Annual Report,
Activities Conducted Under Montana Fish, Wildlife, and Parks Scientific Collectors Permit No. SCP-05-04

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March 30, 2005

Summary:

Electrofishing and snorkeling activities on the Nyack floodplain of the Middle Fork of the Flathead River in 2004 produced critical insights as to lateral habitat fish community characteristics. Native trout were rarely encountered in lateral habitats while native sculpins, suckers, mountain whitefish and non-native brook trout were common. During electrofishing bull trout were rarely encountered (4 fish in July, 6 fish in August) and then primarily in springbrook environments. Bull trout were equally rare in snorkel surveys (4 fish, found only in September-October) and were found at only one springbrook site and one backwater site at night, indicating restricted diel movement. Weirs were not deployed as planned, limiting our ability to make inferences about fish movement.

Sampling Activities:

The 2004 permit covered multiple pass electrofishing and snorkeling activities. We originally intended to do multiple pass mark-recapture electrofishing in July with a short interval of a few days between electrofishing surveys. We decided after our first attempt at using this method that it would be too stressful for small fish to be marked and recaptured over this short interval, especially in backwaters where thermal conditions often approached stressful limits for most fish species. We decided that instead of marking fish and recapturing them after a short interval in July to get at population estimates and growth rates, we would use two separate electrofishing periods without marking fish in July and August to minimize fish stress, injury and chance of accidental mortalities. Snorkeling activities were broken into five sample periods 15-25 days apart. Snorkeling progressed as planned with the exception of main channel night snorkeling. After one attempt we decided that given the small size of field crews (two people) and lack of external lighting it was too dangerous to snorkel faster flowing main channel segments at night. This means we missed opportunities to track bull trout and cutthroat nocturnal mainstem activity, which we noted anecdotally to be greater than daytime activity. We are currently unable to pursue this aspect of the study due to crew size and equipment limitations but believe it to be a worthwhile line of inquiry for other investigators to pursue. See attached spreadsheets and map for electrofishing and snorkeling locations and dates.

Weir trapping and most video recording, which were also covered under the permit, was not accomplished. This was due to unexpected field assistance shortages as a key field technician was forced to leave the project prematurely due to a family emergency. As Dr. Stanford and I were at another remote field camp at the time we were unable to recruit and hire a suitably trained replacement on short notice. As such weirs were not deployed and video recording of behavioral interactions was severely curtailed.

Fish Population Characteristics:

We are currently analyzing our electrofishing data to obtain population estimates and growth rates for different habitat types using a combination of a bias-adjusted jackknife removal population estimator and Bayesian tools to analyze differences in growth rates between habitats. What has been analyzed from the electrofishing data is unadjusted fish density and biomass by species for lateral habitat types in July and August, length weight regression curves by species for lateral habitat types and length frequency histograms from both periods combined (see attached figures). General trends from this electrofishing and snorkeling data indicate:

-Sucker and sculpin densities increased in backwaters and shallow shorelines from July to August while brook trout densities appeared to decrease slightly at shallow shoreline and springbrook sites. Decreased density of brook trout at springbrook sites may be attributed in part to removal of fish for isotope samples in July if brook trout are moving very little in springbrooks. We hope to resolve this in 2005 through weir trapping.
-Biomass of sculpin and brook trout increased in all three habitat types from July to August, most likely due to recruitment of juvenile sculpins and individual growth of both species. Sucker biomass decreased slightly in backwaters from July to August likely due to predation of juveniles. Sucker biomass increased slightly in springbrooks from July to August, likely due to recruitment of young of the year.
-Bull trout and cutthroat trout were most often absent from our surveys, or when present were extremely rare.
-Within species length-weight relationships appear to differ between habitat types, the significance of which is currently unknown. We hope to resolve this issue with otolith analysis and Bayesian tools.
-Length frequency histograms indicate that juvenile to subadult brook trout and young of the year longnose suckers predominate at lateral sites while both juvenile and adult sculpin are present during the summer months. The few mountain whitefish that were encountered were also juvenile.
-Results from our snorkeling surveys indicate that juvenile brook trout and sucker occupancy of main channel habitats in summer months was almost non-existent while juvenile whitefish numbers increased as fall approached. This lends evidence to our belief that lateral habitats are critical habitats for brook trout and sucker recruitment in particular, and to a lesser extent mountain whitefish.
-Bull trout (4) were encountered in September and October at two sites, a springbrook and a backwater, and then only at night during snorkel surveys. Bull trout size range was 9-15 cm and all were considered to be subadult.
-Cutthroat trout observed during snorkeling were well distributed across all habitats and sampling dates sampled but in low numbers. They were more commonly encountered during the night (55) than during the day (26). Sizes ranged from 5-35 cm and included juveniles through adults.

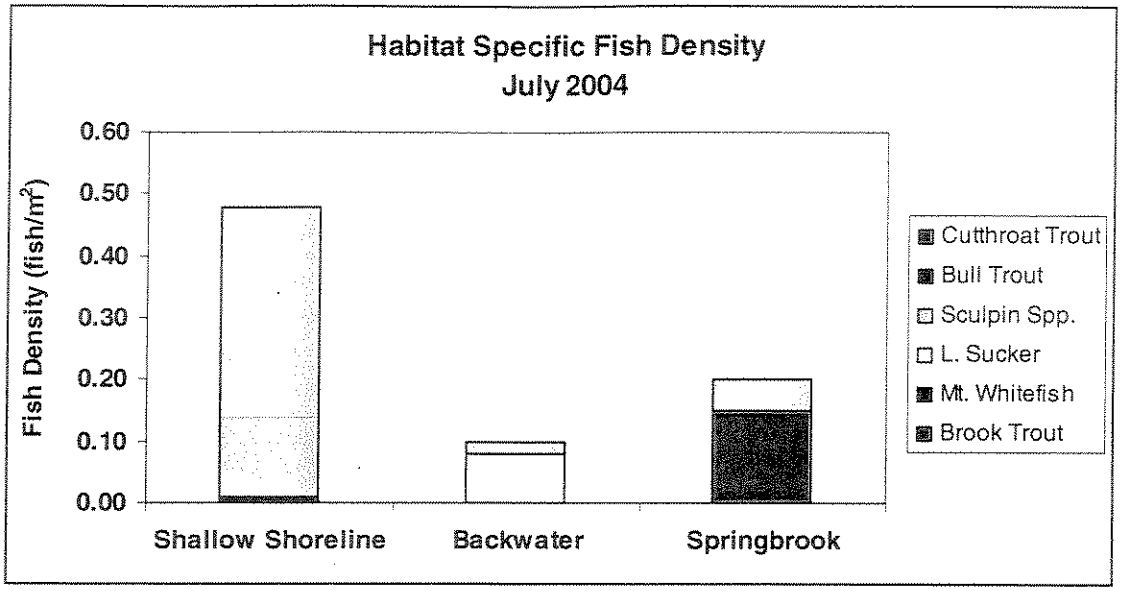
Fish Take:

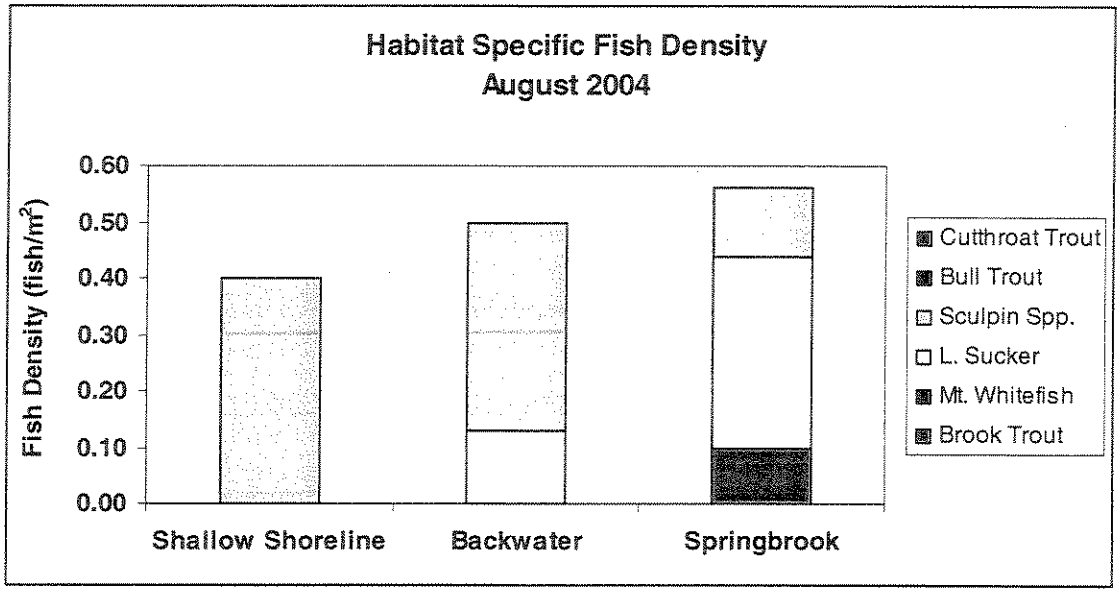
Lethal samples of brook trout, mountain whitefish, longnose sucker, and sculpin spp. (see attached report to Montana Fish, Wildlife and Parks) were taken by electrofishing in July, August, and October 2004 mainly for the purpose of isotopic analysis as part of a larger food web study. In the case of brook trout, otoliths were also taken for age and growth analysis. Samples are currently being analyzed and we do not have results back as yet. No lethal samples of bull trout or brook trout were taken. All bull trout (10) and cutthroat trout (3) encountered during electrofishing were immediately released alive with no mortalities or injuries. During snorkeling surveys of fish distribution and abundance, bull trout (4) were observed only at night while cutthroat were active during the day (26) but more often at night (55). Fish observed during snorkeling were often spooked from their position within habitats due to the small sample area but most resumed position within 10-30 minutes after sampling ended so harassment was kept to a minimum. As we were not able to initiate weir sampling as anticipated, handling associated with weirs was not an issue.

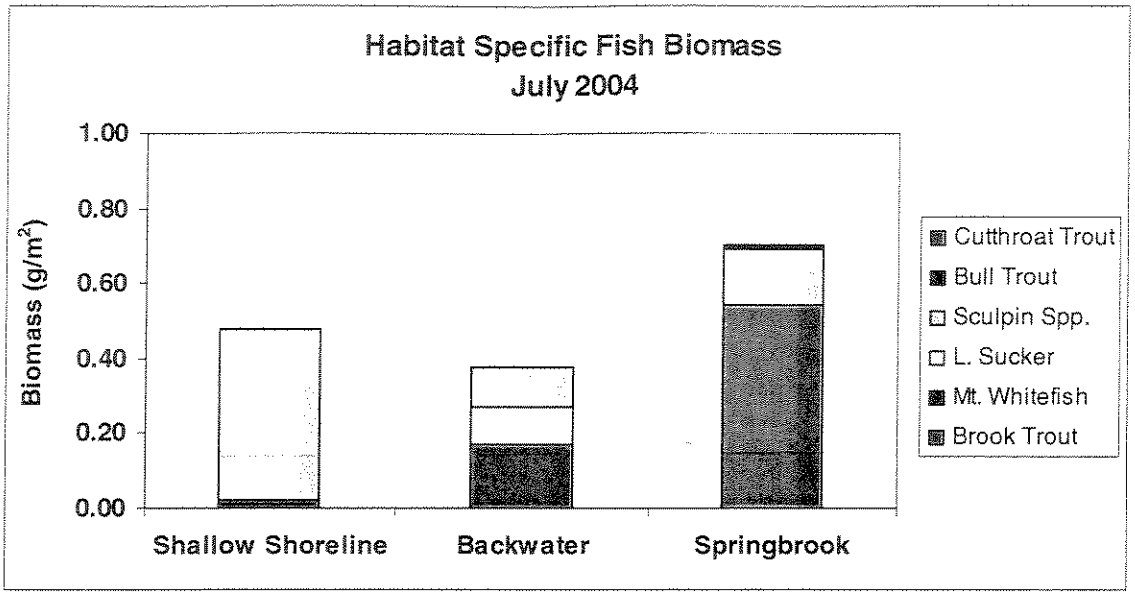
Future Activities:

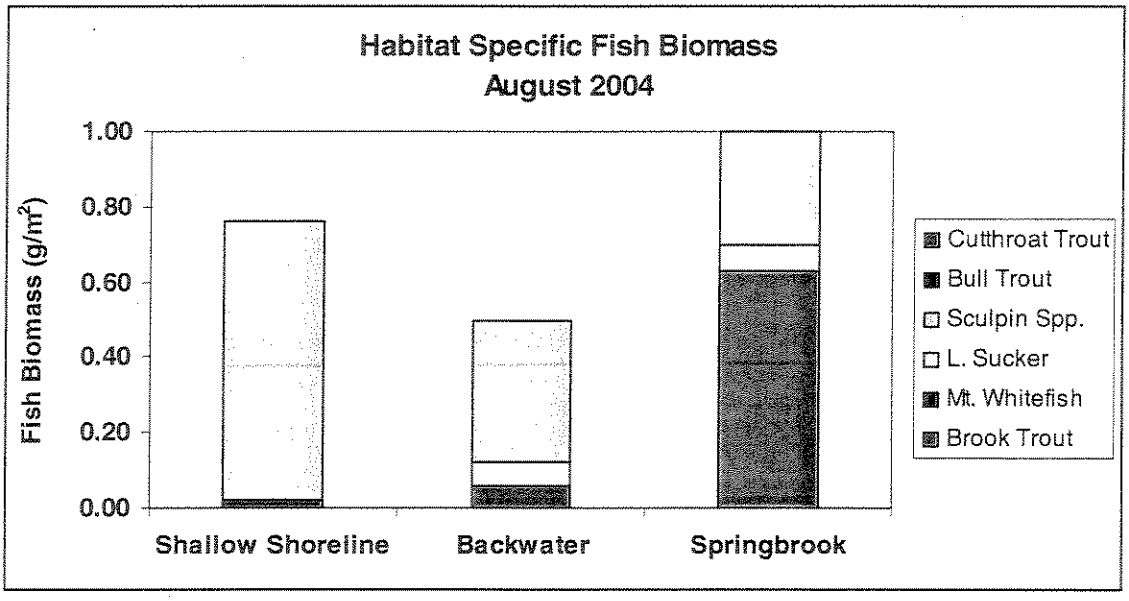
See attached proposal for 2005 activities.

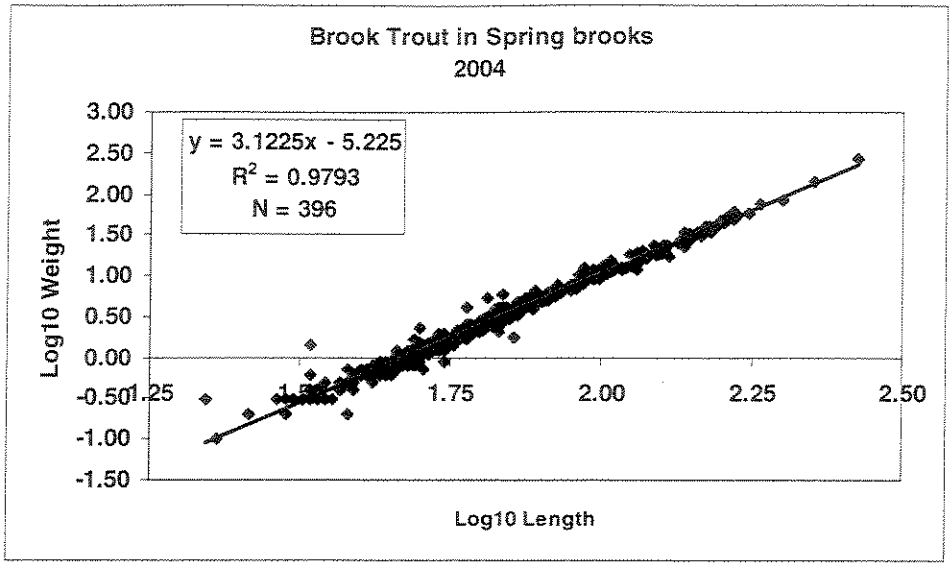
Fish Population Characteristics Figures

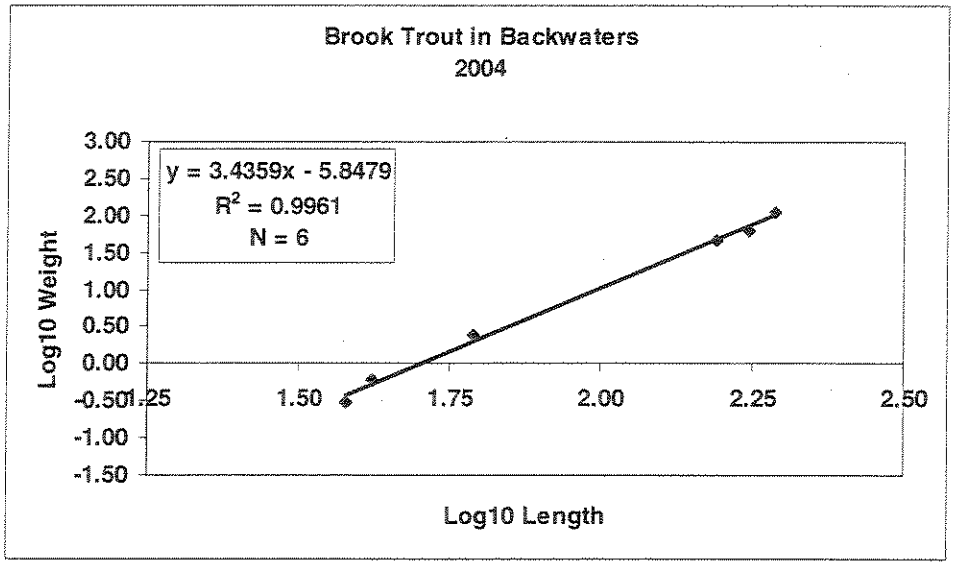


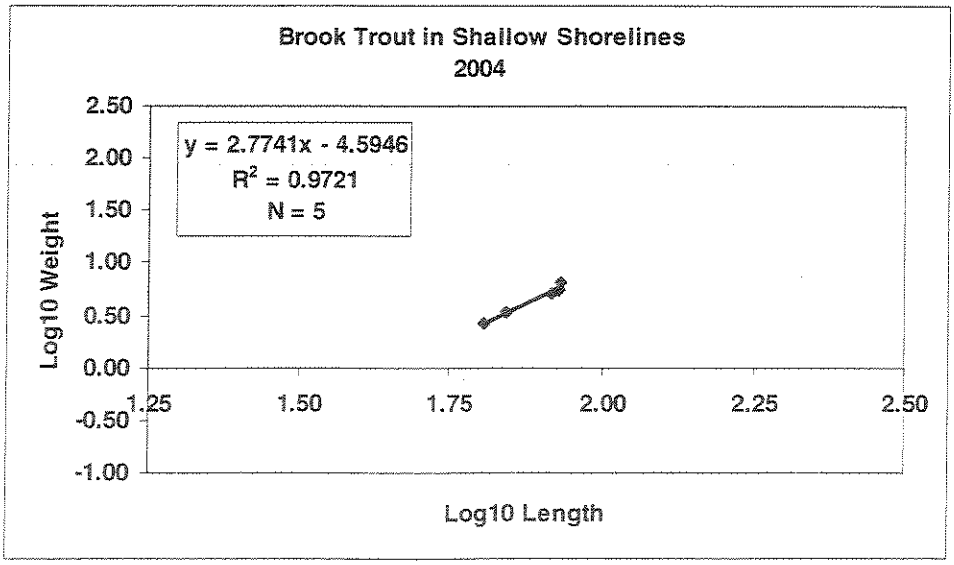


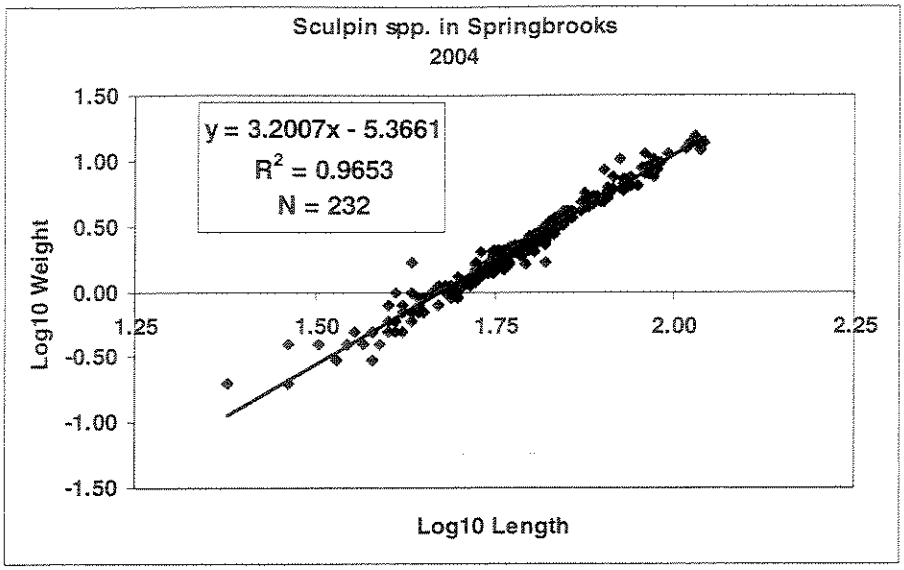

Habitat Specific Fish Biomass
July 2004
Biomass (g/m2)
1.00
0.80
0.60
0.40
0.20
0.00
Shallow Shoreline
Backwater
Springbrook
Cutthroat Trout
Bull Trout
Sculpin Spp.
L. Sucker
Mt. Whitefish
Brook Trout

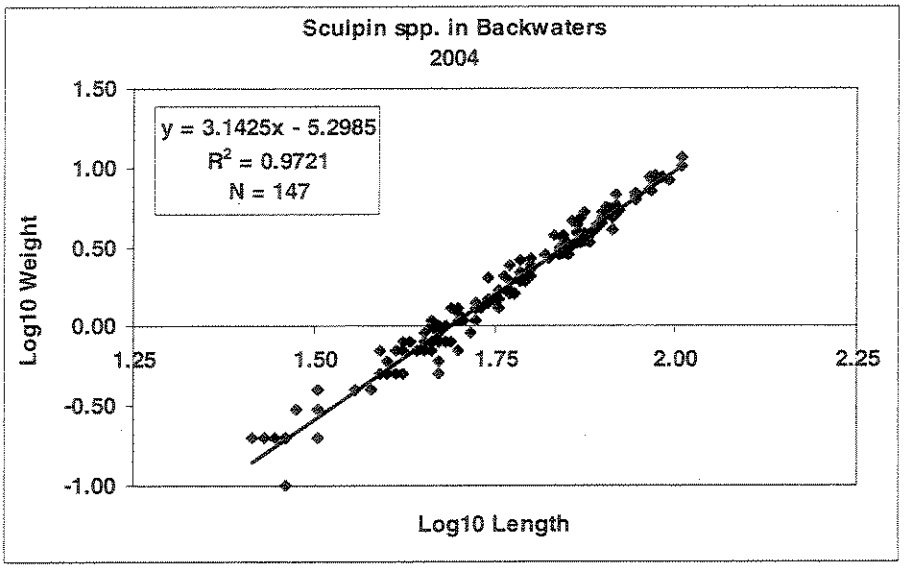

Habitat Specific Fish Biomass
August 2004
Fish Biomass (g/m2)
1.00
0.80
0.60
0.40
0.20
0.00
Shallow Shoreline
Backwater
Springbrook
Cutthroat Trout
Bull Trout
Sculpin Spp.
L. Sucker
Mt. Whitefish
Brook Trout

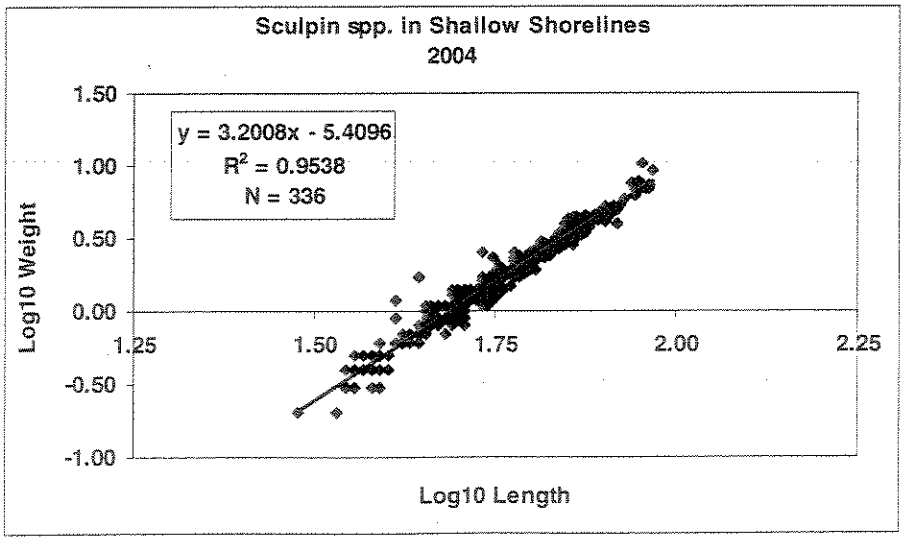

Brook Trout in Spring brooks
2004
y = 3.1225x - 5.225
R2 = 0.9793
N = 396
Log10 Weight
Log10 Length
3.00
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
1.25
1.75
2.00
2.25
2.50

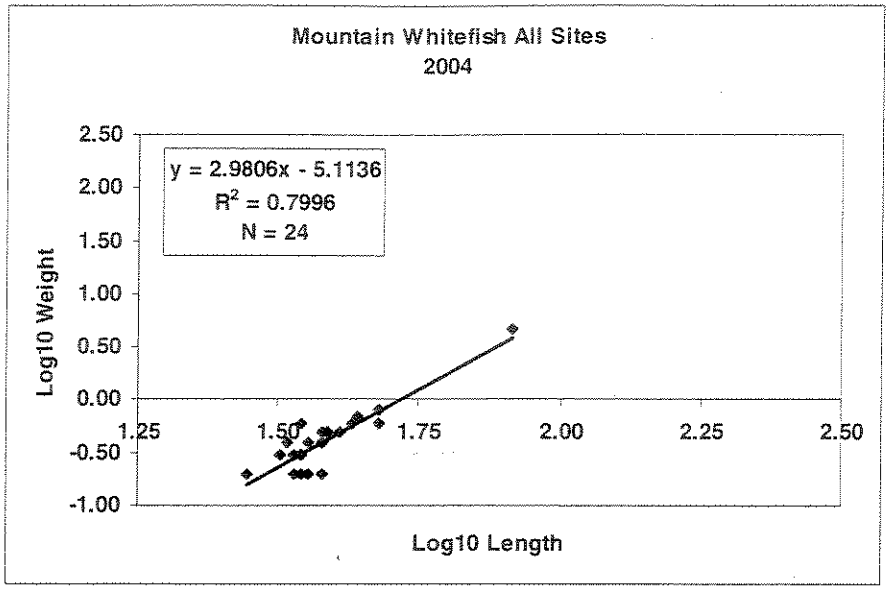

Brook Trout in Backwaters
2004
y = 3.4359x - 5.8479
R2 = 0.9961
N = 6
Log10 Weight
Log10 Length
3.00
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
1.25
1.50
1.75
2.00
2.25
2.50

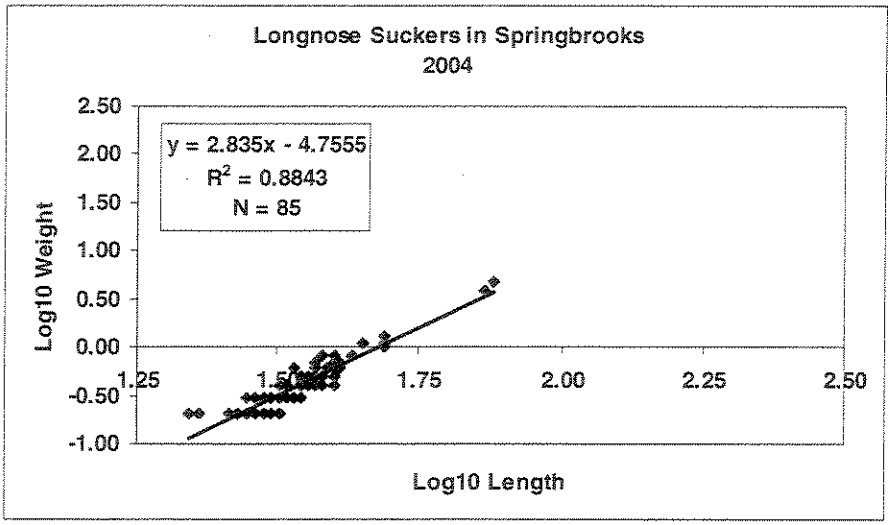

Brook Trout in Shallow Shorelines
2004
y = 2.7741x - 4.5946
R2 = 0.9721
N = 5
Log10 Weight
Log10 Length
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
1.25
1.50
1.75
2.00
2.25
2.50

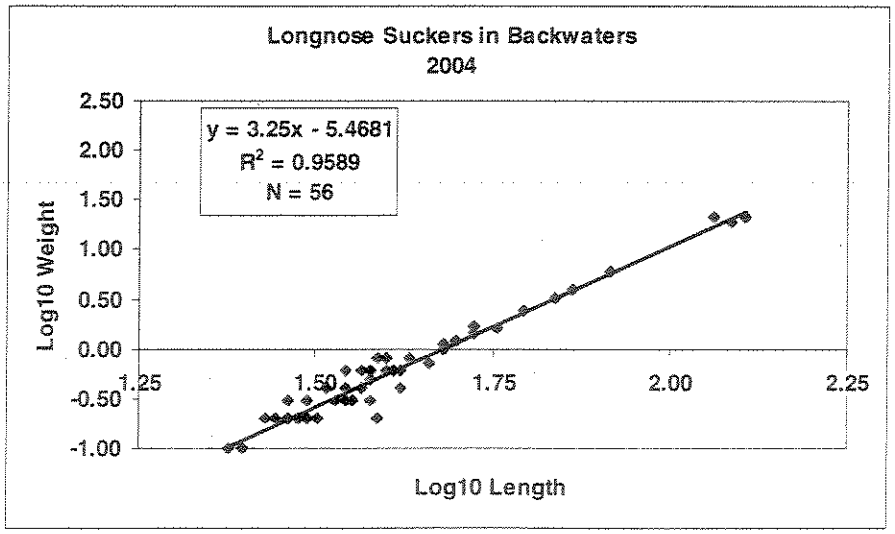

Sculpin spp. in Springbrooks
2004
y = 3.2007x - 5.3661
R2 = 0.9653
N = 232
Log10 Weight
Log10 Length
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
1.25
1.50
1.75
2.00
2.25

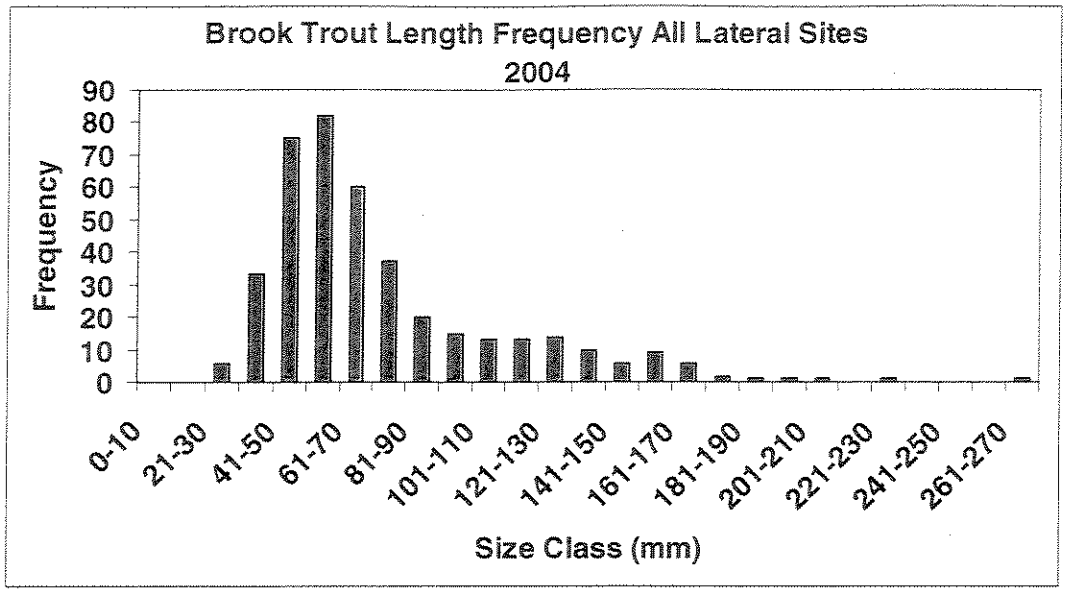

Sculpin spp. in Backwaters
2004
y = 3.1425x - 5.2985
R2 = 0.9721
N = 147
Log10 Weight
Log10 Length
1.50
1.00
0.50
0.00
-0.50
-1.00
1.25
1.50
1.75
2.00
2.25

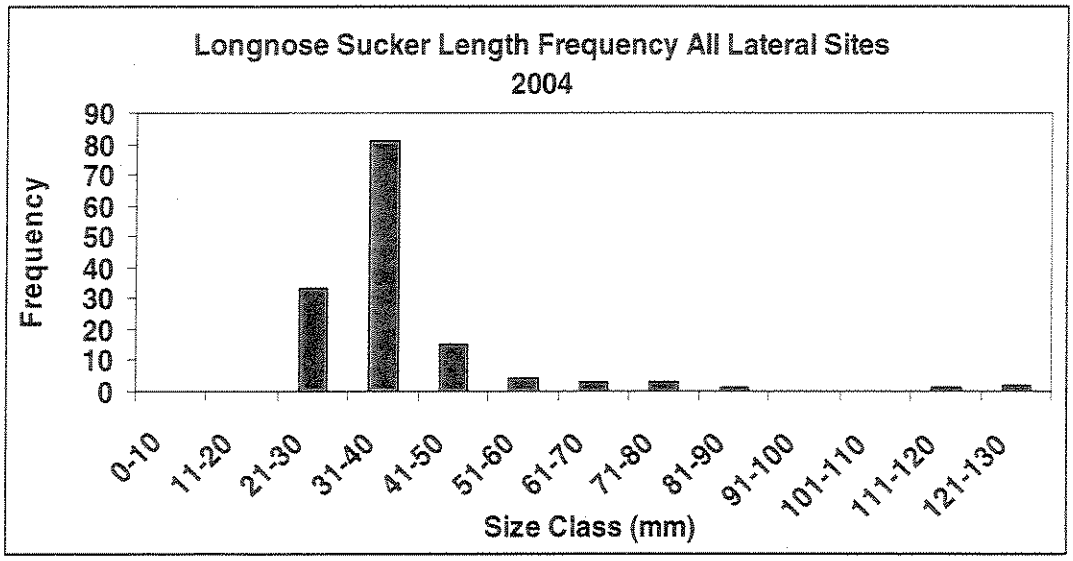

Sculpin spp. in Shallow Shorelines
2004
y = 3.2008x - 5.4096
R2 = 0.9538
N = 336
Log10 Weight
Log10 Length
1.50
1.00
0.50
0.00
-0.50
-1.00
1.25
1.50
1.75
2.00
2.25

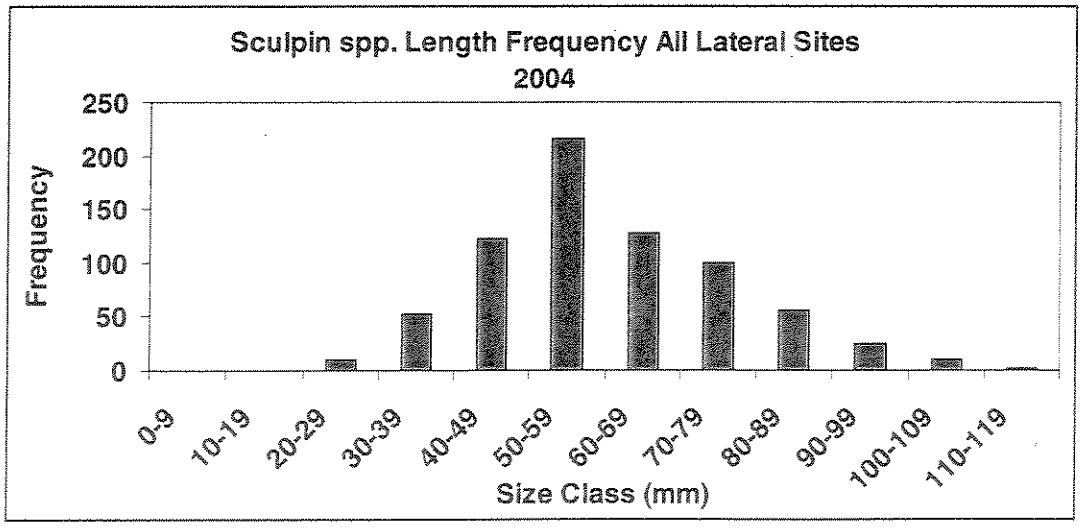

Mountain Whitefish All Sites
2004
y = 2.9806x - 5.1136
R2 = 0.7996
N = 24
Log10 Weight
Log10 Length
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
1.25
1.50
1.75
2.00
2.25
2.50


Longnose Suckers in Springbrooks
2004
y = 2.835x - 4.7555
R2 = 0.8843
N = 85
Log10 Weight
Log10 Length
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
1.25
1.75
2.00
2.25
2.50


Longnose Suckers in Backwaters
2004
y = 3.25x - 5.4681
R2 = 0.9589
N = 56
Log10 Weight
Log10 Length
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
1.25
1.50
1.75
2.00
2.25


Brook Trout Length Frequency All Lateral Sites
2004
Frequency
90
80
70
60
50
40
30
20
10
0
0-10
21-30
41-50
61-70
81-90
101-110
121-130
141-150
161-170
181-190
201-210
221-230
241-250
261-270
Size Class (mm)


Longnose Sucker Length Frequency All Lateral Sites
2004
Frequency
90
80
70
60
50
40
30
20
10
0
0-10
11-20
21-30
31-40
41-50
51-60
61-70
71-80
81-90
91-100
101-110
111-120
121-130
Size Class (mm)


Sculpin spp. Length Frequency All Lateral Sites
2004
Frequency
250
200
150
100
50
0
0-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
90-99
100-109
110-119
Size Class (mm)

Montana Department of Fish, Wildlife and Parks
FISHERIES DIVISION
1420 East Sixth Avenue, Helena, MT 59620

REPORT OF FISH TAKEN UNDER A SCIENTIFIC COLLECTOR'S PERMIT -- 2004
Year

Instructions: Return completed form to MDFWP at the above address.
Column No. 5: "Time of Year" use the following codes: 1=Jan Feb Mar; 2=Apr May Jun; 3=Jul Aug Sep; 4 = Oct Nov Dec
Column No. 6: "Water and Location" include County and Nearest Landmark.

Licensee's Name: Jack Stanford | Telephone No. & Area Code: 406-982-3301

Street Address: Flathead Lake Biological Station 311 Bio Station Lane

City: Polson | State: MT | Zip Code: 59806-9659

1 Species Taken	2 Approximate Number Taken	3 Size Range Inches	4 Gear Used	5 Time of Year	6 Water and Location
Brook Trout, Salvelinus fontinalis	78	2-8	electrofishing	July/Aug	MFFR
Mountain Whitefish, Prosopium williamsoni	16	1-3.5	electrofishing	↓	↓
Sculpin spp.	132	1-5	electrofishing		
Cottus spp.					
Longnose sucker Catostomus catostomus	71	1-3	electrofishing	↓	↓
Brook Trout Salvelinus fontinalis	21	2-8	electrofishing	October	MFFR
Mountain Whitefish Prosopium williamsoni	33	1-7.5	electrofishing	October	↓
Sculpin spp.	49	1-5	electrofishing	October	
Cottus spp.					
Longnose sucker Catostomus catostomus	9	1-3	electrofishing	October	↓

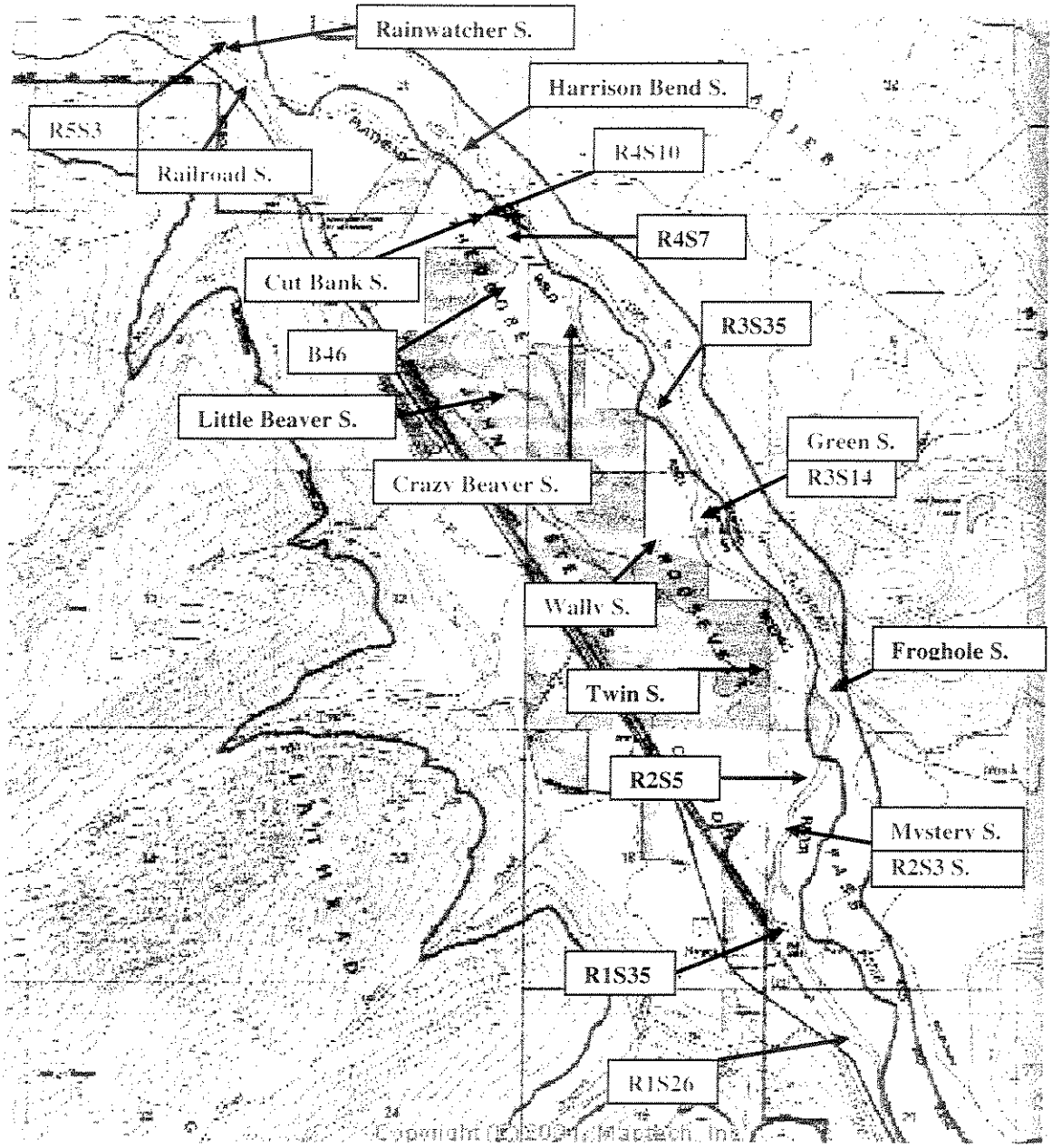
12/90 CH:mp

Map of Nyack 2004 study sites

Nyack Floodplain

Red = Electrofishing sites

Green = Snorkeling sites



2004 Nyack Electrofishing Sites and Dates

Location	Habitat Type	Sample Date 1	Area Sampled (m)	Sample Date 2	Area Sampled (m)	Sampling Notes
R1S35	Shallow shoreline	June 21, 2004	90.0	August 31, 2004	112.5	
R2S5	Shallow shoreline	July 1, 2004	121.0	August 21, 2004	333.0	
R3S35	Shallow shoreline	June 22, 2004	56.6	August 21, 2004	93.8	
R4S7	Shallow shoreline	June 30, 2004	54.0	August 20, 2004	373.3	
R1S35	Backwater	June 21, 2004	1054.0	August 31, 2004	600.0	
R2S5	Backwater	July 1, 2004	615.0	August 18, 2004	134.5	
R4S7	Backwater	June 24, 2004	627.9	August 20, 2004	266.8	
Rainwatcher	Springbrook	July 8, 2004	817.3	August 23, 2004	1200.0	
Froghole	Springbrook	June 28, 2004	608.5	August 18, 2004	400.0	
Little Beaver	Springbrook	June 30, 2004	1085.0	August 19, 2004	1000.0	
Twin	Springbrook	June 23, 2004	804.0	August 17, 2004	420.0	
Harrison Bend	Springbrook	June 29, 2004	872.1	August 19, 2004	560.0	Lots of supended sediment, aquatic vegetation made sampling very inefficient compared to other sites

2004 Nyack Snorkel Survey Sites and Dates

Location	Habitat Type	Time of Day	Sample Date 1	Sample Date 2	Sample Date 3	Sample Date 4	Sample Date 5
Wally	Springbrook	Day	July 20, 2004	August 12, 2004	August 30, 2004	September 13, 2004	October 3, 2004
Wally	Springbrook	Night	July 16, 2004	August 13, 2004	September 2, 2004	September 14, 2004	October 1, 2004
Crazy Beaver	Springbrook	Day	July 16, 2004	August 12, 2004	August 30, 2004	September 13, 2004	October 3, 2004
Crazy Beaver	Springbrook	Night	July 18, 2004	August 13, 2004	September 2, 2004	September 14, 2004	October 1, 2004
Cut Bank	Springbrook	Day	N/A	August 11, 2004	September 3, 2004	N/A	September 27, 2004
Cut Bank	Springbrook	Night	N/A	August 12, 2004	September 4, 2004	N/A	October 2, 2004
Green	Springbrook	Day	July 19, 2004	August 12, 2004	September 2, 2004	September 16, 2004	N/A
Green	Springbrook	Night	July 16, 2004	August 13, 2004	September 3, 2004	September 16, 2004	N/A
Mystery	Springbrook	Day	July 18, 2004	August 14, 2004	September 2, 2004	September 16, 2004	October 1, 2004
Mystery	Springbrook	Night	July 19, 2004	August 14, 2004	August 30, 2004	September 13, 2004	October 2, 2004
Railroad	Springbrook	Day	July 17, 2004	August 13, 2004	August 30, 2004	September 13, 2004	October 3, 2004
Railroad	Springbrook	Night	July 19, 2004	August 14, 2004	September 2, 2004	September 14, 2004	October 1, 2004
R1S26	Shallow Shoreline	Day	July 16, 2004	August 11, 2004	September 3, 2004	September 17, 2004	September 27, 2004
R1S26	Shallow Shoreline	Night	July 18, 2004	August 14, 2004	August 30, 2004	September 16, 2004	October 2, 2004
R1S26	Backwater	Day	July 16, 2004	August 11, 2004	September 4, 2004	September 16, 2004	October 1, 2004
R1S26	Backwater	Night	July 18, 2004	August 14, 2004	August 30, 2004	September 16, 2004	October 2, 2004
R1S26	Main channel	Day	July 16, 2004	August 11, 2004	September 7, 2004	September 14, 2004	October 1, 2004
R1S26	Main channel	Night	N/A	N/A	N/A	N/A	N/A
R2S3	Shallow Shoreline	Day	July 18, 2004	August 14, 2004	September 3, 2004	September 17, 2004	September 27, 2004
R2S3	Shallow Shoreline	Night	July 19, 2004	August 14, 2004	August 30, 2004	September 13, 2004	October 2, 2004
R2S3	Backwater	Day	N/A	August 14, 2004	N/A	N/A	N/A
R2S3	Backwater	Night	N/A	August 14, 2004	N/A	N/A	N/A
R2S3	Main channel	Day	July 18, 2004	August 14, 2004	September 7, 2004	September 14, 2004	October 1, 2004
R2S3	Main channel	Night	N/A	N/A	N/A	N/A	N/A
R3S14	Shallow Shoreline	Day	July 19, 2004	August 12, 2004	September 4, 2004	September 17, 2004	October 2, 2004
R3S14	Shallow Shoreline	Night	July 16, 2004	August 13, 2004	September 3, 2004	September 16, 2004	October 3, 2004
R3S14	Backwater	Day	July 19, 2004	August 12, 2004	September 4, 2004	September 16, 2004	October 2, 2004
R3S14	Backwater	Night	N/A	N/A	September 7, 2004	September 16, 2004	October 3, 2004
R3S14	Main channel	Day	July 19, 2004	August 12, 2004	September 7, 2004	September 14, 2004	October 2, 2004
R3S14	Main channel	Night	N/A	N/A	N/A	N/A	N/A
R4S10	Shallow Shoreline	Day	July 19, 2004	August 11, 2004	September 3, 2004	September 17, 2004	September 27, 2004
R4S10	Shallow Shoreline	Night	July 17, 2004	August 12, 2004	September 4, 2004	September 16, 2004	October 2, 2004
R4S10	Backwater	Day	July 20, 2004	N/A	September 7, 2004	N/A	September 27, 2004
R4S10	Backwater	Night	July 17, 2004	N/A	N/A	N/A	October 2, 2004
R4S10	Main channel	Day	N/A	August 11, 2004	September 7, 2004	September 14, 2004	October 2, 2004
R4S10	Main channel	Night	N/A	N/A	N/A	N/A	N/A
R5S3	Shallow Shoreline	Day	N/A	August 13, 2004	September 4, 2004	N/A	October 2, 2004
R5S3	Shallow Shoreline	Night	N/A	August 14, 2004	September 3, 2004	September 13, 2004	October 3, 2004
R5S3	Backwater	Day	N/A	August 13, 2004	September 2, 2004	N/A	October 2, 2004
R5S3	Backwater	Night	N/A	August 14, 2004	September 3, 2004	September 13, 2004	October 3, 2004
R5S3	Main channel	Day	N/A	August 13, 2004	September 7, 2004	N/A	October 2, 2004
R5S3	Main channel	Night	N/A	N/A	N/A	N/A	N/A
B46	Backwater	Day	July 19, 2004	August 15, 2004	August 30, 2004	September 16, 2004	October 3, 2004
B46	Backwater	Night	July 18, 2004	August 11, 2004	September 3, 2004	September 13, 2004	October 1, 2004