W 4151

Long-term Monitoring of Fish Populations and Habitat of South Boulder Creek, Colorado, within the City of Boulder Open Space Property

Annual Report

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INTRODUCTION

A long-term monitoring program for fish and aquatic habitat was initiated in 1996. Biological data collected in a consistent manner over a long period (biomonitoring) are necessary to determine if changes are occurring in biota relative to anthropogenic or natural changes in habitat. Fishes are thought to be good indicators of the relative health of an aquatic ecosystem. These taxa integrate effects of both site and watershed conditions and the magnitude of detrimental impacts may be manifest in the composition and abundance of these taxa.

Baseline survey data collected during 1994 and 1995 have indicated that a reasonably diverse fish assemblage composed of 9 native and 7 non-native species (Table 1) exists in South Boulder Creek (Bestgen and Kondratieff 1996). Those data suggested that the distribution and abundance of the fish community of South Boulder Creek is affected by several factors and is dynamic. However, whether changes in the fish community are due relatively more to anthropogenic factors such as flow variation or siltation or natural variation is unknown. Long-term variation in abundance of most South Boulder Creek stream fish species is unknown because long-term data are lacking.

TASKS and OBJECTIVES

The tasks and objectives for this project as set out in the research proposal were as follows.

Task I. Sample fishes at four quantitative sites, spring, summer, fall. These sites were South Mesa Trailhead, downstream of Shearer Headgate, just downstream of South Boulder Road. and just upstream of Baseline Road three times per year (spring, summer, and fall) and three to five qualitative sites (e.g., downstream of Valmont Road) twice per year. The most downstream two stations are geographically close but were chosen because both sites represent the upstream distribution of several South Boulder Creek taxa

and are thus unique. The Baseline Road site is important because it has historically been sampled by other investigators.

Task II. Sample qualitative sites in spring and fall.

Task III. Sample habitat in fall.

Task IV. Summarize data and write report in fall. The report will be short and consist mostly of presentation of data collected.

METHODS

Ichthyological Assessments.--Fishes were sampled at four permanent sites in South Boulder Creek. Sites were similar to those sampled during the 1994-95 survey, and were reaches about 100-200 m long. Effort was quantified at these sites via recording electrofishing time in the predetermined site, which facilitates long-term comparisons.

Seines and dipnets or observations were used at qualitative sites or in special habitats. The focus of qualitative collections was to determine distribution and abundance of potentially noxious introduced species (western mosquitofish *Gambusia affinis* downstream of Valmont Road) and to verify continued existence of plains topminnow *Fundulus sciadicus*, a species of concern (formerly federal Category II) and a state special concern species at several sites. Fishes were enumerated, a subsample measured (spring only), and released back into the reach.

Water Chemistry.--Water chemistry information (temperature, dissolved oxygen, water conductivity, pH) will be collected at several sites during each season.

RESULTS

A total of 13 species and one hybrid were captured or observed during 1996 sampling (Table 1) at the four quantitative sites sampled in spring and summer and at four qualitative sites sampled in summer (Appendix I). No species new to South Boulder Creek were collected in 1996 compared to those found in 1994-95.

Table 1.--List of fish species collected or observed during the 1996 survey period, eight of which were native to Colorado and five of which were introduced (N=native, I = introduced).

Common Name	Scientific Name	Status
rainbow trout	*Oncorhynchus mykiss*	I
brown trout	*Salmo trutta*	I
common carp	*Cyprinus carpio*	I
central stoneroller	*Campostoma anomalum*	N
fathead minnow	*Pimephales promelas*	N
longnose dace	*Rhinichthys cataractae*	N
creek chub	*Semotilus atromaculatus*	N
longnose sucker	*Catostomus catostomus*	N
white sucker	*Catostomus commersoni*	N
longnose x white sucker hybrid	*C. catostomus x C. commersoni*	
plains topminnow	*Fundulus sciadicus*	N
western mosquitofish	*Gambusia affinis*	I
green sunfish	*Lepomis cyanellus*	N
largemouth bass	*Micropterus salmoides*	I

Absent from samples collected in previous years were introduced pumkinseed *Lepomis gibbosus* and black crappie *Pomoxis nigromaculatus*, and native orangespotted sunfish *Lepomis humilis*. These species were rare in previous surveys South Boulder Creek and were likely escapees from reservoirs which is more typical habitat for these taxa.

Overall, the fish communities at quantitative and qualitative sampling sites were very similar to those found during 1994-1995. Longnose suckers and rainbow trout continued to dominate the fish community at the South Mesa Trailhead site, while brown trout and longnose dace persist in lower numbers. The deep pool at the upstream end of the site continued to hold the most and largest fish.

The quantitative site at the LaFayette Water Treatment facility during 1994-95 was moved downstream to just downstream of the Shearer Headgate in 1996. The stream in the vicinity of the Headgate may be the subject to future restoration efforts and was thus considered a better location. The community in that reach was dominated by longnose suckers and longnose dace, and rainbow trout and fathead minnows were still rare. Habitat in this reach was predominantly shallow riffles and runs; deeper pool habitat required by large-bodied life stages of rainbow trout and longnose suckers was not found.

South Boulder Creek just downstream of South Boulder Road continued to support a reasonably diverse fish community that was composed of up to nine species in 1996. Brown trout up to 374 mm total length were found there and the side channel flowing into South Boulder Creek from the west continued to support large numbers of plains topminnow. The silt load deposited on channel substrate was relatively heavy in South Boulder Creek at this site and downstream, but was relatively low upstream. This pattern was similar to that found in 1994-95.

South Boulder Creek just upstream of Baseline Road supported a fish community nearly identical to that found near South Boulder Road except that central stoneroller was common and plains topminnow was not found. This pattern essentially mirrors that found in 1994-95. Discharge at this site was very low (0.014 m^3/sec) in spring 1996 but was higher in summer due to extended runoff.

Samples collected at qualitative sites in 1996 indicated the continued presence of plains topminnow at all sites where it was collected in 1994-95. Populations were most abundant in the side channel that enters South Boulder Creek just downstream of South Boulder Road. Sampling downstream of KOA Reservoir indicated that western mosquitofish still persisted there.

SHORTCOMINGS IN 1996 BY TASK

Task I. Spring and summer quantitative samples were collected; a quantitative fall sample was not collected.

Task II. A single qualitative sample was collected in summer instead of two in spring and fall.

Task III. Habitat sampling was not conducted.

Task IV. Report summarizing available data was submitted.

LITERATURE CITED

Bestgen, K. R., and B. Kondratieff. 1996. Fishes, macroinvertebrates, and habitat of South Boulder Creek, Colorado, within City of Boulder Open Space. Unpublished report submitted to the City of Boulder, Open Space Department, Boulder CO. 100 pp.

South Boulder Creek Fish Community Survey

Quantitative sites, spring 1996

Site 1: Colorado, Boulder County, South Boulder Creek, South Mesa Trailhead, upstream of footbridge for 150 m, T1SR70WS29-30 boundary, 26 April 1996, backpack electrofisher time 1393 seconds. K. R. Bestgen, C. Miller

Common name	Abundance (No.)	(%)
rainbow trout	17	25.0
brown trout	1	1.5
longnose dace	5	7.4
longnose sucker	45	66.1
(4 species)		
Totals	68	100.0

Water conductivity = 55 micromhos
Water temperature = 14°C
Water clarity = clear to > 1 m

Quantitative sites, spring 1996 continued

Site 2: Colorado, Boulder County, South Boulder Creek, about 1.3 km downstream of Broadway Ave., 150 m downstream of Shearer headgate T1SR70WS16NE1/4, 26 April 1996, backpack electrofisher time 2099 seconds, K. R. Bestgen, C. Miller + other Open Space personnel.

Common name	Abundance (No.)	(%)
fathead minnow	2	1.7
longnose dace	54	44.6
longnose sucker	65	53.7
(3 species)		
Totals	121	100.0

Water conductivity = 80 micromhos
Water temperature = 17°C
Water clarity = clear to > 1 m

Quantitative sites, spring 1996 continued

Site 3: Colorado, Boulder County, South Boulder Creek, South Boulder Road, 200 m downstream of, on Gebhardt Property T1SR70WS3SW1/4, 26 April 1996, backpack electrofisher time 1240 seconds, K. R. Bestgen, C. Miller.

Common name	Abundance (No.)	(%)
rainbow trout	6	3.8
brown trout	5	3.2
fathead minnow	50	31.6
creek chub	26	16.5
longnose dace	12	7.6
longnose sucker	46	29.1
white sucker	9	5.7
plains topminnow	1	0.6
green sunfish	3	1.9
(9 species)		
Totals	158	100.0

Water conductivity, South Boulder Creek upstream of side channel inflow = 75 micromhos
Water conductivity, South Boulder Creek downstream of side channel inflow = 130 micromhos
Water conductivity, in side channel inflow = 230 micromhos
Water temperature, South Boulder Creek downstream of side channel inflow = 18°C
Water clarity = clear to > 1 m

Quantitative sites, spring 1996 continued

Site 4: Colorado, Boulder County, South Boulder Creek, 40 m upstream of Baseline Rd., at Bobolink Trailhead, for 300 m T1SR70WS3 N. boundary, 26 April 1996, backpack electrofisher time 957 seconds, K. R. Bestgen, C. Miller.

Common name	Abundance (No.)	(%)
brown trout	3	1.1
central stoneroller	44	16.4
fathead minnow	11	4.1
creek chub	79	29.5
longnose dace	90	33.6
longnose sucker	20	7.4
white sucker	19	7.1
White x longnose sucker hybrid	1	0.4
green sunfish	1	0.4
(8 species + hybrid) Totals	268	100.0

Water conductivity = 190 micromhos
Water temperature = 13°C
Water clarity = clear to > 1 m

South Boulder Creek Fish Community Survey

Quantitative sites, summer 1996

Site 1: Colorado, Boulder County, South Boulder Creek, South Mesa Trailhead, upstream of footbridge for 150 m, T1SR70WS29-30 boundary, 18 August 1996, backpack electrofisher time 1202 seconds, K. R. Bestgen.

Common name	Abundance (No.)	(%)
rainbow trout	24	38.1
brown trout	2	3.2
longnose dace	4	6.3
longnose sucker	33	52.4
(4 species)		
Totals	63	100.0

Water conductivity = 60 micromhos
Water temperature = 16°C
Water clarity = clear to > 1 m

Quantitative sites, summer 1996 continued

Site 2: Colorado, Boulder County, South Boulder Creek, about 1.3 km downstream of Broadway Ave., 150 m downstream of Shearer headgate T1SR70WS16NE1/4, 18 August 1996, backpack electrofisher time 1506 seconds, K. R. Bestgen.

Common name	Abundance (No.)	(%)
rainbow trout	4	6.8
longnose dace	32	54.2
longnose sucker	23	40.0
(3 species)		
Totals	59	100.0

Water conductivity = 60 micromhos
Water temperature = 16°C
Water clarity = clear to > 1 m

Quantitative sites, summer 1996 continued

Site 3: Colorado, Boulder County, South Boulder Creek, South Boulder Road, 200 m downstream of, on Gebhardt Property T1SR70WS3SW1/4, 18 August 1996, backpack electrofisher time 1232 seconds, K. R. Bestgen.

Common name	Abundance (No.)	(%)
rainbow trout	7	5.6
brown trout	4	3.2
fathead minnow	23	18.5
creek chub	15	12.1
longnose dace	9	7.3
longnose sucker	45	36.2
white sucker	13	10.5
plains topminnow	6	4.8
green sunfish	2	1.6
(9 species)		
Totals	124	100.0

Water conductivity, South Boulder Creek upstream of side channel inflow = 70 micromhos
Water temperature, South Boulder Creek downstream of side channel inflow = 19°C
Water clarity = clear to > 1 m

Quantitative sites, summer 1996 continued

Site 4: Colorado, Boulder County, South Boulder Creek, 40 m upstream of Baseline Rd., at Bobolink Trailhead, for 300 m T1SR70WS3 N. boundary, 18 August 1996, backpack electrofisher time 1232 seconds, K. R. Bestgen.

Common name	Abundance (No.)	(%)
brown trout	1	0.4
central stoneroller	49	19.5
fathead minnow	8	3.2
creek chub	87	34.7
longnose dace	53	21.1
longnose sucker	28	11.2
white sucker	21	8.4
green sunfish	4	1.6
(8 species)		
Totals	251	100.0

Water conductivity = 130 micromhos
Water temperature = 15°C
Water clarity = clear to > 1 m

South Boulder Fish Community Survey

Qualitative sites, summer 1996

Colorado, Boulder County, South Boulder Creek,
pond at South Boulder Ck. West trailhead, just west of Broadway Ave. T1SR70WS16SW1/4, 17 August 1996, K. R. Bestgen, K. Bestgen. Dip net sample + observations.

Common name	Abundance (No.)	(%)
plains topminnow	13	86.7
green sunfish	2	13.3
(2 species)		
Totals	15	100.0

Colorado, Boulder County, gravel pit pond off of west side of South Boulder Creek, directly northeast of the East Boulder Recreation Area. T1SR70WS3 S boundary of NW1/4, 17 August 1996, K. R. Bestgen, K. Bestgen. Hand seine.

Common name	Abundance (No.)	(%)
plains topminnow	+100	100
(1 species)		
Totals	+100	100.0

Qualitative sites, summer 1996 continued

KOA Reservoir, northwest arm of KOA reservoir, west of bike path. T1NR70WS27NW1/4, 17 August 1996 (observed most species, seined topminnows),K. R. Bestgen, K. Bestgen.

Common name	Abundance (No.)	(%)	
common carp			
plains topminnow	26	(many more observed)	
bluegill			
largemouth bass			
(4 species)			
Totals	26	100.0	(+observed other species)

Colorado, Boulder County, South Boulder Creek, at and downstream of Valmont Rd. for about 100 m, directly below KOA Res., T1NR70WS22SW1/4, 17 August 1996, K. R. Bestgen, K. Bestgen. Hand seine, + observations.

Common name	Abundance (No.)	(%)	
western mosquitofish	18	64.3	
bluegill	4	14.3	
largemouth bass	6	21.4	
(3 species)			
Totals	28	100.0	(more of same taxa observed)