

FISH SURVEYS  
ON THE  
UINTA & WASATCH-CACHE NATIONAL FORESTS  
1995

By

Paul K Cowley  
Forest Fish Biologist  
Uinta and Wasatch-Cache National Forest

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## INTRODUCTION

In a joint effort between the Caribou, Bridger-Teton, Uinta & Wasatch-Cache National Forests, Region 4 of the Forest Service, the states of Wyoming, Idaho and Utah, the Fish and Wildlife Service and the Bureau of Land Management, surveys were conducted throughout many of the tributaries throughout the range of the Bonneville cutthroat trout. The main purpose for conducting these surveys was to identify fish species compositions of streams on the forest. A secondary purpose was to collect tissue samples from cutthroat trout collected to determine genetic purity. Other information which was hoped could be acquired was a population estimate for fish within the stream and age class distribution of the population.

The streams, sampled (Table 1) on the Uinta and Wasatch-Cache National Forest, were selected by Forest staff. Working with a Forest Service seasonal crew and Utah Division of Natural Resources the streams were sampled to determine species composition, fin clips were taken and where possible a population estimate made. It should be noted that the stream flows were very high in 1995 with most streams being about a month late in spring runoff. This will probably affect future efforts to replicate surveys in the future. The month behind is this authors perception with no set records identified to base comparisons on.

## METHODS

Crews were instructed to sample two locations on each stream surveyed. Crews consisted of two to three people. One person ran the electrofishing equipment and, depending on the individual, may also have assisted in netting fish. The second person would also net fish and a third person would net fish and also carry a bucket to hold captured fish. A string line or a tape measure was used to determine the ending point of the 100 M section sampled. One sampling location was located near the stream's mouth if on forest or at the forest boundaries if the stream's mouth was off forest. Some of the samples, collected in coordination with Utah Division of Natural Resources personnel, were collected off forest to aid in better describing the stream. The second sampling location was located near the headwaters. All possible attempts were made to locate sampling sections where a crew, in future years, could relocate and resample the same stream sections.

The sample sections were approximately 100m in length and started and ended at distinguishable habitat breaks. All side channels were sampled within the length of the survey section.

Table 1. Sampling location for streams surveyed for fish on the Wasatch-Cache National Forest in 1995 and township (T), range (R) and section (Sec) where sampled.

Drainage Creek	BASIN	County	Sample Location
BONNEVILLE BASIN			
WEBER RIVER			
SOUTH FORK OGDEN RIVER	WEBER		T6N,R3E,Sec5
SOUTH FORK OGDEN RIVER	WEBER		T6N,R3E,Sec7
SOUTH FORK OGDEN RIVER	WEBER		T7N,R3E,Sec33
SOUTH FORK OGDEN RIVER	WEBER		T6N,R3E,Sec6
SOUTH FORK OGDEN RIVER	WEBER		T7N,R3E,Sec32
SLATE CREEK	SUMMIT		T2S,R7E,Sec19
YELLOW PINE CREEK	SUMMIT		T2S,R7E,Sec20
YELLOW PINE CREEK	SUMMIT		T2S,R7E,Sec20
COOP CREEK	SUMMIT		T2S,R7E,Sec27
COOP CREEK	SUMMIT		T2S,R7E,Sec27
SHINGLE CREEK	SUMMIT		T2S,R7E,Sec35
SHINGLE CREEK	SUMMIT		T2S,R7E,Sec24
GREAT SALT LAKE			
INDIAN HICKMAN CREEK		TOOELE	T4S,R7W,Sec32
AMERICAN FORK RIVER			
AMERICAN FORK RIVER		UTAH	T3S,R3E,Sec27
PROVO RIVER			
PROVO DEER CREEK	UTAH		T4S,R3E,Sec24
RIGHT FORK LITTLE HOBBLE CR.	WASATCH		T6S,R5E,Sec8
RILEYS CANYON	SUMMIT		T3S,R7E,Sec7
SHINGLE CREEK	SUMMIT		T2S,R7E,Sec35
NORTH FORK PROVO RIVER	SUMMIT		T2S,R7E,Sec36
BOULDER CREEK	SUMMIT		T2S,R8E,Sec31
BOULDER CREEK	SUMMIT		T2S,R8E,Sec4
ROCK CREEK	SUMMIT		T3S,R8E,Sec5
SOAPSTONE CREEK	SUMMIT		T3S,R8E,Sec9
SPRING CANYON CREEK	SUMMIT		T3S,R8E,Sec2
SPRING CANYON CREEK	SUMMIT		T3S,R8E,Sec2
TRIBUTARY TO SPRING CYN. C.	SUMMIT		T3S,R8E,Sec2
COBBLE CREEK	SUMMIT		T2S,R9W,Sec33
Hobble Creek			
RIGHT FORK HOBBLE CREEK		UTAH	T3S,R5E,Sec20

Table 1 continued.

Drainage Creek	BASIN County	Sample Location
SPANISH FORK RIVER		
BENNIE CREEK		
NEBO CREEK	UTAH	T12,R2E,Sec24
TIE FORK	UTAH	T6S,R6E,Sec11
TIE FORK	UTAH	T5S,R6E,Sec35SALT
CREEK		
SALT CREEK	UTAH	T12S,R2E,Sec32
SALT CREEK	UTAH	T12S,R2E,Sec32
COLORADO RIVER BASIN		
PRICE RIVER		
RIGHT FORK WHITE RIVER	UTAH	T10S,R8E,Sec9
TABBYUNE CREEK	UTAH	T10S,R8E,Sec35

S=SOUTH, N=NORTH, E=EAST, W=WEST, F=FORK, C=COUNTY, R=RESERVOIR

Fish collected within the sampling section during each pass were placed in a bucket of fresh water until weight and total length could be measured and adipose fin clips taken. Crews were instructed to take fin clips from up to 30 cutthroat trout. I selected the adipose fin because I believed that removal of this fin would be the least damaging to the fish's ability to survive. Fish less than 80mm were not fin clipped because of the small size of the adipose fin. The fin clips were preserved in 95% alcohol. Five whole fish were also collected and preserved in 70% alcohol for museum specimens and to make comparisons between meristic counts and DNA analysis. Whole fish were sliced open along the right side to better preserve internal organs.

A population estimate was made for each section were possible. Some populations were not estimated because the sampling assumptions were violated. The assumptions for making population estimates are: (1) equal sampling efforts, (2) the probability of capture for any individual in the population is equal, and (3) the population is closed, no movement, deaths or births occur during or between sampling efforts (White et al. 1982). The probability of capture for any individual is also suppose to be equal between passes. Riley and Fausch (1992) found that this may not always be the case. They suggest that at least three passes be done to test capture probability. In most situations only two passes were conducted because of limited money, time and other resources.

Fish populations were estimated for fish 100mm and over. The probably for capturing fish under 100mm is believed to be to low to make an accurate estimate. With electrofishing the larger the fish the higher the probability of capture (White et al. 1982). Fish under 50mm were assumed to be age 0 fish. Fish from 51 to 100mm were believed to be age 1 fish. It is realized that in many situations, because of local environmental factors, this generalization may not hold true.

In the lower section of Big Cottonwood Creek capture probabilities were determined for fish 50 - 99mm, 100 - 149mm and 150mm and longer. These probabilities were 0.575, 0.862 and 0.75 respectively. The capture probability for size 100mm and longer was 0.838. It is recognized that the use of a population estimate which assumes equal probability of capture is violated. For this survey population estimates were made for fish 100mm and over to minimize the probability of capture affects on population estimates.

The calculations used to make the population estimate was:

$$N = U1/(1-(U2/U1))$$

where

N = population estimate for the section sampled  
U1 = fish captured during the first sample  
U2 = fish captured during the second sample

The probability of capture (P) is estimated by using:  $P=1-(U2/U1)$ . Results from calculation using this formula suggest that if more fish are captured during the second pass than the first pass a violation of the assumptions has occurred and the population estimate is of no value. Also if no fish are captured during a second pass a capture probability of 100 has occurred and all fish in the population have theoretically been captured. An upper and lower bound was placed on the population estimate. The formula used was:

$$CI' N \pm 1.96 \sqrt{N(P(1 \& P))}$$

where:

CI = 95% confidence interval.

In some cases the lower confidence limit was below the number of fish taken from a survey reach. In such cases the lower limit was set at the number of fish, 100mm and longer, of a particular species, capture from a stream reach.

## RESULTS

Twenty four streams were surveyed on the Uinta and Wasatch-Cache National Forests through this effort (Table 1). All streams contained water at the time of sampling. Upper Spring Canyon and Cobble creeks had enough water to support fish but no fish were located during the survey. The other streams were composed of a number of fish species (Table 2).

### Weber River Drainage

#### Ogden River

The South Fork of the Ogden River is a tributary of the Ogden River which drains into the Weber River. In the summer of 1995 seasonal crew worked with the staff of the Utah Division of Wildlife Resources to sample the South Fork of the Ogden River. Most of the land along the mainstem of the South Fork is privately owned. The Forest Service manages some small tracks within the lower reach of the river. Private homes, campgrounds and picnic areas are common in the drainage. Other recreational activities include hiking, fishing, mountain biking and rafting. Five samples reaches were surveyed on the South Fork of the Ogden River.

Sample section one was located above the Diversion near Eagles Campground. Water temperature at the time of electrofishing the section was 48°F on 01 August 1995. The section consisted of 100% cutthroat trout with 4 fish being captured during the first pass and 2 fish being captured during the second pass. The population estimate for fish 100mm or longer for this reach would be 8 and ranged from 6, the number of fish captured during the two passes, to 11. The total length of the fish capture ranged from 189mm to 403mm and averaged 282mm (11.1in., Figure 1). Weights ranged from less than 80g to 650g and averaged 281.7g.

Sample section two was located adjacent to Bott's Campground in township 6N, range 3E, section 7. The sampling took place on 1 August 1995. Six cutthroat trout were captured during the first pass and one was captured during the second pass. No other species of fish were captured during the survey. The cutthroat trout population estimate for this reach was 7 fish, 100mm and longer, and ranged from 7 to 9. The total length of the cutthroat trout capture ranged from 167mm to 377mm and averaged 289.4mm (11.4.in., Figure 1). The cutthroat trout's weight ranged from 43g to 510g and averaged 264.0g (9.3oz.).

Sample section three was located at the Beaver Creek confluence in township 7N, range 3E, and section 33. Cutthroat trout were again the only fish captured within the survey section.

Water temperature, at the time of electrofishing the

Table 2. Streams surveyed on the Wasatch-Cache National Forest in 1995 and fish species found in sampling sections.

Drainage Stream	Fish Species	
	Lower	Upper
BONNEVILLE BASIN		
WEBER RIVER		
SOUTH FORK OGDEN RIVER	CUT	
SLATE CREEK	RBT,CUT,SCU,WHF	NS
YELLOW PINE CREEK	CUT,SCU,RBT,MSU	CUT,SCU
COOP CREEK	CUT,SCU,RBT	CUT
SHINGLE CREEK	BKT,CUT,SCU	BKT
GREAT SALT LAKE		
INDIAN HICKMAN	RBT	NS
AMERICAN FORK RIVER		
AMERICAN FORK RIVER	NS	RBT,CUT
PROVO RIVER		
DEER CREEK	BRT	NS
RIGHT FORK, LITTLE HOBBLE CR.	BKT	BKT
RILEYS CANYON	FISHLESS	FISHLESS
SHINGLE CREEK	WHF,MSC	NS
NORTH FORK PROVO RIVER	RBT,CUT,SCU,MSC,BKT	NS
BOULDER CREEK	CUT,BKT,SCU	BKT,CUT
ROCK CREEK	CUT,SALAMANDER	NS
SOAPSTONE CREEK	CUT,RBT	NS
SPRING CANYON	BKT	FISHLESS
UNNAMED TRIBUTARY, SPRING CYN.	FISHLESS	NS
COBBLE CREEK	FISHLESS	FISHLESS
Hobble Creek		
RIGHT FORK HOBBLE CREEK		RBT,BRT,CUT,SCU
SPANISH FORK RIVER		
BENNIE CREEK	NS	BRT,RBT
NEBO CREEK	NS	CUT
TIE FORK	BRT,CUT,SCU	CUT
SALT CREEK		
SALT CREEK	RBT,BRT,SCU	RBT,BRT,SCU
COLORADO RIVER BASIN		
PRICE RIVER		
RIGHT FORK WHITE RIVER	CUT	NS
TABBYUNE CREEK	CUT	NS

CUT=CUTTHROAT TROUT, BKT=BROOK TROUT, RBT=RAINBOW TROUT,  
 HRB=HATCHERY RAINBOW TROUT, SCU=SCULPIN, BRT=BROWN TROUT,  
 WHF=MOUNTAIN WHITEFISH, MSC=MOUNTAIN SUCKER, NS=NO SAMPLE

Figure 1. Length frequency of cutthroat trout captured in four sections of South Fork Ogden River, 1995.

section, was 48°F on 3 August 1995. Ten cutthroat trout were captured during the first pass and one cutthroat trout was captured during the second pass. The cutthroat trout population was estimated for the survey section, fish 100mm or longer for this section, was 11 and ranged from 11, the number of fish captured during the two passes, to 13. The total length of the cutthroat trout captured ranged from 137mm to 381mm and averaged 259.3mm (10.2in., Figure 1). Their weight ranged from 25 to 463 and averaged 212.2g (7.5oz.).

The fourth sample site was adjacent to Memorial Park, township 7N, range 3E, section 32. Cutthroat trout were again the only fish captured within the survey section. Water temperature was not taken at this section during the electrofishing on 3 August 1995. Three cutthroat trout were captured during the first pass and ten cutthroat trout was captured during the second pass. No population estimate was made for the section because of the increased number of fish caught during the second pass. The total length of the cutthroat trout captured ranged from 146mm to 498mm and averaged 146.3mm (5.7in., Figure 1). Their weight ranged from 33 to 1386 and averaged 337.6g (11.9oz.).

The fifth site was adjacent to the Perception Park Campground. Only one cutthroat trout was captured during the survey on the 3 August 1995. The cutthroat trout was 164mm in length and weighted 56 grams.

#### Slate Creek

Slate Creek is a tributary to Beaver Creek in the Weber River Drainage. The survey section started at the mouth of Slate Creek and went upstream 100M. Water temperature at the time of electrofishing the section was 52°F at about 11:30 in the morning of 13 July 1995. The section consisted of 28% cutthroat trout, 11% rainbow trout, 2% mountain whitefish and 60% sculpin by count. Fourteen cutthroat trout, three rainbow trout, one whitefish and 25 sculpin were captured during the first pass and four cutthroat trout, three rainbow trout and 14 sculpin were captured during a second pass. Twenty one additional cutthroat were captured above the sampling site to obtain additional fin clips. The total length of the cutthroat trout captured ranged from 66 to 241mm and averaged 123.1mm (4.8in.). Their weight ranged from 2g to 166g and averaged 30.6g (1.1oz.). The total length of the rainbow trout captured ranged from 205 to 275mm and averaged 230.4mm (9.1in.). Their weight ranged from 126g to 231g and averaged 155.6g (5.5oz.). The one whitefish captured was 315mm in length and weighted 327g. This section of Slate Creek consists primarily of age 1 and 2 cutthroat trout as distinguished by length (Figure 2).

Figure 2. Length frequency of rainbow and cutthroat trout in the survey reach of Slate Creek, Weber River Drainage, 1995.

## Yellow Pine Creek

Yellow Pine Creek, a tributary to Beaver Creek in the Weber River Drainage, was sampled on the 6 of July 1995. The survey section started at the upstream end of the culvert where the Mirror Lake Highway passes over the stream and continues upstream 100M. Water temperature at the time of electrofishing the section was 52°F at about 1:30 on the afternoon of 6 July 1995. The section consisted of cutthroat trout and sculpin. Six cutthroat trout and 17 sculpin were captured during the first pass and three cutthroat trout and 13 scuplin were captured during a second pass. Fifteen additional cutthroat were captured above and below the sampling site to obtain additional fin clips. The total length of the cutthroat trout captured ranged from 58 to 238mm and averaged 119.9mm (4.7in.). The weight ranged from less than 1g to 109g and averaged 28.7g (1.0oz.). This section of Yellow Pine Creek consists primarily of age 1 and 2 fish as distinguished by length (Figure 3).

A section of upper Yellow Pine Creek was also sampled. This section was located just above the registration board on Yellow Pine Trail. You than go straight south to where the river is and two side channels join to form the main channel. The survey section started at the joining of these two split channels and goes downstream 100m. No fish were captured in the survey section. One cutthroat was captured just above the survey reach along with 22 sculpin. The cutthroat was 92mm long and weighted 7 grams.

## Coop Creek

Coop Creek is a tributary to Beaver Creek in the Weber River Drainage. The lower survey section started at the upstream end of the culvert which passes under the Mirror Lake Highway and went upstream 90M where the stream braids during high flows. Water temperature at the time of electrofishing the section was 54°F at about 2:00 in the afternoon of 10 July 1995. The section consisted of 14% cutthroat trout and 86% sculpin, by count. One rainbow trout was collected below the survey reach. Five cutthroat trout and 26 sculpin were captured during the first pass and one cutthroat trout and 11 scuplin were captured during a second pass. Seven additional cutthroat were captured below the sampling site to obtain additional fin clips. The total length of the cutthroat trout captured ranged from 73 to 223mm and averaged 152.0mm (6.0in., Figure 4). The weight ranged from 4g to 113g and averaged 49.2g (1.7oz.). The total length of the rainbow trout captured was 230mm (9.1 inches) and weighted 156g.

The upper survey section started at a point where the road parallels the stream near some old dispersed campsites on goes upstream 100m. Water temperature at the time of electrofishing

Figure 3. Length frequency of cutthroat trout captured in lower section of Yellow Pine Creek, Weber River Drainage, 1995.

Figure 4. Length frequency of cutthroat trout captured in the upper and lower sections of Coop Creek, Weber River Drainage, 1995.

the section was 44°F at about 10:00 in the morning of 10 July 1995. The section consisted of 100% cutthroat trout. Eight cutthroat trout were captured during the first pass and five cutthroat trout were captured during a second pass. Twenty additional cutthroat trout were captured above the sampling site to obtain additional fin clips. The total length of the cutthroat trout captured ranged from 45 to 177mm and averaged 116.0mm (4.6in.). Their weight ranged from less than 1g to 47g and averaged 17.4g (0.6oz.).

### Shingle Creek

Shingle Creek naturally was a tributary to Beaver Creek in the Weber River Drainage. Late 1800's or in the early part of this century a canal was cut to allow Shingle Creek to drain into the Provo River Drainage which allows water to be directed either way. Two lower survey sections were established on Shingle Creek. Three sections were surveyed in the drainage.

The lower survey reach was located in the canal which allows the stream to drain into the Provo River. It was located next to a dispersed camping spot across from the Lower Provo River Campground. Water temperature at the time of electrofishing the section was 44°F at about 9:00 in the morning of 13 July 1995. The section consisted of 60% whitefish and 40% mountain sucker. Only adult fish were found in the section.

The middle survey section started at the diversion dam and went upstream 100m. Water temperature at the time of electrofishing the section was 59°F at about 2:00 in the afternoon of 25 July 1995. The game fish composition in this section consisted of 27% cutthroat trout and 73% brook trout. Four cutthroat and nine brook trout were captured during the first pass and no cutthroat and three brook trout were captured during a second pass. The population estimate, of fish over 100mm, for the survey reach was estimated at four cutthroat and 11 (+2) brook trout for the section. The total length of the cutthroat trout captured ranged from 137 to 227mm and averaged 174.0mm (6.9in., Figure 5). Their weight ranged from 28g to 124g and averaged 63.3g (2.2oz.). The total length of the brook trout captured ranged from 87 to 198mm and averaged 159.8mm (6.3in., Figure 5). Their weight ranged from 7g to 97g and averaged 53.4g (1.9oz.).

The upper survey section starts where the tributary from the middle of section 12 enters Shingle Creek and goes upstream 100m. Water temperature at the time of electrofishing the section was 46°F at about 11:00 in the morning of 12 July 1995. The fish composition in this section consisted of 100% brook trout. Twenty one brook trout were captured during the first pass and eight brook trout were captured during a second pass. The

Figure 5. Length frequency of cutthroat and brook trout captured in middle section of Shingle Creek, Weber/Provo River drainages, 1995.

population estimate for the survey section was estimated at 23 brook trout over 100mm and ranged from 22, the number of brook trout caught over 100mm, to 27. The total length of the brook trout captured ranged from 56 to 197mm and averaged 130.8mm (5.1in., Figure 6). Their weight ranged from less than 1g to 75g and averaged 26.3g (0.9oz.).

### Great Salt Lake Drainage

#### Indian Hickman Creek

Indian Hickman Creek drains into Skull Valley on the west side of the Stansbury Mountain Range. The survey section started at the National Forest boundary and went upstream 100m. This stream section was surveyed on 4 October 1995. The section consisted of 100% rainbow trout with 90 fish being captured during the first pass and 24 fish being captured during the second pass. The total length of the fish capture ranged from 53mm to 235mm and averaged 167.8mm (6.6in., Figure 7). Their weight ranged from less than 1g to 127g and averaged 47.9g (1.7oz.). This section of Indian Hickman Creek consisted primarily of age 2 and 3 year old fish with a few older fish (Figure 8). The rainbow trout population was estimated for fish 100mm and longer to be 116 fish and ranged from the 107 fish, the number caught, up to 125 fish.

### American Fork River

#### American Fork River

The American Fork River drains directly into Utah Lake. The sample section was located in an area know as Dutchman's Flat. A dispersed campground is located adjacent to the section surveyed. Historical activities in the drainage include mining.

The survey section started at the upper end of the culvert, where Forest road 085 crosses the stream in section 27, Township 3 south, Range 3 east and went upstream 100m. Within the section were five functioning log weirs and one that had failed. Water temperature at the time of electrofishing the section was 53°F at about 2:00 in the afternoon of 6 September 1995. Cutthroat and stocked rainbow trout were captured in the section. The total length of the cutthroat trout captured ranged from 65mm to 245mm and averaged 136.6mm (5.4in., Figure 8). They weighted from 3g to 141g and averaged 38.6g (1.3oz.). The cutthroat trout

Figure 6. Length frequency of brook trout captured in the upper section of Shingle Creek, Weber/Provo River drainages, 1995.

Figure 7. Length frequency of rainbow trout captured in Indian Hickman Creek, 1995.

Figure 8. Length frequency of cutthroat trout captured in the American Fork River, 1995.

population estimate was 32 and ranged from 27 to 37 fish per 100 meters of stream. No measurements were made on the rainbow trout because of the time limitation of the crew. Fifty five rainbow trout were captured during the first pass and 11 were captured during the second pass. Because this section looked like a stocking point on the stream to infer a population estimate from these counts for rainbow trout would be an overestimate.

### Provo River Drainage

#### Provo Deer Creek

Provo Deer Creek was sampled just below the interpretative site at Cascade Spring. The sample site started at the base of a large willow tree below a stretch of open water, approximately 1/4 mile below the parking lot of the interpretative site, and goes upstream 100m. The survey reach was broken down into two smaller reaches for sampling purposes because of the great number of fish captured. The survey was conducted in the morning on 6 September 1995. The water temperature at the time of sampling was 50 °F. Provo Deer Creek flows in a southerly direction and enters the Provo River just downstream of the Deer Creek Reservoir. Activities occurring within the drainage include hunting, fishing and camping.

The sample section contained rainbow and brown trout. The total length of the one rainbow trout captured was 231mm and it's weighted 132g. The total length of the brown trout captured ranged from 63mm to 267mm and averaged 168.9mm (6.7in., Figure 9). Their weight ranged from less than 1g to 224 grams and averaged 67.8 grams (2.4 oz.). The population estimate for only the lower 50m was 41 fish and ranged from 41 to 45. Only the lower 50m had a population estimate completed on it because in the upper 50m section a bucket of fish was lost due to a fall.

#### Right Fork Little Hobble Creek

Right Fork Little Hobble Creek is a tributary to Main Creek which runs into Deer Creek Reservoir. This stream was surveyed on 7 September 1995. Because of limited time only species composition information was collected. Only brook trout were found in the stream. The survey point was near the intersection of forest roads 121 and 619 adjacent to an old loading corral in Little Valley. Most of the fish were found in beaver ponds in this area.

Figure 9. Length frequency of brown trout captured in Provo Deer Creek, Provo River Drainage, 1995.

## Rileys Canyon

Rileys Canyon is a tributary to the Provo River just upstream of the town of Woodland. The stream was surveyed on 5 September 1995. The stream is very small and contained water but no fish.

## Shingle Creek

For the explanation and write-up on Shingle Creek refer to Shingle Creek on the Weber River Drainage.

## North Fork Provo River

The North Fork Provo River is a tributary to the Provo River. The river has provided a channel for moving water artificially stored in headwater lakes downstream to farmers for irrigation. This has created some artificially high flows and large woody material has been removed from the channel in the past. Grazing, camping, fishing and hunting also takes place in the drainage. The surveyed reach goes from the upstream end of the box culvert for the Mirror Lake highway road upstream 102.9m. At the time of the survey, 25 July 1995, the water was high and fast with a temperature of 48°F.

Fish capture within this section included brook, hatchery rainbow, and cutthroat trout, sculpin and mountain sucker. Additional cutthroat trout were collected downstream the section for genetic analysis. Within the section, game fish comprised 4 (44%) rainbow trout, 1 (11%) brook trout and 4 (44%) cutthroat trout of the population.

The cutthroat trout captured within and outside the survey section ranged from 69mm to 160mm and averaged 100.9mm in total length (Figure 10). They weighed 2g to 31g and averaged 11.8g. The brook trout was 112mm and weighted 14g. The rainbow trout captured within the survey section ranged from 263mm to 275mm and averaged 268.5mm in total length (10.6in., Figure 13). They weighed 198g to 257g and averaged 220.5g (7.7oz).

## Boulder Creek

Boulder Creek is a tributary to the North Fork Provo River and drains south out of Big Elk Lake. Two sections were surveyed on Boulder Creek in 1995. Historic land uses have included timber harvest and grazing. Hunting and other recreational activities are the primary uses today.

Figure 10. Length frequency of rainbow and cutthroat trout captured in the North Fork Provo River, 1995.

The lower section starts where the mouth of Boundary Creek and goes upstream 103.8m. Water temperature at the time of collection, 9:00am on 27 July 1995, was 48°F. Cutthroat and brook trout, mountain whitefish and sculpin were found in this area. The cutthroat trout population estimate for the 103.8m section was 4 fish, 100mm and longer. The population estimate ranged from 3, the number of fish captured, to 6 fish. The 17 cutthroat trout captured ranged in total length from 67mm to 215mm and averaged 119.9 (4.7in., Figure 11). The weight of these fish ranged from less than 1g to 103g and averaged 27.5g (1.0oz).

The upper section starts where the trail to Big Elk Lake runs adjacent to Boulder Creek and goes upstream 100m. Water temperature at the time of collection, 11:30am on 26 July 1995, was 55°F. Cutthroat and one brook trout were found in this area. The population estimate for the 100m section was 19 fish, 100mm and longer, and ranged from 19 the number of fish captured to 21. In all, 36 cutthroat were collected and measured. They ranged in total length from 56mm to 227mm and averaged 147.9 (5.8in., Figure 11). The weight of these fish ranged from 2g to 71g and averaged 33.2g (1.2oz). The brook trout was 176mm long and weighted 32g.

#### Rock Creek

Rock Creek is a tributary of the Provo River. This stream was surveyed on the 28 of July 1995. At 1:00 in the afternoon the water temperature was 50°F. The survey section started at the upstream end of the culvert on the Mirror Lake Highway and goes upstream 89m until the stream divides and is lost in the thick riparian zone. Only one cutthroat trout was caught after two passes in the survey reach. Below the survey section an additional five cutthroat trout were captured. The cutthroat trout range in total length from 128mm to 234mm and average 171.3mm (6.7in, Figure 12). They weighed from 17 to 145 grams and averaged 60.5g (2.1oz.). One salamander was also captured and released in the section.

#### Soapstone Creek

Soapstone Creek is a tributary to the Provo River and flows west and then north out of the Uinta Nation Forest into the Wasatch Cache National Forest. The sample sections surveyed on Soapstone Creek started at the upstream end of the culvert near the Soapstone Guard Station and goes upstream 102m. Activities which have and/or do occur in the drainage include grazing,

Figure 11. Length frequency of cutthroat trout captured in the upper and lower section of Boulder Creek, Provo River Drainage, 1995.

Figure 12. Length frequency of cutthroat trout captured in Rock Creek, Provo River Drainage, 1995.

timber harvest, hunting, fishing, camping and hiking. A Forest Service Guard Station, a youth summer camp and summer homes are all within close proximity of the stream.

The section surveyed contained cutthroat and rainbow trout. While collecting fish below the survey section brook trout were also collected. The water temperature at the time of sampling, 3:00pm on 7 September 1995, was 52°F. In all 23 cutthroat trout were collected. They ranged in size from 78mm to 247mm and averaged 119.7mm (4.7in., Figure 13). They weighed from 2g to 174g and averaged 24.7g (0.9oz.). The population estimate for the 102m section was 7 fish, 100mm and longer, and ranged from 7 to 9 fish.

### Spring Canyon

Spring Canyon, a tributary to the Provo River, was surveyed in two different locations. Activities which have and/or do occur in the drainage include grazing, timber harvest, hunting, camping and hiking.

The lower section was below the Mirror Lake Highway. Most of the stream in this area was subsurface. In the pools which still had water, brook trout were collected but not measured.

The upper section was near a culvert just below Lambert Meadows. No fish were collected in this area.

An unnamed tributary to Spring Canyon Creek was also sampled with no fish being collected. This tributary is just southwest of Alexander Lake.

### Cobble Creek

Cobble Creek was surveyed from the trail crossing approximately 0.3 miles down from the headwaters down to the mouth (approximately 1.5 miles). No fish were collected during the survey. There was good water high in the drainage that could support fish. Timber harvest and mining are the historic activities in the area. An old trail parallels the stream. The stream was surveyed on 8 August 1995.

Figure 13. Length frequency of cutthroat trout captured in Soapstone Creek, Provo River Drainage, 1995.

## Hobble Creek Drainage

### Right Fork Hobble Creek

The Right Fork Hobble Creek is a tributary to the Hobble Creek which drains into Utah Lake on the East Side. The sample site was started at the foot bridge adjacent to site 21 of the Balsam Campground and goes upstream to the road bridge to sites 8 and 9. The length of the section was 83m.

Species of fish captured within the section included cutthroat (3, 3%), rainbow (58, 58%) and brown trout (11, 11%) and sculpin (30, 30%) were captured in this section. The sample was taken on 1 August 1995 at approximately 10a.m. with the water temperature being 49°F. The cutthroat trout captured ranged from 116mm to 172mm and averaged 150.7mm in total length (Figure 14). They weighed from 14g to 47 grams and averaged 35g (1.2oz.). The rainbow trout captured ranged from 187mm to 290mm and averaged 231.8mm in total length. The rainbow trout population was estimated at 62 fish, 100mm and over, and ranged from 58, the number captured to 69 fish. The brown trout captured ranged from 150mm to 184mm and averaged 166.7mm in total length (Figure 14). They weighed 15g to 67g and averaged 48g. The brown trout population was estimated at 12 fish, 100mm and over, and ranged from 11 to 14 fish.

## Spanish Fork River Drainage

### Bennie Creek

Bennie Creek is a tributary to Thistle Creek which drains into the Spanish Fork River. This stream was sampled on 31 July 1995. Because of the lack of time only species composition was determined. Naturally reproducing rainbow and brown trout were collected from the stream near the end of the improved road which parallels the stream in the drainage.

### Nebo Creek

Nebo Creek was sampled in Red Rock Pasture. Nebo Creek is also a tributary to Thistle Creek. The sampling section is located at the second stream crossing of the trail, in the pasture, and goes upstream for 100m. Water temperature at the time of sampling, 31 July 1995 at 10:00am, was 53°F. Cutthroat trout was the only species captured in and above the section. They ranged in total length from 93mm to 207mm and averaged

Figure 14. Length frequency of rainbow, brown and cutthroat trout captured in Right Fork Hobble Creek, Hobble creek Drainage, 1995.

129.4mm (Figure 15). Their weighed ranged from 9g to 96g and averaged 28.5g (1.0oz.). Activities in the drainage include camping, fishing, hunting and grazing.

#### Tie Fork

Tie Fork is a tributary of Soldier Creek which is a tributary to Spanish Fork Creek. Two survey sections were sampled in Tie Fork. Water Temperature at the time of sampling, 1 August 1995, was 56°F. The main uses in the drainage are hunting, fishing and grazing.

The lower section starts at the upstream end of the second ford from the ford and goes upstream 100m. The species composition found in this section was brown (32, 60%), and cutthroat (1, 3%) trout and sculpin (20, 38%). The population estimate for brown trout, 100mm and larger, was 37 fish per 100m of stream and ranged from 31 to 43. The brown trout ranged in total length from 63mm to 333mm and averaged 195.1 (7.7in., Figure 16). They weighted from less than 1g to 435 grams and averaged 94.3g (3.3oz). The cutthroat trout captured was 244mm long and weighted 141g.

The upper section starts at the end of the road at the trailhead and goes upstream. No set section was done in this area. Brown and cutthroat trout were found in this section with only cutthroat trout being collected and measured. The cutthroat trout ranged in total length from 86mm to 215mm and averaged 153.8 (6.1in., Figure 16). They weighted from less than 7g to 97 grams and averaged 45.7g (1.6oz). The temperature in this upper section was 60°F.

### Salt Creek Drainage

#### Salt Creek

Salt Creek is located southeast of the Mt. Nebo Wilderness and drains south and then west through the town of Nephi. Two sample sections were done in Salt Creek in anticipation of future habitat improvement work. The lower section is where the anticipated improvement work would be done with the upper section being used as a control. The section of Salt Creek where it first enters the Uinta National Forest was dredged and bermed during the 1983 floods. Water temperature at the time of sampling, 3 August 1995 in the morning, was 50°F.

The lower section is located at east of the information sign as an individual drives onto the Forest. Much of the habitat in

Figure 15. Length frequency of cutthroat trout captured in Nebo Creek, Thistle Creek Drainage, 1995.

Figure 16. Length frequency of cutthroat and brown trout captured in the upper and lower section of Tie Fork, Spanish Fork Drainage, 1995.

this area is riffle with dredge piles for banks. Little to no vegetation overhangs the stream. Species composition consisted of rainbow (6) and brown (6) trout and sculpin (9). The rainbow trout ranged, in total length, from 170mm to 240mm and averaged 216.8mm (8.5in., Figure 17). They weighted from 54g to 154g and averaged 112.4g (4.0oz.). The Brown trout ranged, in total length, from 61mm to 244mm and averaged 147.3mm (5.8in., Figure 27). They weighted from 2g to 152g and averaged 52.5g (1.8oz.).

The upper section was located just upstream of the lower section and started at the point where rip-rap had fallen from the bank into the stream. This area consisted of much more overhanging cover and diverse habitat. The species composition consisted of rainbow (18) and brown (26) trout and sculpin (9). The rainbow trout ranged, in total length, from 142mm to 268mm and averaged 226.2mm (8.9in., Figure 27). They weighted from 75g to 224g and averaged 140.5g (4.9oz.). The Brown trout ranged, in total length, from 140mm to 302mm and averaged 190.1mm (7.5in., Figure 27). They weighted from 24g to 306g and averaged 94.8g (3.4oz.).

### Price River Drainage

#### Right Fork White River

Right Fork White River is a tributary to the White River which feeds the Price River. The sample site is located just below the bridge at the confluence of a small stream just after coming on Forest. Mottled sculpin, speckled dace and mountain sucker and cutthroat trout were collected from the survey reach. Because of time constraints only cutthroat were measured. A total of 18 cutthroat were collected in and above the survey reach. They ranged in total length from 125mm to 273mm and averaged 198.3mm (7.8in., Figure 18). Their weight ranged from 17g to 200g and averaged 92.1 (3.2oz.)

#### Tabbyune Creek

Tabbyune Creek drains also into the White River. The survey reach was located on the Left Fork just upstream from the confluence with the Right Fork just after the first big clump of willows. Only cutthroat trout were collected in this section. Additional cutthroat trout were collected above the survey reach. In all the cutthroat ranged in total length from 72mm to 260mm and averaged 131mm (5.2in., Figure 19). They weighted from 3g to 213g and averaged 33.1g (1.2oz.).

Figure 17. Length frequency of brown trout captured in the upper and lower sections of Salt Creek, Salt Creek Drainage, 1995.

Figure 18. Length frequency of cutthroat trout captured in Right Fork White River, Price River Drainage, 1995.

Figure 19. Length frequency of cutthroat trout captured in Tabbyune Creek, Price River Drainage, 1995.

## OPPORTUNITIES AND RECOMMENDATIONS

Opportunities mean many different things to different people. In this report, I have viewed opportunities from a fish management perspective. Ecosystem management principles would suggest that we manage for all resources so as to not lose any one part. In this report I have dealt with mainly fish issues or habitat issues which were obvious at a glance. No habitat surveys were conducted to identify specific habitat project which could be implemented to improve fish habitat.

Many of the smaller tributaries surveyed during 1995 are not large enough to make it worth while to conduct fish habitat surveys on. A quick walk through looking at some limited habitat factors, such as bank stability, availability of spawning gravel, depth and frequency of pools may be sufficient to identify whether or not improvements would be needed. On larger streams like the American Fork River, Provo Deer Creek, Salt Creek or others a habitat survey may provide land and resource managers valuable insights on how to better manage and shape the aquatic ecosystems.

### Weber River Drainage

#### South Fork Ogden River

Much of the South Fork of the Ogden River managed by the Forest Service is in close proximity to campgrounds. With this in mind the major opportunity to protect the aquatic resources would be to protect riparian vegetation, provide hardened access points and use these area for public education. Cutthroat trout still provide valuable resources for public use in these areas. Density of fish around these campgrounds are generally supplemented through stocking. When a cutthroat trout brood stock becomes established, the stocking of native fish to meet these needs may be valuable. Some fish in the South Fork has been determine to have whirling disease. This may significantly affect the way this drainage is managed in regards to fish management and stocking efforts.

#### Slate Creek

Habitat features of Slate Creek are generally in good condition. The main opportunities to improve the potential to

maintain and improve cutthroat trout population is to reduce competition of non-native fishes. The culvert which allows the stream to flow under the Mirror Lake Highway could also have been put in at a lower grade to increase passability of the cutthroat trout. I do not believe it is currently a full barrier to fish migration but it may be a partial barrier.

#### Yellow Pine Creek

Habitat features of Yellow Pine Creek are generally in good condition. The main opportunities to improve the potential to maintain and improve cutthroat trout population is to reduce competition of non-native fishes. The culvert which allows the stream to flow under the Mirror Lake Highway could also be put in at a lower grade to increase passability of the cutthroat trout. Stream bank protection adjacent to the Yellow Pine Campground and dispersed sites may also reduce the sediment contributed to the stream. Production in Yellowpine Creek seemed extremely low considering the water available. It should be remembered, however; that the stream was check during high flow periods.

#### Coop Creek

Coop Creek has a great diversity of habitats. I was surprised that more fish were not collected in the upper sample site. The amount of water during spring runoff may have been miss leading. Here again non-native fish were found in the lower section.

#### Shingle Creek

Shingle Creek provides some interesting challenges for land and resource managers. At the upper end of the drainage are Lower, East and West Shingle lakes which during high flows must contribute water to Shingle Creek. I say this because there is no easy access points for fish stocking yet the upper end of Shingle Creek contained brook trout believed to have come from Lower, East or West Shingle Creek lakes.

At the lower end of Shingle Creek a diversion allows for the transport of water and fish to either the Provo River Drainage or to the Weber River Drainage. Because Shingle Creek is the headwaters of the Weber River Drainage and close to the top of the Provo River Drainage brook trout could spread throughout the two drainages. Brook trout do compete with cutthroat trout and with some subspecies, brook trout will out compete the cutthroat trout. Because of the drop from the diversion structure into the canal moving water to the Provo River Drainage it is unlikely that fish from the Provo could migrate into the Weber River Drainage at this point. Because the entire stream can be diverted using the above mentioned diversion structure, aquatic species live may be

stranded as water is shifted from one basin to another. To minimize these impacts caused from this diversion structure a fish screen could be install at both the upper and lower ends of the canal. There would be some long term maintenance costs associated with these structures and it may not be worth the costs considering that much of the damage has already occurred.

### Great Salt Lake Drainage

#### Indian Hickman Creek

Indian Hickman Creek provides some interesting challenges to fish managers. Access to the stream is very limited because the public would have to travel through the Skull Valley Indian Reservation, which currently restricts public access. Fishing the stream would be very difficult because of the incised channel and the thick riparian vegetation. Many of the fish we collected during the sampling were starting to show some of the signs of over utilization of food resources. Many of the fish had large heads and small thin bodies. This would suggest that partial removal of some of the fish would help the population.

On the other hand, the rainbow trout population in the stream is one of only a few on the Forest which are self sustaining which make them quite unique. The population is one of three population know to exist on the Stansbury Mountains and the only one know to exist in the Desert Peak Wilderness. The replacement of the existing population with native cutthroat trout may provide a brood source for future population. I would be concerned with removing the existing population which has already adapted to the stream conditions and appear to be doing quite well except for over populating.

### American Fork River Drainage

#### American Fork River

The American Fork River is one of the most fished stream on the Pleasant Grove Ranger District. This brings with it a number of opportunities and problems. Past attempts to improve fish habitat by providing additional pools through installing log weirs appear to have been successful. A number of fish in the surveyed section were found in close proximity to the log weirs. The log weirs have also allows the angler to key in on where to fish. To keep up with the fishing demand, rainbow trout were being stocked on top of existing cutthroat trout populations. On the day this section was sampled, the exotic rainbow trout out numbered the native cutthroat trout almost three to one. The argument could be

made that stocking non-native fish reduces the fishing pressure on native fish. In this case, I believe that the stocking of rainbow this high up in the drainage encouraged more anglers to travel the rough road to harvest these easily seen fish. When we left the sampling site on a weekday afternoon, there were a number of anglers which had come up for the evening to fish this section of stream.

The road up American Fork Canyon above Tibble Fork Reservoir is in need of improvement. Much of the stream channel damage in this area appears to be due to past flood events.

### Provo River Drainage

#### Provo Deer Creek

Provo Deer Creek was one of the most productive streams we surveyed. The habitat looked good and the fish appeared to be healthy. Dispersed camping appears to be affecting the stability of the stream banks and the riparian vegetation. The road which parallels the stream also appears to be in bad condition and could be contributing sediment to the stream. Much of the area below the sample site is state land.

#### Right Fork Little Hobble Creek

Right Fork Little Hobble Creek up around the corrals in Little Valley could benefit from planting willows and riparian vegetation along the stream. This would allow for increased beaver use and more ponded water. About the only location fish were found in Little Valley were in the existing beaver ponds built in the sagebrush flats.

#### Rileys Canyon

No opportunities were identified for Rileys Canyon.

#### North Fork Provo River

Many opportunities exist on the North Fork Provo River involving channel shaping through deposition zones and moving dispersed camping sites farther away from the stream. In many areas the North Fork also lacks large woody material which forms holding and rearing pools for fish. With all of the headwater lakes it is unlikely that species composition could be altered significantly.

## Boulder Creek

There are few opportunities to improve Boulder Creek from a fisheries perspective. Big Elk Lake provides for a mix of fish, access is very poor to think of bank stabilization work.

## Rock Creek

No opportunities were identified in Rock Creek. Access for fish from the Provo River in Rock Creek is very poor because of the natural terrain. This population is the one most threatened by extinction because of their limited numbers.

## Soapstone Creek

Opportunities to improve the cutthroat trout populations in Soapstone Creek include improving bank stability through Camp Rogers, and repairing one of the camp's main bridges. During the survey it was noted that a portion of this bridge had fallen into the river and could block flow passage through the bridge. Soapstone Creek had one of the strongest cutthroat trout populations in the upper Provo River.

## Spring Canyon

No opportunities were identified in Spring Canyon Creek.

## Cobble Creek

Cobble Creek could be stocked with cutthroat trout to provide a refuge population. This population will never be connected with the mainstem Provo River because of the water falls and gradient from the river. Prior to stocking a full inventory of the biotic community of Cobble Creek should be conducted.

## Hobble Creek Drainage

### Right Fork Hobble Creek

The Right Fork Hobble Creek will most likely lose it

cutthroat trout population over the next 5 years. Only three of 102 fish collected were cutthroat trout. I am uncertain if the cutthroat trout could be recovered in this stream with the number of brown trout found in the area and the heavy stocking of rainbow trout which currently occurs.

From a habitat perspective, the hardening of the banks, re-establishment of riparian vegetation and providing access points for the public would aid the aquatic system. Sediment would be reduced and fish habitat would improve.

### Spanish Fork River Drainage

#### Bennie Creek

No opportunities were identified in Bennie Creek. To return the stream to a cutthroat trout stream would be very difficult if not impossible with the number of beaver ponds and springs along the spring. The rainbow and brown trout in the stream are naturally reproducing and are a unique resource in themselves.

#### Nebo Creek

Nebo Creek should be preserved as a cutthroat trout stream. The opportunity exists to limit the spread of non-native fish upstream into the headwaters.

#### Tie Fork

The opportunity exists to return Tie Fork to a Bonneville cutthroat trout stream. A number of bank stabilizing structures have also been install in recent years.

### Salt Creek Drainage

#### Salt Creek

Opportunities in Salt Creek include the installation of instream structures to provide a greater diversity of habitats. While shocking Salt Creek, any obstruction which slowed the water had fish in it. With so much habitat being destroyed to prevent flooding, the installation of habitat in such a manner to allow for high flows would be beneficial.

## Price River Drainage

### Right Fork White River

Water temperature in the Right Fork White River is a major concern. To be 64°F on the first of August is nearing the tolerance level for trout. The planting of riparian vegetation could provide the needed shading to minimize effects of temperature increases.

### Tabbyune Creek

No opportunities were identified for Tabbyune Creek.

## **DISCUSSION**

Over the past two years staff of the Wasatch-Cache, Uinta, Caribou and Bridger-Teton National forests, Idaho Department of Fish and Game, Wyoming Game and Fish, Utah Division of Wildlife Resources have, with support from the Intermountain Region of the Forest Service and the Fish and Wildlife Service in coordination with the Bureau of Land Management, surveyed 82 streams within the historic range of the Bonneville cutthroat trout. Of these 82 streams 60 were in Utah, 13 were in Idaho and 9 were in Wyoming. Within the 82 stream, 135 sample sections were surveyed. Of these 135 sections surveyed, 93 were in Utah, 33 were in Idaho, and 9 were in Wyoming.

### Utah

Of the 59 streams surveyed in Utah, 8 were on the Uinta Nation Forest and 51 were on the Wasatch-Cache Nation Forest. There were 10 survey sections on the Uinta and 83 on the Wasatch-Cache National Forest.

### Wasatch-Cache Nation Forest

Of the 51 stream sampled in 1994 (Cowley 1994) and 1995 on the Wasatch-Cache National Forest within the historic range of the Bonneville cutthroat trout, 15 had only native fish in them, 20 had a mix of native and exotic fish, 5 contained only exotic fish, 5 were fishless and 6 were without water. A stream was considered native if only cutthroat, sculpin, mountain whitefish and/or mountain sucker were found in the drainage. It is assumed for

this discussion that all cutthroat trout are native. This is optimistic because it is known that yellowstone cutthroat have been stocked in many of the high mountain lakes and in some streams. It is also know that Colorado cutthroat trout have been found in a few drainages which were historically fishless or contained Bonneville cutthroat trout (Shiozawa and Evans 1995). Mixed streams were those containing any of the above listed native fish and a species not historically found in the drainage such as rainbow, brook and/or brown trout. Exotic fish are species like rainbow, brook and/or brown trout.

There are 650 miles of stream on the Wasatch-Cache National Forest. Using a Forest map and making a quick count of the streams, there are approximately 93 streams on the Forest (Cowley 1995a). Of these 93 streams, species composition is not known in 32%, only native fish are found in 25%, 26% contain native and exotic fish, 9% contain only exotic fish and 9% of the streams were fishless (Figure 20). Most of the streams with unknown species compositions are found on the Kamas District (Table 3).

Table 3. Species composition of streams, by districts on the Wasatch-Cache National Forest. Based on surveys completed in 1994 and 1995 and the authors personal knowledge.

District	Unknown	Native	Mix	Exotic	Fishless
Salt Lake	6	2	1	5	3
Ogden	9	2	2	0	1
Kamas	11	2	9	0	4
Evanston	0	13	6	1	0
Logan	4	4	6	2	0
TOTAL STREAMS (93)	30	23	24	8	8

Most of native streams are found on the Evanston District. Four of these 13 streams are most likely yellowstone cutthroat which have move down from plants made in lakes. Two other are believe to have originated from Colorado cutthroat trout transplants. Logan District also has a number of streams with only cutthroat trout in them. most of these are in the upper Logan River which appears to be a strong hold for the native Bonneville cutthroat trout. Salt Lake and Ogden district's

streams are small headwater streams with limited accessibility.

There were a variety of differences for streams with mixed populations. On the Logan Ranger District streams with mixed exotic and native population had geographic distances between species on the same stream. For example on Beaver Creek, the lower portion of the stream was exclusively cutthroat with brook trout being found in the upper reaches of the stream. In general this does not hold true with the streams on the Kamas Ranger District where stocked rainbow trout caused eight of the nine mixed streams to be listed as such.

Cutthroat trout populations were still quite strong in the Beaver Creek Drainage despite extensive stocking. The culverts on the Mirror Lake Highway may be partial barriers to the stocked rainbow. On the Evanston District many of the mixed streams had been almost completely taken over by exotic species. This may have been a result of heavy stocking and fishing pressure; habitat alteration due to irrigation diversions, historic logging operations and splash dam. For many of these mixed streams on the Evanston Ranger District, the ability to maintain viable cutthroat trout populations are questionable even with the most strict habitat protection measures.

Salt Lake leads the in the number of streams which have been taken over by exotic species. Three of the five streams identified are in the Stansbury Range. The isolation of these streams and the potential for drought may have caused the cutthroat in these streams to have gone extinct. Or cutthroat may not have existed in the streams to begin with. Rainbow and brown trout appear to be the dominant species in these streams. Brook trout was found in one stream on the Evanston Ranger District where it was likely that no fish had previously inhabited the stream.

The greatest number of fishless streams were found on the Kamas District in 1995. Most of these had major barriers or were too small to sustain fish. The Ogden and Salt Lake District also had a couple of fishless streams. These were areas where prior to the 1983 floods fish were found. The floods most likely pushed the previously existing populations out of these steep Wasatch Front tributaries.

With only 30 stream left to survey, one year with a crew of two people should be able to survey all of the remaining streams. This does not take into account the Colorado River Drainage.

Figure 20. Species composition of streams found on the Wasatch-Cache National Forest in the historic range of the Bonneville cutthroat trout as of January 1996.

## Uinta National Forest

Of the 8 stream sampled in 1995 on the Uinta National Forest within the historic range of the Bonneville cutthroat trout, 1 had only native fish in it, 5 had a mix of native and exotic fish, 2 contained only exotic fish, none were fishless or without water.

## Idaho

### Caribou National Forest

Of the 13 stream sampled in 1994 on the Caribou National Forest within the historic range of the Bonneville cutthroat trout, 3 had only native fish in it, 6 had a mix of native and exotic fish, 2 contained only exotic fish, 1 was fishless and 1 was without water (Cowley 1994).

## Wyoming

### Bridger-Teton National Forest

Of the 9 stream sampled in 1995 on the Bridger-Teton National Forest within the historic range of the Bonneville cutthroat trout, 7 had only native fish in it and 2 had a mix of native (Cowley 1995b). No streams had exotic fish only or were fishless or were without water.

#### LITERATURE CITED

- Cowley, P.K. 1994. Fish surveys of the Caribou National Forest. Uinta and Wasatch-Cache National Forest, Salt Lake City, Utah.
- Cowley, P.K. 1995a. Fish surveys on the Wasatch-Cache National Forest. Uinta and Wasatch-Cache National Forest, Salt Lake City, Utah.
- Cowley, P.K. 1995b. Fish surveys on the Kemmerer Ranger District, Bridger-Teton National Forest. Uinta and Wasatch-Cache National Forest, Salt Lake City, Utah.
- Riley, S.C., and K.D. Fausch. 1992. Underestimation of trout population size by maximum-likelihood removal estimates in small streams. North American Journal of fisheries Management: 12:768-776.
- Shiozawa, D.K., and P.R. Evans. 1995. The genetic status of cutthroat trout from various drainages in the Wasatch-Cache National Forest based on examination of mitochondria DNA. Interim Report. Department of Zoology, Brigham Young University, Provo, Utah. 19pp.
- White, G.C., D.R. Anderson, K.P. Burnham, D.L. Otis. 1982. Capture-Recapture and removal methods for sampling closed populations. Los Alamos National Laboratory, Los Alamos, New Mexico. LA-8787-NERP, UC-11

**APPENDIX**

Appendix A. Fish samples taken to Brigham Young University in 1995 by the Uinta and Wasatch-Cache National Forests. Samples were from sites in Utah.

<u>Stream</u>	<u>Drainage</u> <u>Whole</u>	<u>County</u>	<u>Fin Clips</u>	<u>Fish</u>
YELLOW PINE (LOWER)	WEBER RIVER	SUMMIT	17	
YELLOW PINE (UPPER)	WEBER RIVER	SUMMIT	1	
COOP CREEK (UPPER)	WEBER RIVER	SUMMIT	30	
COOP CREEK (LOWER)	WEBER RIVER	SUMMIT	11	1
SHINGLE CREEK (UPPER)	WEBER RIVER	SUMMIT	0	
SHINGLE CREEK (LOWER)	PROVO RIVER	SUMMIT	0	
SLATE CREEK (LOWER)	WEBER RIVER	SUMMIT	30	
SHINGLE CREEK (MIDDLE)	WEBER/PROVO RIVER	SUMMIT	4	
NORTH FORK PROVO RIVER (LOWER)		PROVO RIVER	SUMMIT	9
BOULDER CREEK (UPPER)	N.F. PROVO RIVER	SUMMIT	30	1
BOULDER CREEK (LOWER)	PROVO RIVER	SUMMIT	12	
ROCK CREEK (LOWER)	PROVO RIVER	SUMMIT	6	
SOUTH FORK OGDEN RIVER (SEC 3)		OGDEN RIVER	WEBER	6
SOUTH FORK OGDEN RIVER (SEC 4)		OGDEN RIVER	WEBER	7
TIE FORK (LOWER)	SPANISH FORK	UTAH	1	
TIE FORK (UPPER)	SPANISH FORK	UTAH	30	
NEBO CREEK	THISTLE CREEK	UTAH	30	5
RIGHT FORK HOBBLE CREEK	UTAH LAKE		UTAH	3
TABBYUNE CREEK	PRICE RIVER		UTAH	30
	5			
RIGHT FORK WHITE RIVER	PRICE RIVER		UTAH	18
SALT CREEK (LOWER)	SALT CREEK		UTAH	0
SALT CREEK (UPPER)	SALT CREEK	UTAH	0	
SOUTH FORK OGDEN RIVER	OGDEN RIVER	WEBER	11	
SOUTH FORK OGDEN RIVER	OGDEN RIVER	WEBER	13	
SOUTH FORK OGDEN RIVER	OGDEN RIVER	WEBER	1	
COBBLE CREEK	PROVO RIVER	SUMMIT	0	
RILEYS CANYON	PROVO RIVER	SUMMIT	0	
SPRING CANYON (LOWER)	PROVO RIVER	SUMMIT	0	
TRIB OF SPRING CANYON	SPRING CANYON	SUMMIT	0	
SPRING CANYON (UPPER)	PROVO RIVER	SUMMIT	0	
RIGHT FORK, LITTLE HOBBLE CREEK		PROVO RIVER	WASATCH	
	0			
SOAPSTONE CREEK	PROVO RIVER	SUMMIT	21	
AMERICAN FORK RIVER	AMERICAN FORK CANYON		UTAH	30
PROVO DEER CREEK	PROVO RIVER	UTAH	0	

Appendix B. Fish samples taken to Brigham Young University in 1995 by the Bridger-Teton National Forest. Samples were from sites in Wyoming.

<u>Stream</u>	<u>Drainage</u>	<u>County</u>	<u>Fin Clips</u>
TRESSPASS CREEK	SMITHS FORK	LINCOLN	30
LITTLE WHITE CREEK	SALT CREEK	LINCOLN	20
WATER CANYON	SALT CREEK	LINCOLN	30
PORCUPINE CREEK	SMITHS FORK	LINCOLN	30
LANDER CREEK	SMITHS FORK	LINCOLN	10
NORTH FORK SMITHS FORK	SMITHS FORK	LINCOLN	30
UNNAMED TRIB OF GIRAFFE CREEK	GIRAFFE CREEK	LINCOLN	30

PACKSTRING CREEK  
NORTH FORK LANDER CREEK

SALT CREEK  
LANDER CREEK

LINCOLN  
LINCOLN

22  
7

Appendix C. Raw data collected from streams in Utah by the staff of the Uinta and Wasatch-Cache National forests in 1995.