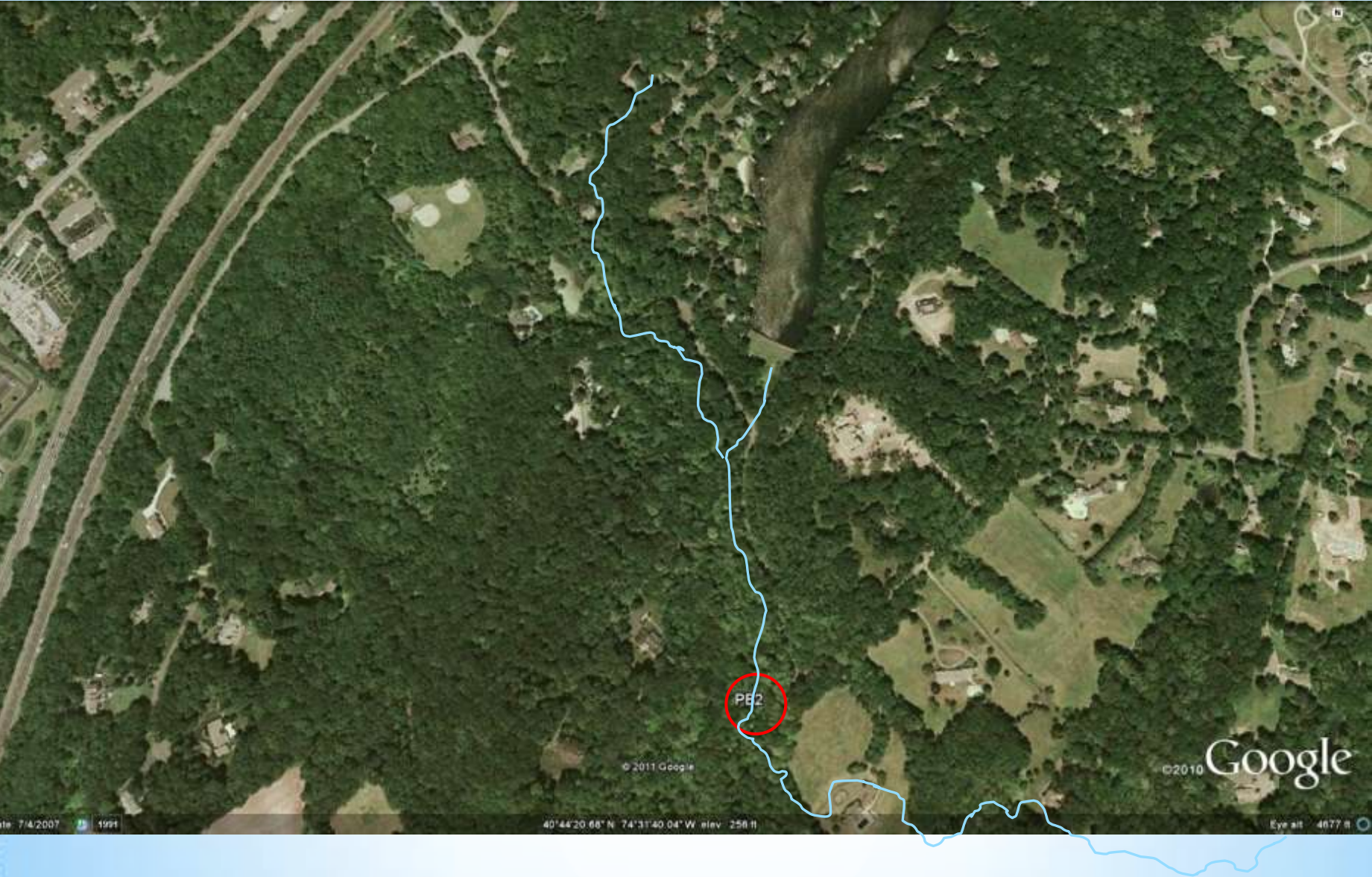
***PB1**
 Good substrate
 Some sedimentation

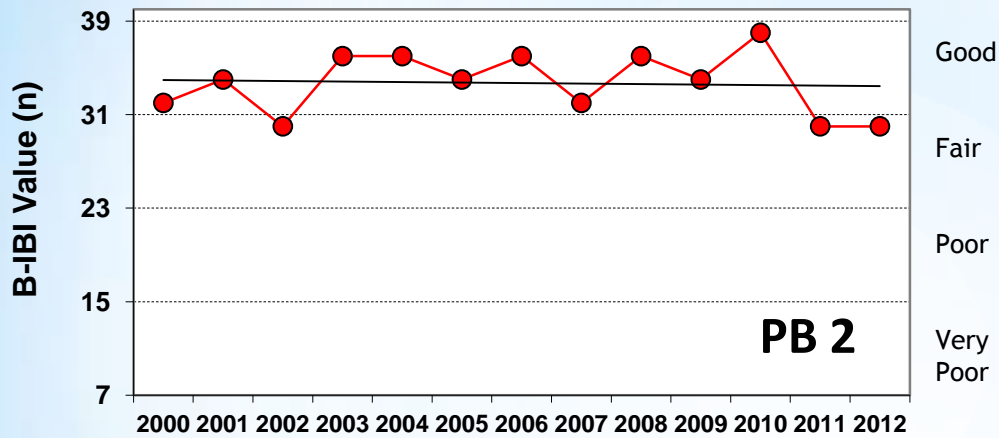


Opposite Youngs Road
Good canopy cover
Mt Kemble influences?



Opposite Youngs Road
Good canopy cover
Mt Kemble influences?



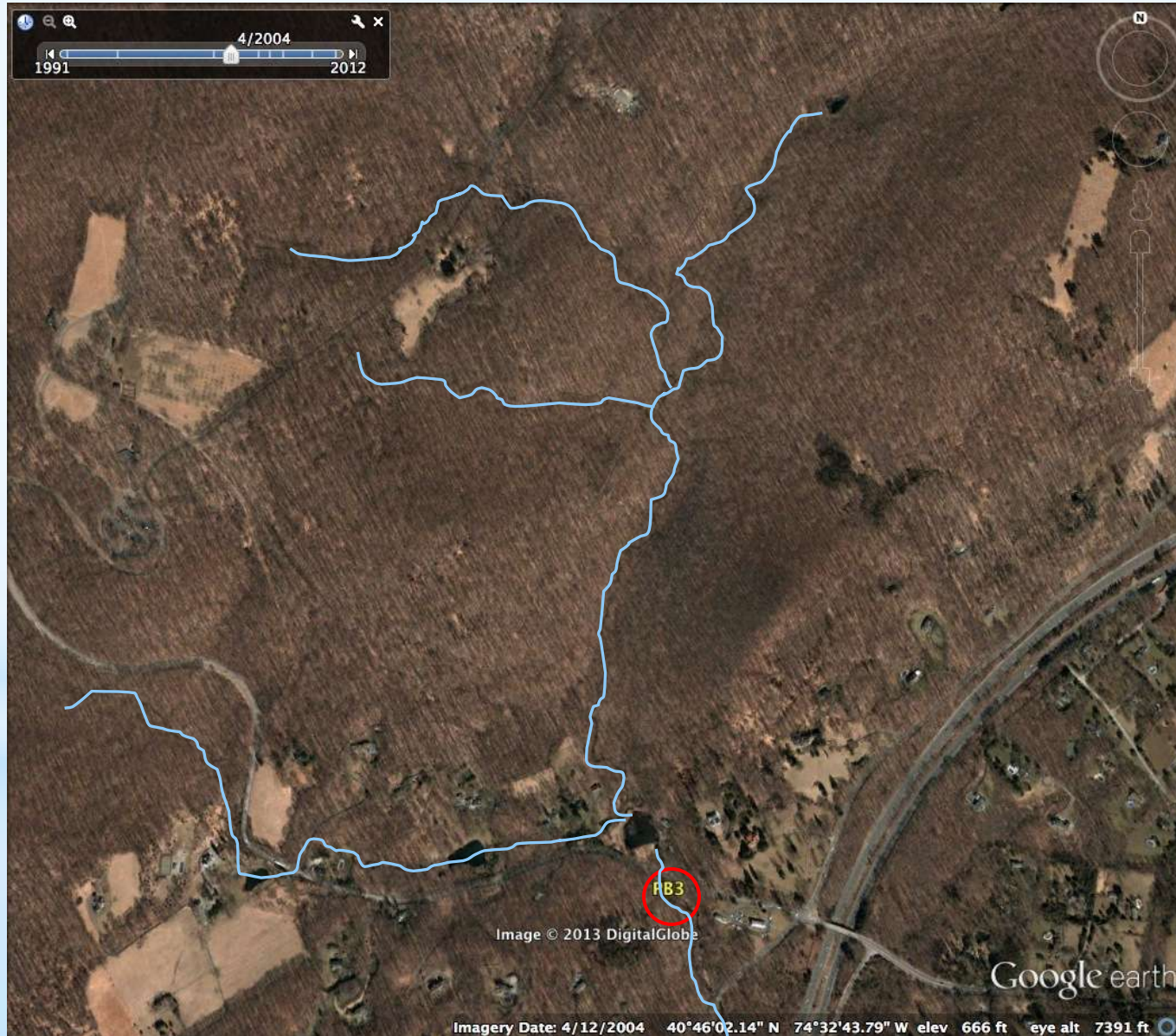


* PB2

Big 2011 drop in B-IBI
sustained in 2012

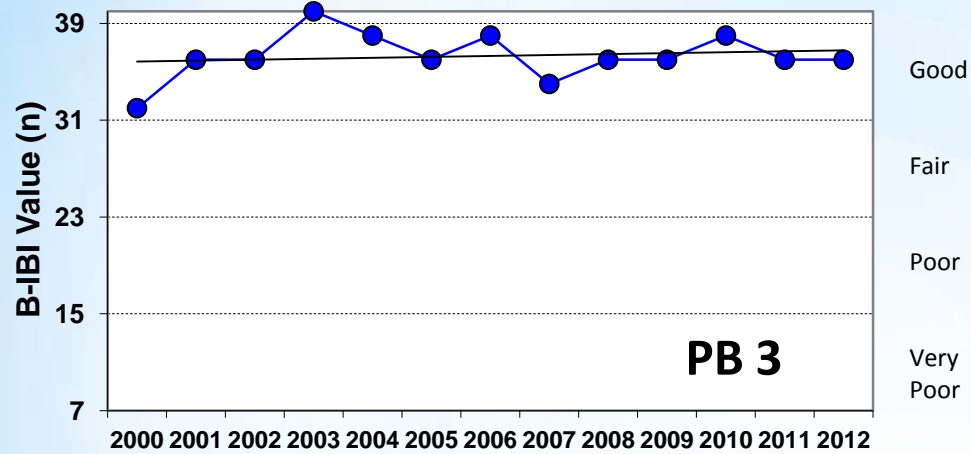


Tempe Wick Road Small impoundment upstream



Tempe Wick Road Small impoundment upstream

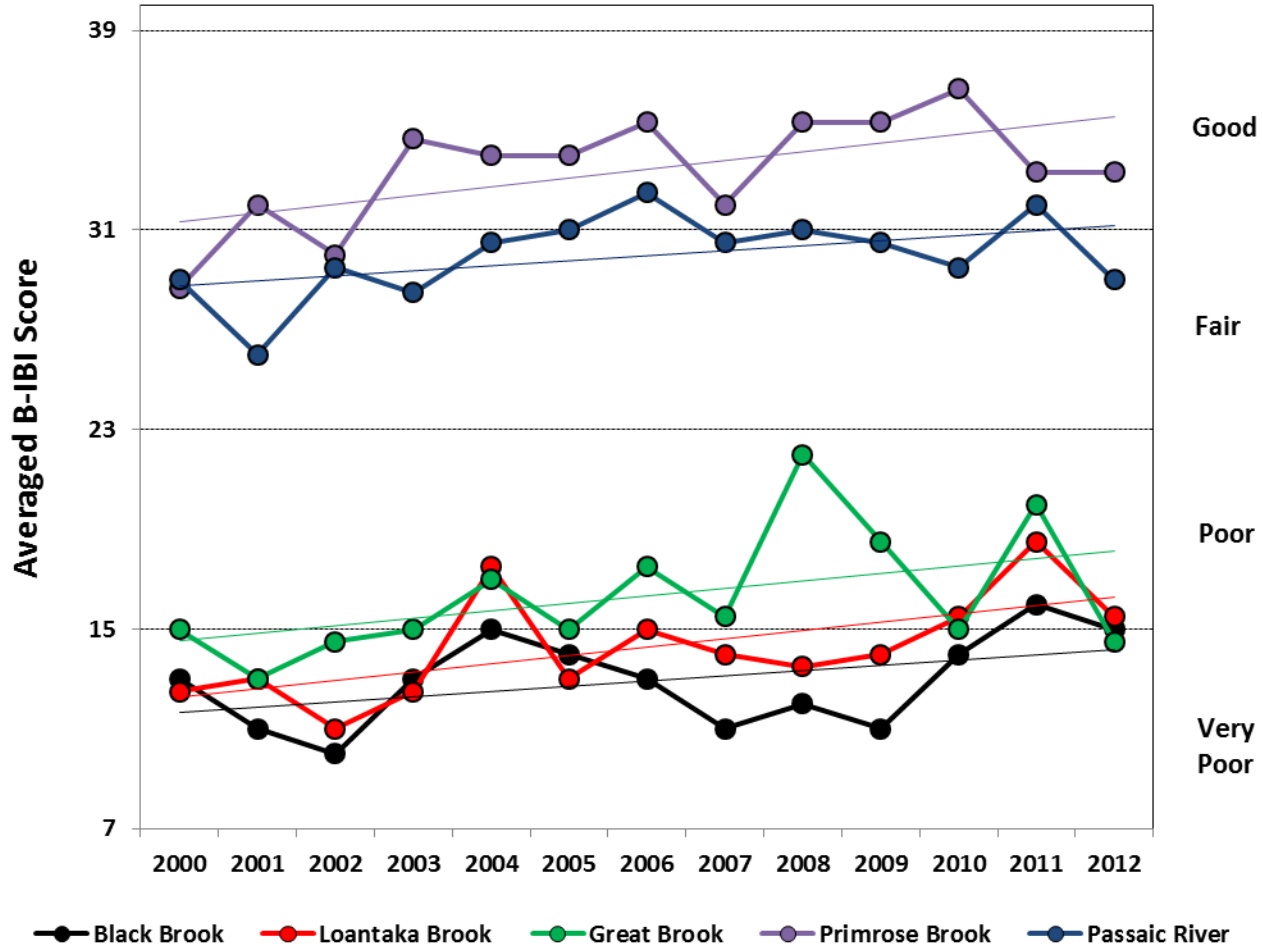




Ideal MIV habitat - Despite heavily traveled roadway

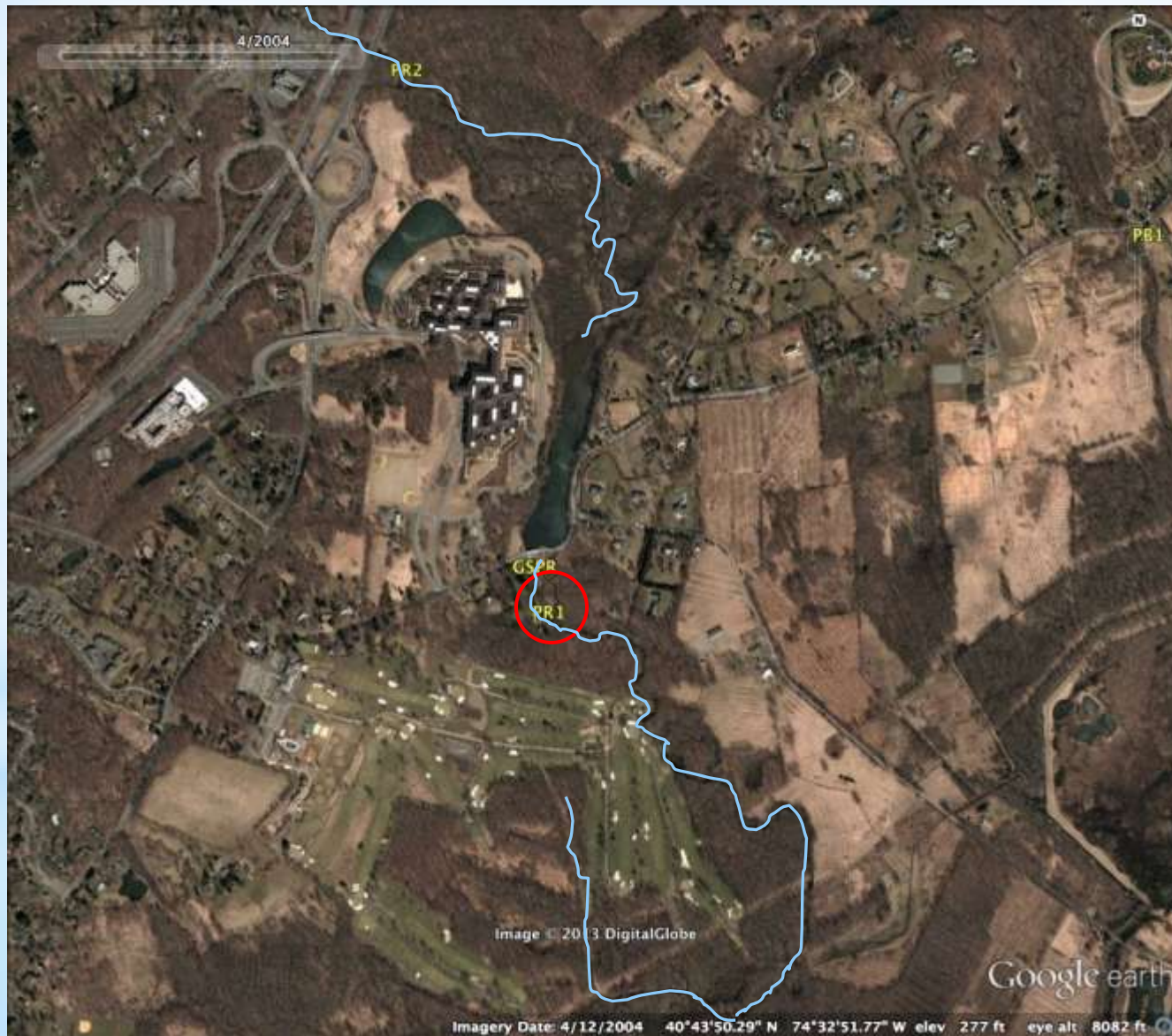


Great Swamp Watershed Streams Averaged Annual B-IBI Scores, 2000-2012



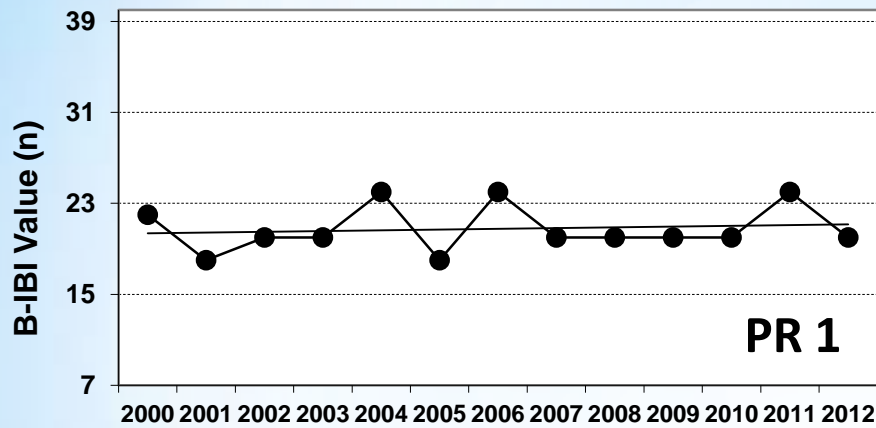
Below Osborn Pond

High temperature, eutrophication products from pond



Below Osborn Pond
High temperature, eutrophication products from pond





Good

Fair

Poor

Very Poor

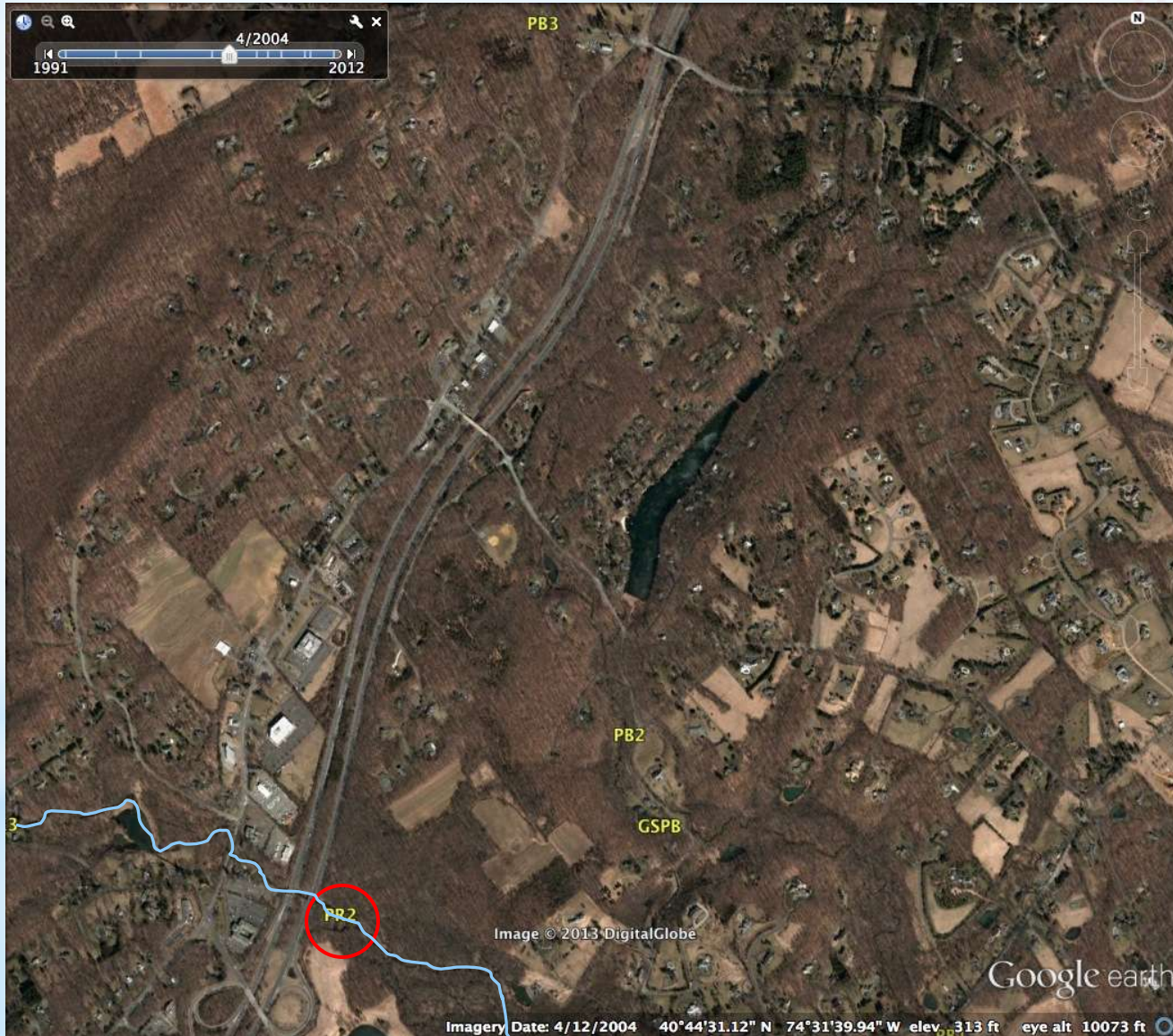
* PR1



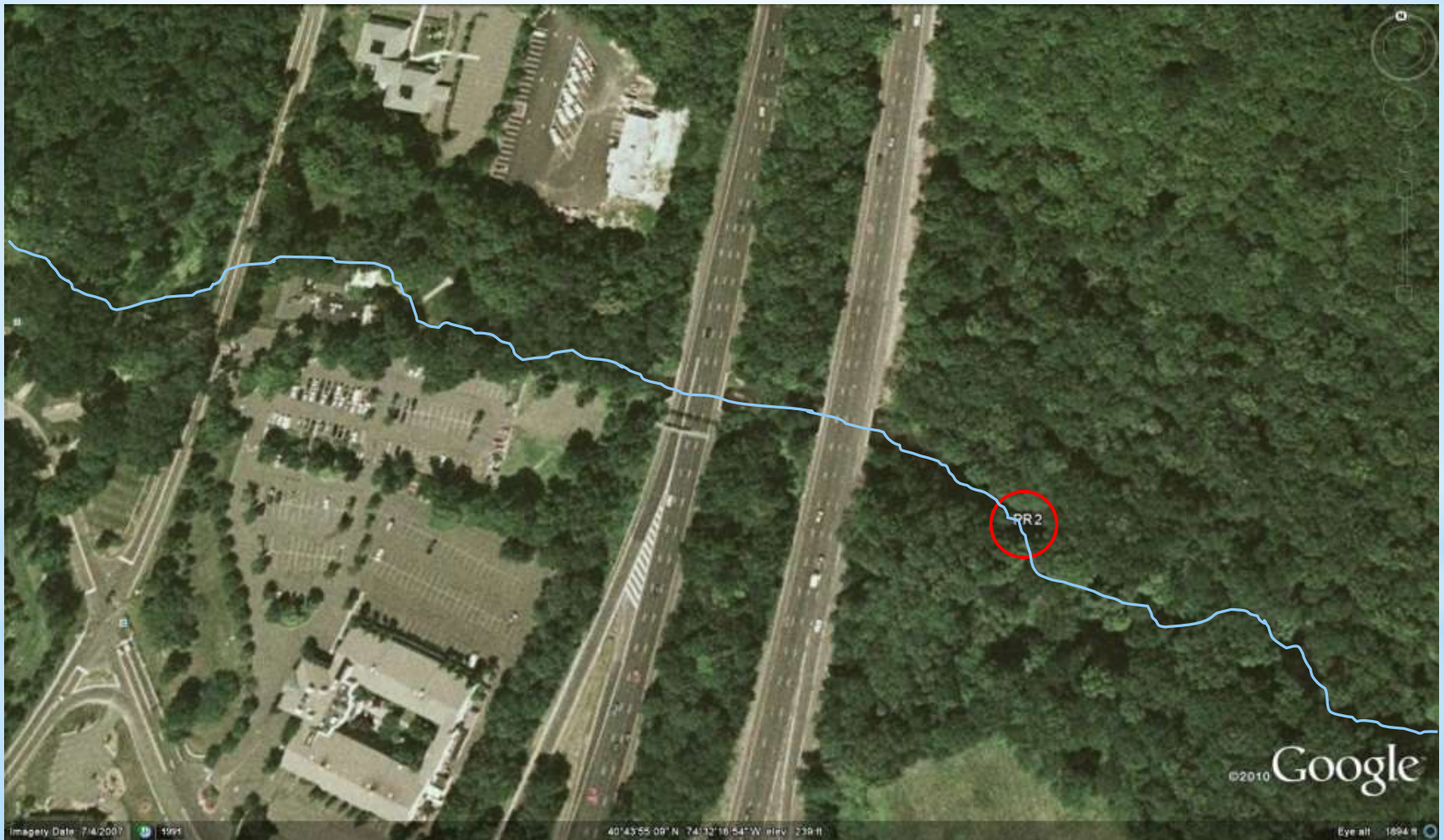
Limited substrate
Hydropsychids up
Cardiocladius down

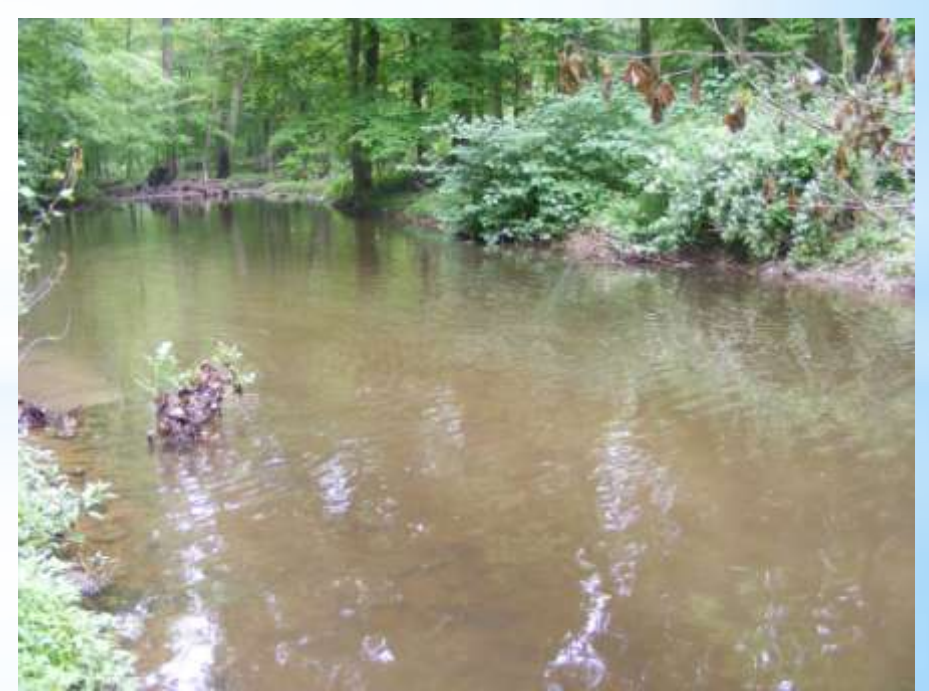


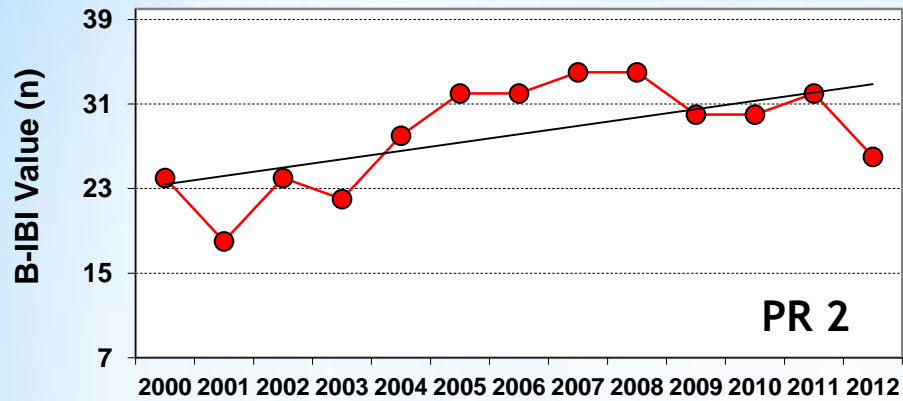
Below I-287 Flooding, sediments, highway debris



Below I-287
Flooding, sediments, highway debris







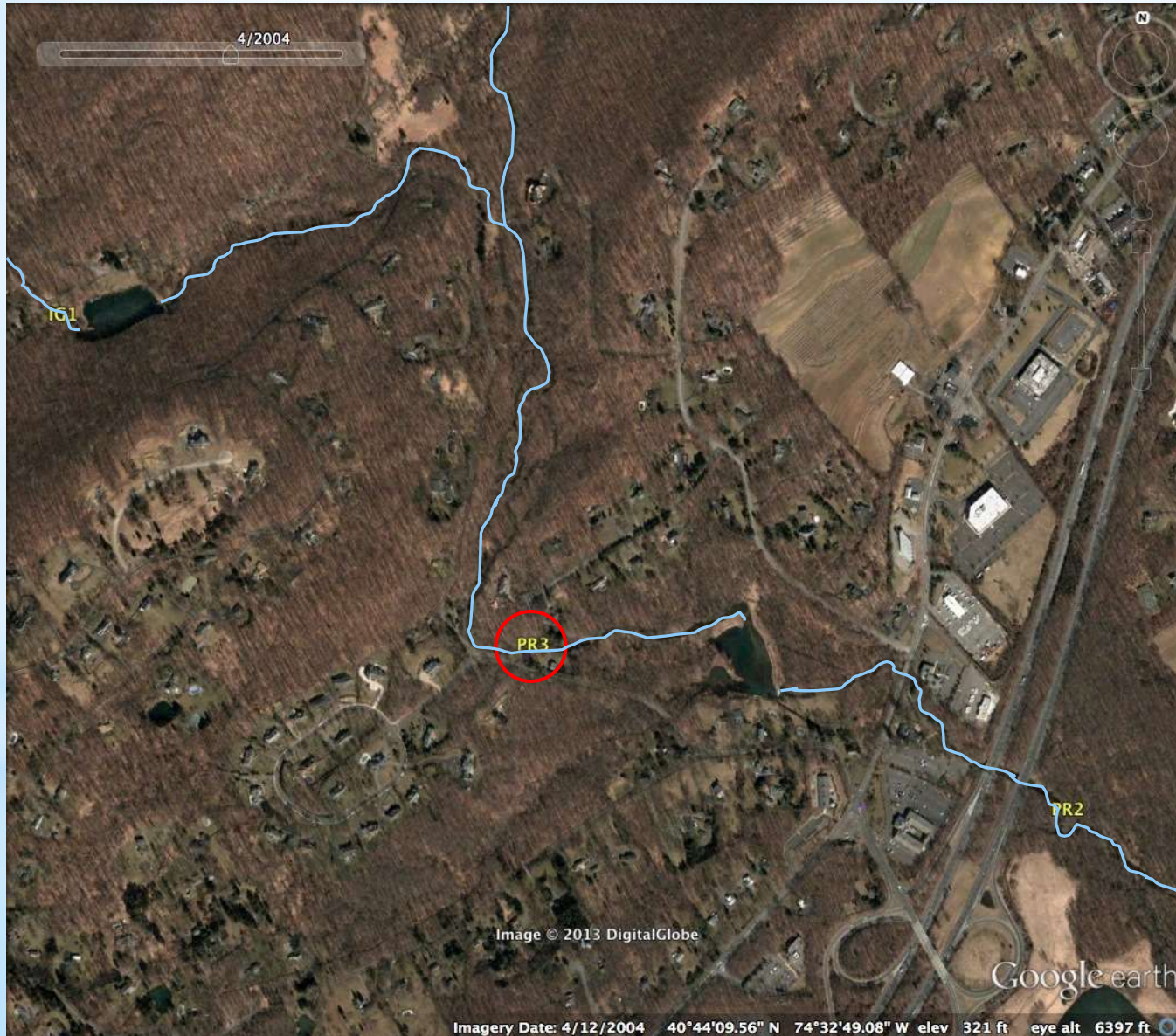
* PR2

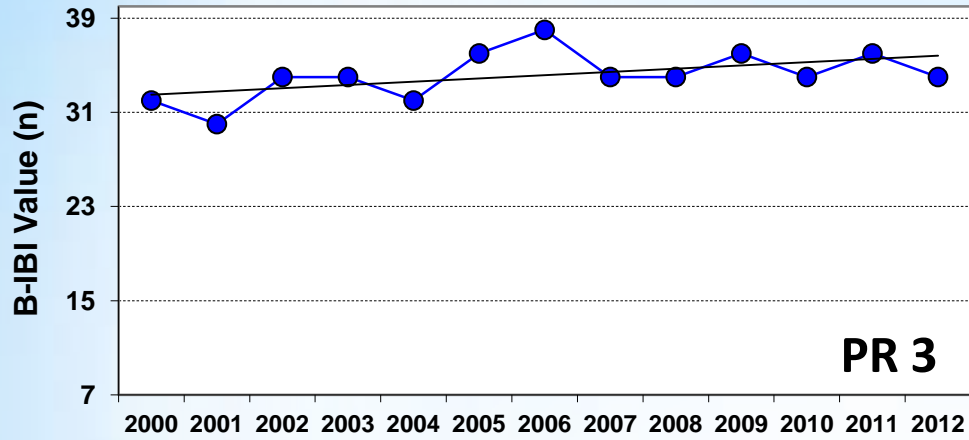
Entire rocky substrate blown out (by Irene?). New, less well endowed site downstream. Fewer Mayflies, Caddisflies.



Hardscrabble Road

Ideal habitat – close to roadway





Good
Fair
Poor
Very Poor

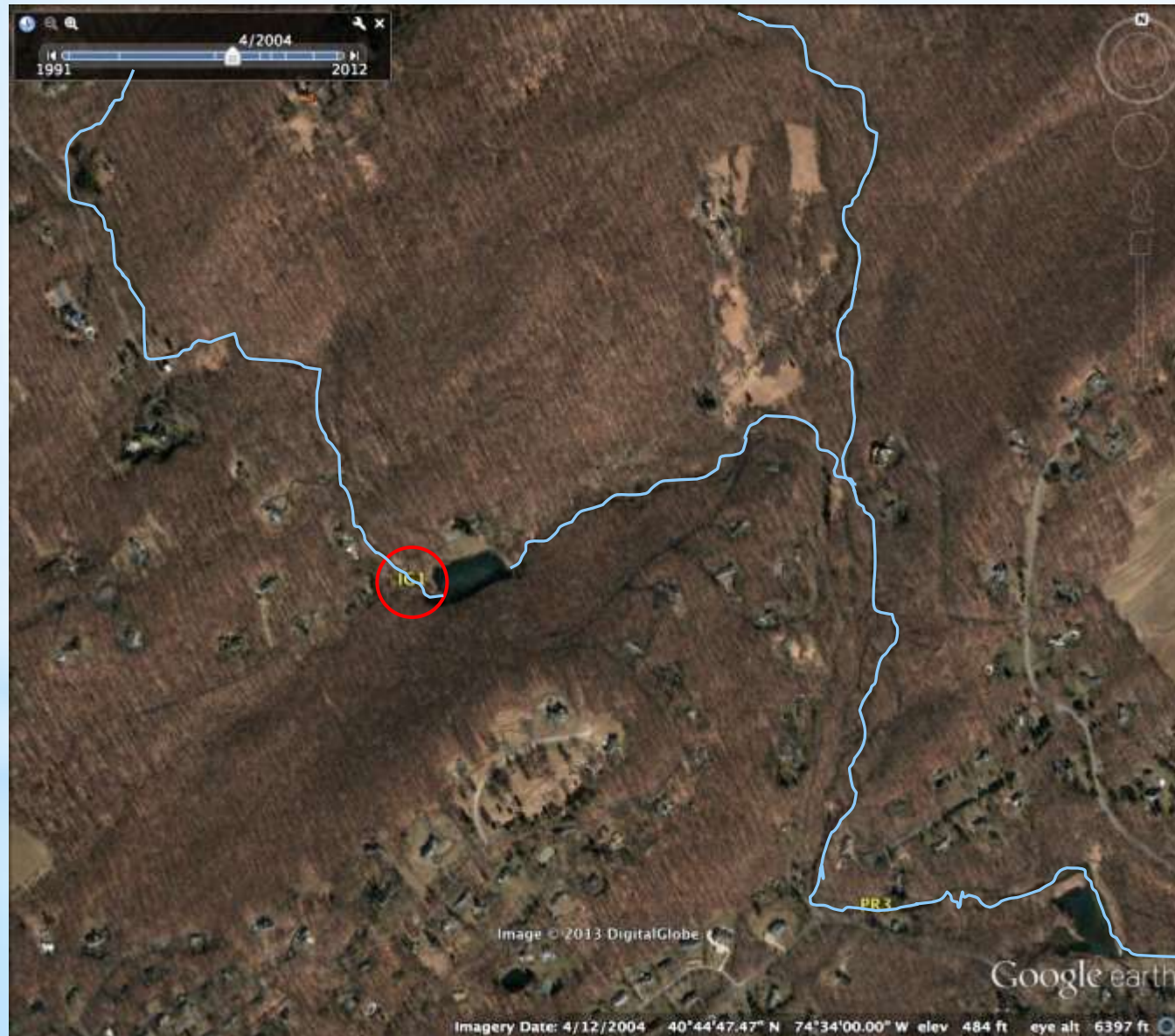
* PR3

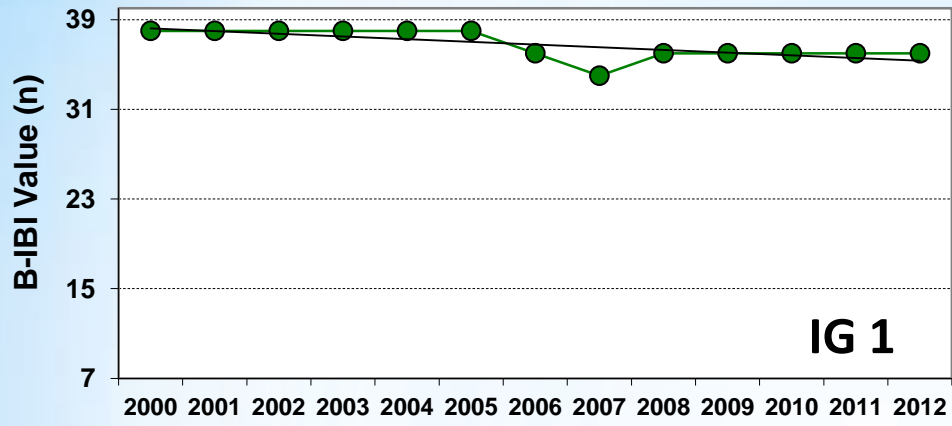
High MIV diversity;
low density



Upper Passaic tributary
"Reference" site

*IG1





Good

Fair

Poor

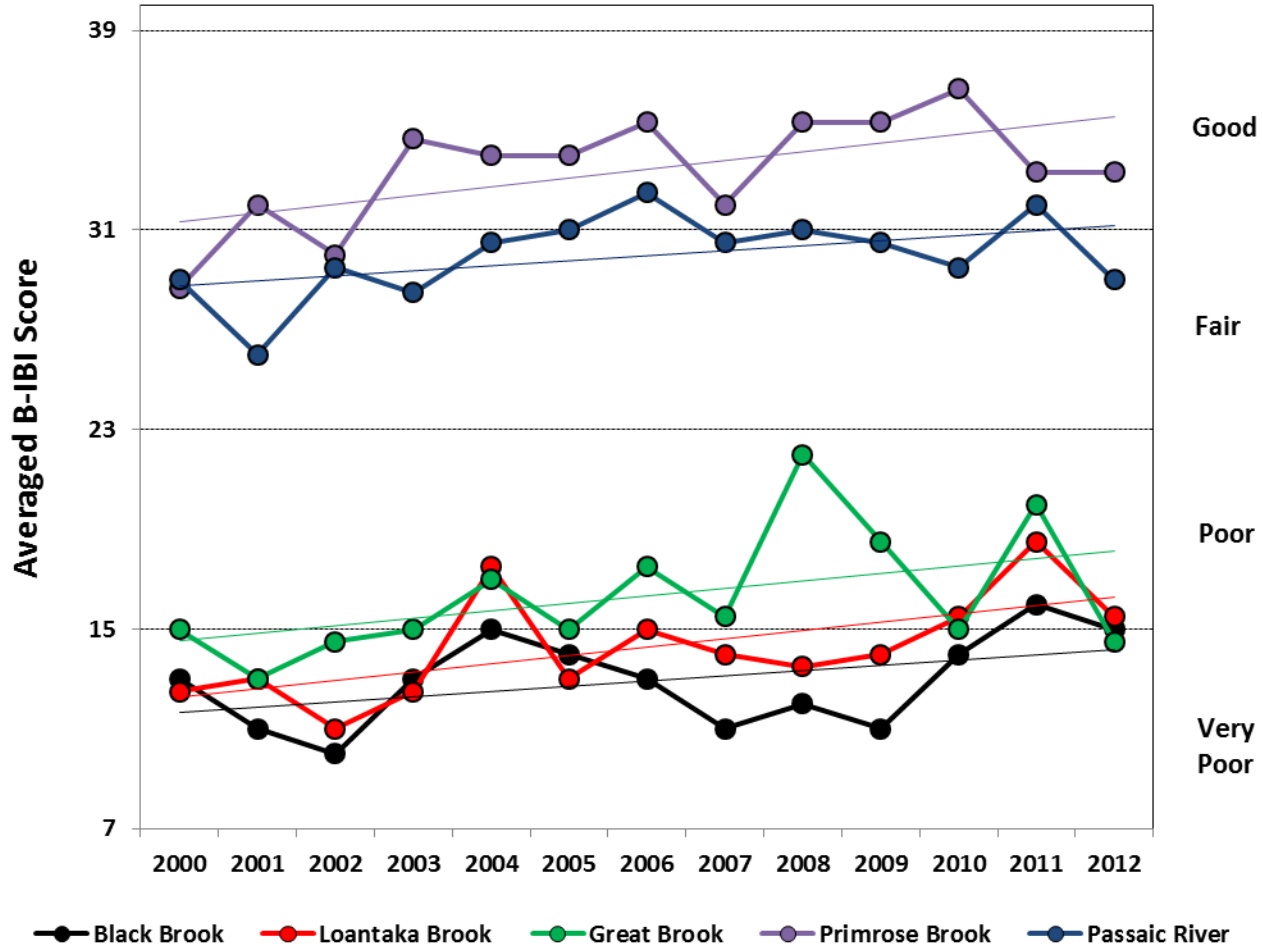
Very

Poor

 **IG1**
Great habitat



Great Swamp Watershed Streams Averaged Annual B-IBI Scores, 2000-2012





Highlights for 2013 sampling:

1. On-going issues with TDS levels at GB5, BB2, and LB4
2. Recovery of PR2 and PR1?
3. Continued PB2 low – artifact or real?
4. Blackfly/*Cardiocladius* cycling and Great Brook B-IBI scores

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40°45'03" 18" N, 74°28'24" 80" W, elev. 323 ft

Eye alt: 52235 ft