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BIOCHEMICAL GENETIC EVIDENCE FOR NATIVE RAINBOW TROUT  
IN MONTANA: O'BRIEN CREEK POPULATION.

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## Abstract

Rainbow trout (Salmo gairdneri) from O'Brien Creek (T 31N R 34W) in the Kootenai River drainage of Northwestern Montana were examined electrophoretically to detect the presence of an extant native population. Allele frequencies intermediate to those of coastal and inland populations of rainbow trout were found. There was a significant decrease in the number of heterozygotes at the LDH-4 locus compared to those expected from the Hardy-Weinberg proportion. This could indicate the presence of non-random mating within this population. The O'Brien Creek population may represent a combination of planted coastal and native inland forms.

## Introduction

Two major taxonomic groups of rainbow trout, coastal and inland, have been described in the western North America on the basis of biochemical genetic information (Allendorf and Utter, 1979; Utter and Allendorf 1978). The geographical division of these two groups corresponds with the crest of the Cascade Mountain Range. Hatchery stocks of rainbow trout thought<sup>out</sup> the United States were derived from coastal populations. Therefore, rainbow trout populations in the Kootenai River Drainage with a similar gene frequencies to that of the inland group, likely represent native rainbow trout populations. Using this reasoning, Allendorf et al. (1979) reported the existence of native rainbow trout in the Kootenai drainage.

## Background

A previous study done by Espeland and Scow (1978) did not find any rainbow trout present in O'Brien Creek. Bruce May, Montana Department of Fish and Game, (personal communication) indicated to the contrary that

rainbow trout were found in O'Brien Creek and provided the samples for this study. This study is a continuation of the initial study of Allendorf et al. (1979).

#### Methods

Fifteen rainbow trout were collected from O'Brien Creek in May 1979. Electrophoretic analysis followed the methods of Utter et al. (1974). The enzymes and their loci designations were described in Allendorf et al. (1977).

#### Results

The results reported here are from only two of the polymorphic loci (LDH-4 and SOD) which have been previously found to be most useful in discriminating the coastal and inland forms of rainbow trout (Allendorf and Utter 1979). The allele frequencies at both loci are compared to the results found during the initial study (Table 1). The allele frequency at the SOD locus in the O'Brien Creek population is typical of an inland rainbow trout population. The LDH-4 allele frequency on the otherhand, is intermediate of coastal and inland frequencies. This is similar to what was found for the Yaak River population (Allendorf et al. 1979).

A F statistic developed by Nei (1965) was used to examine the LDH-4 genotype frequencies for departures from proportions expected under Hardy-Weinberg equilibrium.

$$F = 1 - \frac{H_o}{H_e}$$

where  $H_o$  is the observed and  $H_e$  is the expected proportion of heterozygotes. F will assume positive values for a deficiency of observed heterozygotes at

a locus, negative values for an excess and 0 for the exact number of observed heterozygotes as predicted from the Hardy-Weinberg proportions. To test the significance of the F value a  $\chi^2$  test can be used

$$\chi^2 = F^2 N$$

where N equals the number of individuals sampled (Workman 1969). The observed deficiency at the LDH-4 heterozygote genotype resulted in  $F = .5833$ ,  $\chi^2 = 5.104$  ( $P < .025$ ) 1 df.

Forces which may cause an increase in F are inbreeding, positive assortive mating and population subdivision. The significant departure from random mating likely indicates the presence of both planted hatchery rainbow trout and native rainbow trout in O'Brien Creek.

TABLE 1

Stock Composition and Allele Frequencies at the LDH-4 and SOD Loci of Rainbow Trout Populations in the Kootenai Drainage

Stock Composition	Sample Area	Genes Sampled	LDH-4 (100)	SOD (100)
1 Native Rainbow Trout	1) Callahan Creek, MT	80	.539	.988
	2) Callahan Creek, ID	80	.488	1.000
2 Mixed Native and Hatchery Rainbow Trout	3) O'Brien Creek, MT	30	.800	.970
	4) Yaak River, MT	80	.700	.912
3 Planted Hatchery (Coastal Rainbow Trout)	5) Arbo Creek, MT	60	.883	.700
	6) Raymond Creek, MT	36	1.000	.944
	7) Star Creek, ID	100	1.000	.740
4 Jocko Hatchery	Arlee, MT	458	.954	.827

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