

XI. FIGURES

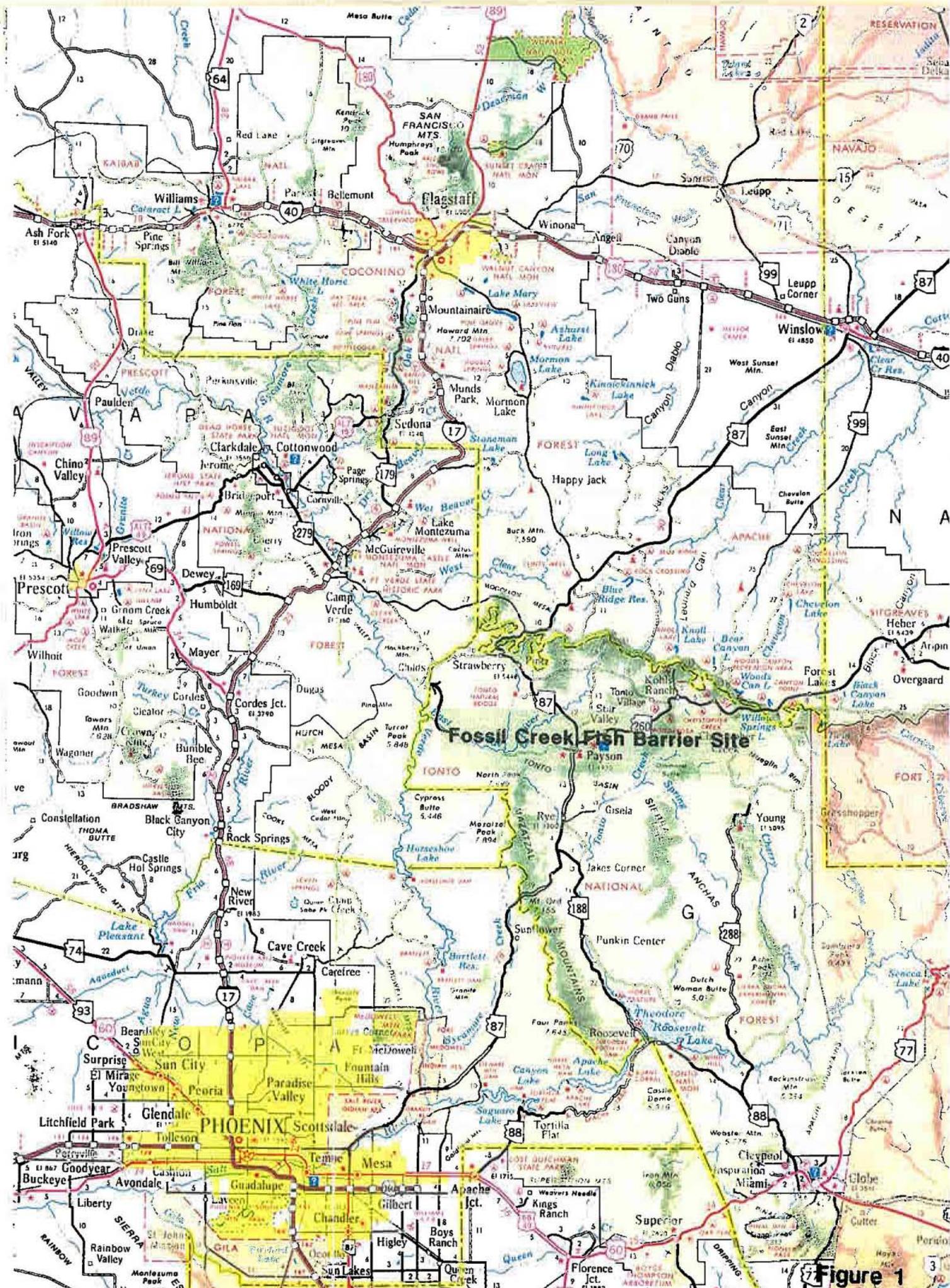


Figure 1

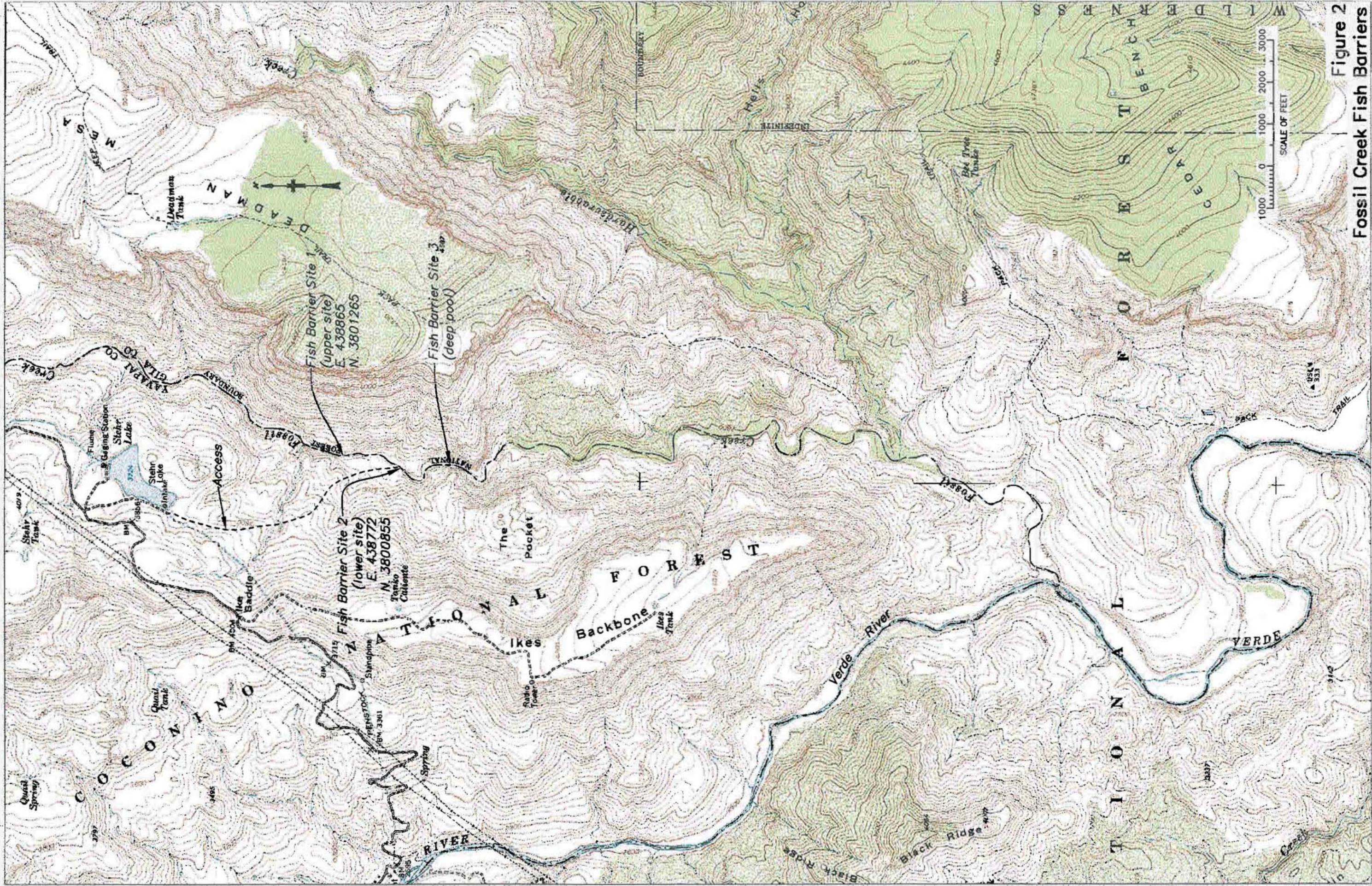
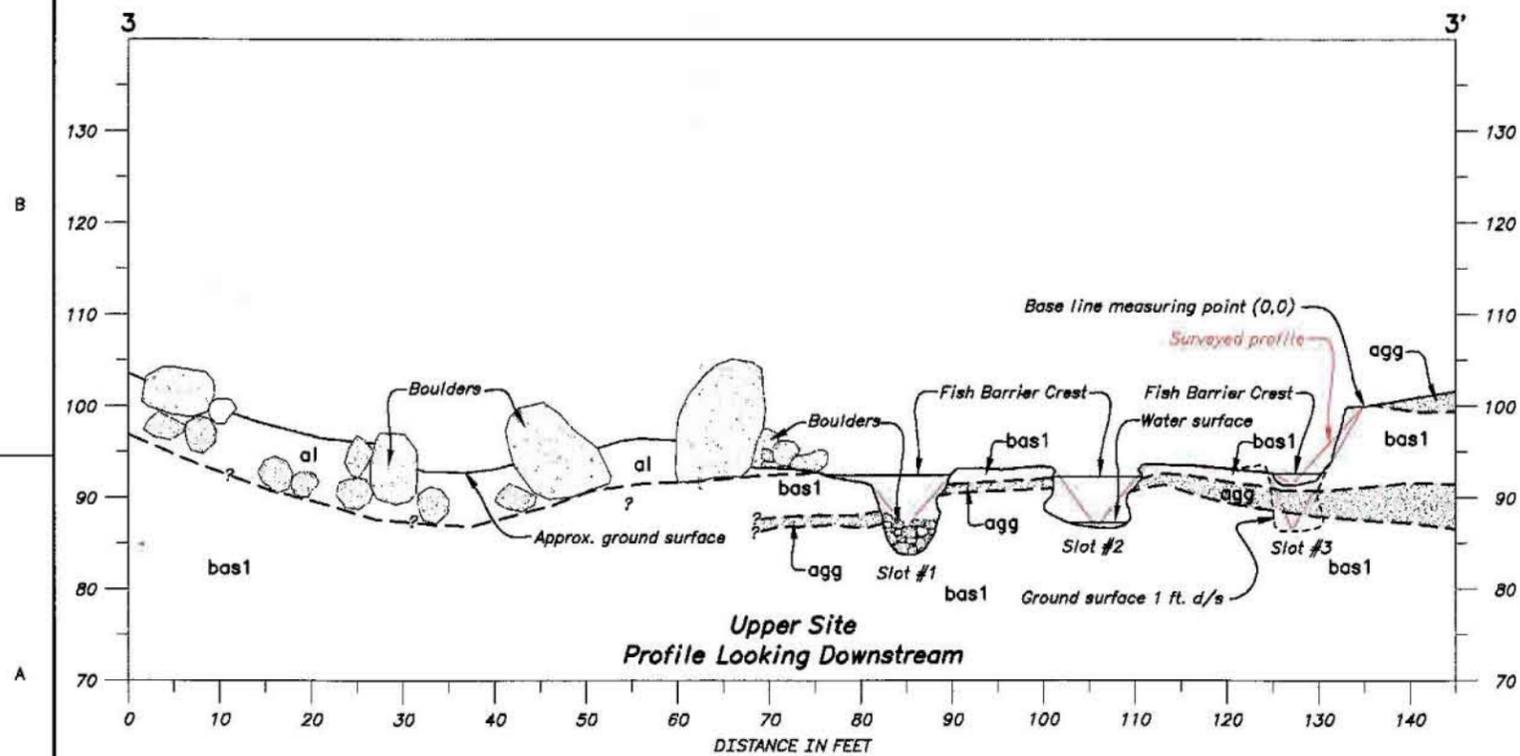
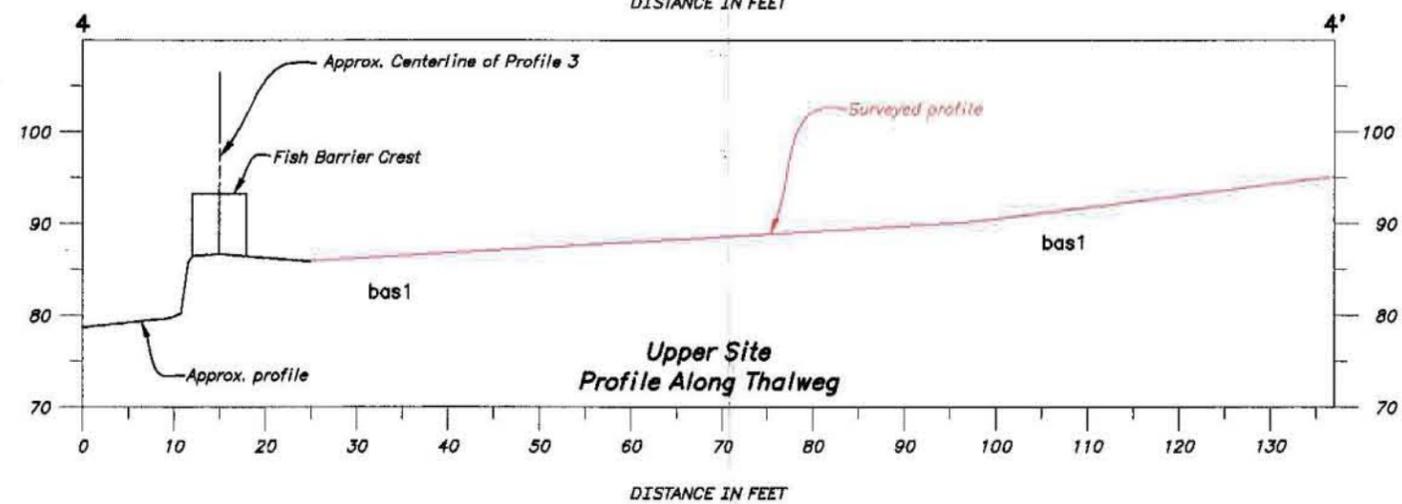
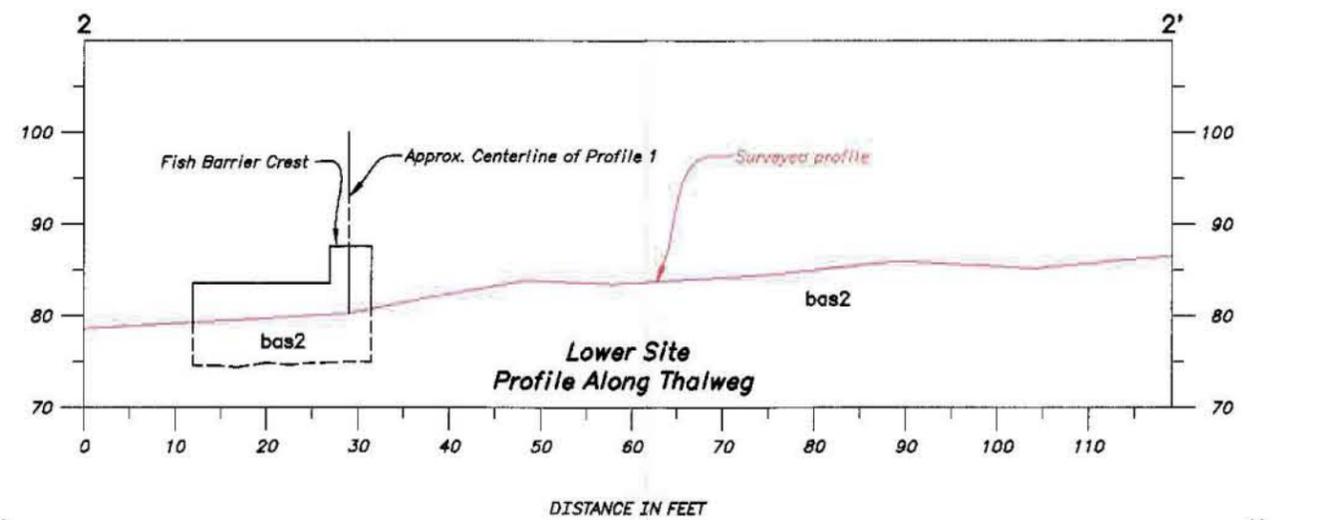
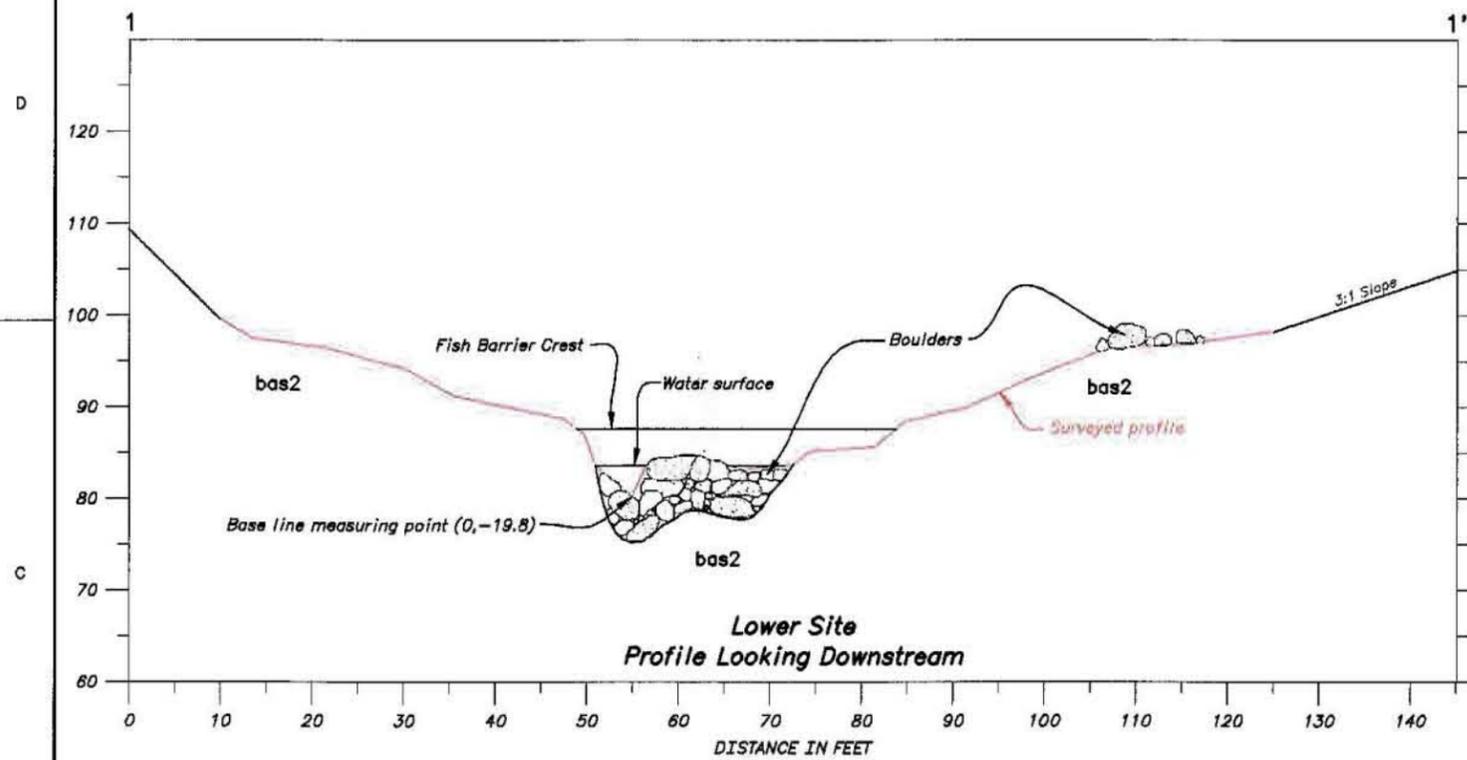


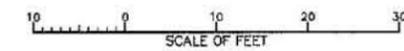
Figure 2
Fossil Creek Fish Barriers

FIGURE 3



GEOLOGIC EXPLANATION

- al Alluvium consists of varying percentages of sand, gravel, cobbles and boulders and minor amounts of fines.
- bas1 Basalt is moderately to slightly weathered, moderately hard to hard and possesses amygdaloidal texture. Amygdules are 1/4 to 1 inch in diameter and are filled with calcium carbonate. Basalt also contains numerous, irregular fractures, 1 to 3 feet long and filled with 1/4 to 2 inches of calcium carbonate.
- agg Agglomerate is composed of 65 percent 1/2- to 3-inch-diameter, scoriaceous andesite fragments in a fine-grained, tuffaceous matrix. The agglomerate is moderately weathered and moderately soft to moderately hard (soft at the surface).
- bas2 Basalt is moderately to slightly weathered and very intensely fractured at the surface, but becomes slightly weathered to fresh and moderately to slightly fractured a few inches into the body of the rock. When struck with a hammer, the surface of the basalt commonly breaks into coarse gravel-size fragments. The rock beneath is usually hard and rings with a hammer blow. The basalt contains numerous, irregular fractures, 6 inches to 3 feet long and filled with 1/4 to 2 inches of calcium carbonate. The fractures tend to be oriented perpendicular to the stream channel.



ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TUCSON DIVISION - ARIZONA

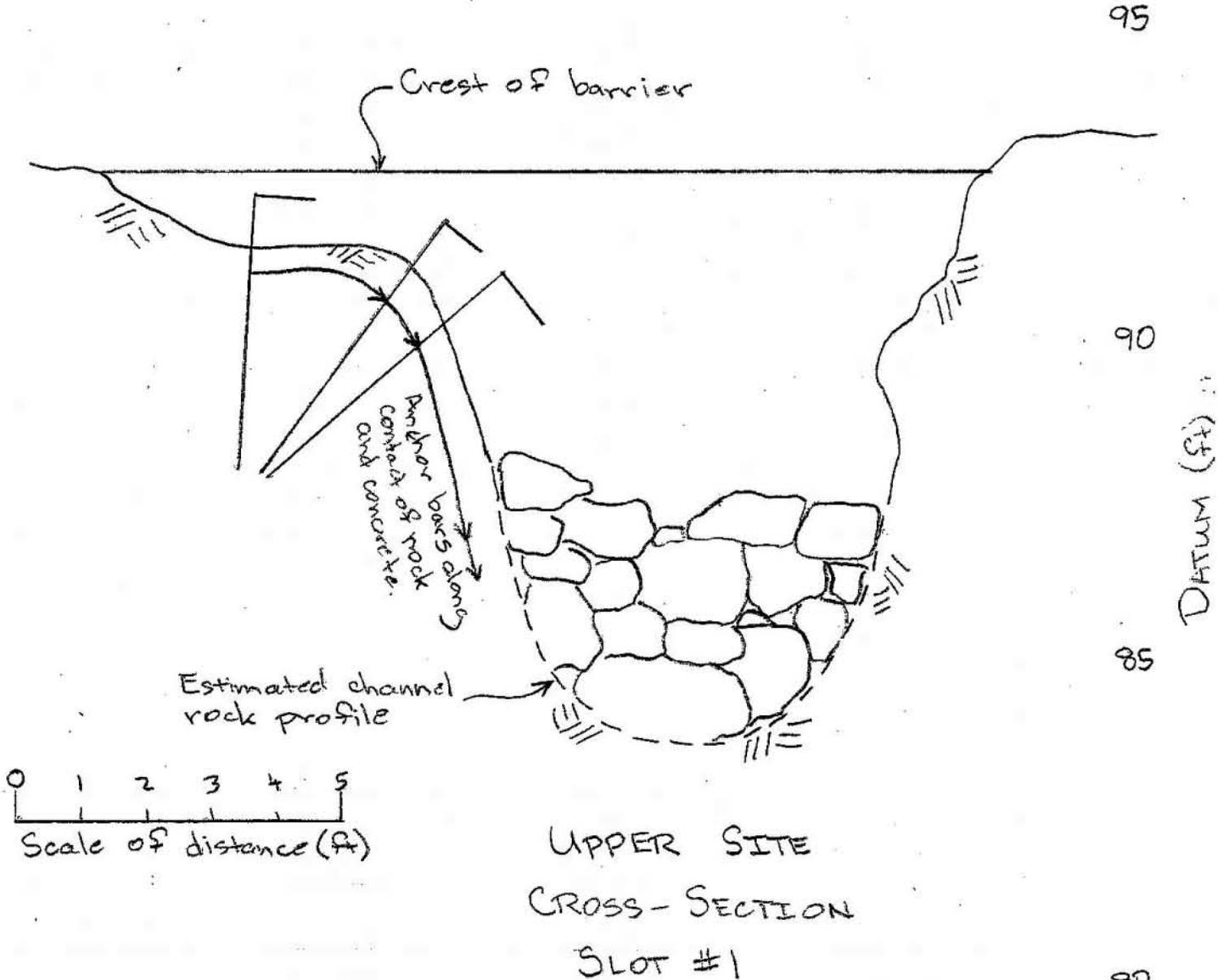
**FOSSIL CREEK
FISH BARRIERS**

PROFILES 1-1', 2-2', 3-3' AND 4-4'

GEOLOGY - <i>[Signature]</i>	TECH. APPR. - _____
DRAWN - <i>[Signature]</i>	SUBMITTED - _____
CHECKED - _____	APPROVED - _____
DATE AND TIME PLOTTED NOVEMBER 13, 2000 11:18	DATE AND TIME PLOTTED APRIL 12, 2000

FIGURE 3

BY <i>J. Riley</i>	DATE <i>11-2-00</i>	PROJECT <i>Fossil Creek</i>	SHEET ____ OF ____
CHKD BY <i>1</i>	DATE	FEATURE <i>Fish Barrier</i>	
DETAILS			



- Notes:
- Barriers at the upper site are 6 feet long in the upstream/downstream dimension
 - Barrier crests at Slot #1 and Slot #3 are at the same elevation. Slot #2 crest elevation is 1 foot lower to allow normal flows of 43 cfs to pass entirely through Slot #2.
 - During our site visit, all stream flow passed through Slot #2.

Figure 4.

COMPUTATION SHEET

BY <i>J. Riley</i>	DATE <i>11-2-00</i>	PROJECT <i>Fossil Creek</i>	SHEET ____ OF ____
CHKD BY	DATE	FEATURE <i>Fish Barrier</i>	
DETAILS			

95

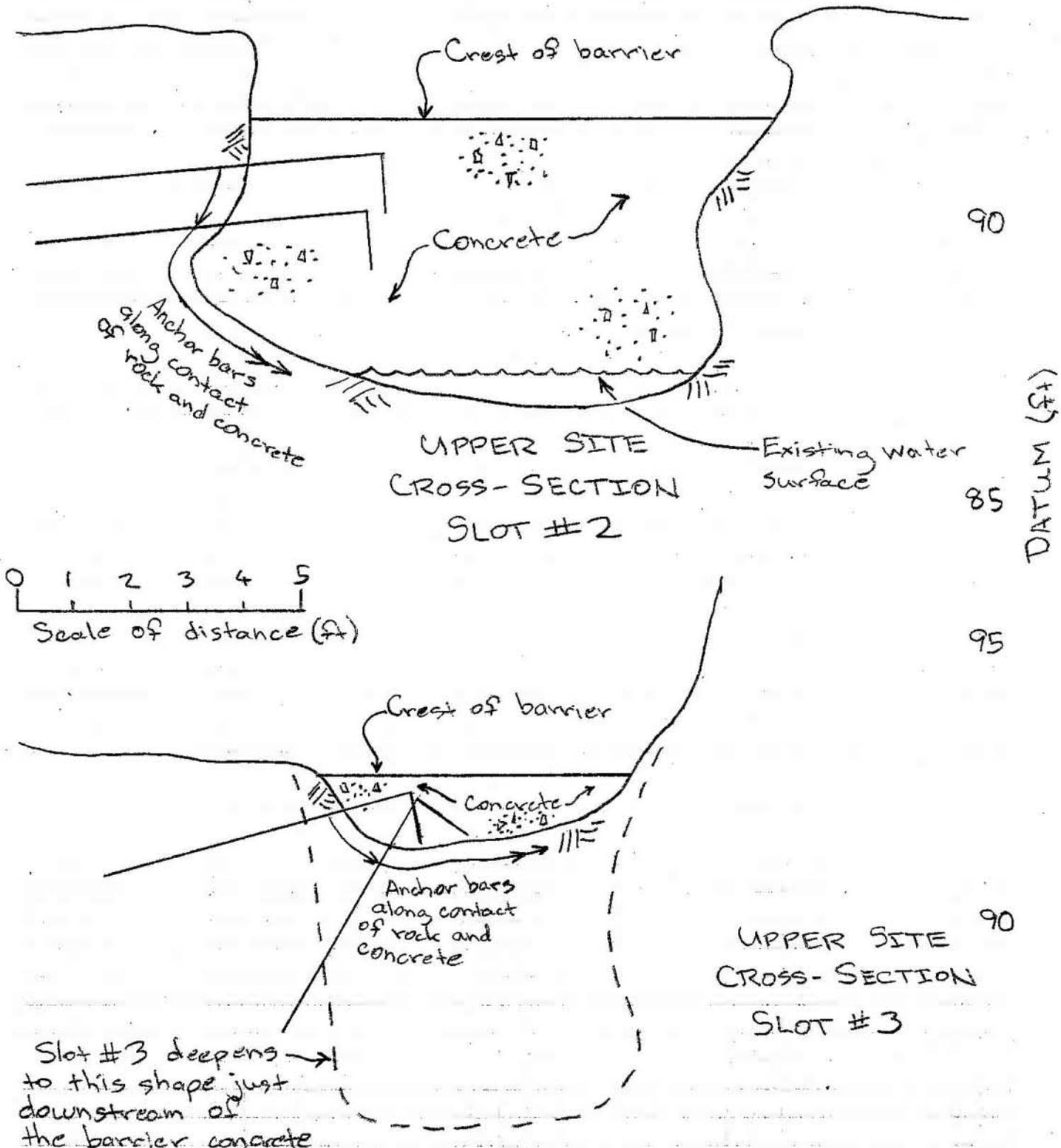


Figure 5
85

COMPUTATION SHEET

BY <i>J. Riley</i>	DATE <i>11-2-00</i>	PROJECT <i>Fossil Creek</i>	SHEET ____ OF ____
CHKD BY <i>1</i>	DATE	FEATURE <i>Fish Barrier</i>	
DETAILS			

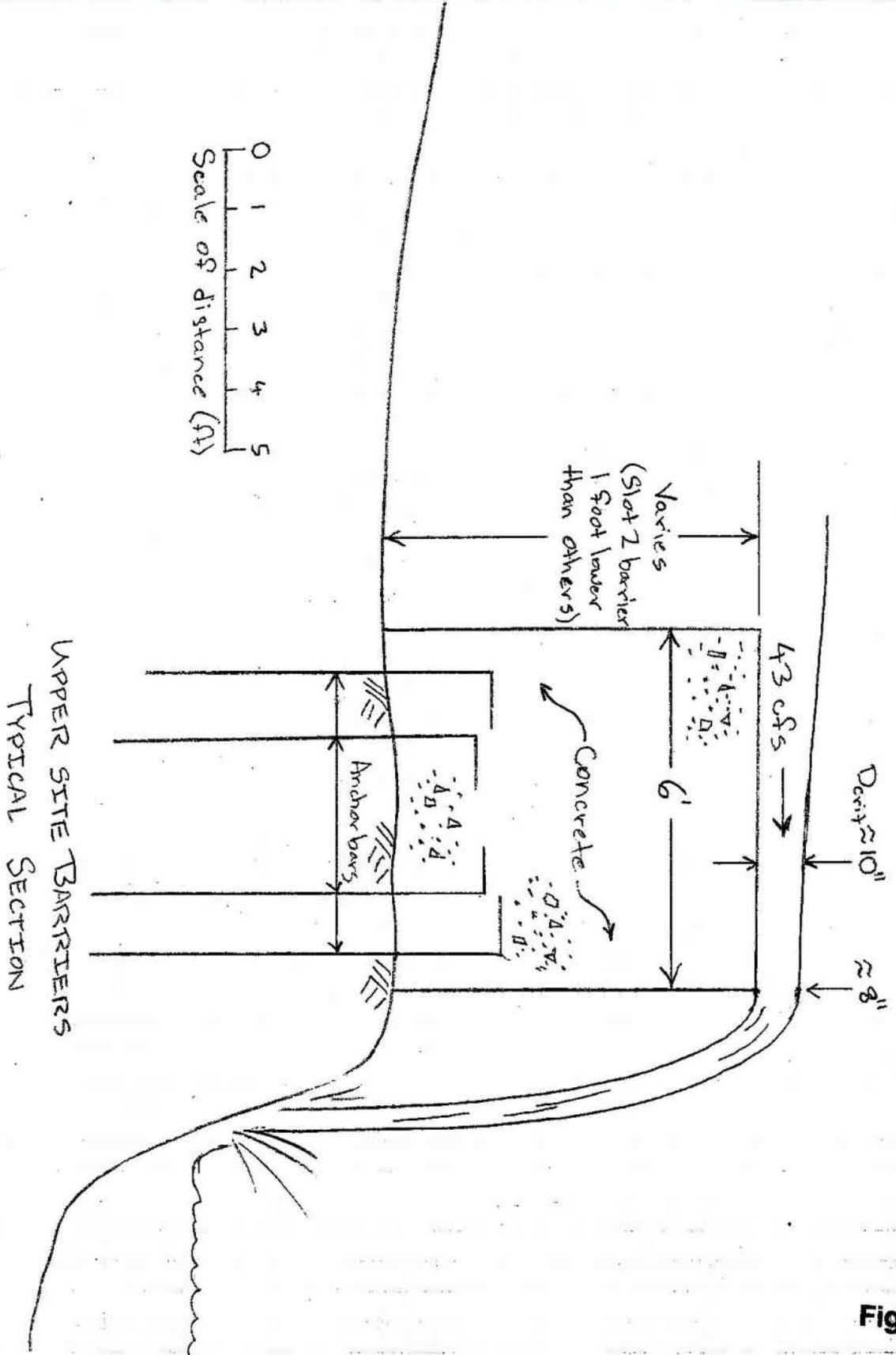


Figure 6

BY <i>J. Riley</i>	DATE <i>11-2-00</i>	PROJECT <i>Fossil Creek</i>	SHEET ____ OF ____
CHKD BY <i>1</i>	DATE	FEATURE <i>Fish Barrier</i>	
DETAILS			

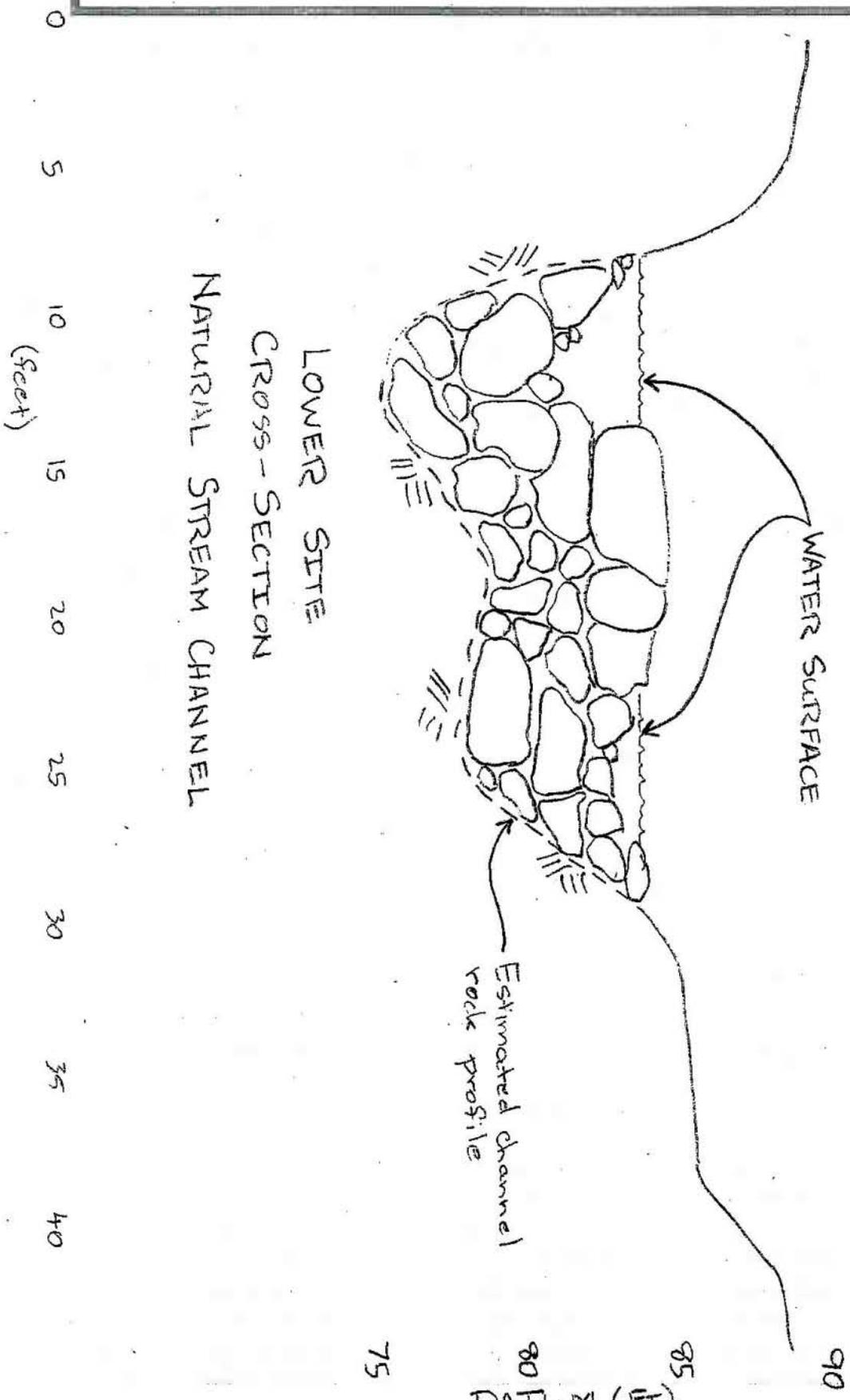


Figure 7

BY <i>J. Riley</i>	DATE <i>11-2-00</i>	PROJECT <i>Fossil Creek</i>	SHEET ____ OF ____
CHKD BY	DATE	FEATURE <i>Fish Barrier</i>	
DETAILS			

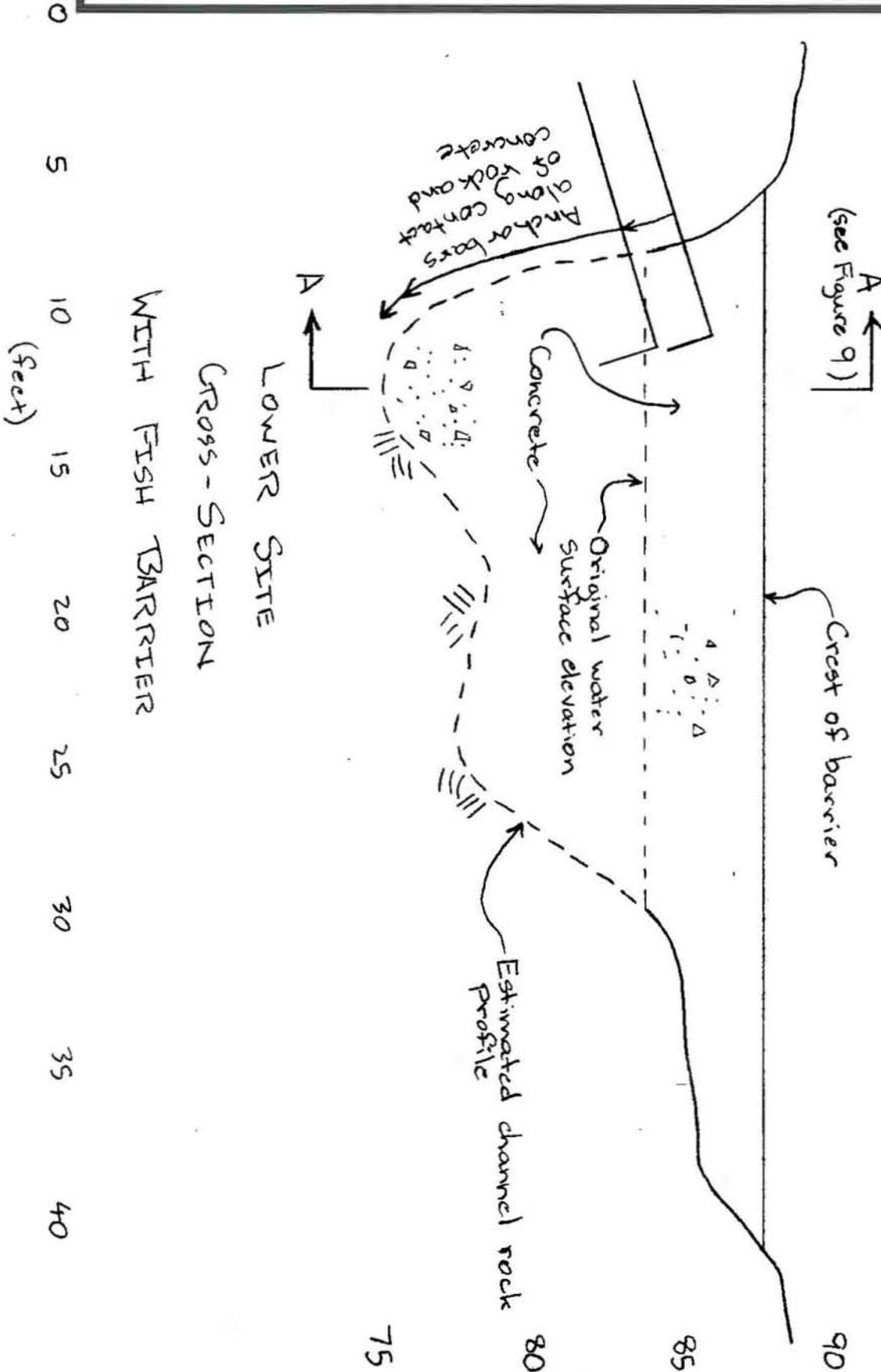


Figure 8

COMPUTATION SHEET

BY <i>J. Riley</i>	DATE <i>11-2-00</i>	PROJECT <i>Fossil Creek</i>	SHEET ____ OF ____
CHKD BY	DATE	FEATURE <i>Fish Barrier</i>	
DETAILS			

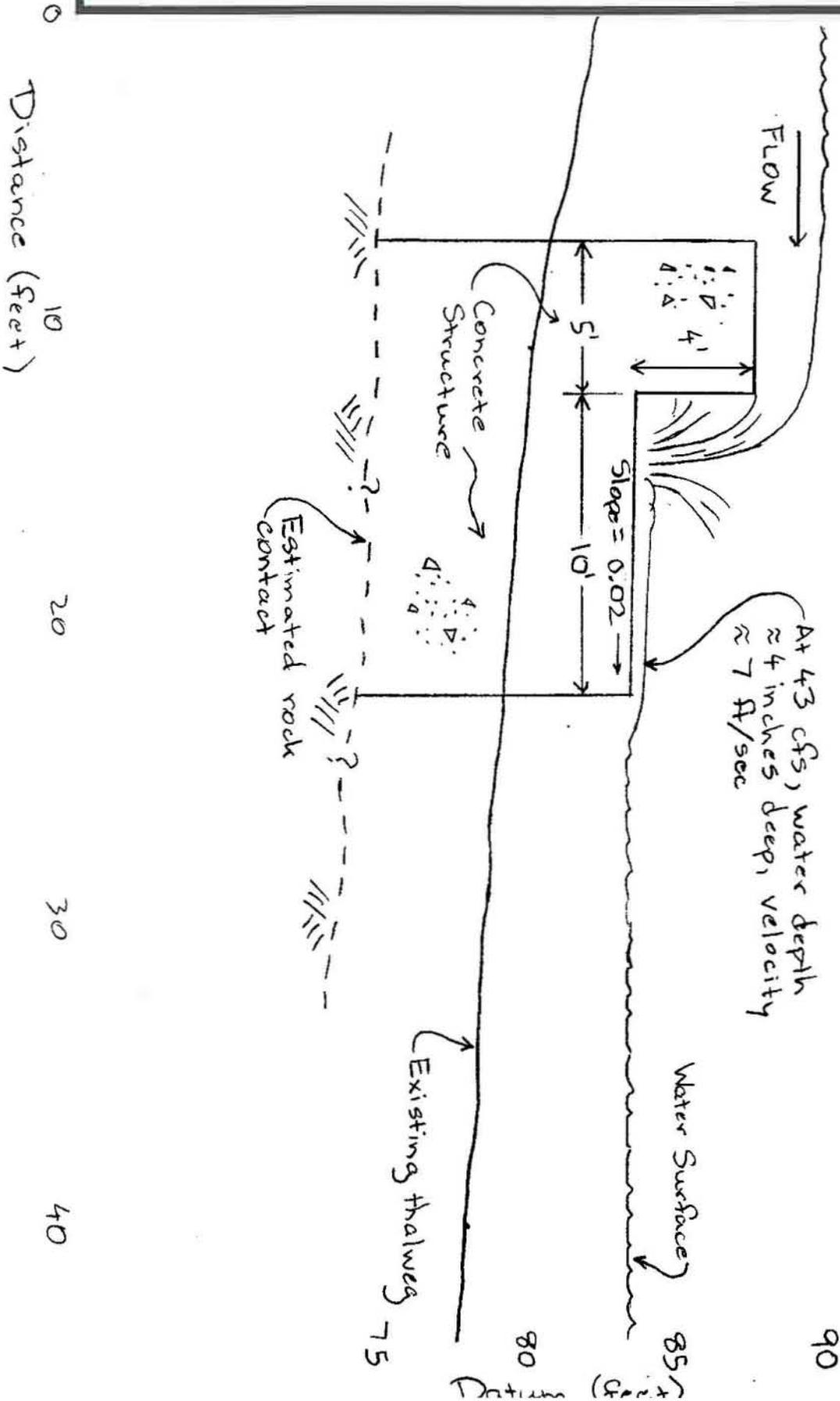


Figure 9

XII. PHOTOS



Photo 1

Fossil Creek Fish Barriers

View looking north (upstream) at a terrace located upstream of the Lower Site. The terrace is approximately 25 feet higher than the river and is the only flat area of any size that could be used to land a helicopter.

USBR Photograph by M. Miller

Date: April 6, 2000

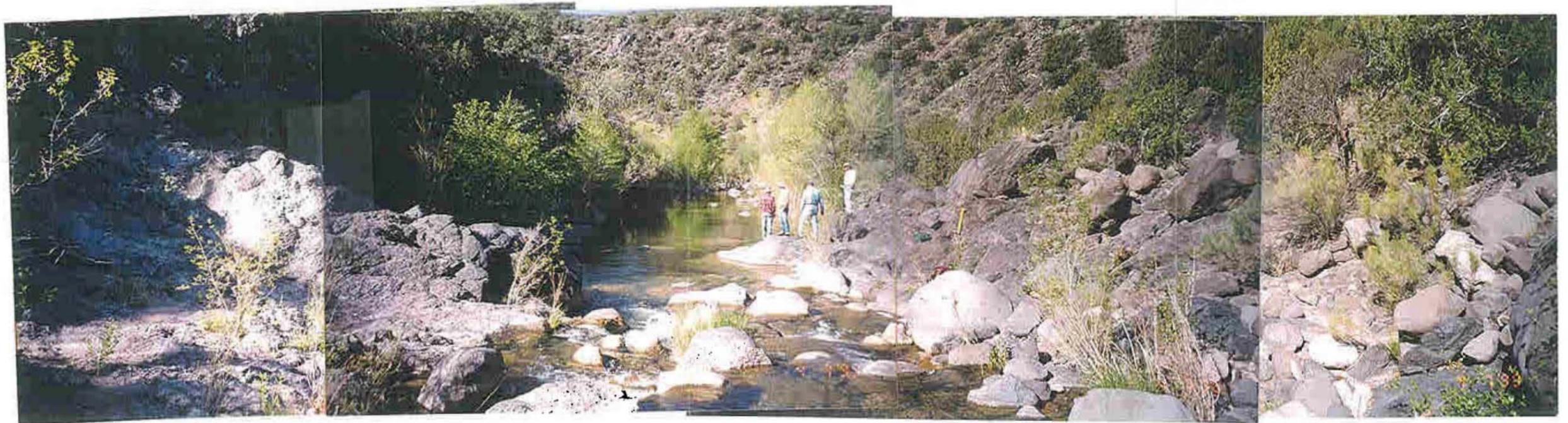


Photo 2

Lower Site

Fossil Creek Fish Barriers

View looking downstream at the proposed Lower Site. The site was selected at a point where the river narrows to about 30 feet wide. The proposed centerline runs along a line drawn from the red backpack on the right side to the rib of rock on the left side. The rib of rock at the water's edge is approximately 6 feet higher than the water surface.

USBR Photograph by M. Miller

Date: April 6, 2000

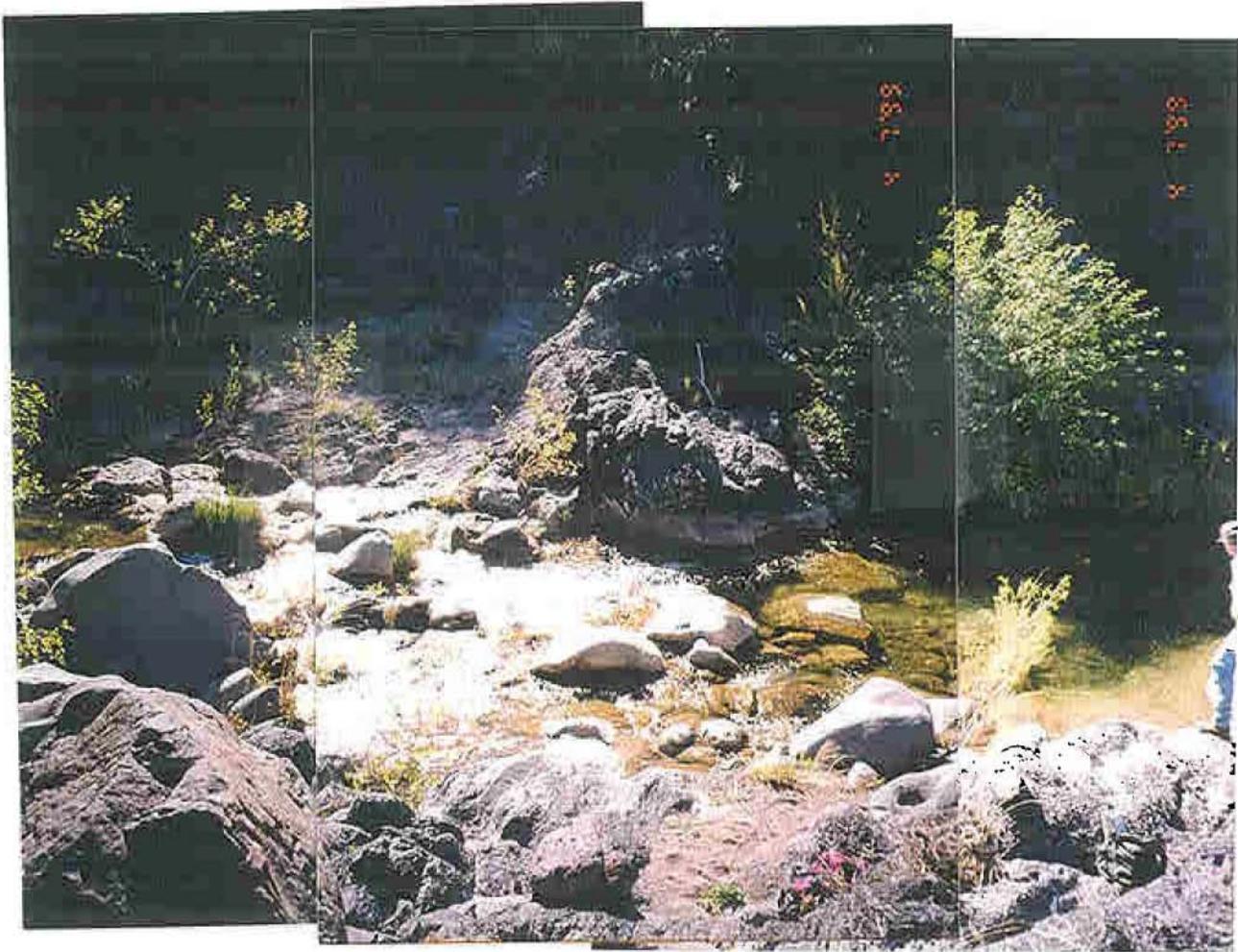


Photo 3

Fossil Creek Fish Barriers

Lower Site

View looking southeast (left) at the left abutment of the proposed Lower Site. The rib of rock is 5 to 7 feet wide and rises 6 to 10 feet above the water surface. Boulders up to 4 by 4 by 3 feet in size fill the channel. Bedrock is estimated to be less than 8 feet below the water surface in the channel.

USBR Photograph by M. Miller

Date: April 6, 2000

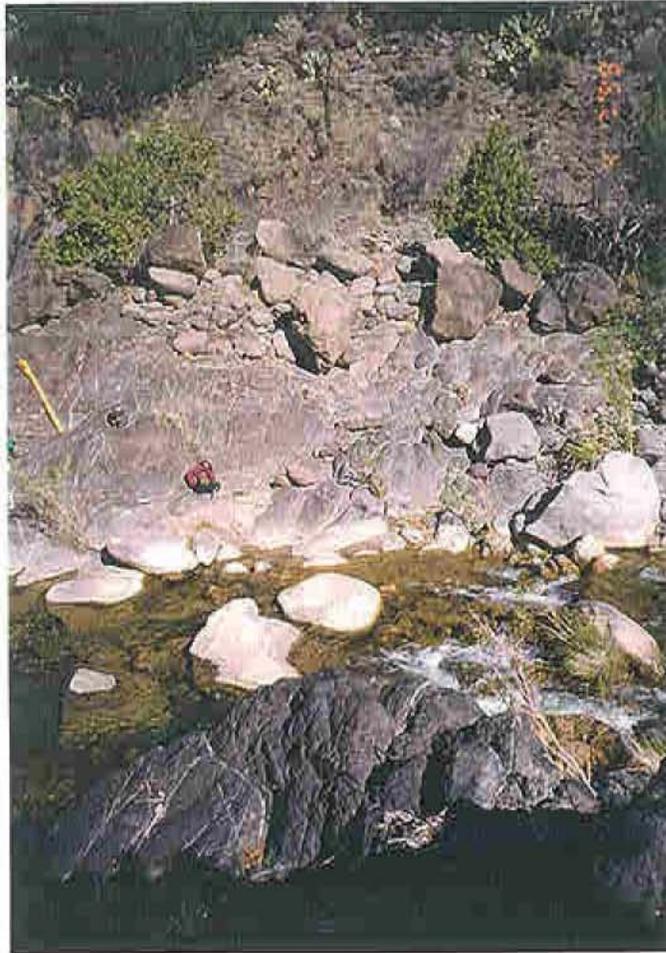


Photo 4

Fossil Creek Fish Barriers

Lower Site

View looking northwest (right) at the right abutment of the proposed Lower Site. The right abutment rises in a smooth slope to about 12 feet above the water surface. At the break in slope, a few large boulders sit on the bedrock surface.

USBR Photograph by M. Miller

Date: April 6, 2000

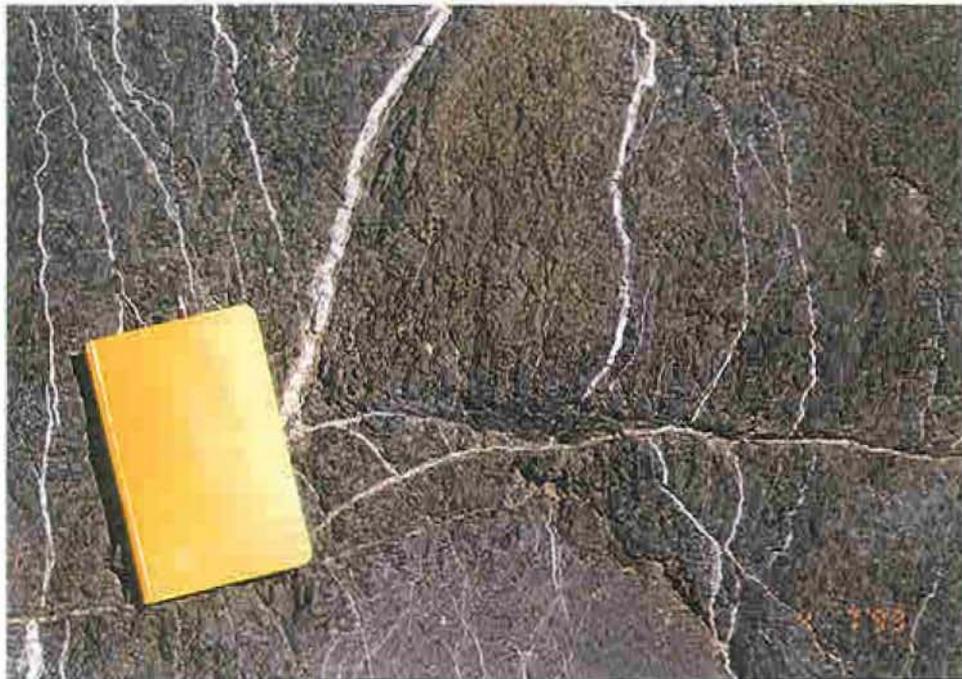


Photo 5

Fossil Creek Fish Barriers

Lower Site

Close up of bedrock on the right abutment. Basalt forms the river banks and channel. The basalt is moderately to slightly weathered and very intensely fractured at the surface, but becomes slightly weathered to fresh and moderately to slightly fractured a few inches into the body of the rock. When struck with a hammer, the surface of the basalt commonly breaks into coarse gravel-size fragments. The rock beneath is usually hard and rings with a hammer blow. The basalt contains numerous, irregular fractures, 6 inches to 3 feet long and filled with 1/4 to 2 inches of calcium carbonate. The fractures tend to be oriented perpendicular to the stream channel.

USBR Photograph by M. Miller

Date: April 6, 2000



Photos 6 and 7

Fossil Creek Fish Barriers

Upper: View looking southwest at the right river bank 20 feet downstream of the proposed Lower Site. This site was examined, but was later rejected due to the presence of a deep pool downstream. Fishery biologists thought that during a flood, the pool could allow fish to move upstream.

Lower: View looking downstream (south) at the proposed Deep Pool Site. This site was also rejected due to the presence of a deep pool downstream.

USBR Photograph by M. Miller

Date: April 6, 2000



Photo 8

Upper Site

Fossil Creek Fish Barriers

View looking downstream (south) at the proposed Upper Site. 1500 feet upstream of the Lower Site the stream has carved three notches in the bedrock. The stream presently flows through the center notch and into a small pool downstream. The creek then flows around and through a number of very large boulders and drops into a deeper pool. The water surface in the deep pool is approximately 8 to 10 feet lower than the water surface upstream of the notch. The proposed fish barrier would extend across and fill the three notches.

The right notch is approximately 2 feet deep and 5 feet wide. No alluvial material fills the notch. The center notch is approximately 8 feet wide and 7 feet deep. The sides of the notch are slightly undercut and irregularly shaped. Water to a depth of about 7 inches flows through the notch. No alluvial material was observed, but large boulders are present upstream and downstream of the center notch. The left notch is approximately 8 feet wide and may be up to 9 feet deep. The total depth to rock is unknown since it is filled with sand- to boulder-size material, but the alluvium is thought to be no more than 3 feet deep. The alluvial material fills the notch tightly enough to prevent water from flowing through it.

USBR Photograph by M. Miller

Date: April 6, 2000

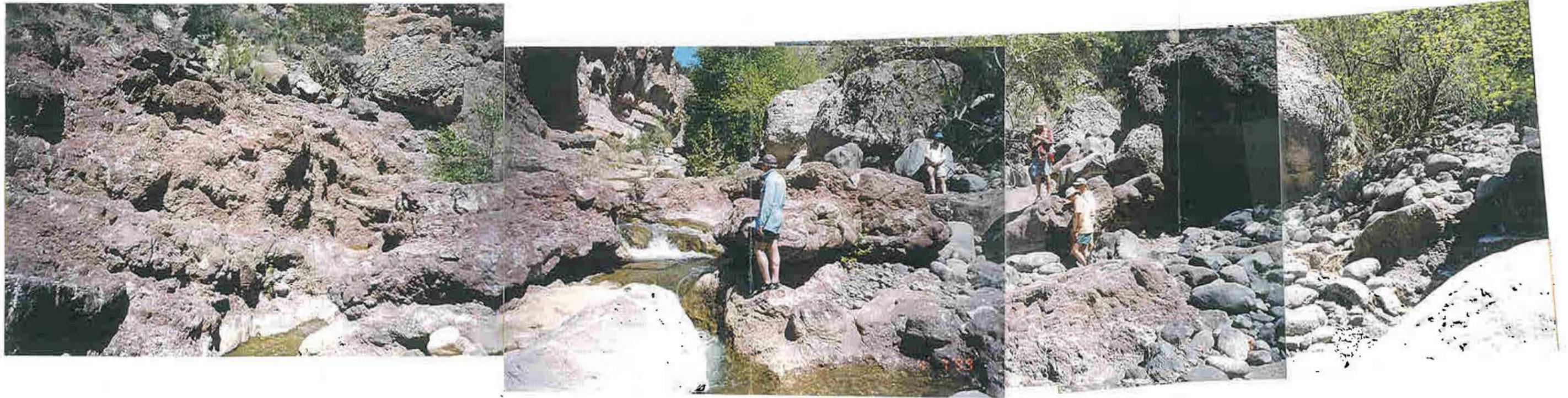


Photo 9

Upper Site

Fossil Creek Fish Barriers

View looking upstream (north) at the proposed Upper Site. Volcanics consisting of alternating layers of basalt and agglomerate ranging from 1 to 4 feet thick form the exposed river channel and right bank of the upstream site (left in photo). The large boulders located upstream force the stream to the right side of the valley. The channel behind these boulders is dry and filled with alluvium and vegetation. It is not known how deep bedrock is in the channel left of the boulders.

USBR Photograph by M. Miller

Date: April 6, 2000

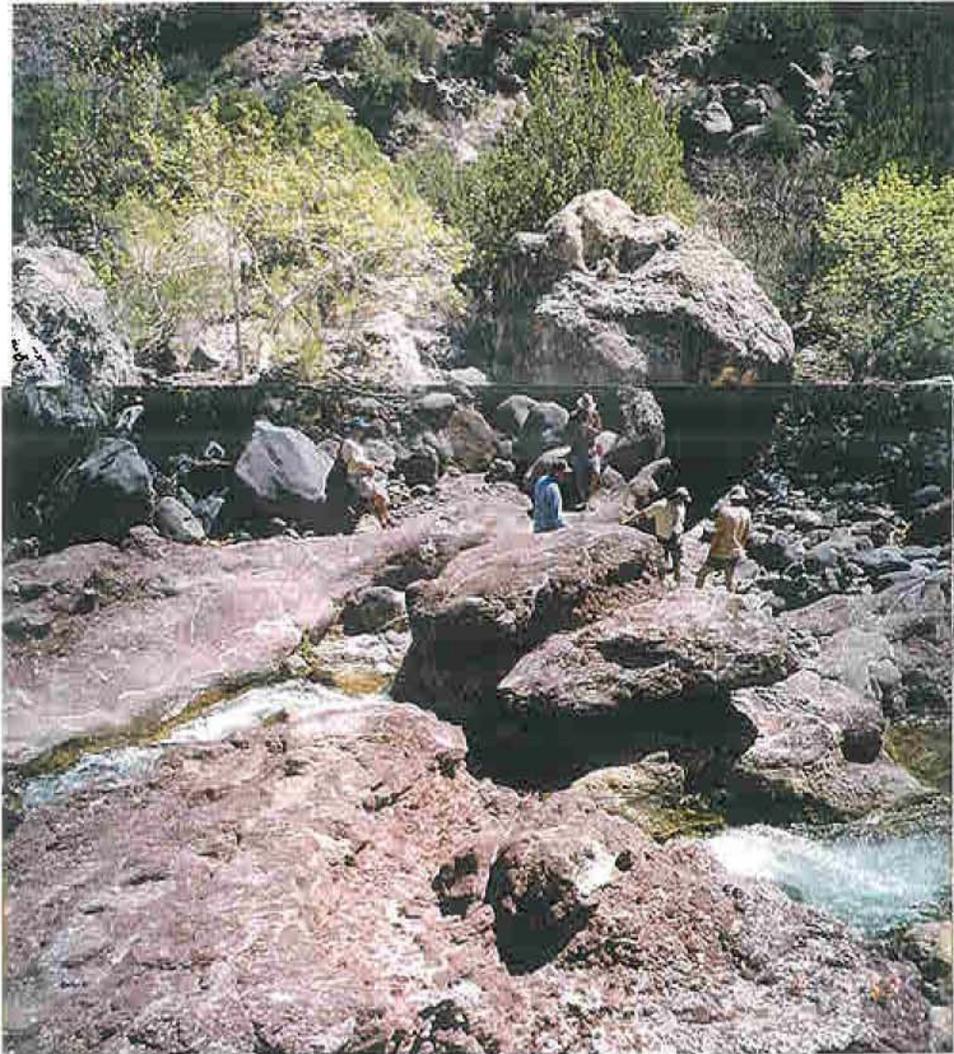


Photo 10

Fossil Creek Fish Barriers

Upper Site

View looking southeast (left) along the centerline of the proposed fish barrier. The engineer is standing on the bedrock of the left abutment where it slopes up from the top of the left notch. Beyond this point the bedrock is obscured by large boulders.

USBR Photograph by M. Miller

Date: April 6, 2000



Photo 11

Upper Site

Fossil Creek Fish Barriers

View looking downstream from the top of a boulder located upstream and left of the proposed centerline. The dashed line marks the approximate profile taken along centerline. The dips in the profile line mark the location of the three notches.

USBR Photograph by M. Miller

Date: April 6, 2000



Photo 12

Fossil Creek Fish Barriers

Upper Site

Closeup of bedrock forming the foundation at the proposed Upper Site. Alternating layers of basalt and agglomerate ranging from 1 to 4 feet thick form the exposed river channel and abutments. The basalt is moderately to slightly weathered, moderately hard to hard and possesses amygdaloidal texture. Amygdules are 1/4 to 1 inch in diameter and are filled with calcium carbonate. The agglomerate is composed of 65 percent, 1/2 to 3 inch diameter scoriaceous basalt fragments in a fine-grained tuffaceous matrix. The agglomerate is moderately weathered and moderately soft to moderately hard (soft at the surface).

USBR Photograph by M. Miller

Date: April 6, 2000