



- III.A.1. Implement Yampa Basin aquatic wildlife management plan.
- III.A.1.b. Remove and translocate northern pike from the Yampa River.
- III.A. 1.d. Remove and translocate smallmouth bass.

VI. Accomplishment of FY 2005 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

*Smallmouth bass*

The goal is to remove as many smallmouth bass as possible from a 12-mile treatment reach and a 5-mile concentration reach and estimate the proportion of the population removed from each reach.

Objectives:

1. Obtain an estimate of the number of smallmouth bass in the 12-mile control and 12-mile treatment reaches in Little Yampa Canyon and the 5-mile reach in Lily Park using a mark-recapture abundance estimator.
2. Remove a large portion of the estimated population of smallmouth bass from the 12-mile treatment reach in Little Yampa Canyon and the 5-mile concentration area in Lily Park.
3. Calculate the proportion of smallmouth bass removed from each study area based on initial population size and compare capture rates between control and treatment reaches.
4. To remove large numbers of age-0 and age-1 smallmouth bass from the 12-mile treatment reach in Little Yampa Canyon.
5. Evaluate movement of tagged smallmouth bass from the control reach to ensure that immigration or emigration does not confound comparisons between control and treatment site.

*Northern pike*

The goal is to remove as many pike as possible from critical habitat and estimate the fraction of the population removed. (Primarily accomplished by Project 98a and supplemented by this Project (#125).

Objectives:

1. Obtain an estimate of the number of northern pike that reside in the 95-mile study reach in the Yampa River using a mark-recapture abundance estimator. (This will be done by Project 98a).
2. Remove a large portion of the estimated population of northern pike from the smallmouth bass study reach during at least five removal passes and from other reaches opportunistically. (Project 98a will conduct 3 removal passes and this project will supplement removal with 2 additional passes).
3. Calculate the proportion of northern pike removed based on initial population size. (This will be done by Project 98a).

Objectives were met and preliminary results are shown in the attached tables and figures. We were able to achieve our stated objectives to obtain abundance estimates for each species and study group. We are still analyzing movement data for smallmouth bass, including recaptures of fish tagged in previous years and by other agencies. The new objective to remove young smallmouth bass in the late summer and fall was accomplished with seven sampling trips from July through October. A significant shortcoming was the failure of a fish screen at Elkhead Reservoir and the subsequent escape from the reservoir of smallmouth bass that had been moved there in 2003, 2004, and 2005.

VII. Recommendations:

1. After smallmouth bass home range and movement data are analyzed and understood, make sure that the study sites are the appropriate size.
2. To increase removal effectiveness, do abundance estimates less frequently such as every three years, in order to remove the large number of fish that are captured during the marking pass.
3. Continue to provide consistent information and public relations messages for agencies and the affected public.

VIII. Project Status:

The project accomplished an intensive removal program within the study sites and assisted the removal efforts of the Colorado Division of Wildlife with a similar study of northern pike. This project and several other nonnative fish management projects will be reviewed in a workshop scheduled for Dec 12-13, 2005 and this work will be revised based on those finding and discussions.

IX. FY 2005 Budget Status

- A. Funds Provided: \$215,395
- B. Funds Expended: \$199,000
- C. Difference: \$16,395
- D. Percent of the FY 2004 work completed, and projected costs to complete: 92% completed, cost to complete 16,395
- E. Recovery Program funds spent for publication charges: \$0

X. Status of Data Submission (Where applicable): Data will be submitted with the final report. Colorado pikeminnow tag data will be submitted to data base manager by the end of calendar year.

XI. Signed: John Hawkins 11/27/05  
Principal Investigator Date

*Submitted electronically.*

Version control:

submitted 11/27/05 by JAH

Table 1. Dates, sample effort, number, and CPUE of smallmouth bass captured in each study site of the Yampa River, 2005.

Bass were segregated into length groups smaller or large than 150 mm TL, because the abundance estimate was for bass > 150 mm TL.

Fish in the Treatment site were marked and released on two sample passes (1a & 1b) because of mechanical problems on the first attempt.

Number of fish removed might include a few mortalities that died in transport.

Pass	Dates	Hours Electrofishing	Number of Bass	CPUE #Bass/Hr	Bass by Size group			Disposition of smallmouth bass	
					# <150	CPUE	# >=150		
<b>Little Yampa Canyon-Control (RM 124--112)</b>									
1	May 7-8	15.0	173	12	18	1	155	10	Mark and Release
2	May 19-20	15.0	261	17	22	1	239	16	Mark and Release
3	June 3-5	13.3	124	9	21	2	103	8	Mark and Release
4	July 8-9	13.8	368	27	78	6	290	21	Mark and Release
Sub-totals		57.1	926		139		787		
Number removed			0		0		0		
<b>Little Yampa Canyon-Treatment (RM 112-100)</b>									
1a	April 22-23, 26-27	12.7	119	9	21	2	98	8	Mark and Release
1b	May 5-6	13.7	137	10	41	3	96	7	Mark and Release
2	May 17-18	17.3	319	18	68	4	251	15	Elkhead or Euthanized
3	May 23-24	15.9	369	23	39	2	330	21	Elkhead or Euthanized
4	May 31-Jun 1	16.1	224	14	60	4	164	10	Elkhead or Euthanized
5	Jun 14-15	15.9	199	13	74	5	125	8	Elkhead or Euthanized
6	Jun 19-20	14.9	83	6	34	2	49	3	Elkhead or Euthanized
7	July 6-7	15.6	311	20	108	7	203	13	Elkhead or Euthanized
8	July 11-12	15.2	452	30	246	16	206	14	Elkhead or Euthanized
9	July 20-21	5.4	295	55	219	41	76	14	Elkhead or Euthanized
Sub-totals		142.6	2508		910		1598		
Number removed			2252		848		1404		
<b>Lily Park (RM 55.5--50.5)</b>									
1	May 4	5.1	263	52	104	20	159	31	Mark and Release
2	May 10	6.5	335	52	167	26	168	26	Elkhead or Euthanized
3	June 6	6.0	369	61	151	25	218	36	Elkhead or Euthanized
4	June 16	6.1	420	69	243	40	177	29	Elkhead or Euthanized
5	June 21	5.5	324	59	218	39	106	19	Elkhead or Euthanized
6	July 19	5.4	404	75	287	53	117	22	Elkhead or Euthanized
Sub-totals		34.6	2115		1170		945		
Number removed			1852		1066		786		
<b>SouthBeach (RM 134.6-124)</b>									
1	May 21	7.4							Mark and Release
2	June 17	9.7							Mark and Release
Sub-totals		17.1							
<b>Lower Juniper (RM 100-92)</b>									
1	June 2	7.6							Mark and Release
Sub-totals		7.6							
		259.1							
<b>Totals for All Reaches Combined</b>									
Number Fish Handled			5549		2219		3330		
Number Fish Removed			4104		1914		2190		

a On each Mark and Release pass some fish were captured more than once and all captures for those fish are reported in this table in the Number of Fish column.

Table 2. Dates, sample effort, number, and CPUE of northern pike captured in each study site of the Yampa River, 2005. Fish in the Treatment site were marked and released on two sample passes (1a & 1b) because of mechanical problems on the first attempt. Number of fish removed might include a few mortalities that died in transport.

Pass	Dates	Hours Electrofishing	Number of Pike <sup>a</sup>	CPUE #Pike/Hr	Disposition of northern pike
<b>Little Yampa Canyon-Control (RM 124--112)</b>					
1	May 7-8	15.0	94	6.3	Mark and Release <sup>b</sup>
2	May 19-20	15.0	40	2.7	LoudySimpson
3	June 3-5	13.3	18	1.4	Loudy Simpson, Martinez
4	July 8-9	13.8	19	1.4	LoudySimpson
Sub-totals		57.1	171		
Number removed			77		
<b>Little Yampa Canyon-Treatment (RM 112-100)</b>					
1a	April 22-23, 26-27	12.7	27	2.1	Mark and Release <sup>c</sup>
1b	May 5-6	13.7	26	1.9	Mark and Release <sup>c</sup>
2	May 17-18	17.3	39	2.3	LoudySimpson <sup>e</sup>
3	May 23-24	15.9	9	0.6	LoudySimpson, Martinez
4	May 31-Jun 1	16.1	16	1.0	LoudySimpson, Martinez
5	Jun 14-15	15.9	16	1.0	LoudySimpson, Martinez
6	Jun 19-20	14.9	6	0.4	LoudySimpson
7	July 6-7	15.6	12	0.8	LoudySimpson
8	July 11-12	15.2	14	0.9	LoudySimpson
9	July 20-21	5.4	8	1.5	LoudySimpson
Sub-totals		142.6	173		
Number removed			120		
<b>Lily Park (RM 55.5--50.5)</b>					
1	May 4	5.1	7	1.4	Mark and Release <sup>d</sup>
2	May 10	6.5	10	1.5	LoudySimpson
3	June 6	6.0	2	0.3	LoudySimpson
4	June 16	6.1	3	0.5	LoudySimpson
5	June 21	5.5	1	0.2	LoudySimpson
6	July 19	5.4	5	0.9	LoudySimpson
Sub-totals		34.6	28		
Number removed			21		
<b>SouthBeach (RM 134.6-124)</b>					
1	May 21	7.4	9		LoudySimpson
2	June 17	9.7	15		LoudySimpson
Sub-totals		17.1	24		
Number removed			24		
<b>Lower Juniper (RM 100-92)</b>					
1	June 2	7.6	10		Loudy Simpson, Martinez
Sub-totals		7.6	10		
Number removed			10		
<b>Totals for All Reaches</b>					
Electrofishing hours		259.1			
Number Fish Handled			406		
Number Fish Removed			252		

a On each Mark and Release pass some fish were captured more than once and all captures for those fish are reported in this table in the Number of Fish column.

b In the Control Reach on the Mark and Release Pass we handled 87 individual northern pike.

c In the Treatment Reach on Mark and Release passes 1a and 1b we handled 47 individual northern pike.

d In the Lily Park reach on the Mark and release pass we handled 6 individual northern pike.

e Of the 39 pike handled, includes 2 that accidentally escaped.

Table 3. Dates, sample effort, number, and CPUE of young smallmouth bass captured by electric seine in each reach of the Yampa River, 2005.  
All bass  $\leq 250$  mm were euthanized.

Pass	Dates	Hours Electrofishing	Number of Bass	CPUE #Bass/Hr
<b>Little Yampa Canyon-Treatment (RM 112-100)</b>				
1	July 20--25	5.0	135	27
2	Aug 10--16	16.5	2494	151
3	Aug 24--30	19.2	5005	261
4	Sept 7--13	4.8	1336	278
5	Sept 29--Oct 3	3.6	273	76
6	Oct 12--18	3.9	285	73
Sub-totals		53	9528	180
<b>Lily Park (RM 55.5--50.5)</b>				
7	Oct 25--26	2.3	39	17
Sub-totals		2.3	39	17
<b>Totals for All Reaches</b>		55	9567	173

Table 4. Abundance estimates for smallmouth bass > 150 mm TL in each study reach of the Yampa River in 2004 and 2005.

Year	Abundance	95% CI	SE	CV	Model	Capture probability	Marked		
							# fish on 1st pass	# fish on 2nd pass	# recaps
<b>Little Yampa Canyon-Control (RM 124--112)</b>									
<u>2-pass capture-recapture</u>									
2004	1413	825--2591	430.1	30%	M(t) Chao	12%	73	171	8
2005	1483	1065--2145	269.8	18%	M(t) Chao	15%	148	228	22
<u>5-pass capture-recapture</u>									
2004	1362	1125--1693	143.6	11%	M(t) Chao	5%, 13%, 8%, 12%, 10%			
2005	2846	2332--3522	301.5	11%	M(t) Darroch	5%, 8%, 3%, 10%			
<b>Little Yampa Canyon-Treatment (RM 112-100)</b>									
2004	1325	788--2414	395.1	30%	M (t) Chao	17%	53	220	8
2005	1223	884--1765	220	18%	M (t) Chao	12%	183	152	22
<b>Lily Park (RM 55.5--50.5)</b>									
2004	703	244--2398	470.9	67%	M(t) Chao	6%	31	43	1
2005	406	293--628	81.8	20%	M(t) Chao	9%	153	35	13

Table 5. Number of smallmouth bass stocked into Elkhead Reservoir from 2003–2005 (2005 data are preliminary).

Year	Length at stocking			Total stocked
	untagged or < 150 mm	Floy tagged 150–249 mm	Floy tagged > =250 mm	
2003	38	126	99	263
2004	1174	846	745	2765
2005	37	12	657	706
Total all years	1249	984	1501	3734

Table 6. Number of tagged smallmouth bass that escaped from Elkhead Reservoir and were recaptured in 2005 in each study reach of the Yampa River.

Agency that recaptured escaped bass	Yampa River river mile of recapture	Year originally stocked in Elkhead			Total
		2003	2004	2005	
Miller Eco	Elkhead Ck.	0	1	1	2
FWS	170–135	0	9	2	11
DOW & CSU	135–124	2	2	1	5
CSU-Control	124–112	0	8	1	9
CSU-Treatment	112–100	0	7	1	8
Total all reaches		2	27	6	35

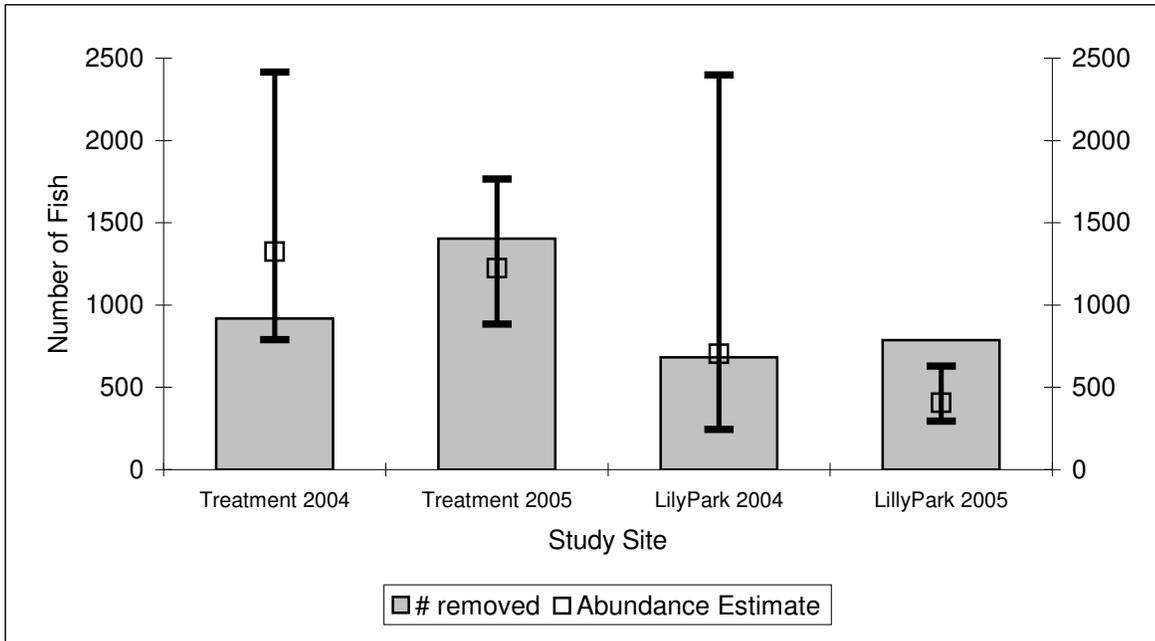
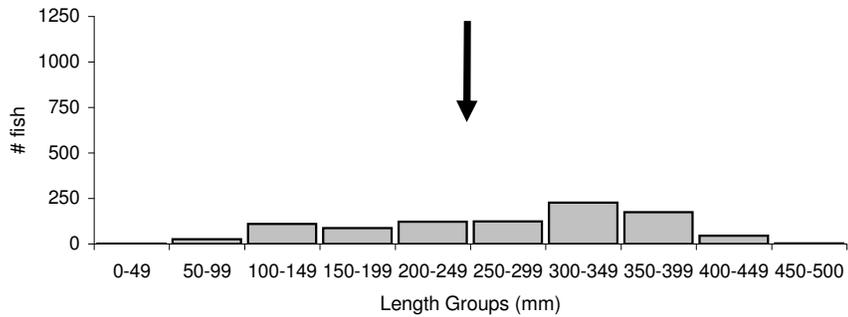
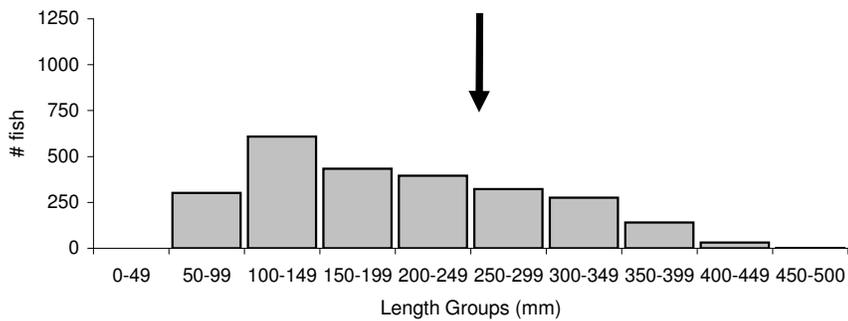


Figure 1. Abundance estimates and 95% CI and number of smallmouth bass removed from the 12-mile Treatment and 5-mile Lily Park study sites in the Yampa River, 2004 and 2005.

Length-frequency of Bass in Control Reach 2005 (n=926)



Length-frequency of Bass in Treatment (Removal) Reach 2005 (n=2508)



Length-frequency of Bass in Lily Park Removal Reach 2005 (n=2115)

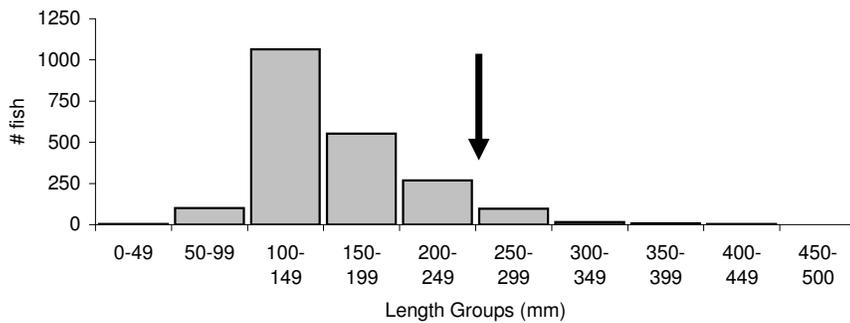


Figure 2. Length frequency of smallmouth bass in the Yampa River study sites, 2005. Arrow denotes 250 mm length. Scales are the same.

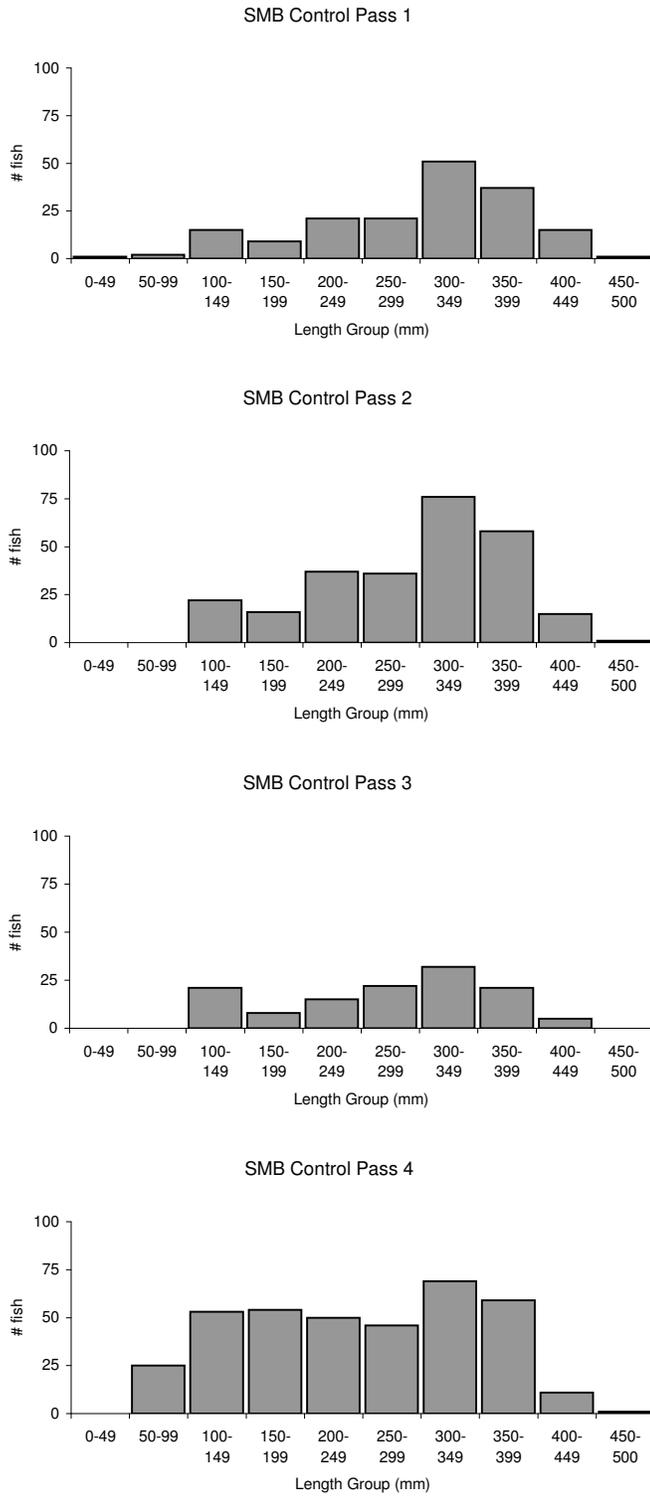


Figure 3. Length frequency of smallmouth bass from the Control (Release) Study site on the Yampa River, 2005.

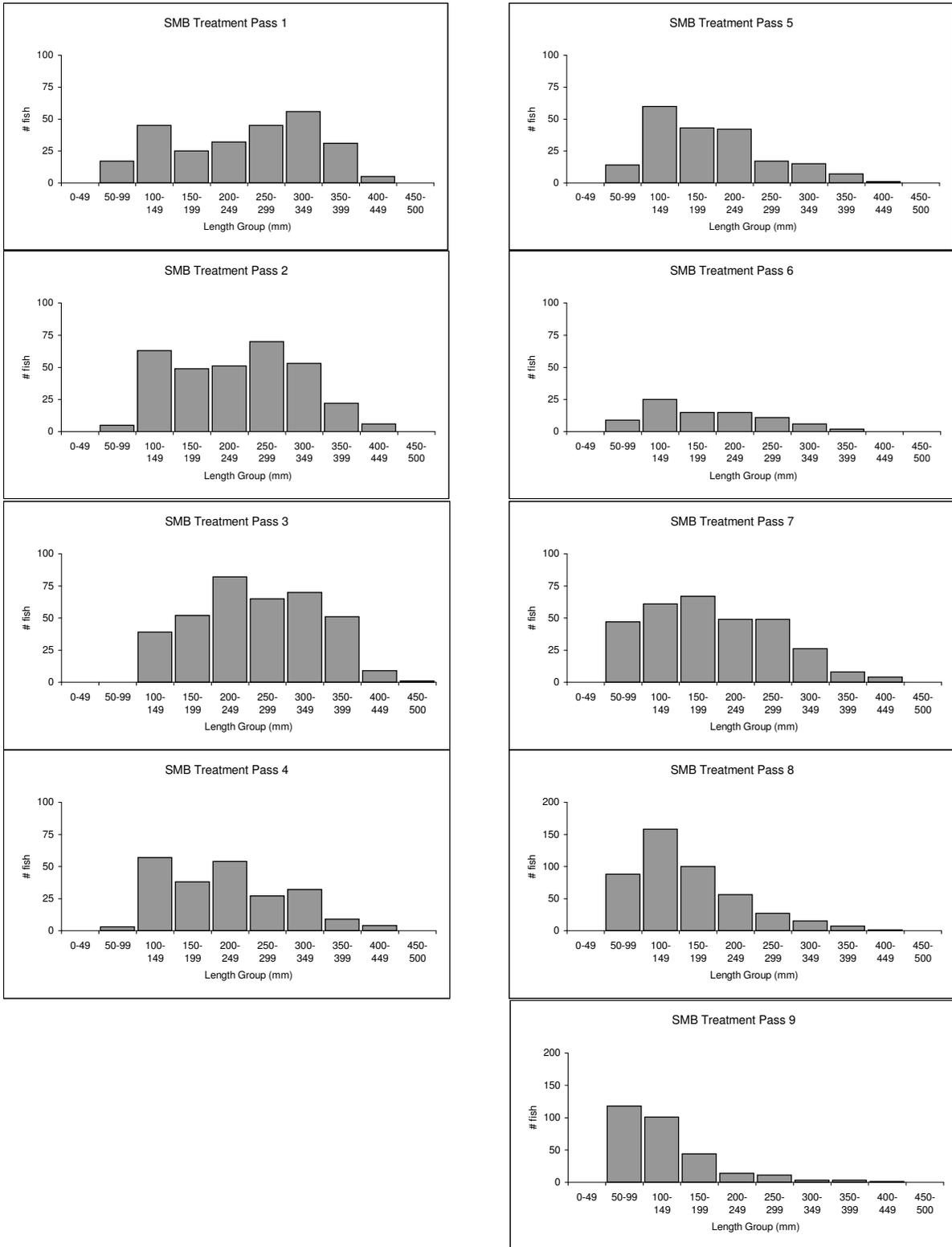


Figure 4. Length frequency of smallmouth bass from the Treatment (removal) reach of the Yampa River, 2005.

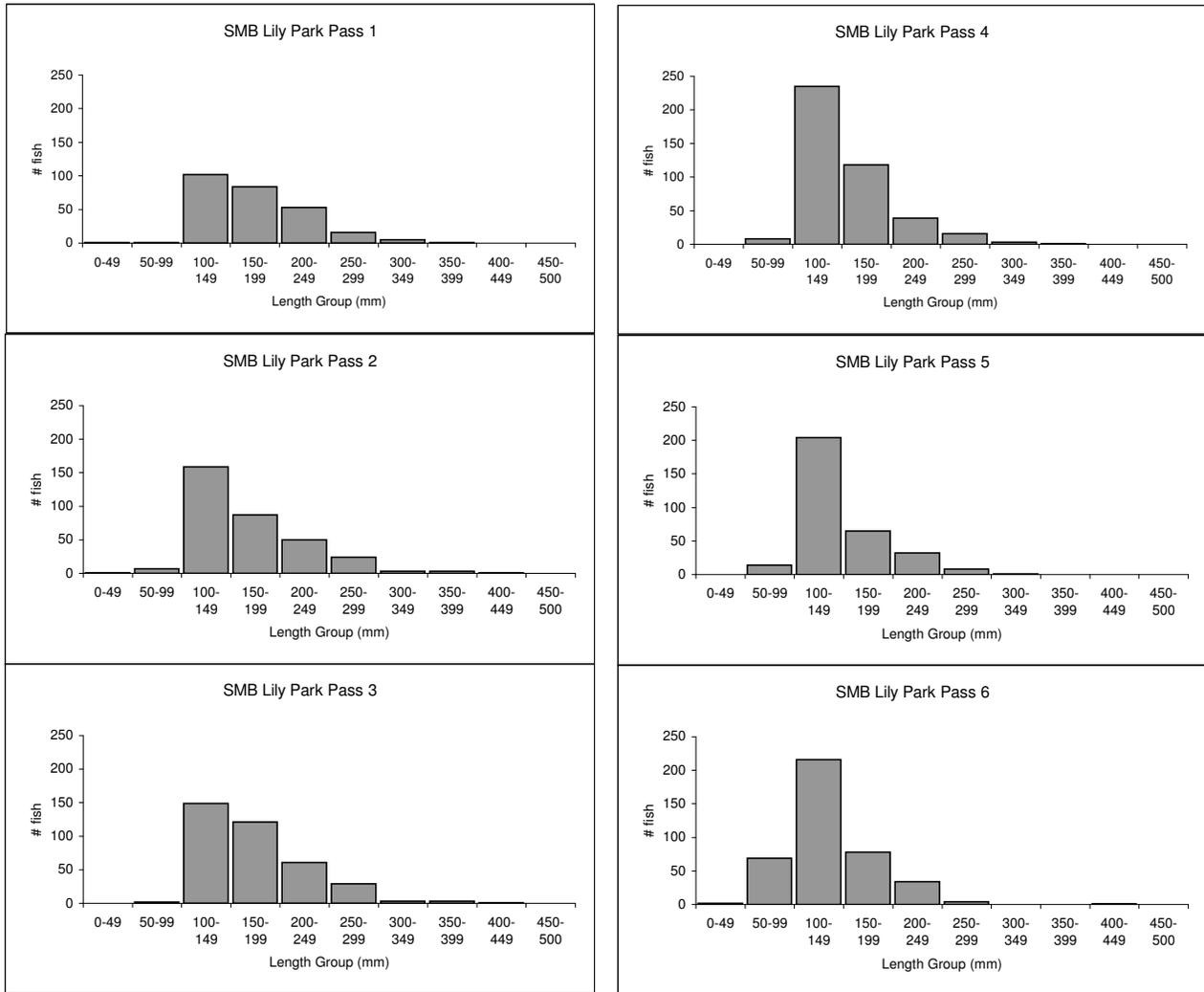


Figure 5. Length frequency of smallmouth bass in the Lily Park (Removal) study site on the Yampa River, 2005.

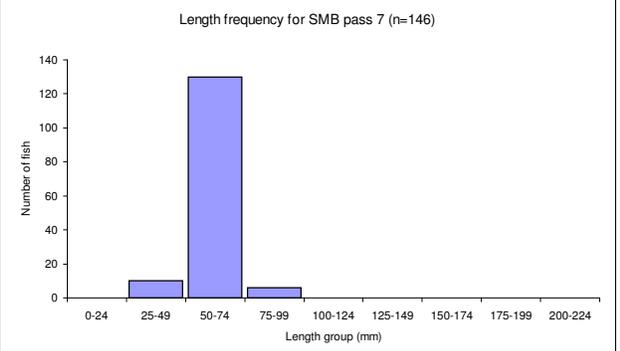
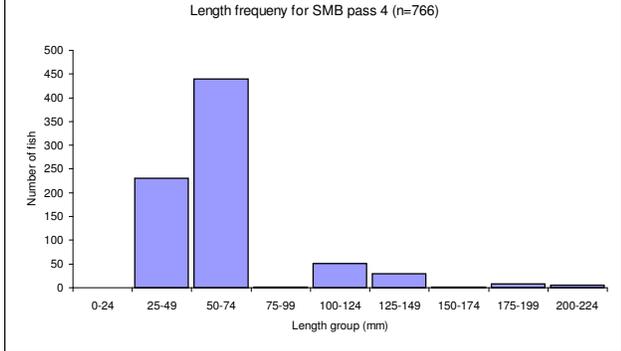
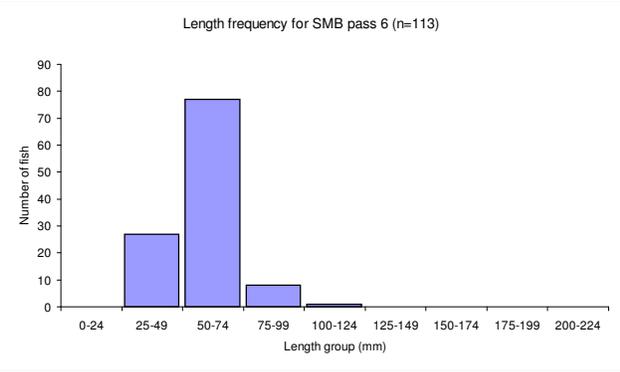
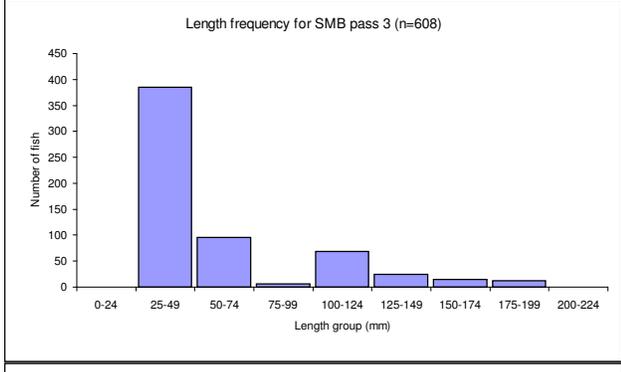
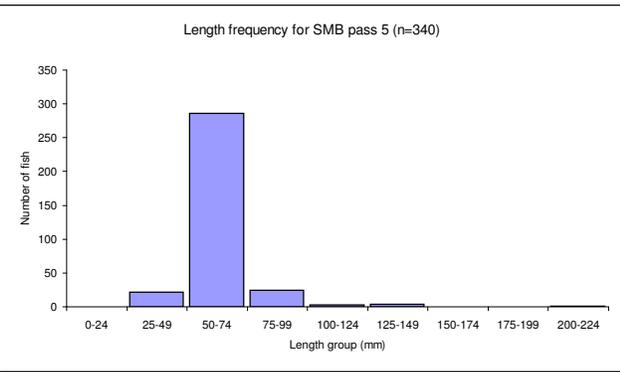
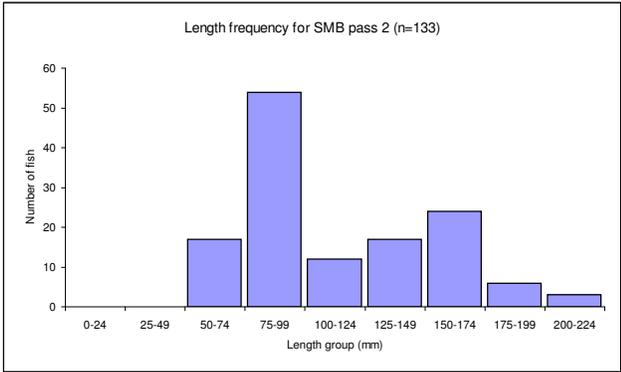
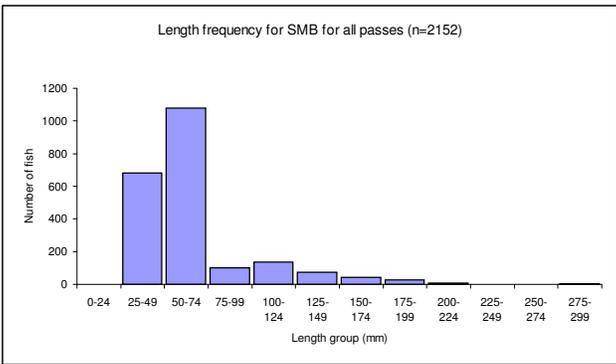


Figure 6. Length frequency of a sub-sample of young smallmouth bass removed by electric seine from the treatment reach of the Yampa River, 20 the treatment reach of the Yampa River, 2005.

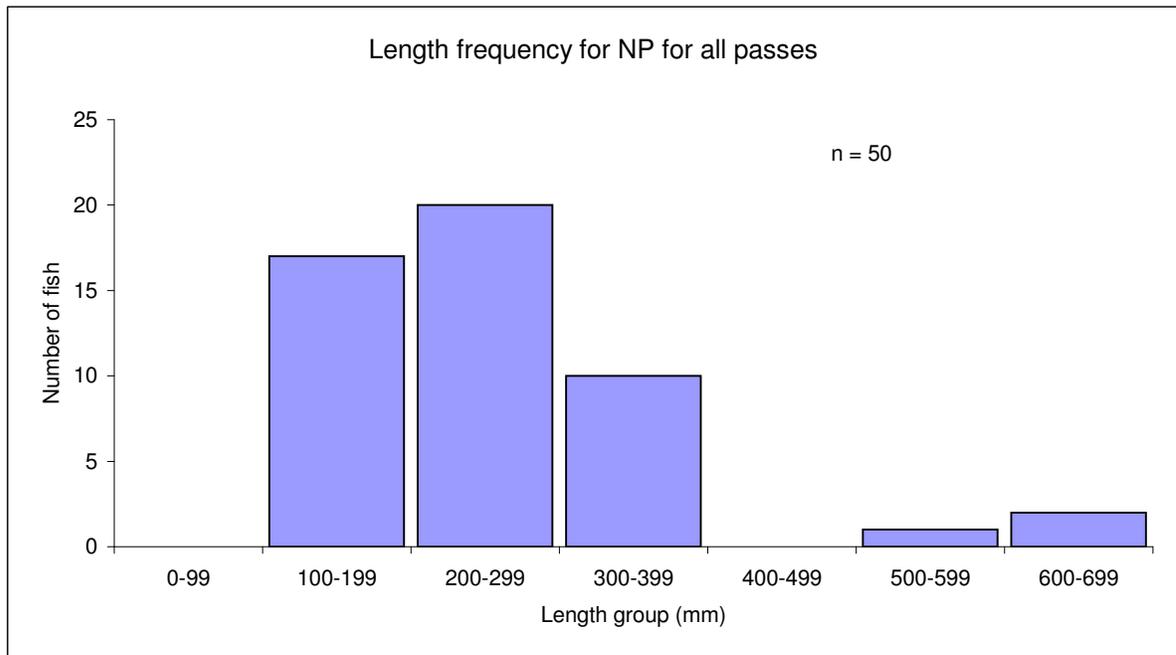


Figure 7. Length frequency for a subsample of northern pike captured by electric seine in the Yampa River, 2005.

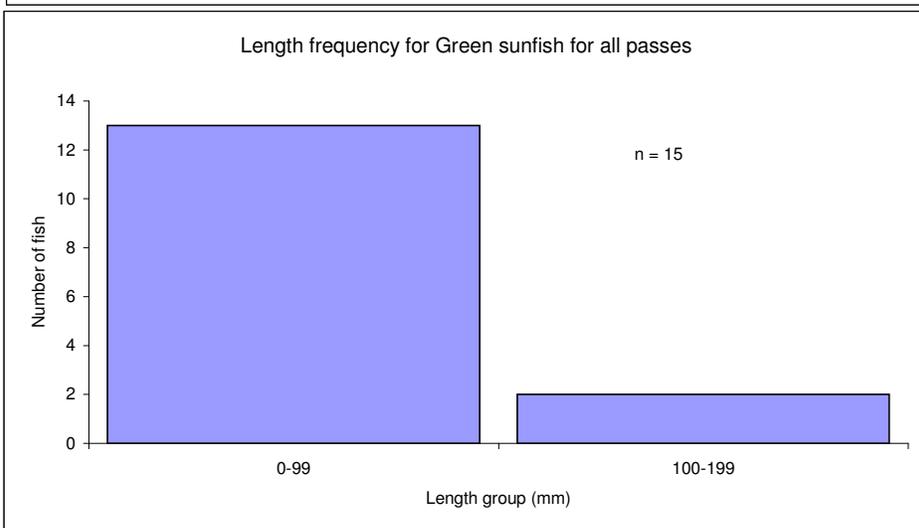
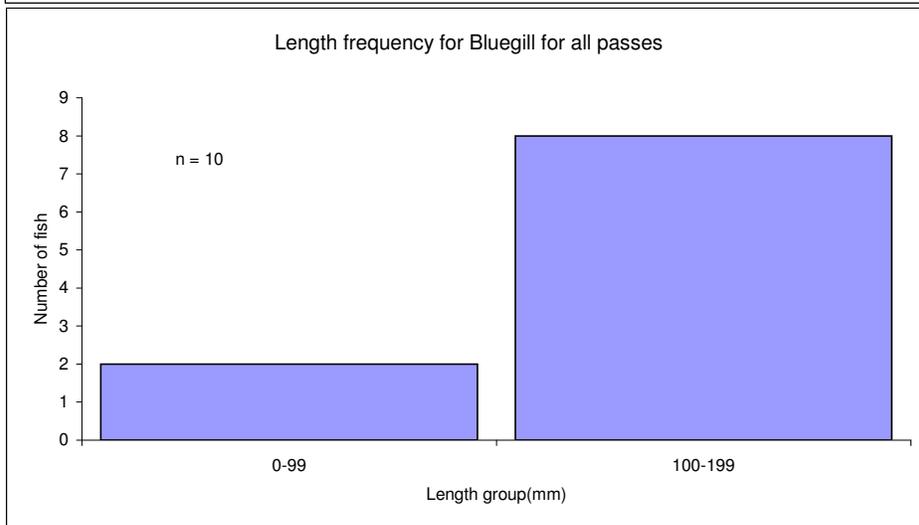
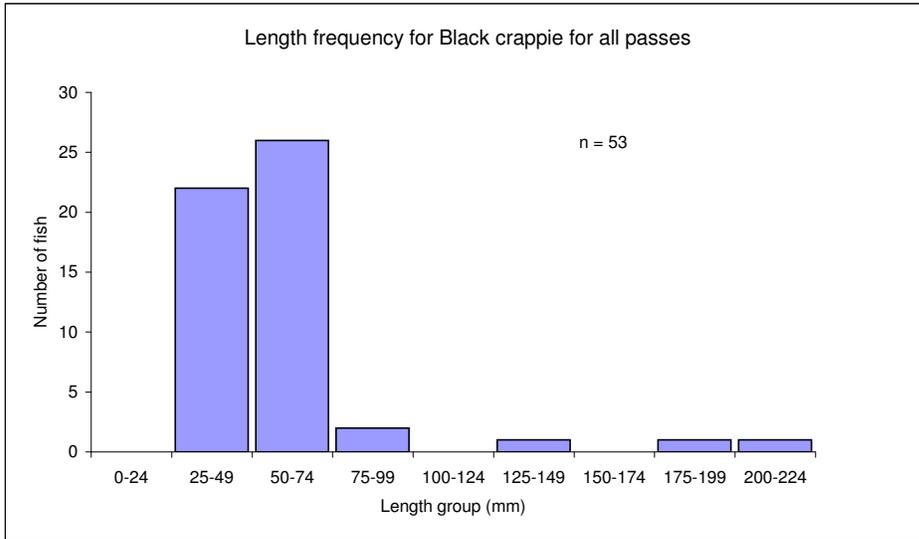


Figure 8. Length frequency for a subsample of centrarchids removed by electric seine from the Yampa River, 2005.