

Boulder Creek Fish Survey

Application of Rabid Bioassessment Protocol V-Fish

and

The Index of Biotic Integrity at Boulder Creek

Before and After Implementation Of

Best Management Practices

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ABSTRACT

The City of Boulder is conducting a comprehensive pollution control project designed to improve water quality within the Boulder Creek basin. The water quality management plan for the basin includes point source and nonpoint source pollution controls as neither control type alone can result in a stream that consistently meets state water quality standards.

Environmental investigations by the City of Boulder demonstrated that nonpoint source pollution contributed to periodic exceedances of water quality standards. It was recognized that nonpoint source pollution problems were correctable and could be controlled by using a variety of state approved improvements termed Best Management Practices (BMPs).

A severely disturbed section of Boulder Creek, the Phase I Demonstration Reach, was chosen for BMP treatments designed to reduce nonpoint source pollution and restore aquatic ecosystem function. The reach is characterized by channelization, poor aquatic habitat, streambank erosion, high water temperature, and an overgrazed riparian zone.

A fish survey was conducted before and after implementation of BMPs. Fish were sampled and evaluated following U.S. Environmental Protection Agency recommended Rapid Bio-Assessment Protocol V-Fish (RBP-V) and the Index of Biotic Integrity (IBI). The IBI is an objective, reproducible stream assessment approach which measures the "health" of a water resource using attributes of the fish population found living there (Karr, 1981). The IBI and RBP-V allow quantitative comparison of stream "health" before and after Best Management Practice treatment.

Pre-and-post-treatment fish sampling results indicated that Boulder Creek ecosystem health is poor at the Demonstration Reach. Thirteen total fish species were collected. Few adult fish were collected and many fish were diseased. Dominant species were the sand shiner Notropis stramineus, Iowa darter Etheostoma exile, and white sucker Catostomus commersoni. Post-treatment sampling was conducted two months after treatment, before the aquatic ecosystem had fully responded to BMP improvements. Poor habitat quality is the primary reason for the poor condition of the Demonstration Reach fish population.

The 1989-1990 fish biodiversity was compared to results from a 1903 fish survey conducted at approximately the same location. Fish biodiversity has been reduced, number of introduced species has increased, and 60 percent of the 22 historical species have been extirpated.

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INTRODUCTION

The City of Boulder is attempting to control nonpoint source (NPS) pollution within the Boulder Creek basin extending from the Indian Peaks Wilderness headwaters to the confluence with St. Vrain Creek. Boulder Creek Phase I Demonstration Reach, located east of the City of Boulder, was selected for state approved improvements termed Best Management Practices (BMPs) designed to control NPS pollution, enhance fish habitat, and improve water quality.

Investigations by the City of Boulder between 1985 and 1988 demonstrated that NPS pollution contributed to periodic and/or episodic exceedances of water quality standards. The control of point source pollution alone has not enabled Boulder Creek to consistently meet water quality standards.

NPS pollution effecting the Boulder Creek basin includes sediment, fertilizer, pesticides, ammonia, fecal coliform, and storm sewer inputs (City of Boulder, 1990). Causes of NPS pollution include channelization, overland flow, overgrazing, streambank erosion, irrigation return flows, development, and road sanding (City of Boulder, 1990).

The Phase I Demonstration Reach was selected for BMP implementation due to its severely disturbed condition. Pre-treatment demonstration reach habitat was characterized by streambank erosion, lack of instream cover, lack of pool habitat, warmwater, and an overgrazed riparian zone consisting mainly of grasses and cottonwood trees.