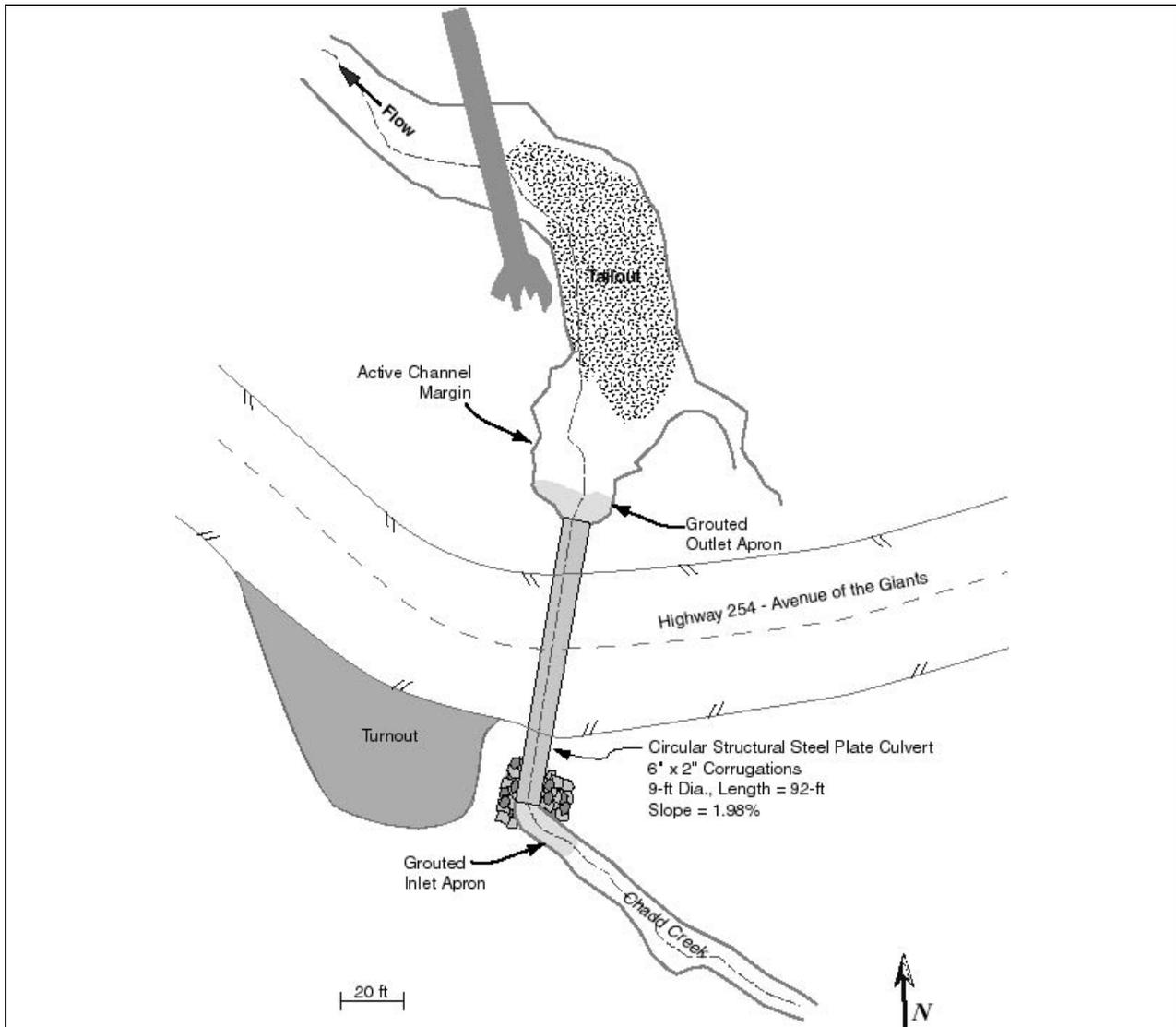


Appendix A – Culvert Descriptions and Hydraulic Observations

Tier 1 Sites	
Chadd Creek	A-1
Cloney Gulch	A-8
Hatchery Creek	A-12
May Creek	A-15
McCready Gulch (2 sites)	A-18
Morrison Gulch	A-22
N F Streeloh Creek	A-28
Sullivan Gulch	A-31
Warren Creek	A-35
Tier 2 Sites	
Boundary Creek	A-39
Clarks Creek	A-43
Cow Creek	A-47
Durphy Creek (3 sites)	A-52
Dry Creek	A-60
James Creek	A-64
Peacock Creek (2 sites)	A-69
Walton Creek	A-77

Chadd Creek Culvert

Location/Ownership	Highway 254, post mile 40.83 / Caltrans
Drainage Area	3.56 sq mi (9.22 km ²)
Culvert Description	Circular, corrugated steel culvert with 6"x2" corrugations Diameter = 9 ft Length = 92 ft Slope = 1.9% Non-embedded No baffles or weirs
Inlet	Projecting, with grouted apron
Outlet	Partially perched. Grouted apron. Bed and bank scour has formed large outlet pool
Channel Constriction (Culvert Width/Bankfull Width)	0.25
Inlet Alignment with Channel (angle from culvert centerline)	45 degrees



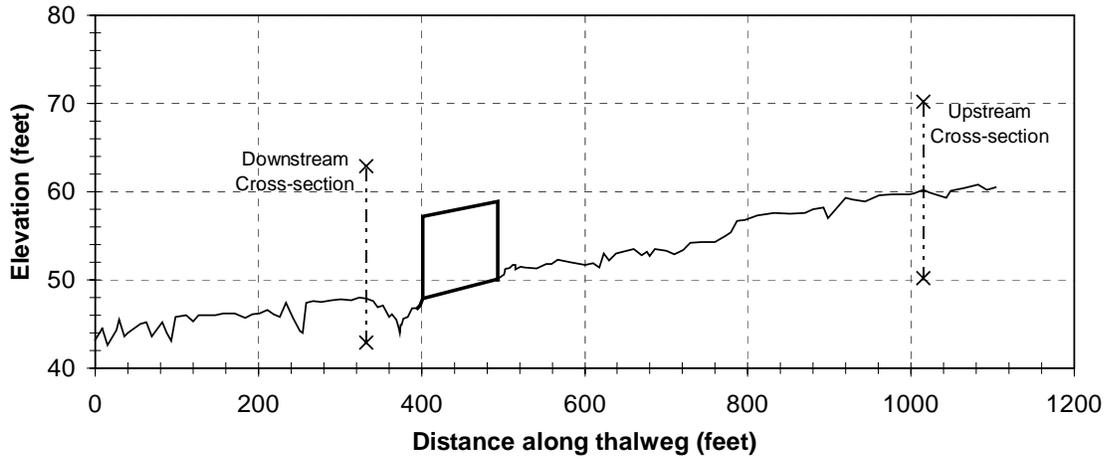
Chadd Creek plan map.



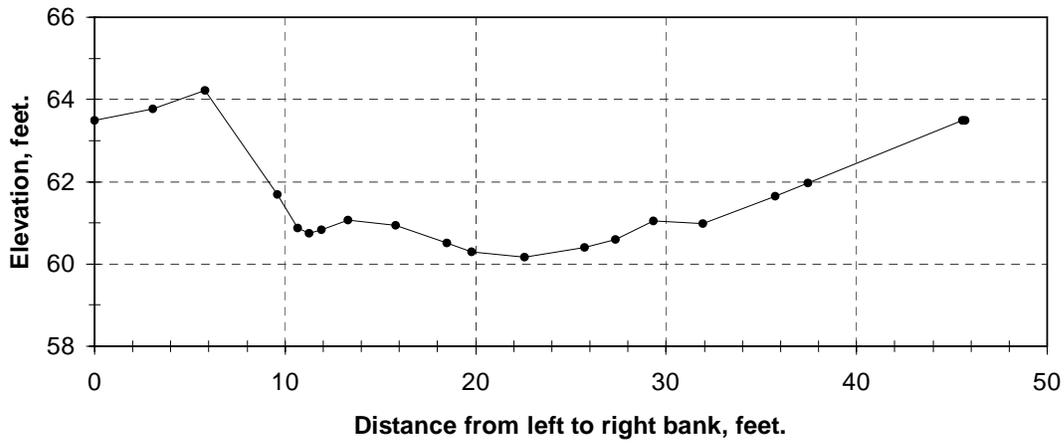
Chadd Creek culvert inlet



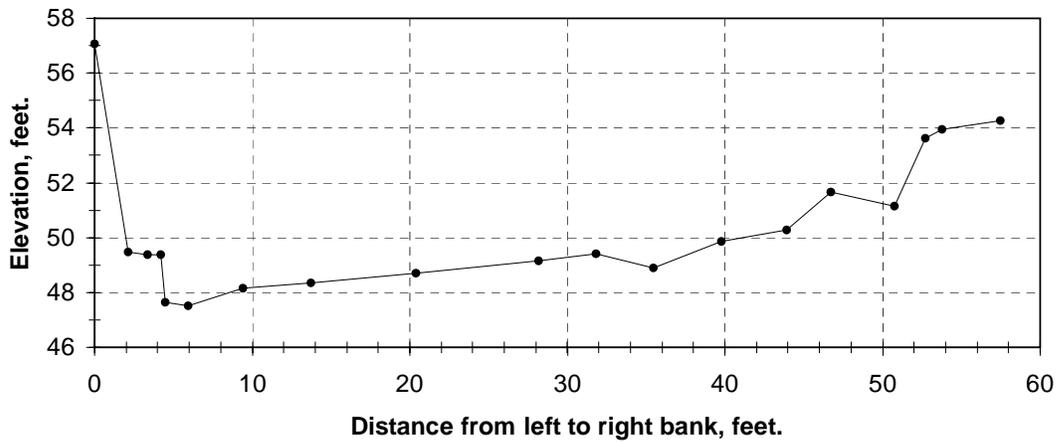
Chadd Creek culvert outlet



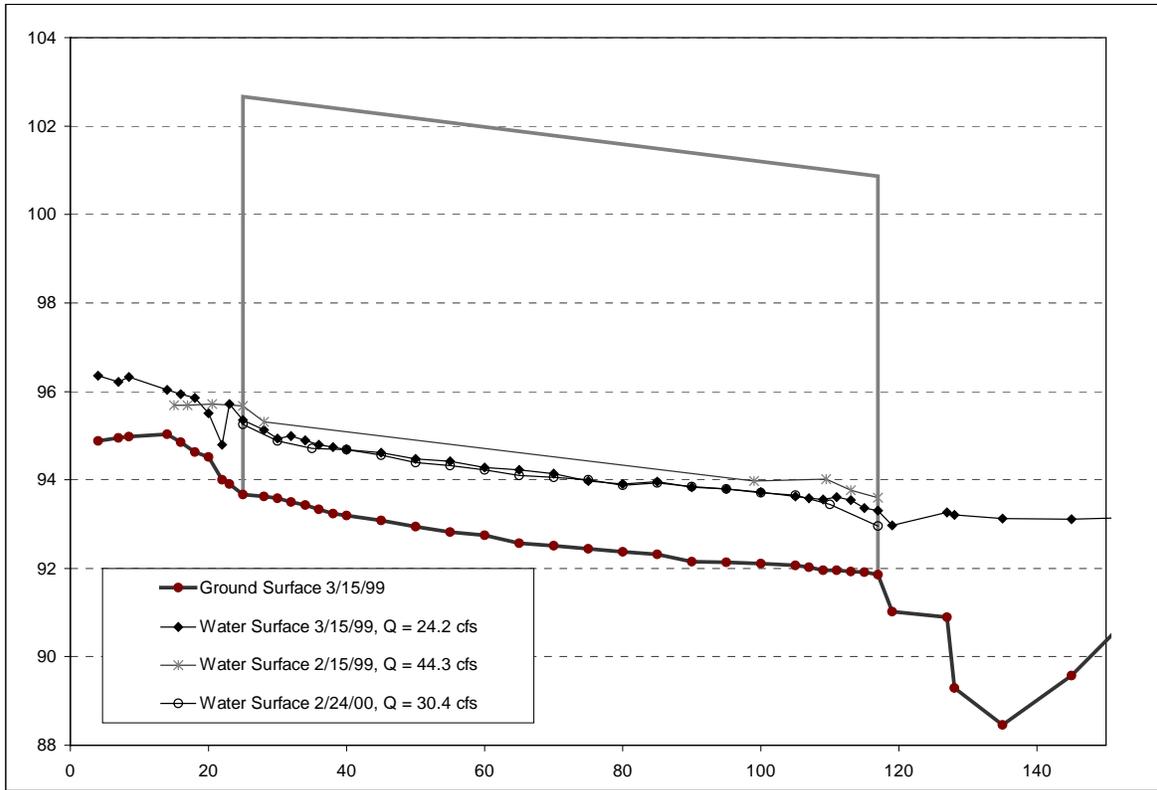
Chadd Creek longitudinal profile.



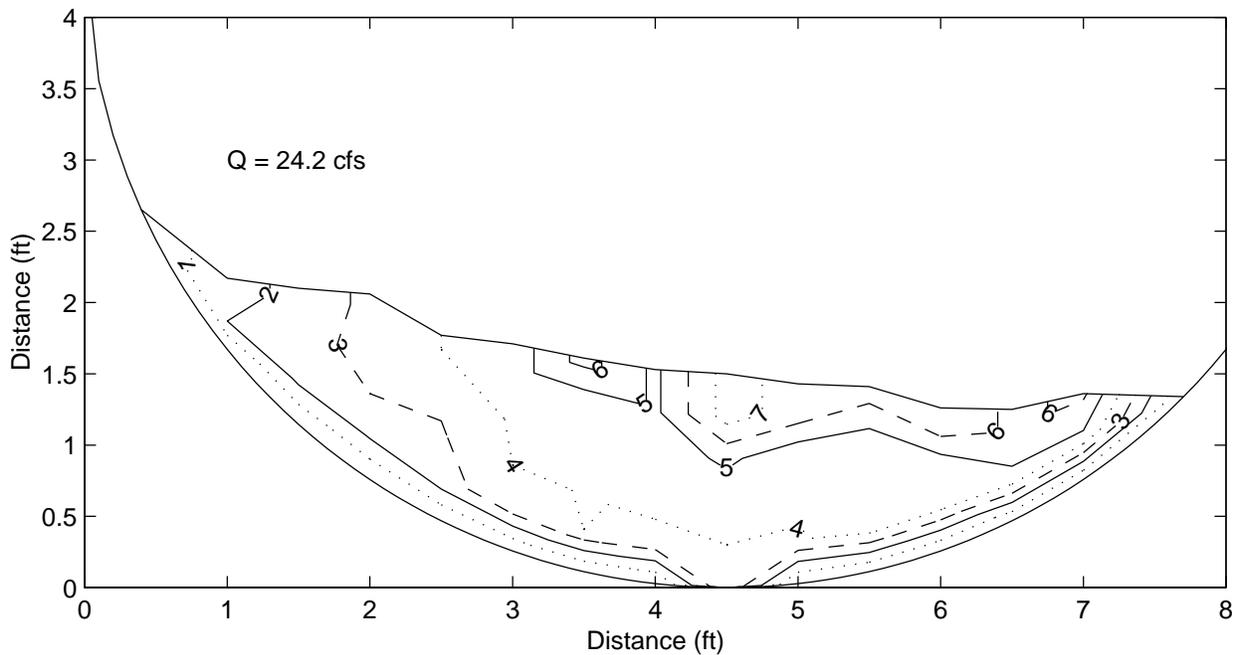
Chadd Creek upstream cross section.



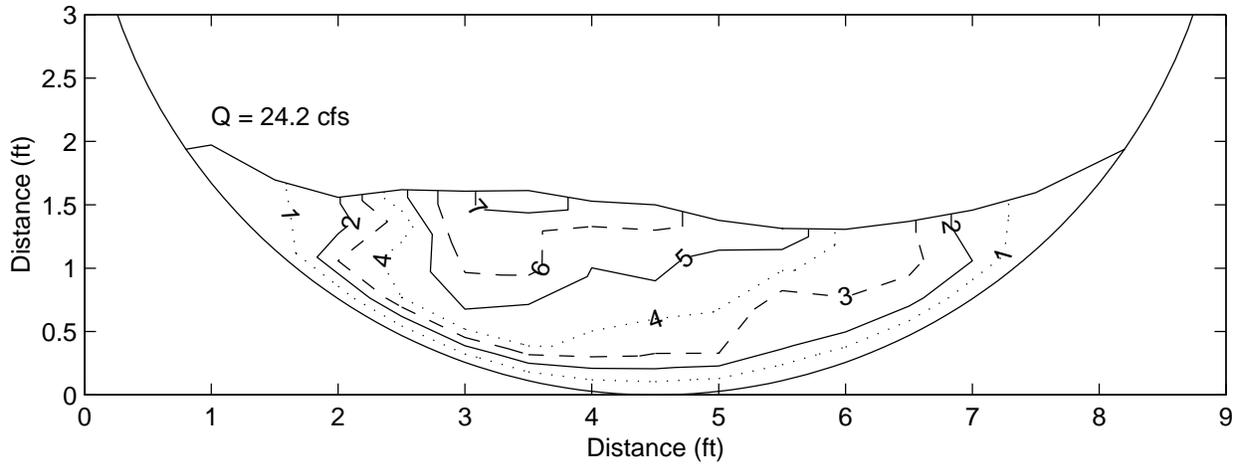
Chadd Creek downstream cross section, located at tailwater control.



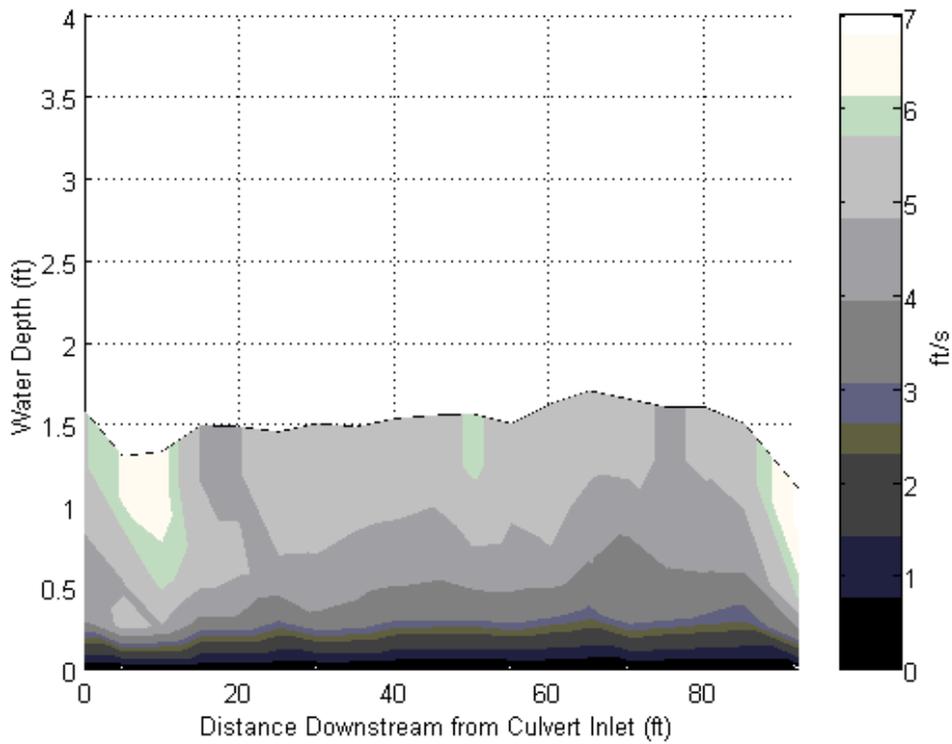
Chadd Creek water surface profiles. Manning's roughness calculated using water surface slope within the barrel: Q = 24.2 cfs, n = 0.057; Q = 30.4 cfs, n = 0.042; Q = 44.3 cfs, n = 0.054.



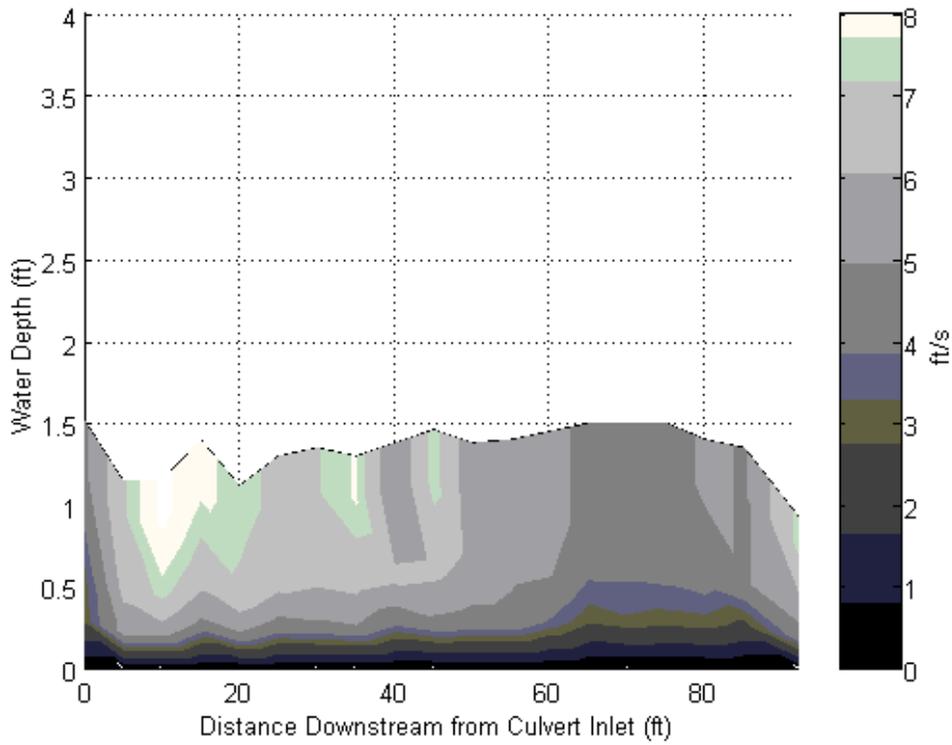
Chadd Creek velocity cross section at the culvert inlet. Average water velocity within the cross-section was 3.9 ft/s.



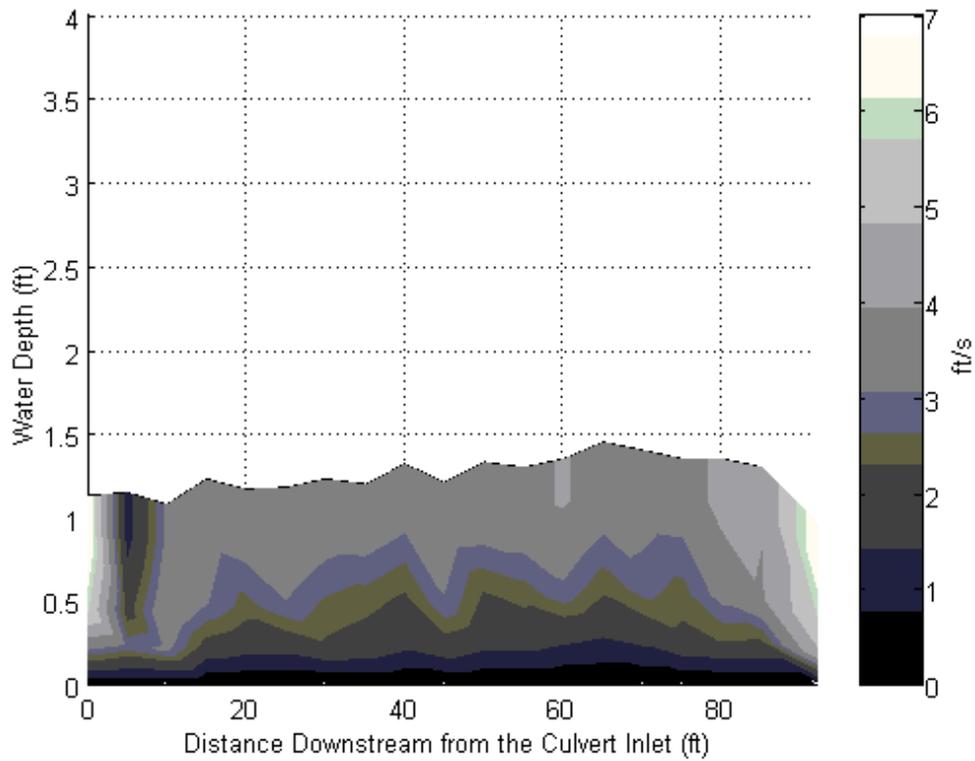
Chadd Creek velocity cross section within culvert, 50-ft downstream of inlet. Average water velocity within the cross-section was 3.7 ft/s.



Chadd Creek longitudinal velocity profile along the centerline.



Chadd creek longitudinal velocity profile along the left edge of the culvert (facing downstream).



Chadd creek longitudinal velocity profile along the right edge of the culvert (facing downstream).

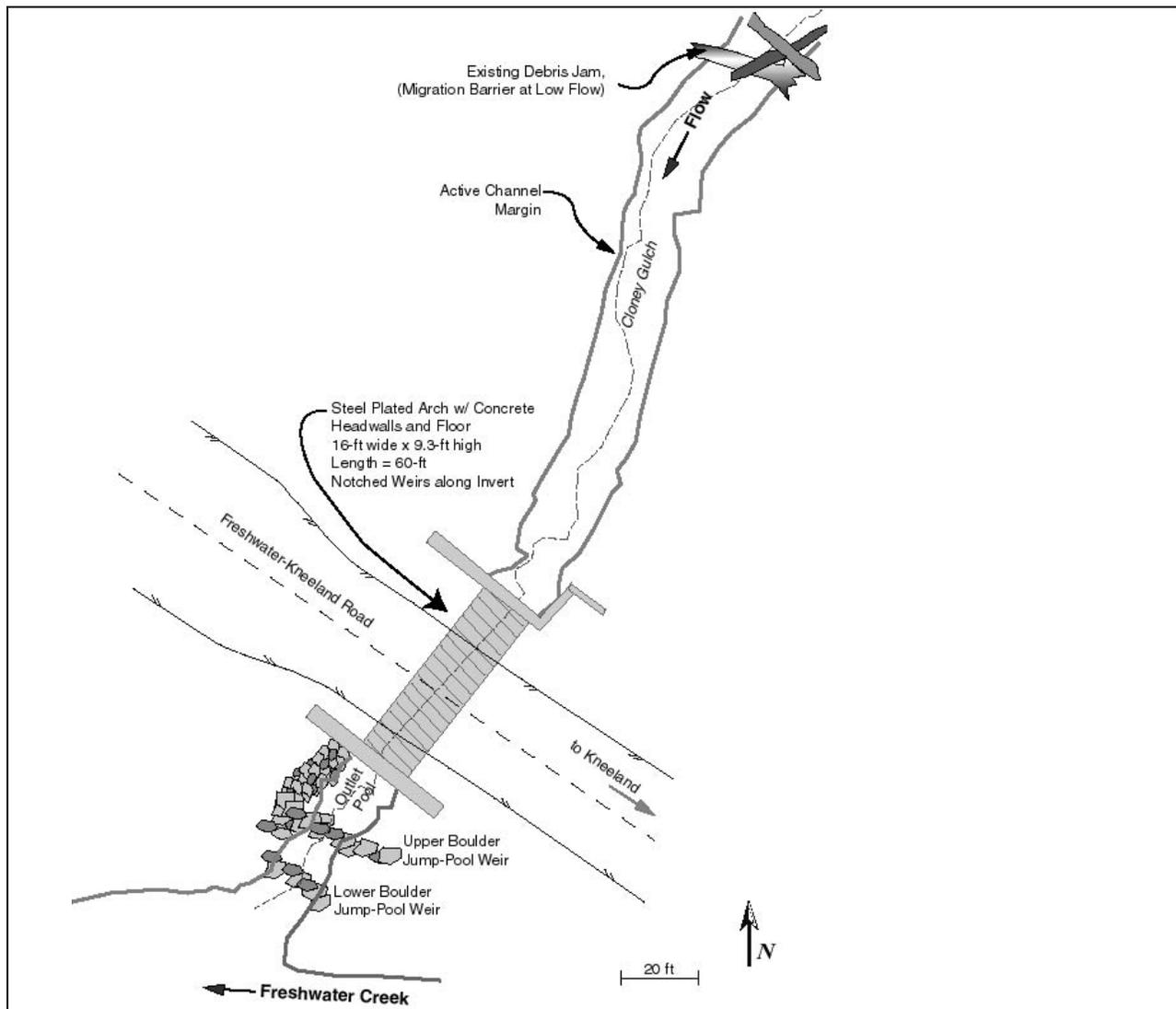
Summary of Occupied Velocity Analysis

Velocities in the table represent the lowest average velocity calculated within the culvert cross-section in the square areas used to represent the swimming area presented by different fish size classes.

Cross Section	Juvenile Fish (0.3 x 0.3 sq ft)	Resident trout (0.6 x 0.6 sq ft)	Adult Salmonids (0.8 x 0.8 sq ft)	Cross Section Ave Velocity
Inlet, Q = 24 cfs	1.1 ft/s	1.9 ft/s	2.4 ft/s	3.9 ft/s
Mid-barrel, Q = 24 cfs	0.8 ft/s	1.4 ft/s	1.8 ft/s	3.7 ft/s

Cloney Gulch Culvert

Location/Ownership	Freshwater Rd / Humboldt County
Drainage Area	4.67 sq mi (12.97 km ²)
Culvert Description	Open arch with concrete bottom and 6" x 2" corrugated steel arch Height x Width = 9.3 ft x 16 ft Length = 60 ft Slope = 0.9% Non-embedded Baffles on right side, Notched weirs at inlet and outlet
Inlet	Head wall with metal wing wall on the right side
Outlet	Perched outlet with rock weir below. Bed and bank scour has formed an outlet pool
Channel Constriction (Culvert Width/Bankfull Width)	0.8
Inlet Alignment with Channel (angle from culvert centerline)	10 degrees



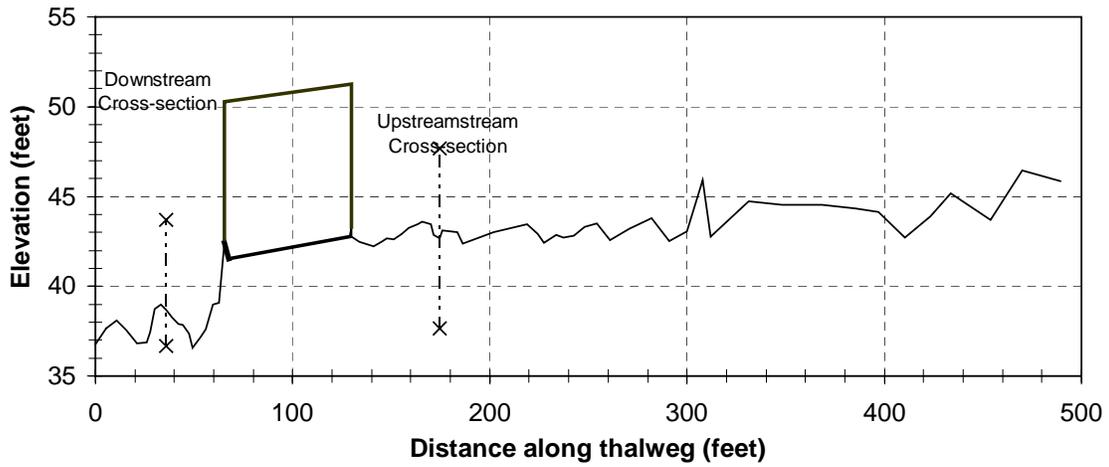
Cloney Gulch plan map.



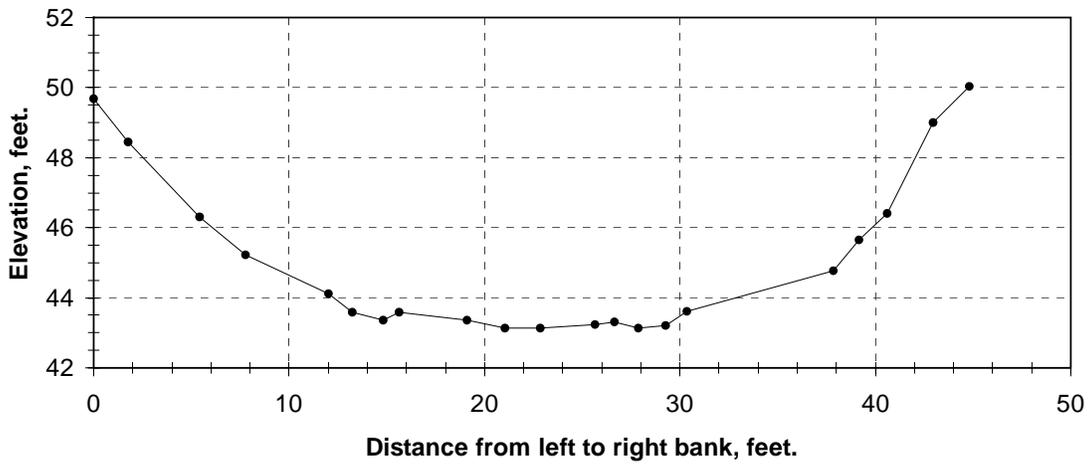
Cloney Gulch culvert inlet at winter storm flow.



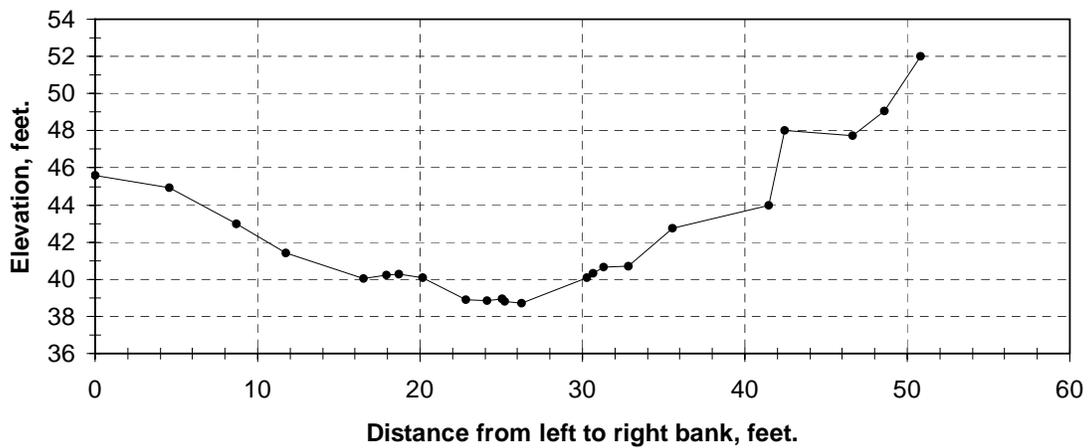
Cloney Gulch culvert outlet at summer low flow.



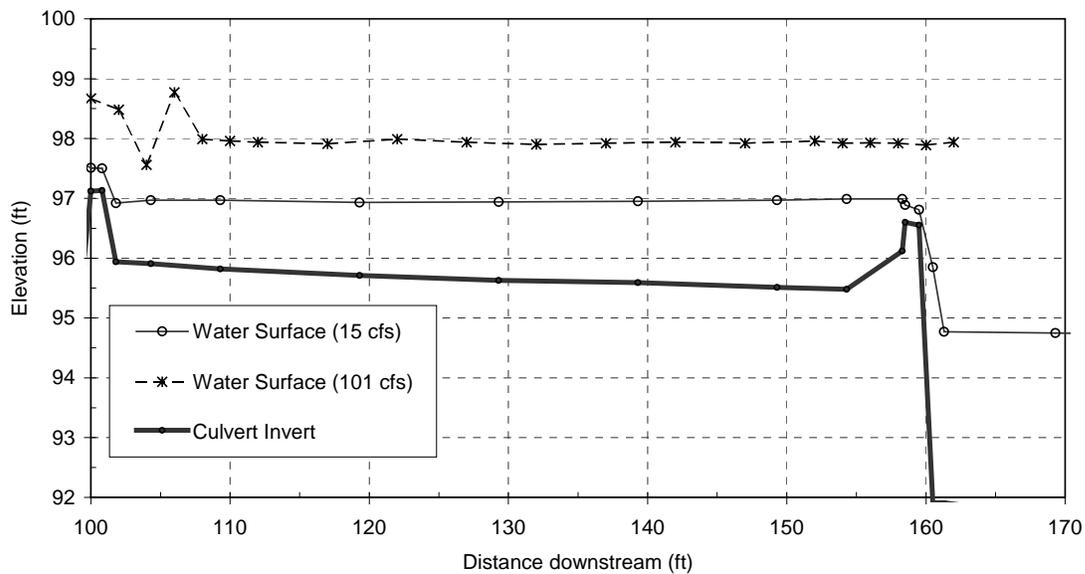
Cloney Gulch longitudinal profile.



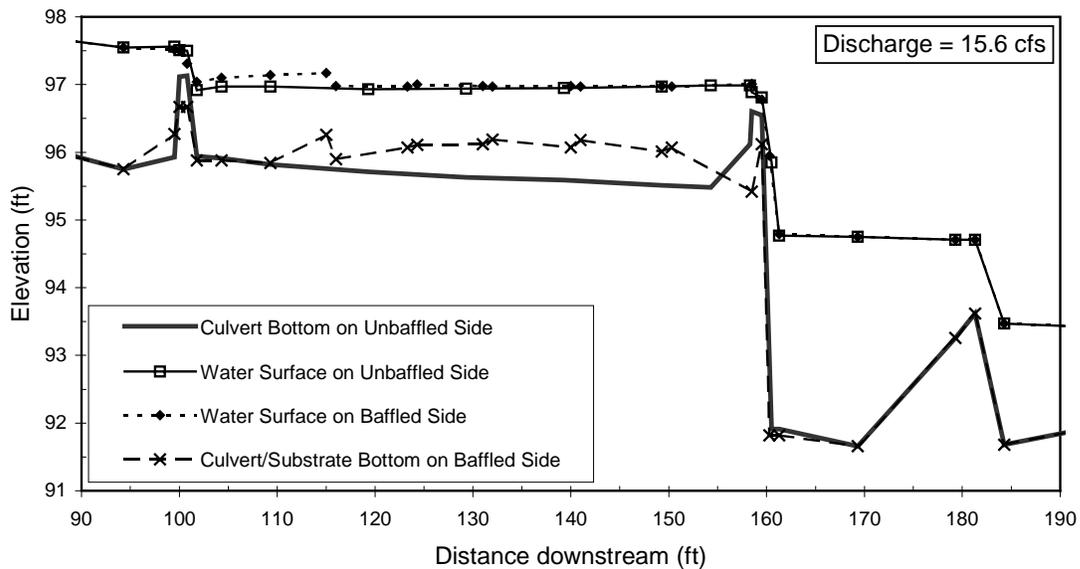
Cloney Gulch upstream cross section.



Cloney Gulch downstream cross section, located at rock weir, tailwater control.



Cloney Gulch water surface profile for the unbaffled (left) side of the culvert.

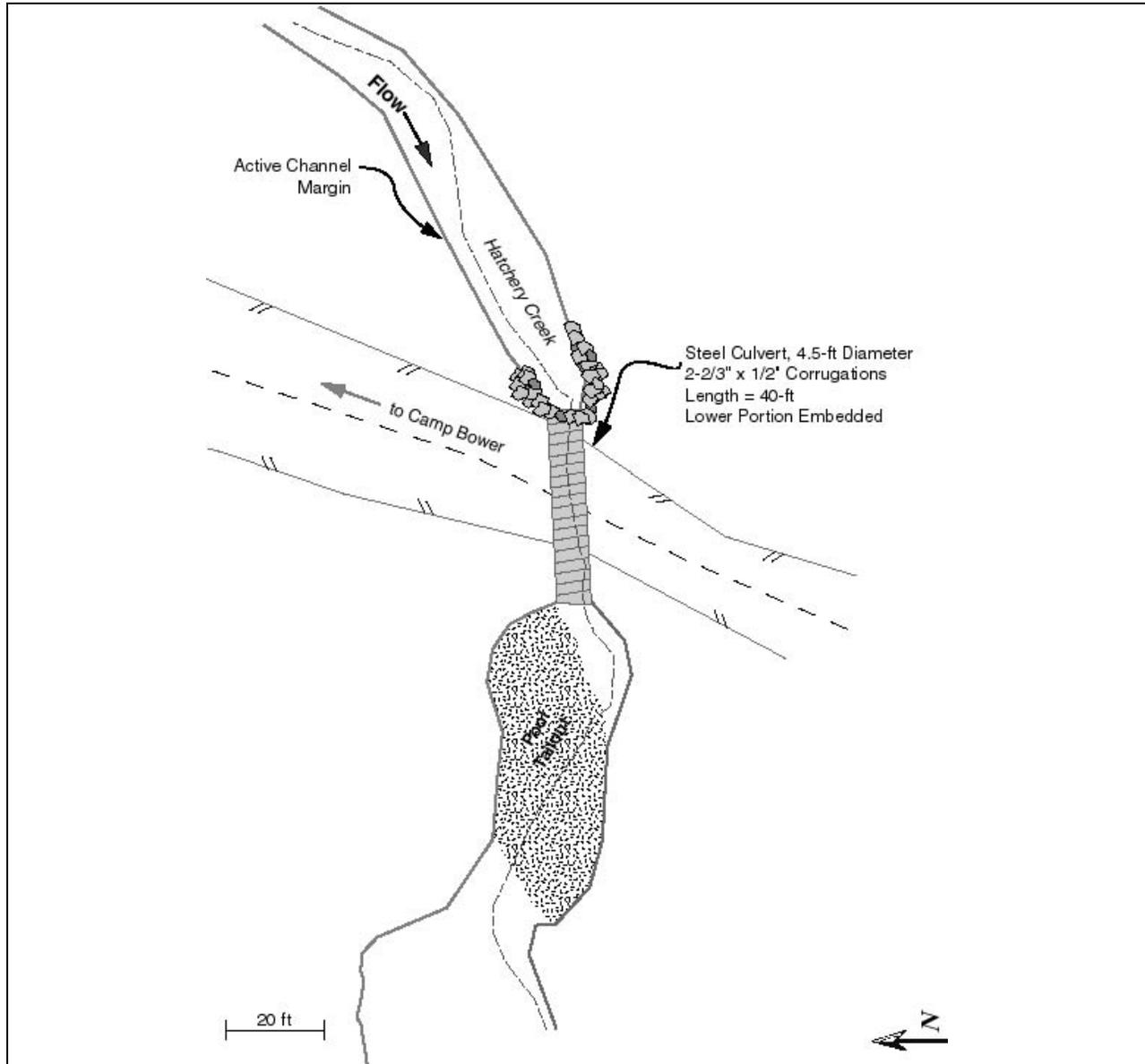


Cloney Gulch water surface profile for the baffled (right) and unbaffled (left) sides of the culvert.

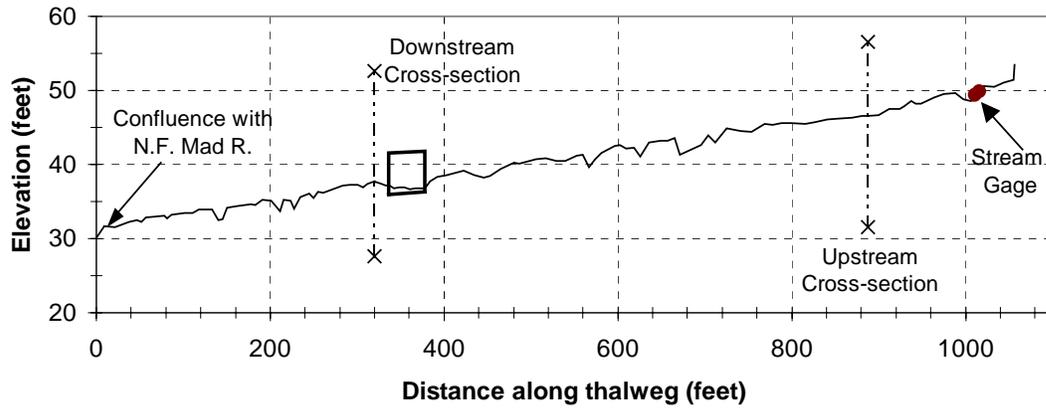
Roughness coefficients, velocity cross-sections and occupied velocities were not measured or calculated for the Cloney Gulch culvert because of the partial baffles.

Hatchery Creek Culvert

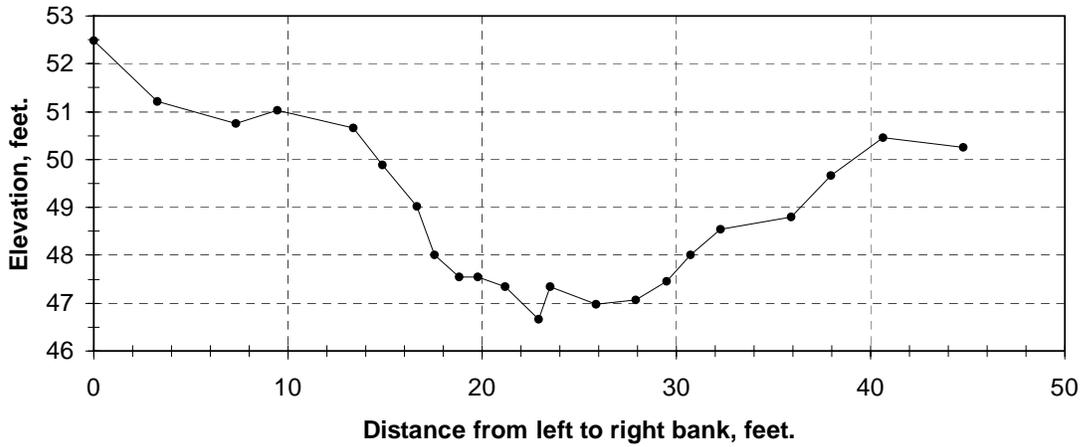
Location/Ownership	Camp Bower Rd / Simpson Timber, Humboldt County
Drainage Area	0.83 sq mi (12.97 km ²)
Culvert Description	Circular, corrugated steel culvert with 2 2/3" x 1/2" corrugations Diameter = 4.5 ft Length = 40 ft Slope = 0.8% Embedded for downstream 20 feet No baffles or weirs
Inlet	Projecting
Outlet	At stream grade, culvert has caused bank scour at outlet
Channel Constriction (Culvert Width/Bankfull Width)	0.25
Inlet Alignment with Channel (angle from culvert centerline)	30 degrees



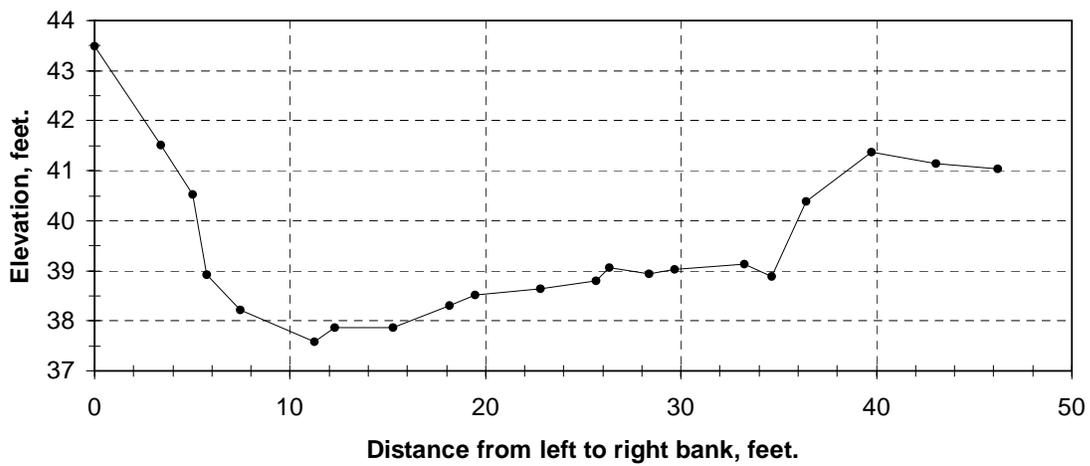
Hatchery Creek plan map.



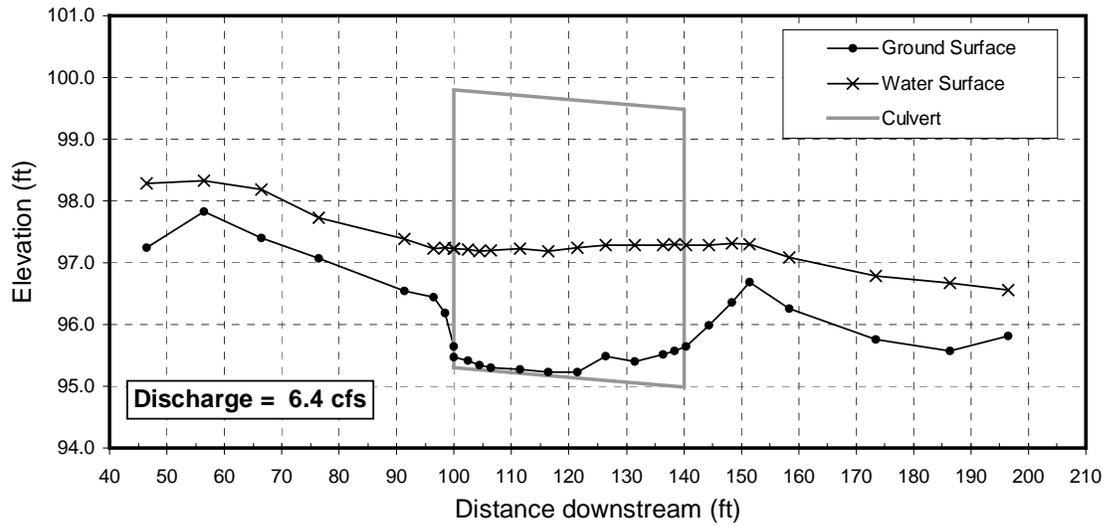
Hatchery Creek longitudinal profile.



Hatchery Creek upstream cross section.



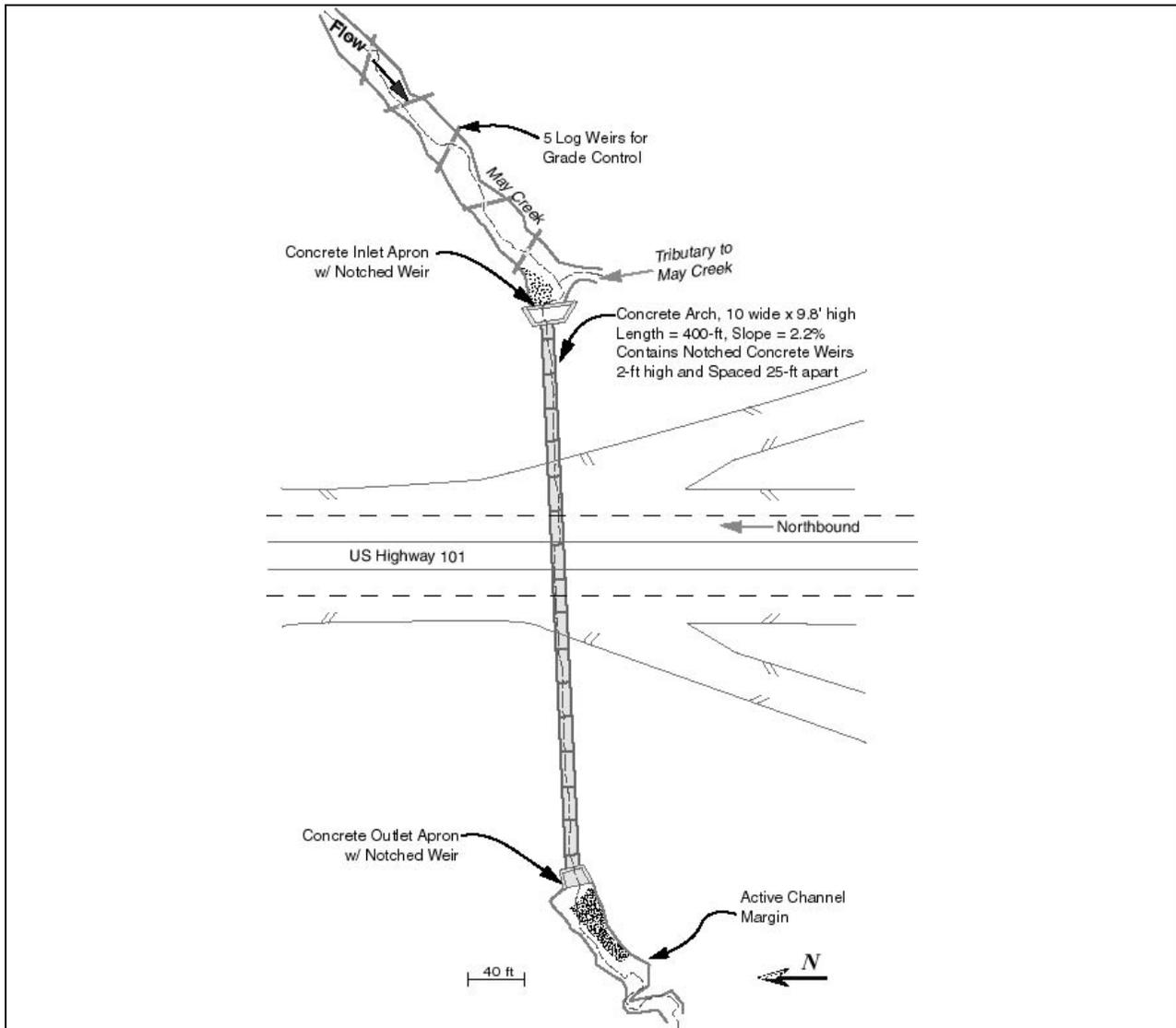
Hatchery Creek downstream cross section, located at tailwater control.



Hatchery Creek water surface profiles. Roughness coefficients were not calculated because the embedded substrate is discontinuous.

May Creek Culvert

Location/Ownership	Highway 101, post mile 126.13, Humboldt County / Caltrans
Drainage Area	1.75 sq mi (4.86 km ²)
Culvert Description	Pipe arch - concrete Height x Width = 9.8 ft x 10 ft Length = 400 ft Slope = 2.2% Non-embedded Weirs spanning full culvert width with alternating notches
Inlet	Wing wall
Outlet	Perched outlet with an outlet apron and weir. Bed scour has formed an outlet pool
Channel Constriction (Culvert Width/Bankfull Width)	0.6
Inlet Alignment with Channel (angle from culvert centerline)	45 degrees



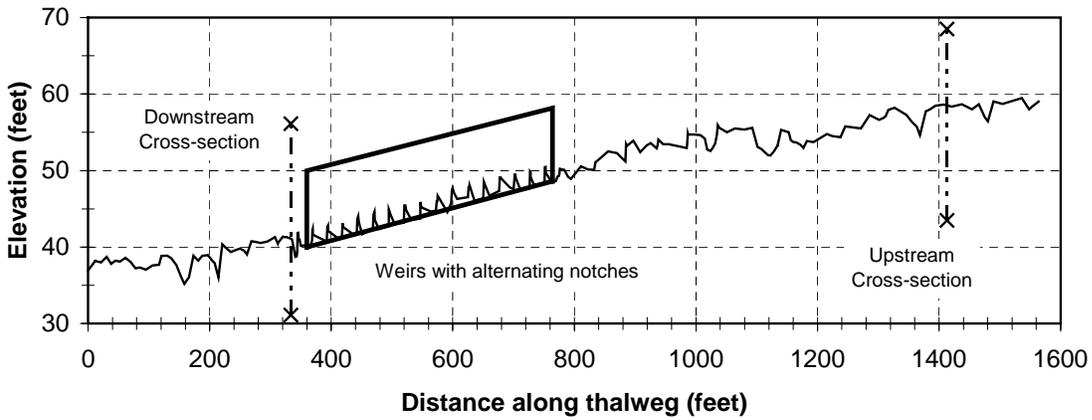
May Creek plan map.



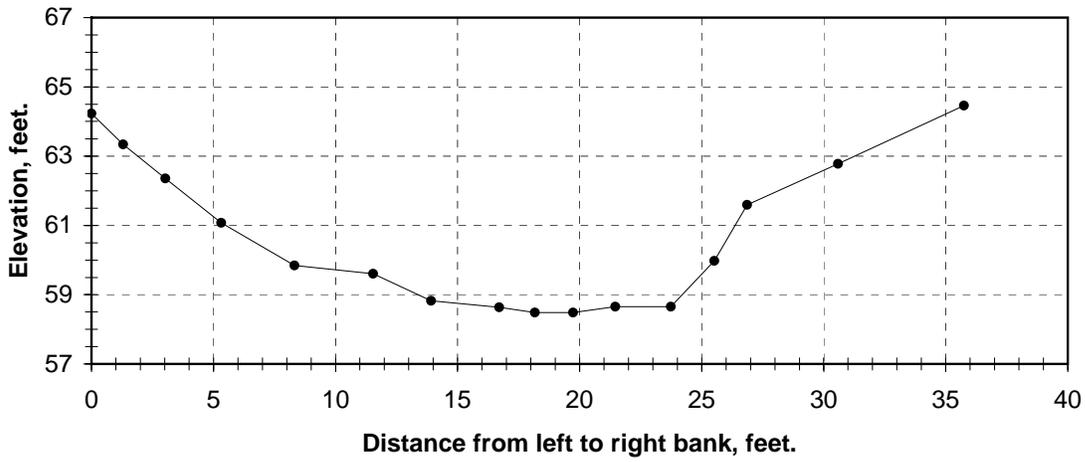
May Creek inlet



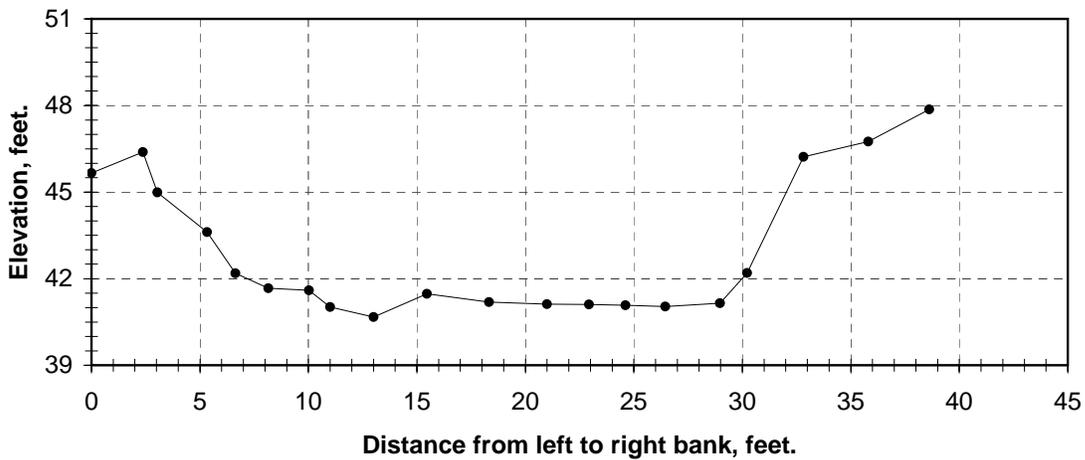
May Creek outlet



May Creek longitudinal profile.



May Creek upstream cross section.



May Creek downstream cross section, located at tailwater control.

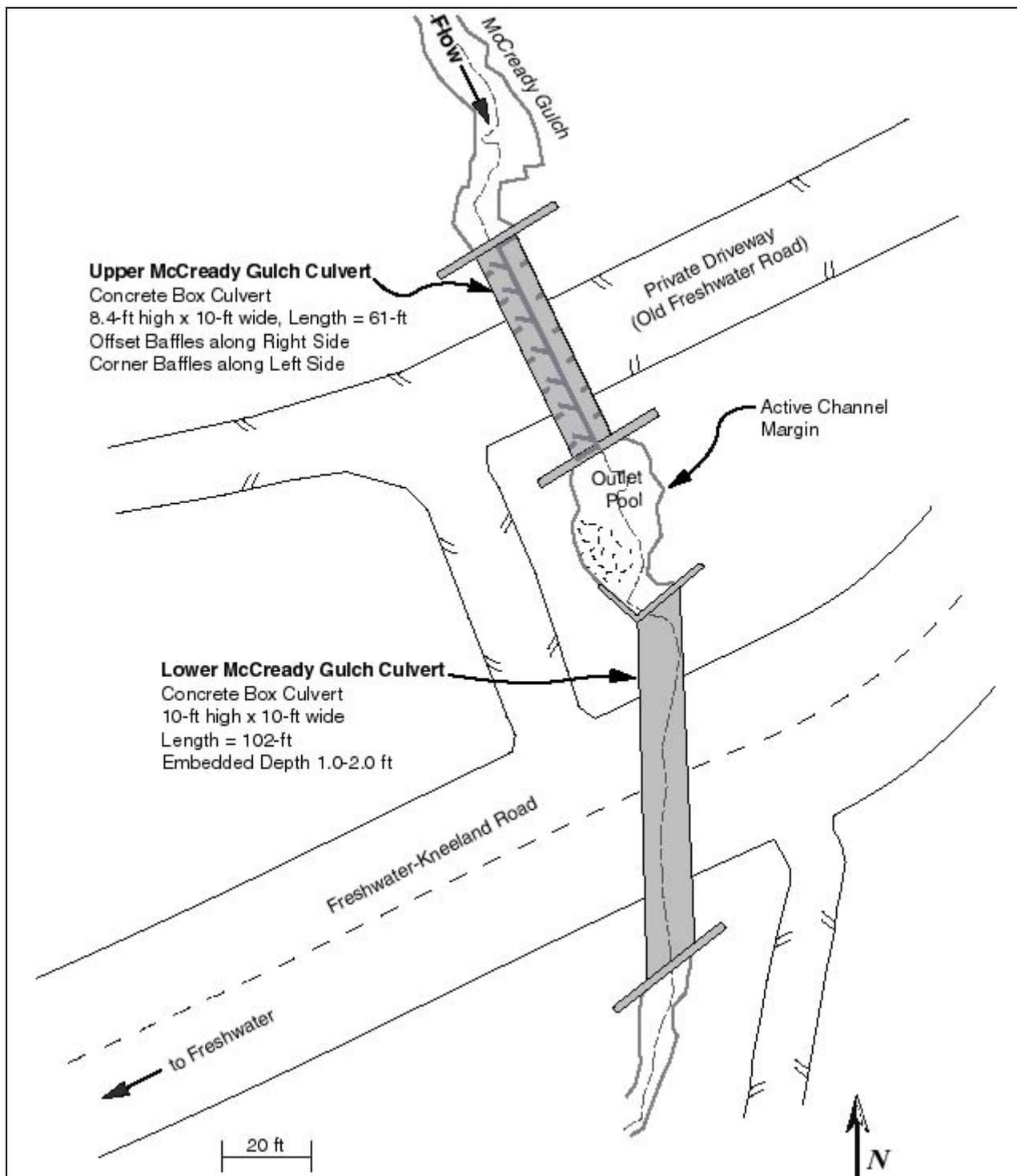
McCready Gulch Culvert

Culvert 1 – Upstream Culvert - Old Freshwater Rd

Location/Ownership	Old Freshwater Rd/ Humboldt County
Drainage Area	1.95 sq mi (5.05 km ²)
Culvert Description	Concrete box Height x Width = 8 ft x 10 ft Length = 61 ft Slope = 0.6% Non-embedded Offset (Washington) baffles on right side, corner blocks along left side.
Inlet	Head wall
Outlet	Perched outlet. Bed scour has formed a deep outlet pool
Channel Constriction (Culvert Width/Bankfull Width)	0.4
Inlet Alignment with Channel (angle from culvert centerline)	10 degrees

Culvert 2 – Downstream Culvert - Freshwater Rd

Location/Ownership	Freshwater Rd/ Humboldt County
Drainage Area	1.98 sq mi (5.13 km ²)
Culvert Description	Concrete box Height x Width = 10 ft x 10 ft Length = 102 ft Culvert Slope = 1.2%; Ave. substrate slope varied from 0.1 to -0.35% over 3 different surveys Embedded No baffles or weirs
Inlet	Wing wall
Outlet	At stream grade.
Channel Constriction (Culvert Width/Bankfull Width)	0.4
Inlet Alignment with Channel (angle from culvert centerline)	0 degrees



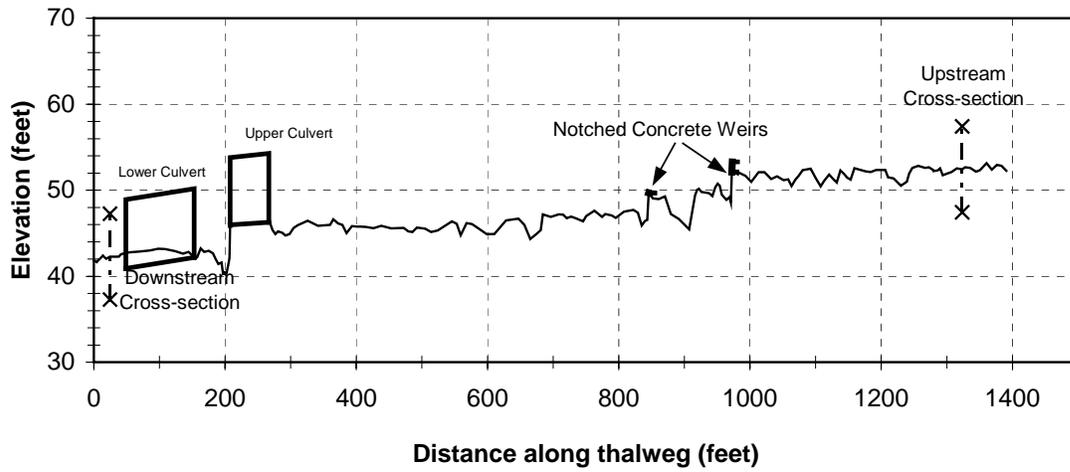
McCready Gulch plan map.



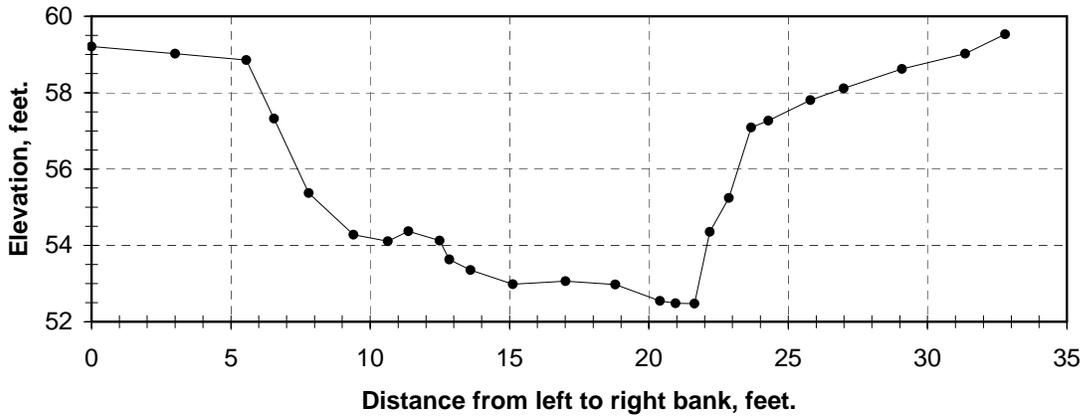
Upper McCready Gulch culvert: Left – looking upstream at the inlet. Right – Looking downstream at the outlet. The Lower McCready Gulch culvert is visible in the upper left corner.



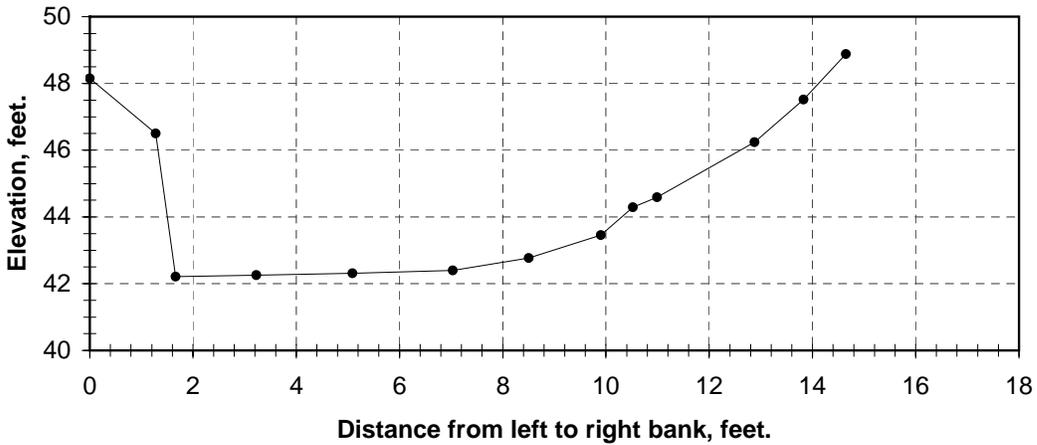
Upper McCready Gulch culvert outlet just prior to removal for replacement with a bridge.



McCready Gulch longitudinal profile.



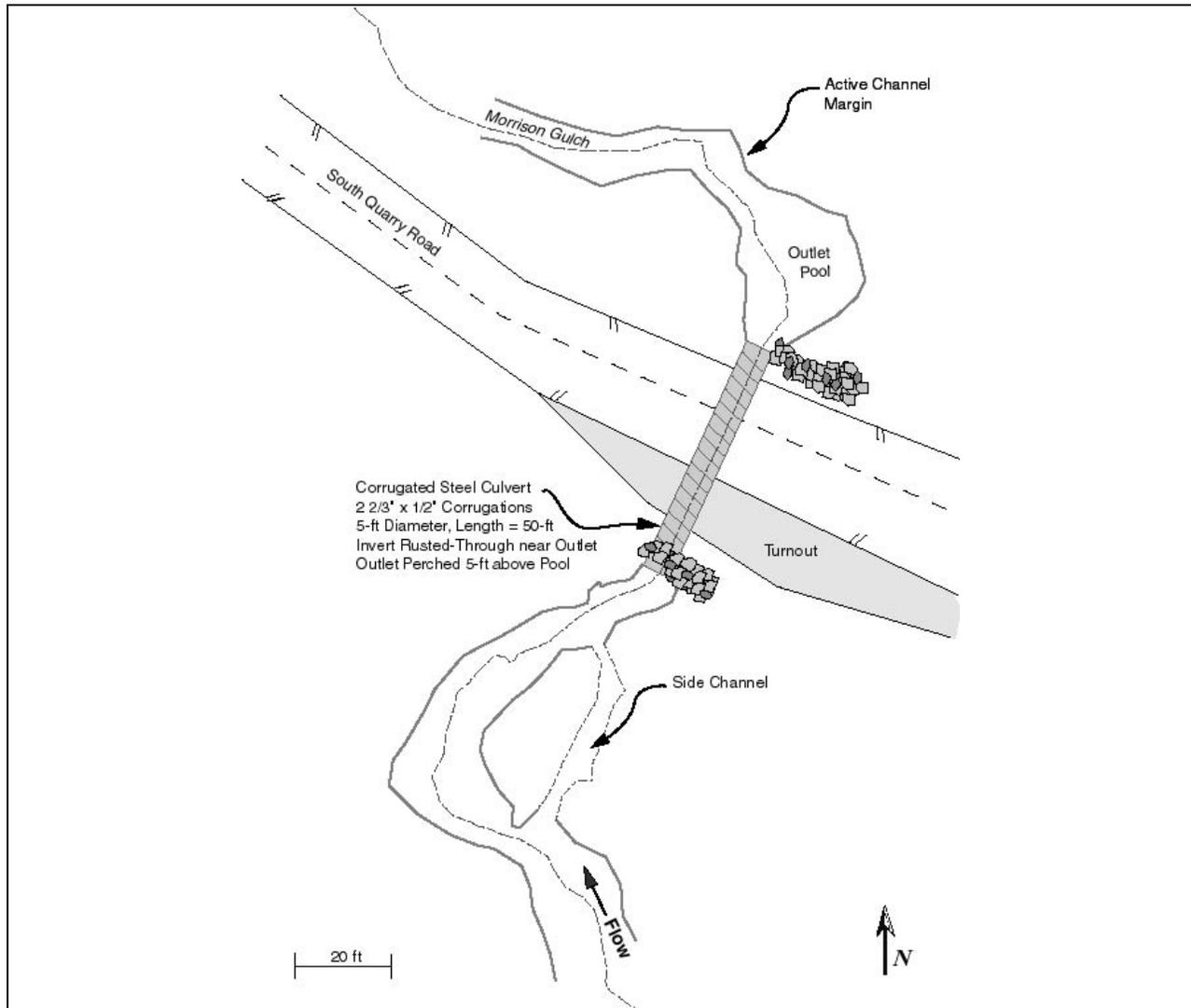
McCready Gulch upstream cross section.



McCready Gulch downstream cross section, located at tailwater control for the downstream culvert, Culvert 2.

Morrison Gulch Culvert

Location/Ownership	Quarry Rd/ Humboldt County
Drainage Area	0.99 sq mi (2.56 km ²)
Culvert Description	Circular, corrugated steel culvert with 2 2/3" x 1/2" corrugations Diameter = 5 ft Length = 50 ft Slope = 1.0% Not embedded No baffles or weirs
Inlet	Projecting
Outlet	Perched outlet. Bed scour has formed an outlet pool
Channel Constriction (Culvert Width/Bankfull Width)	0.55
Inlet Alignment with Channel (angle from culvert centerline)	20 degrees



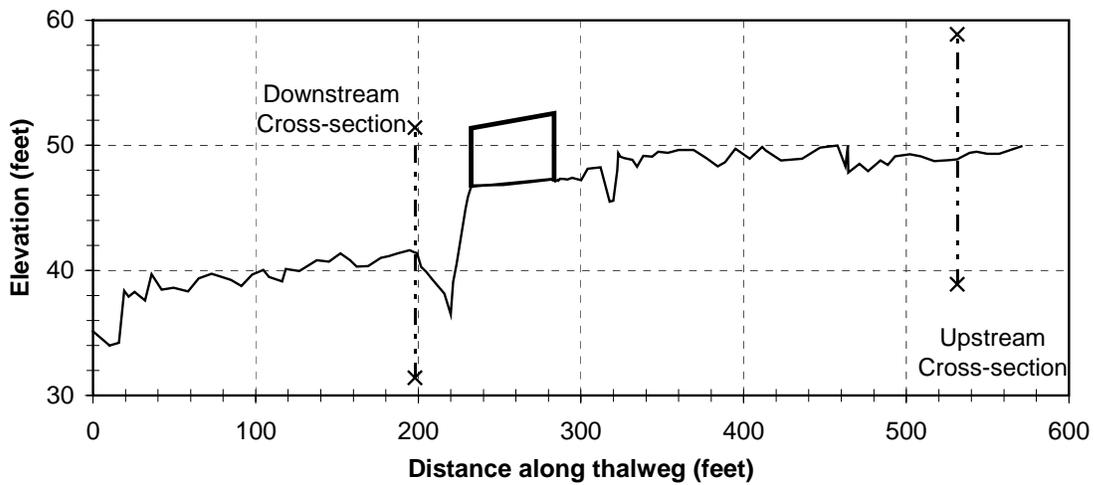
Morrison Gulch plan map.



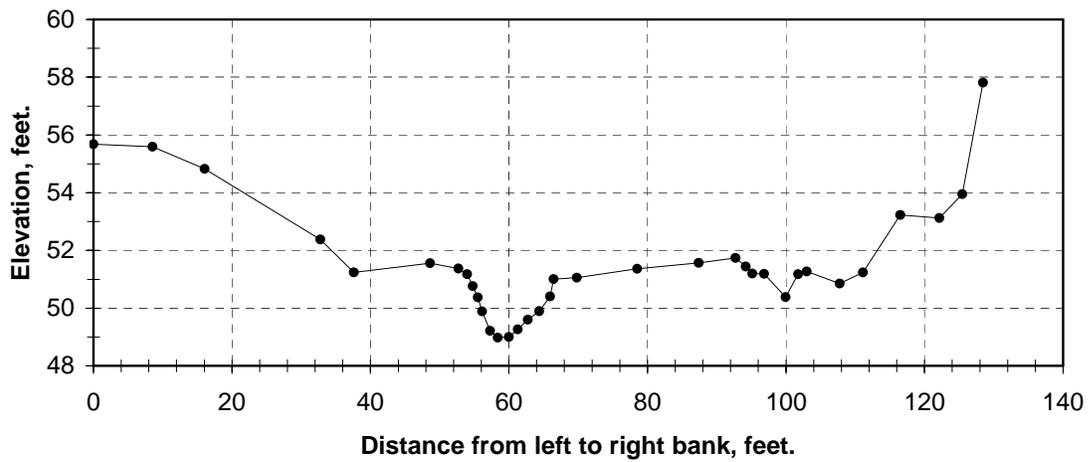
Morrison Gulch inlet during the NMFS study. The culvert was replaced in 2001.



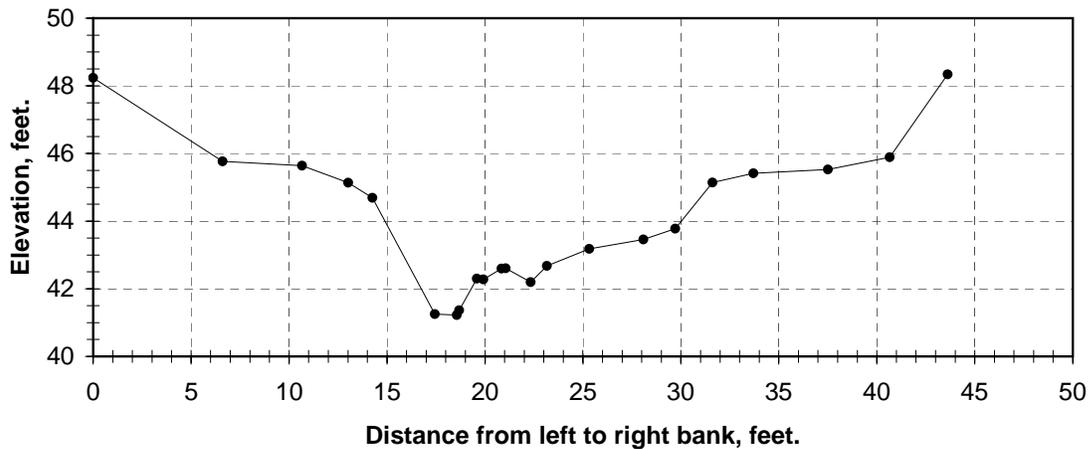
Morrison Gulch outlet during the NMFS study. The culvert was replaced in 2001.



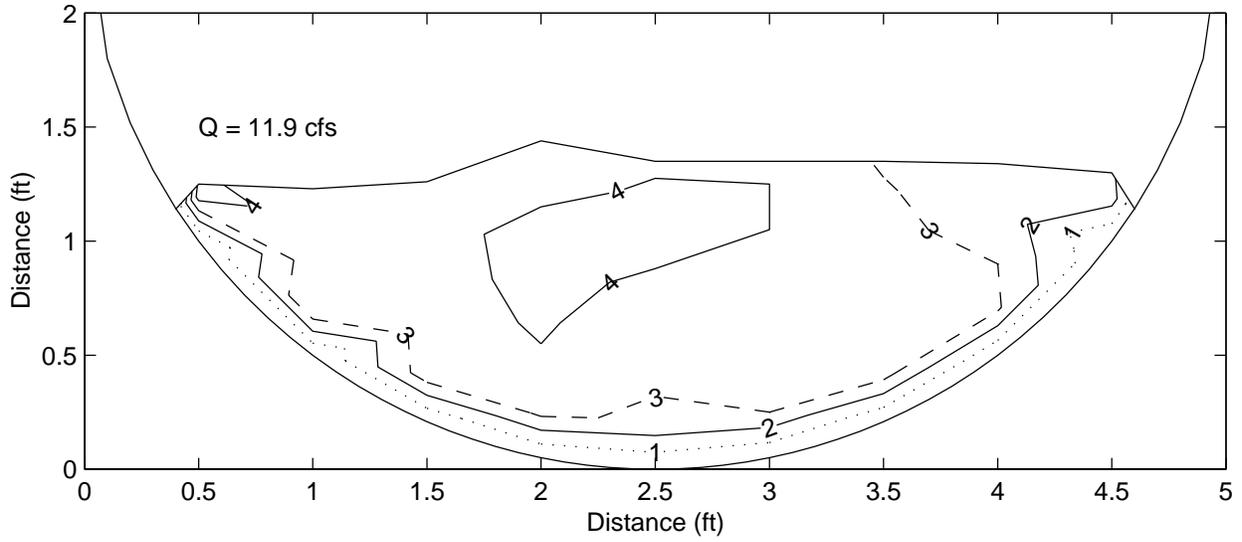
Morrison Gulch longitudinal profile.



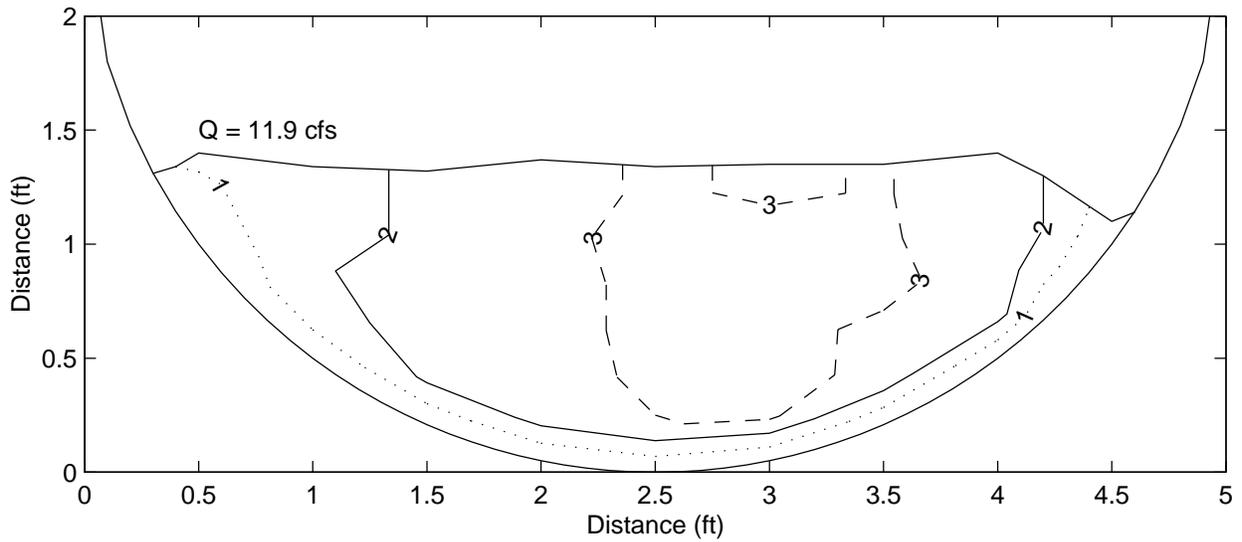
Morrison Gulch upstream cross section.



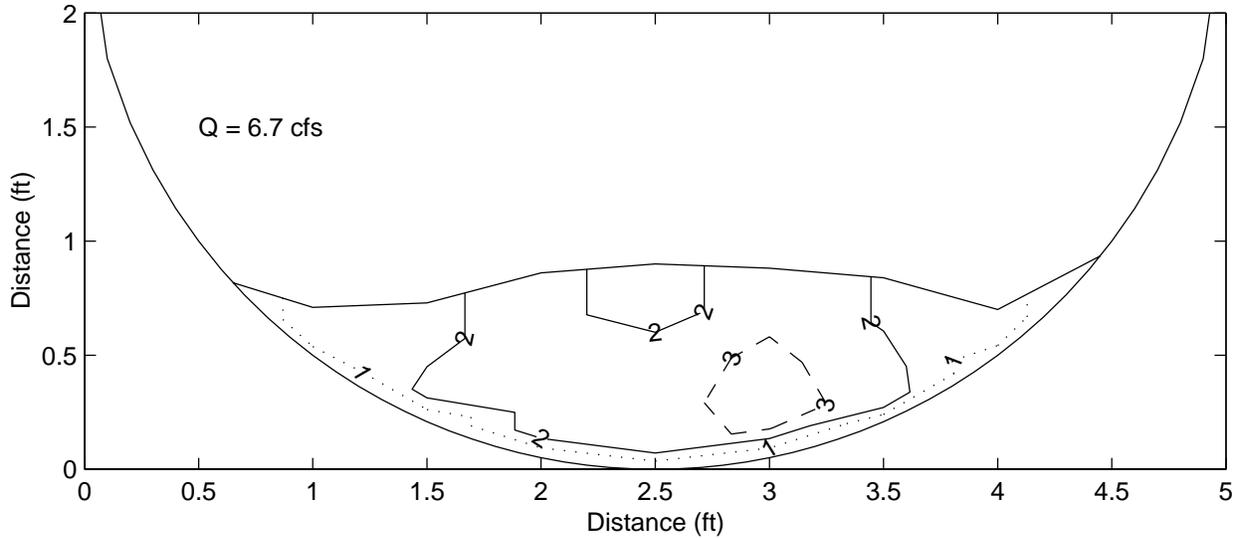
Morrison Gulch downstream cross section, located at outlet pool tailwater control.



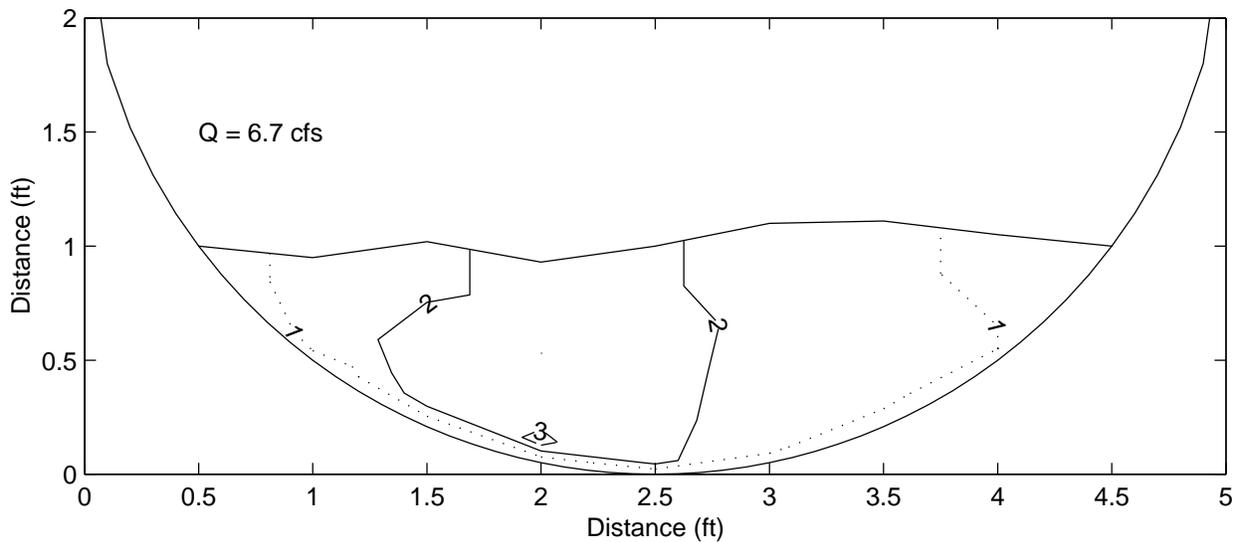
Morrison Gulch velocity cross section at the inlet. Average water velocity within the cross-section was 3.3 ft/s.



Morrison Gulch velocity cross section in the culvert barrel. Average water velocity within the cross-section was 2.5 ft/s.



Morrison Gulch velocity cross section at the inlet. Average water velocity within the cross-section was 2.2 ft/s.



Morrison Gulch velocity cross section in the culvert barrel. Average water velocity within the cross-section was 1.8 ft/s.

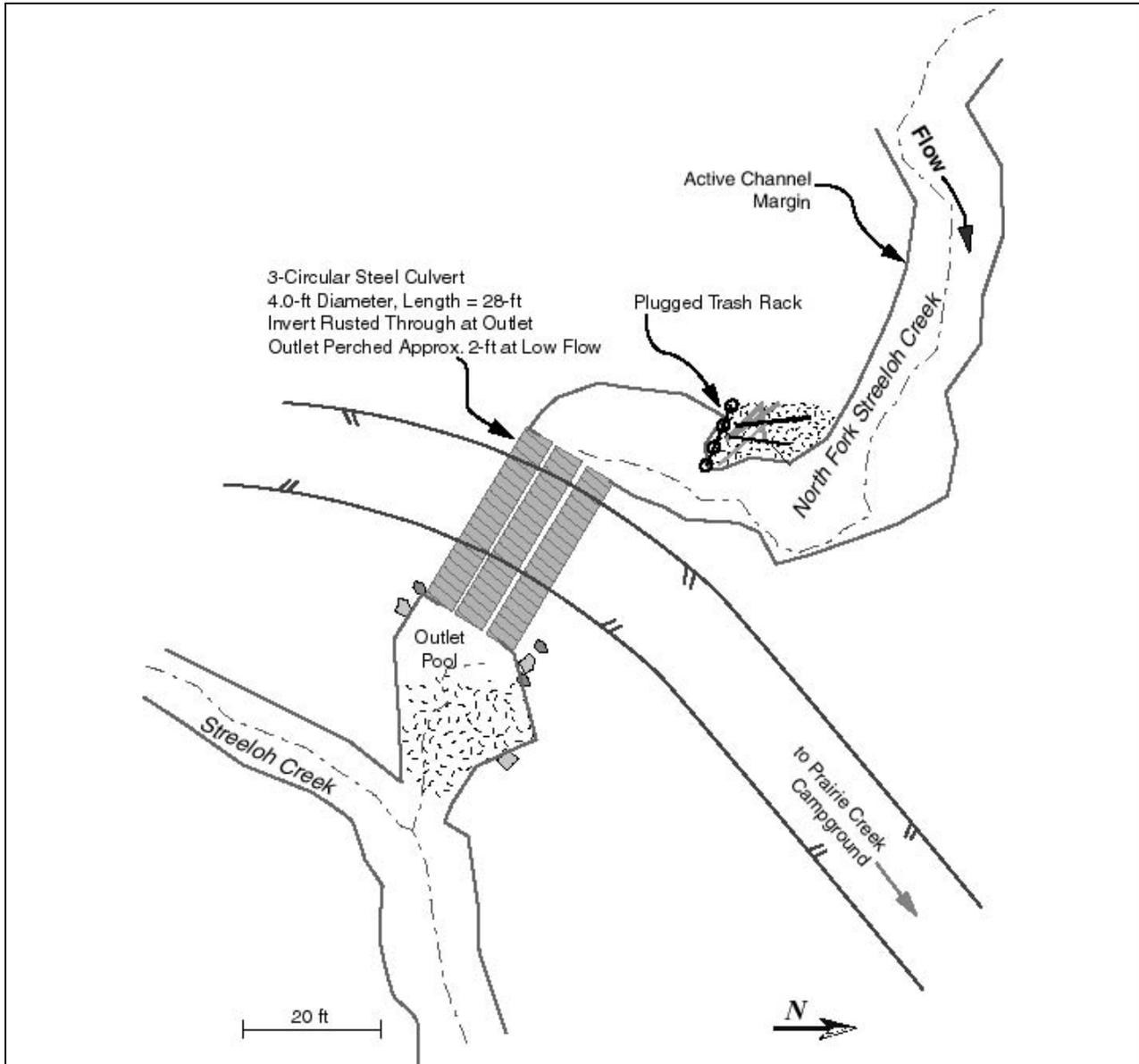
Summary of Occupied Velocity Analysis

Velocities in the table represent the lowest average velocity calculated within the culvert cross-section in the square areas used to represent the swimming area presented by different fish size classes.

Cross Section	Juvenile Fish (0.3 x 0.3 sq ft)	Resident trout (0.6 x 0.6 sq ft)	Adult Salmonids (0.8 x 0.8 sq ft)	Cross Section Ave Velocity
Inlet, Q = 17 cfs	1.2 ft/s	1.8 ft/s	2.5 ft/s	2.8 ft/s
Inlet, Q = 12 cfs	2.1 ft/s	2.9 ft/s	3.2 ft/s	3.3 ft/s
Inlet, Q = 6.7 cfs	1.2 ft/s	2.3 ft/s	N/A	2.2 ft/s
Mid-barrel, Q = 12 cfs	1.0 ft/s	1.8 ft/s	2.1 ft/s	2.5 ft/s
Mid-barrel, Q = 6.7 cfs	0.9 ft/s	1.2 ft/s	N/A	1.8 ft/s

NF Streeloh Creek Culvert

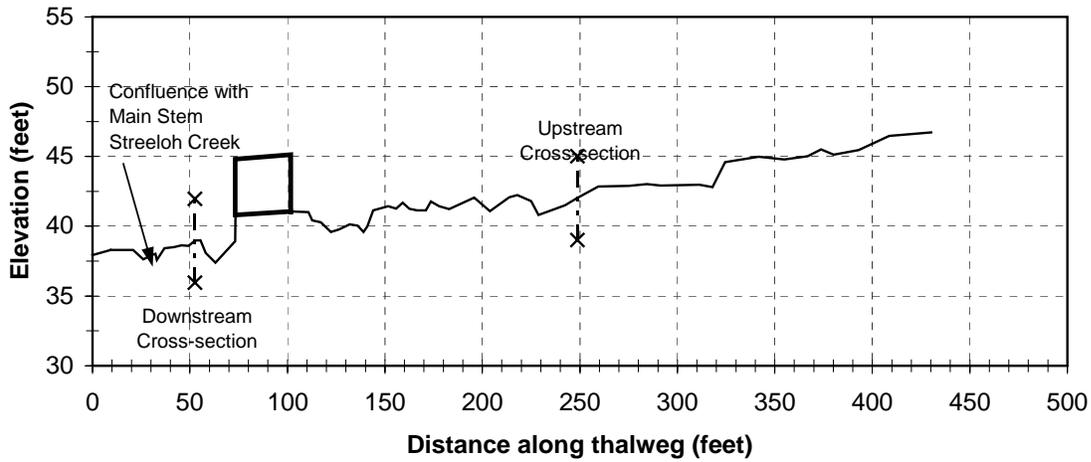
Location/Ownership	Streeloh Creek Rd/ Prairie Creek State Park
Drainage Area	1.18 sq mi (3.06 km ²)
Culvert Description	3 circular, corrugated steel culvert with 2 2/3" x 1/2" corrugations Diameter = 4 ft Length = 28 ft Slope = 0.7% Non-embedded, No baffles or weirs
Inlet	Projecting
Outlet	Perched outlet. Bed and bank scour has formed an outlet pool
Channel Constriction (Culvert Width/Bankfull Width)	
Inlet Alignment with Channel (angle from culvert centerline)	45 degrees



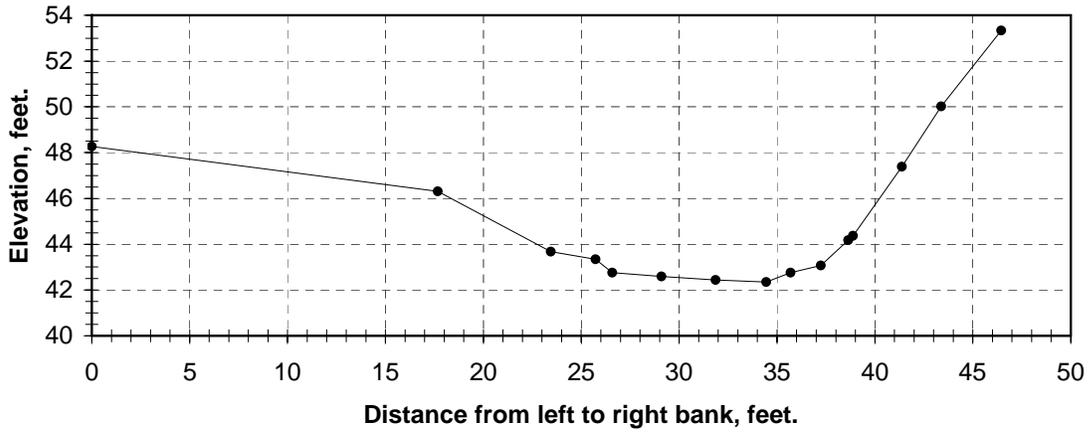
NF Streeloh Creek plan map.



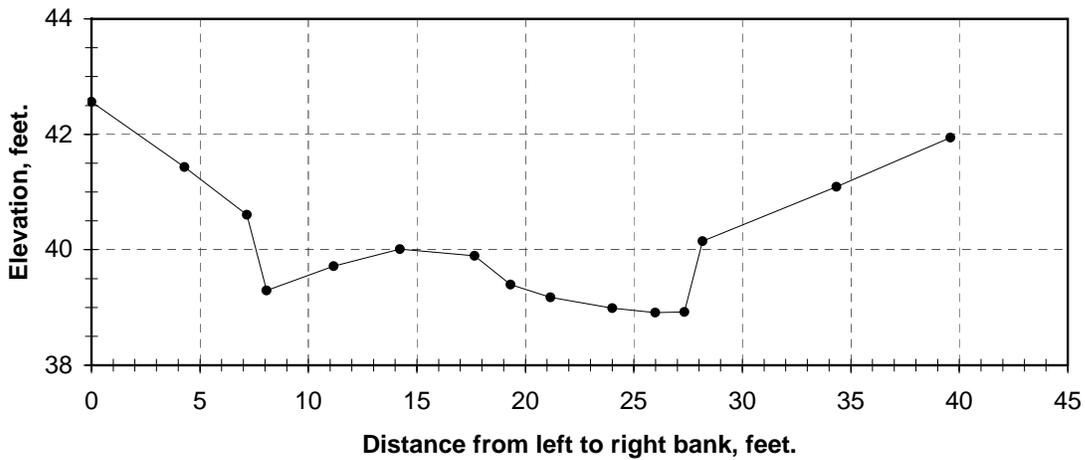
North Fork Strelah Creek culvert outlets.



NF Streeloh Creek longitudinal profile.



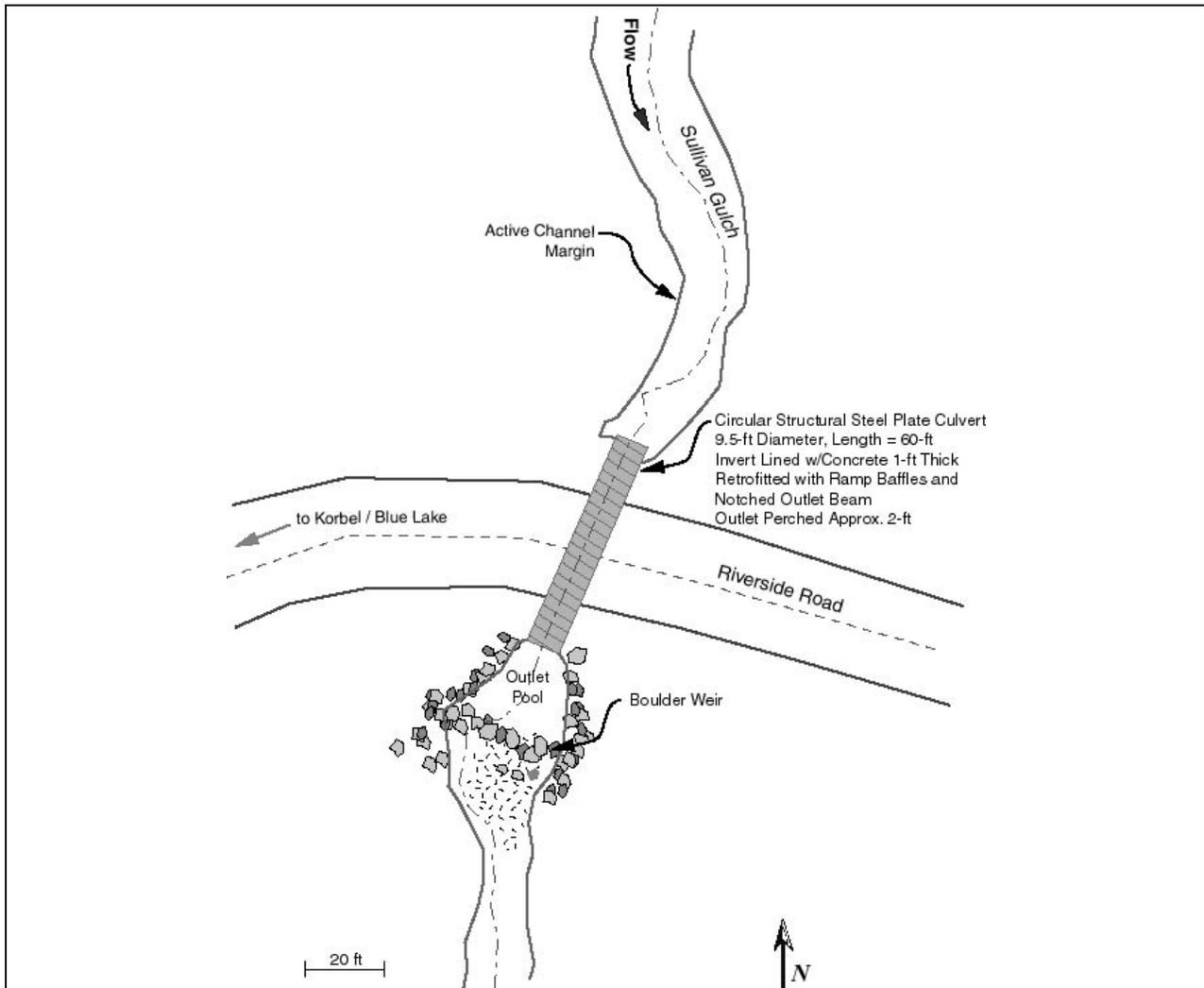
NF Streeloh Creek upstream cross section.



NF Streeloh Creek downstream cross section, located at outlet pool tailwater control.

Sullivan Gulch Culvert

Location/Ownership	Riverside Rd, Korbel/ Humboldt County
Drainage Area	2.35 sq mi (6.09 km ²)
Culvert Description	Circular, corrugated steel culvert with 6"x 2" corrugations Diameter = 9.5 ft Length = 60 ft Slope = 1.6% Embedded with concrete approximately 1 ft deep Alternating steel ramp baffles inside with a v-notch wooden weir at the outlet
Inlet	Projecting, Mitered
Outlet	Perched outlet. Bed and bank scour has formed an outlet pool
Channel Constriction (Culvert Width/Bankfull Width)	0.5
Inlet Alignment with Channel (angle from culvert centerline)	0 degrees



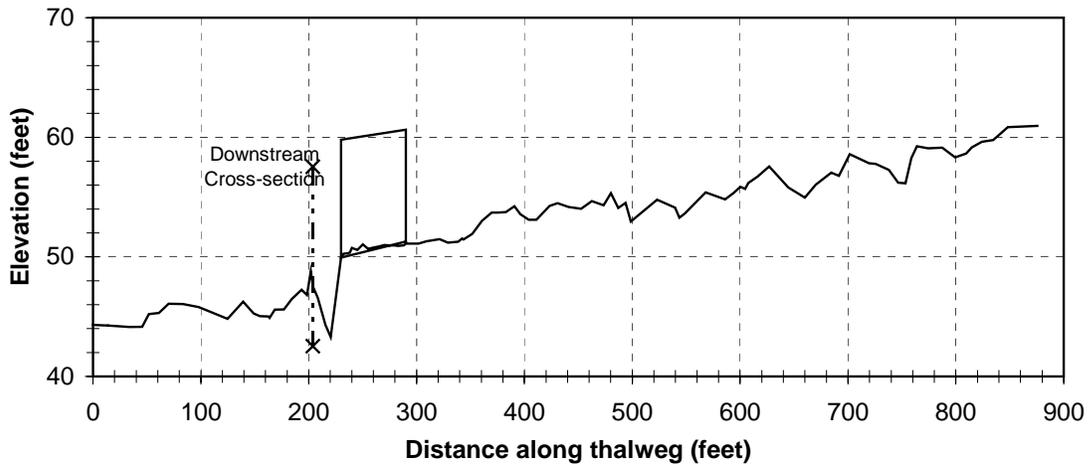
Sullivan Gulch plan map.



Sullivan Gulch outlet at low flow.

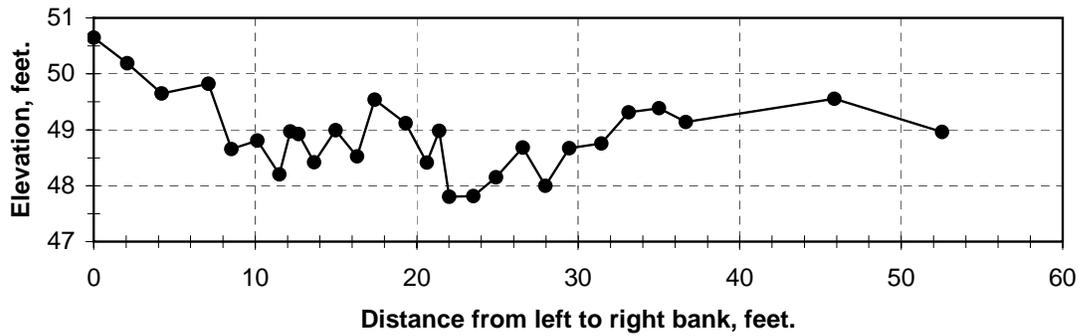


Sullivan Gulch outlet at high flow.

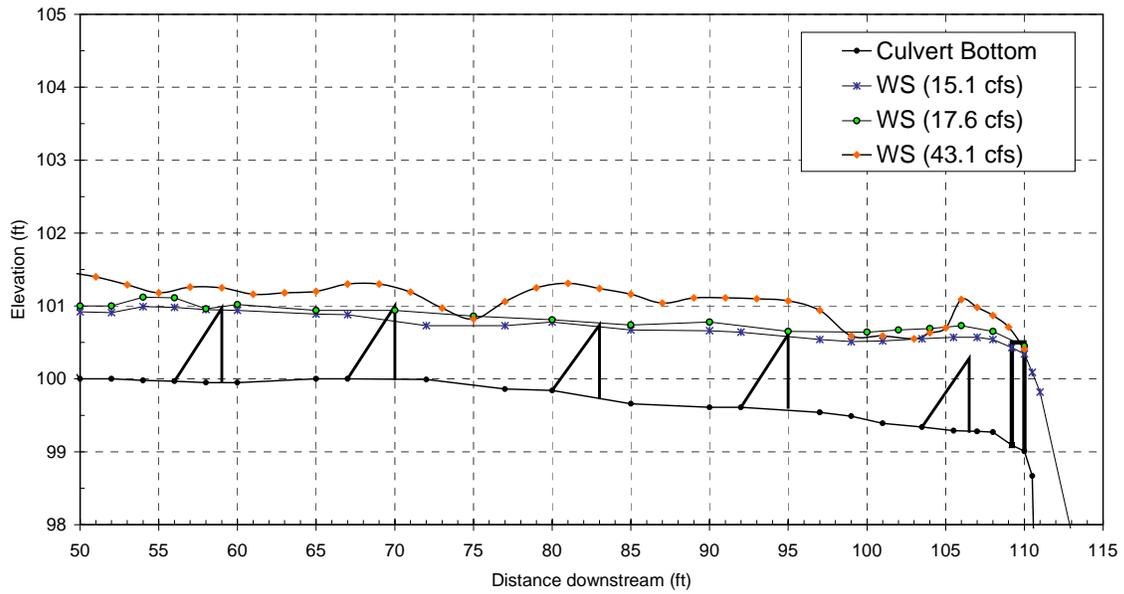


Sullivan Gulch longitudinal profile.

No upstream cross section was surveyed at Sullivan Gulch.



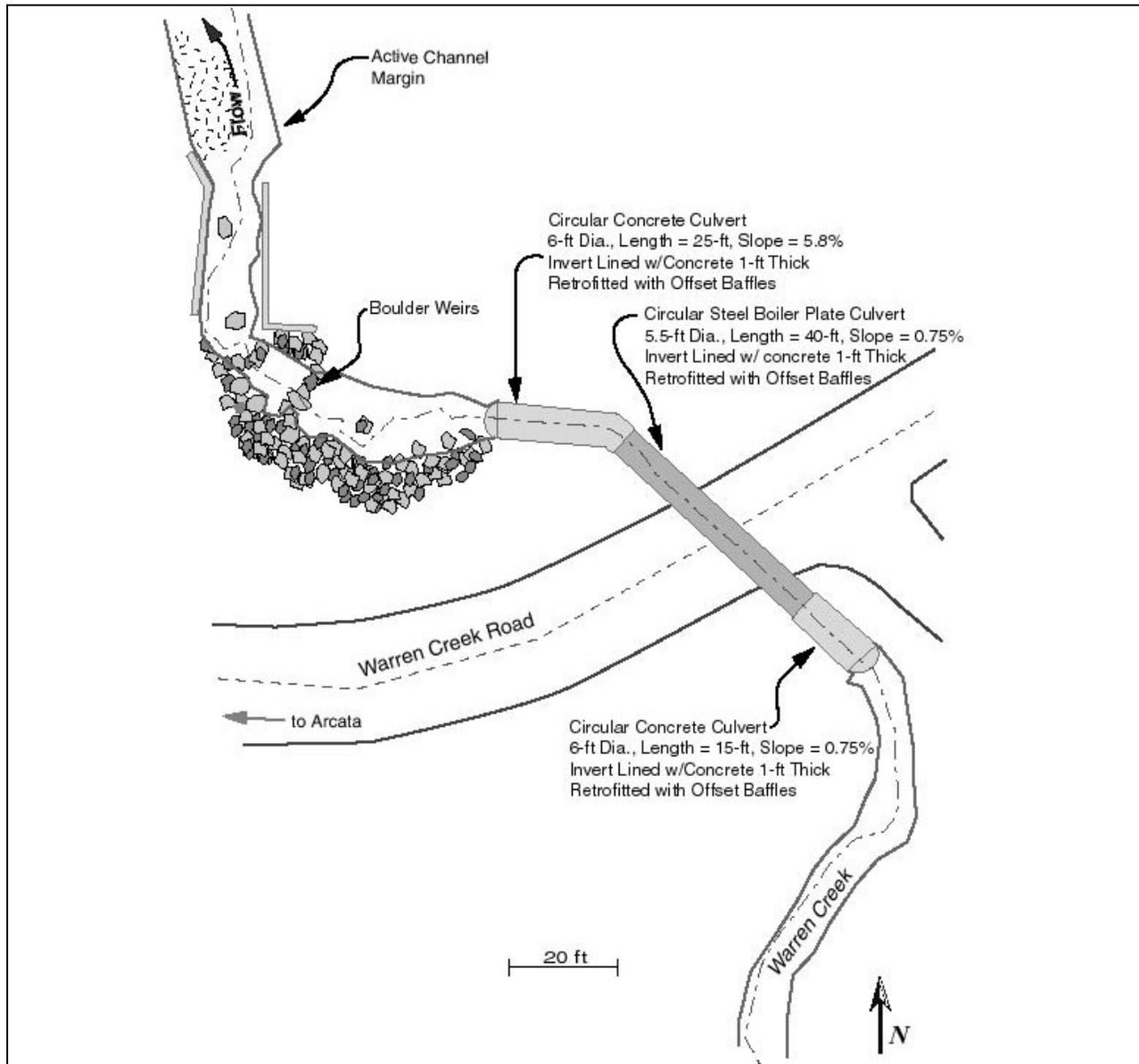
Sullivan Gulch downstream cross section, located at the outlet pool rock weir, tailwater control.



Sullivan Gulch water surface profiles. Manning's roughness calculated using water surface slope within the barrel: Q = 43 cfs, n = 0.042; Q = 17 cfs, n = 0.063; Q = 15 cfs, n = 0.072.

Warren Creek Culvert

Location/Ownership	Warren Creek Rd/ Humboldt County
Drainage Area	1.60 sq mi (4.14 km ²)
Culvert Description	Circular, concrete with two distinct sections Diameter = 6 ft Length: Section 1 = 60 ft, Section 2 = 26 ft Slope: Section 1 = 0.7%, Section 2 = 5.8% Non-embedded Baffled with Offset (Washington) baffles
Inlet	Projecting, mitered
Outlet	Step pools formed by a series of rock weirs
Channel Constriction (Culvert Width/Bankfull Width)	0.5
Inlet Alignment with Channel (angle from culvert centerline)	15 degrees



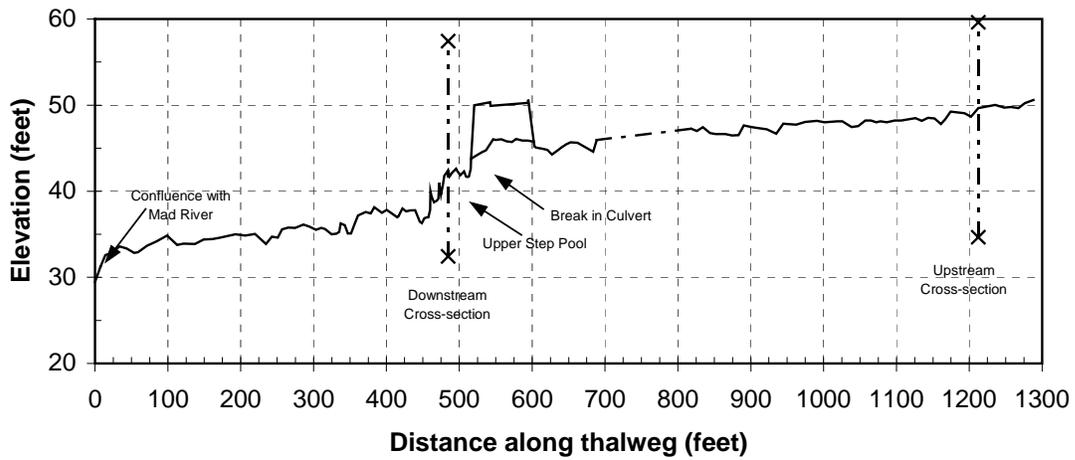
Warren Creek plan map.



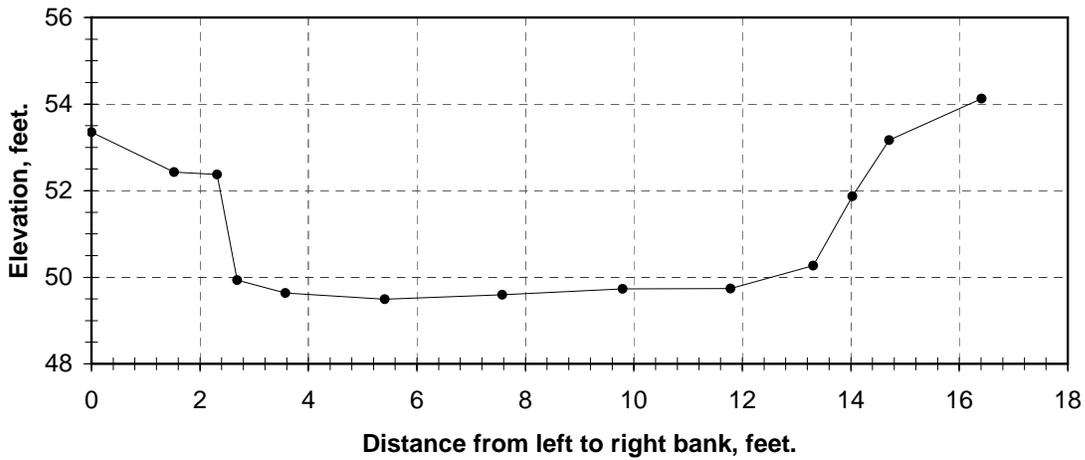
Warren Creek inlet.



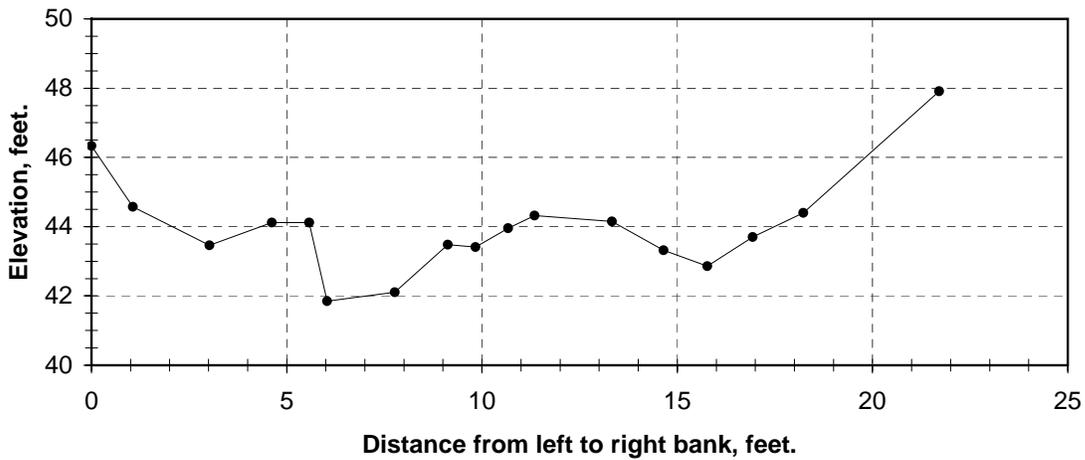
Warren Creek outlet.



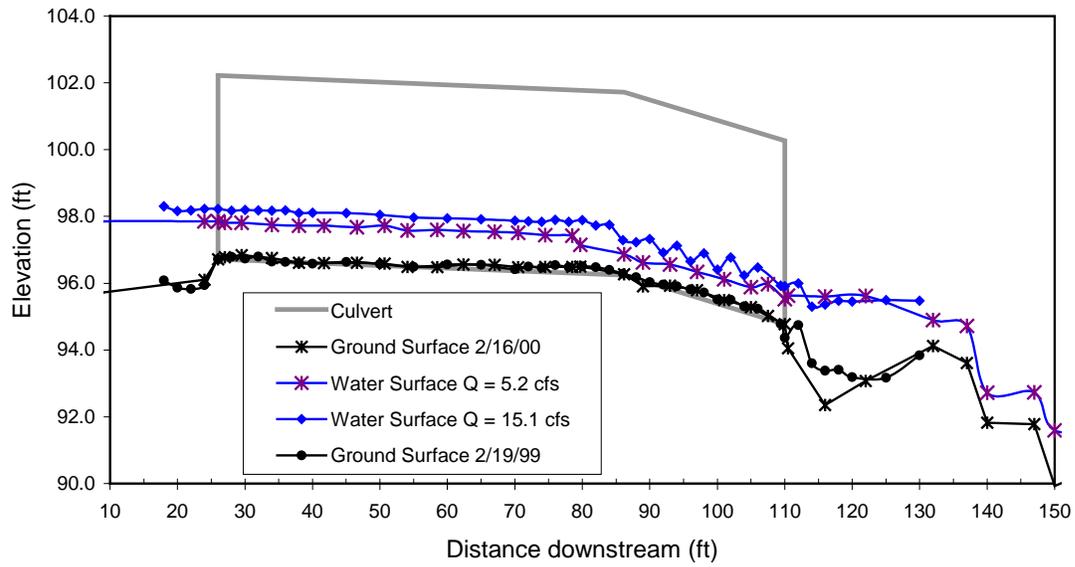
Warren Creek longitudinal profile.



Warren Creek upstream cross section.



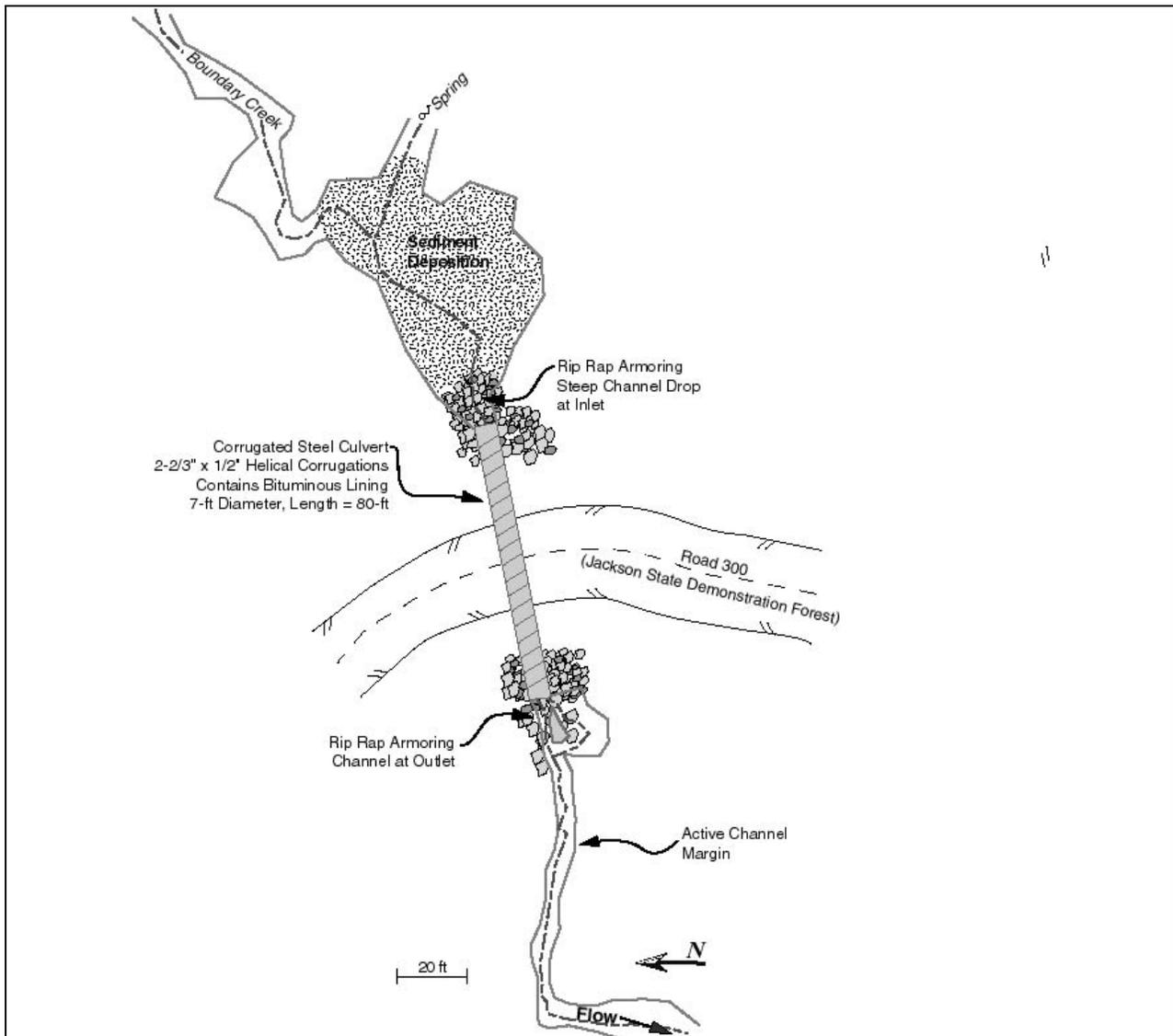
Warren Creek downstream cross section, located at outlet pool tailwater control.



Warren Creek water surface profiles. Manning's roughness calculated using water surface slope within the barrel: In Section 1 (upstream 60 ft) Q = 5.2 cfs, n = 0.063; Q = 15 cfs, n = 0.040; In Section 2 (downstream 26 ft) Q = 5.2 cfs, n = 0.053; Q = 15 cfs, n = 0.063.

Boundary Creek Culvert

Location/Ownership	Rd 300 / Jackson State Forest
Drainage Area	0.36 sq mi (0.93 km ²)
Culvert Description	Circular, corrugated steel culvert with 2 2/3" x 1/2" corrugations Diameter = 7 ft Length = 80 ft Slope = 3.3% Not embedded No baffles or weirs
Inlet	Projecting
Outlet	At stream grade
Channel Constriction (Culvert Width/Bankfull Width)	0.7
Inlet Alignment with Channel (angle from culvert centerline)	0 degrees



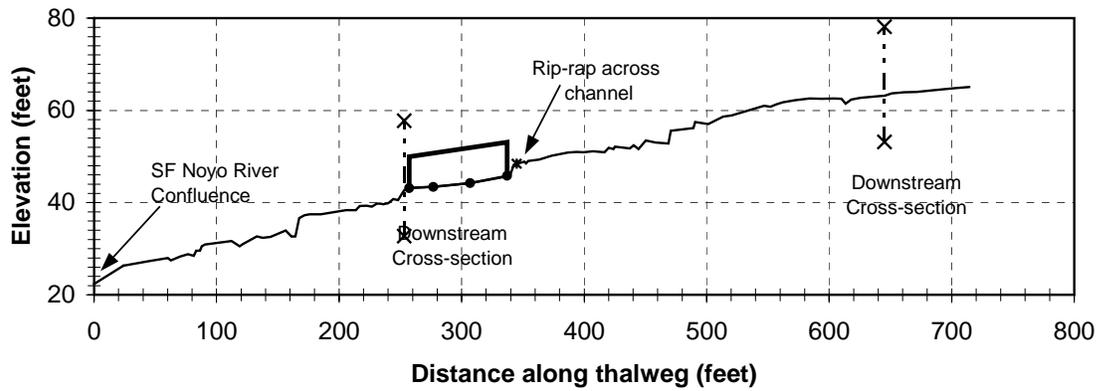
Boundary Creek plan map.



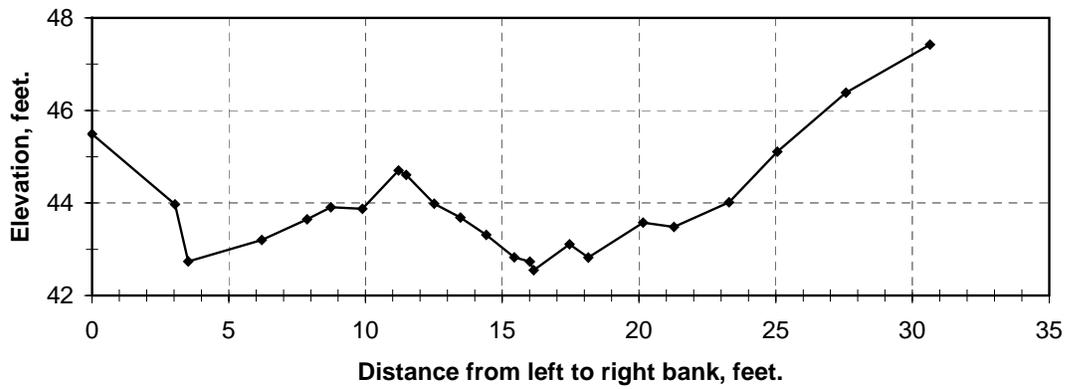
Boundary Creek inlet and upstream channel (left) and inlet (right).



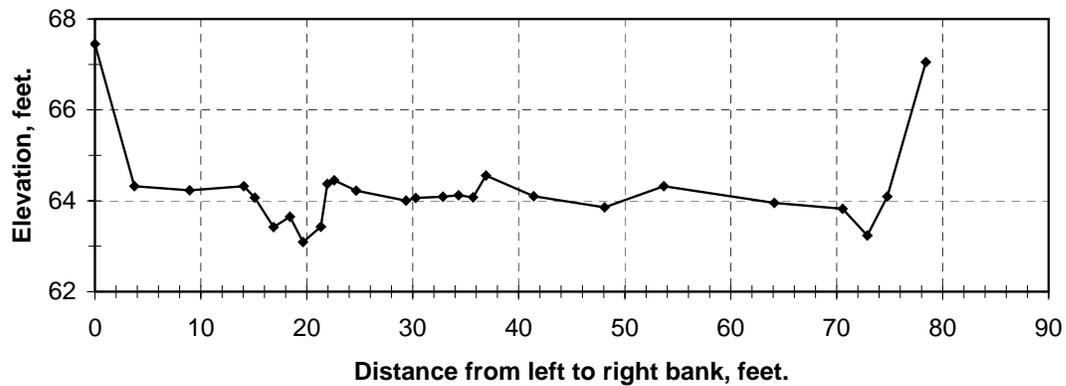
Boundary Creek outlet.



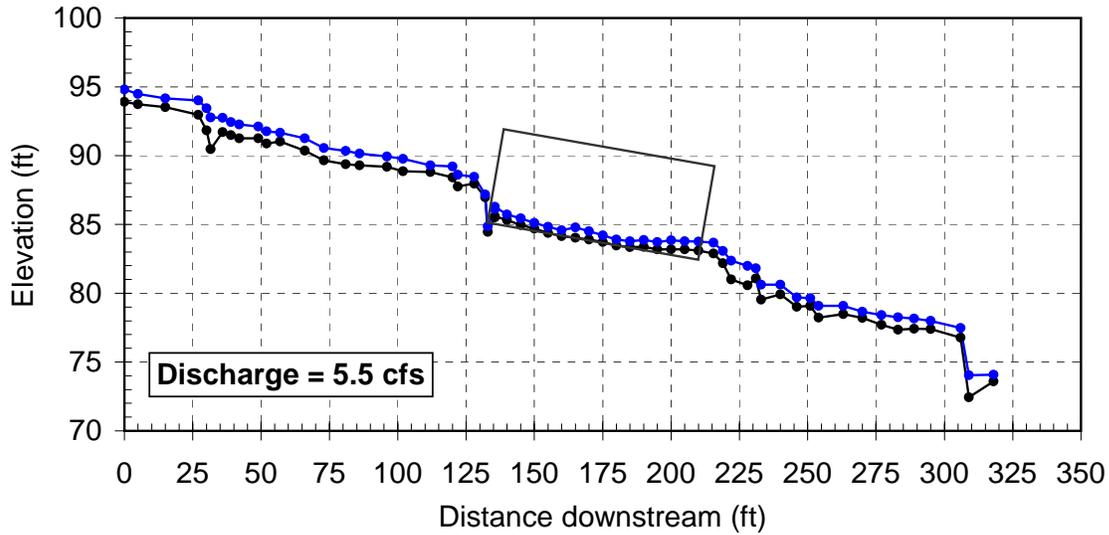
Boundary Creek longitudinal profile.



Boundary Creek upstream cross section.



Boundary Creek downstream cross section, located at the tailwater control.



Boundary Creek water surface profiles. Manning's roughness calculated using the water surface slope within the barrel: $Q = 5.5$ cfs, $n = 0.028$.

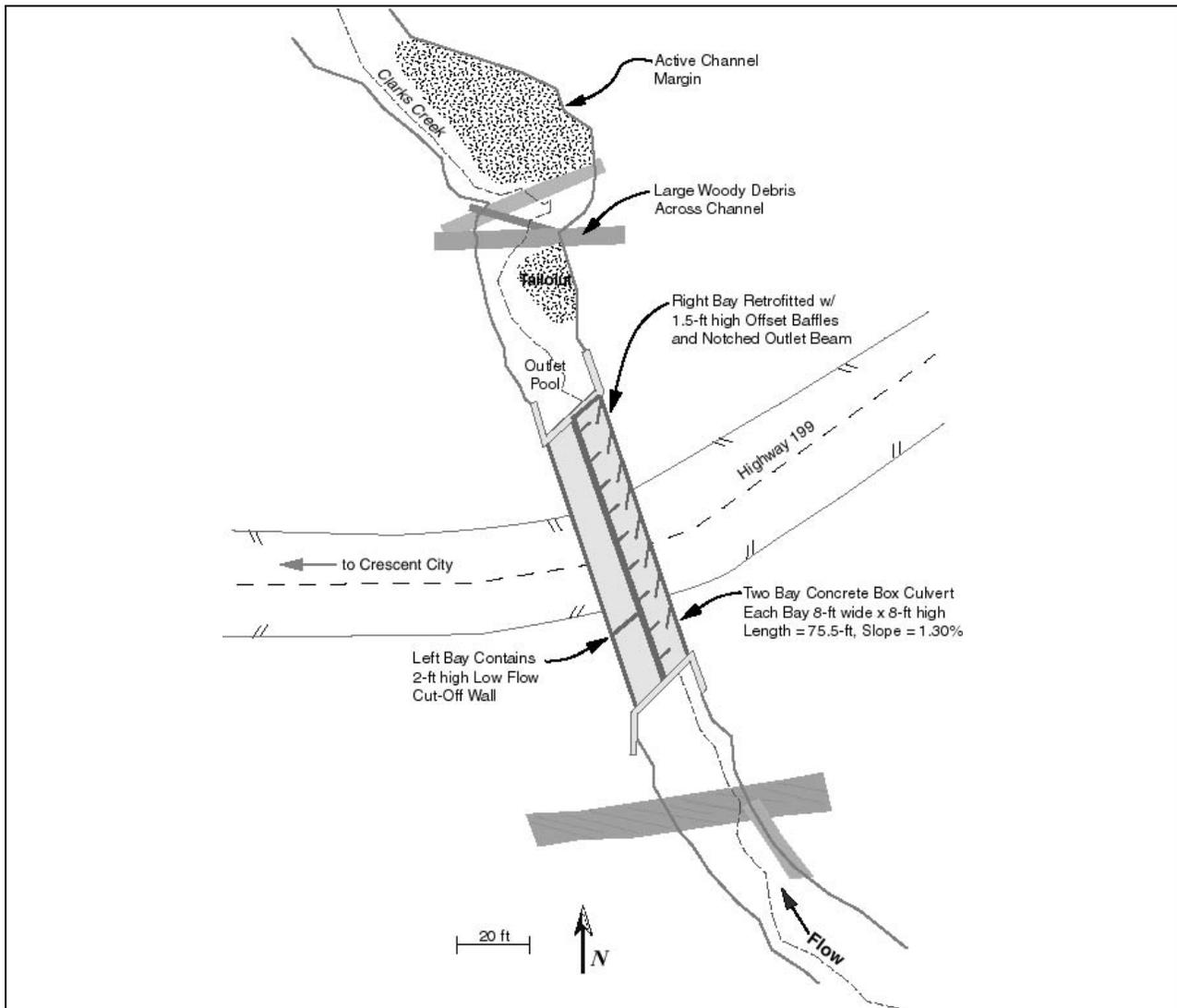
Summary of Occupied Velocity Analysis

Velocities in the table represent the lowest average velocity calculated within the culvert cross-section in the square areas used to represent the swimming area presented by different fish size classes.

Cross Section	Juvenile Fish (0.3 x 0.3 sq ft)	Resident trout (0.6 x 0.6 sq ft)	Adult Salmonids (0.8 x 0.8 sq ft)	Cross Section Ave Velocity
Mid-barrel, $Q = 5.5$ cfs	4.1 ft/s	N/A	N/A	6.1 ft/s

Clarks Creek Culvert

Location/Ownership	Hwy 199, Post mile 2.56 / Caltrans
Drainage Area	0.1.08 sq mi (2.80 km ²)
Culvert Description	Box, concrete Height x Width = 8 ft x 8 ft Length = 76 ft Slope = 1.3% Not embedded Baffled
Inlet	Wing wall
Outlet	Perched outlet. Bed and bank scour at outlet has formed a pool
Channel Constriction (Culvert Width/Bankfull Width)	0.75
Inlet Alignment with Channel (angle from culvert centerline)	0 degrees



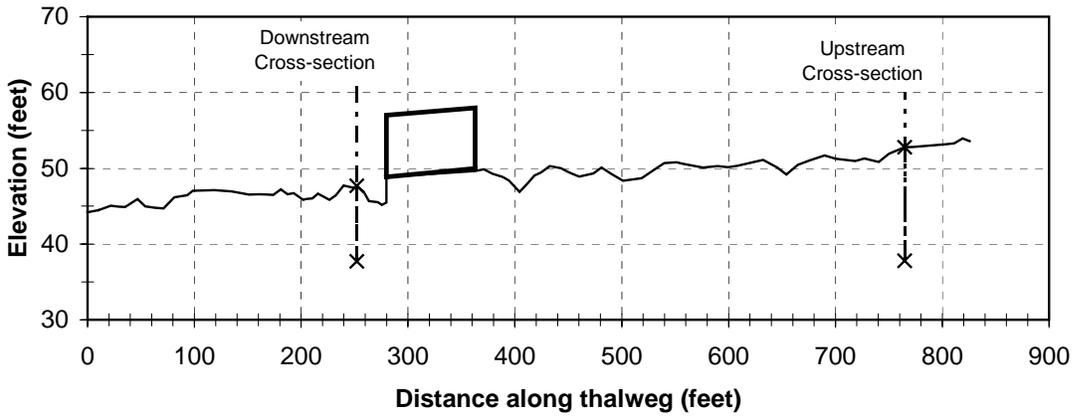
Clarks Creek plan map.



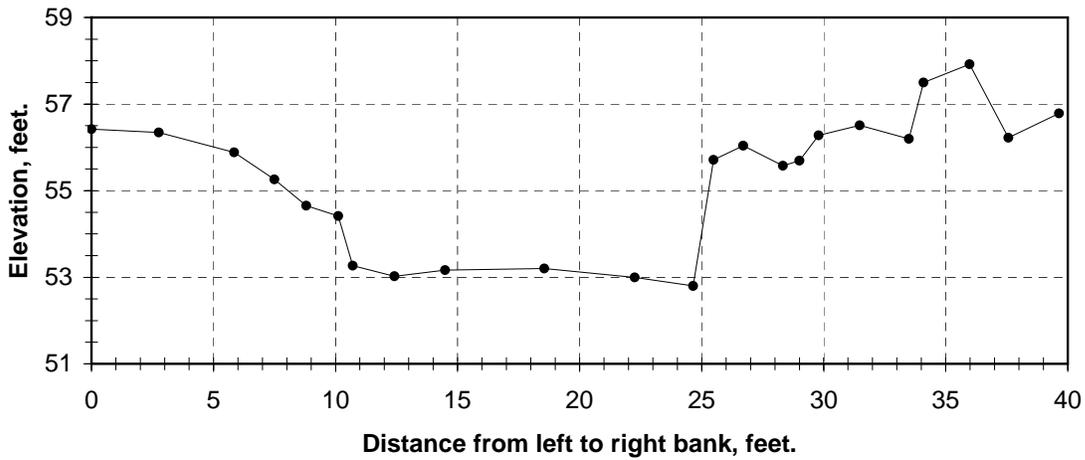
Clarks Creek Inlet



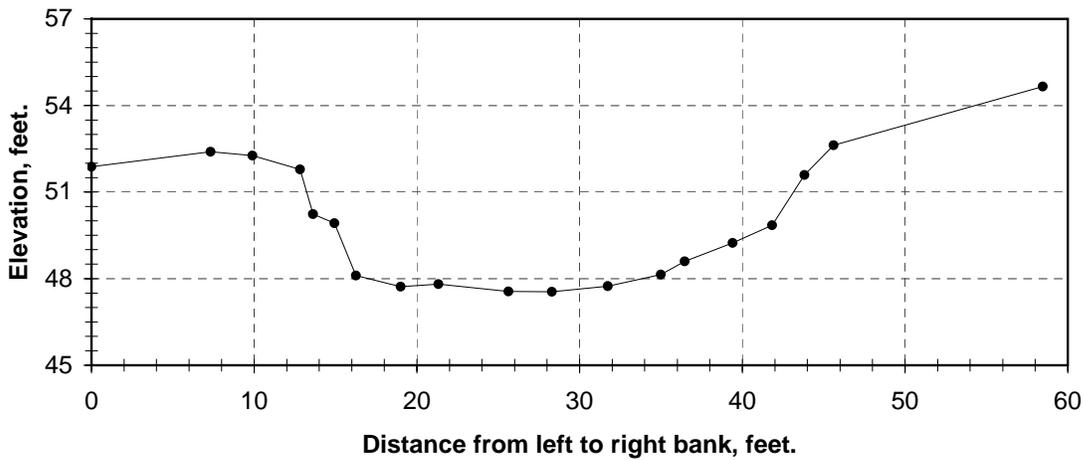
Clarks Creek Outlet



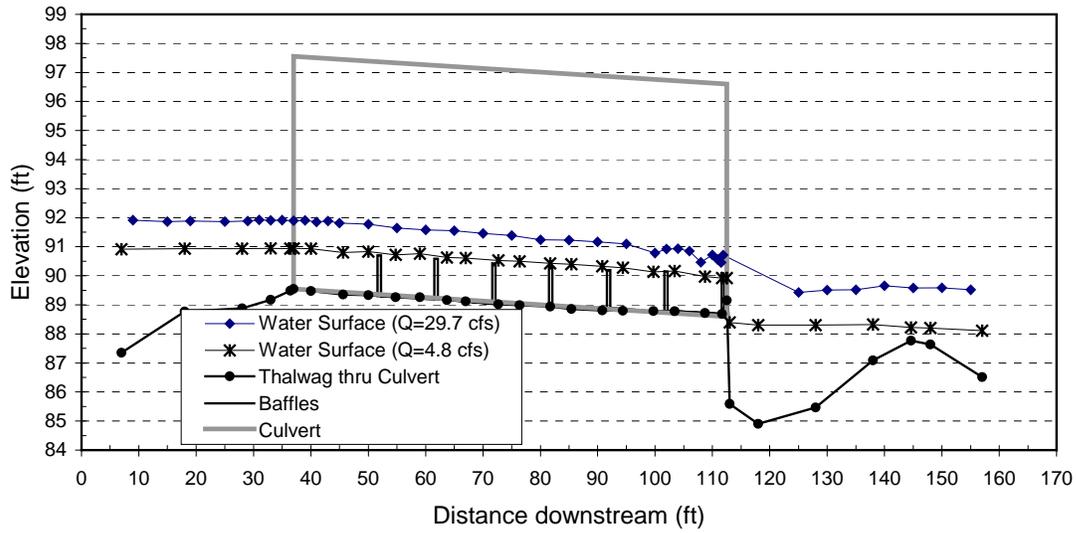
Clarks Creek longitudinal profile.



Clarks Creek upstream cross section.



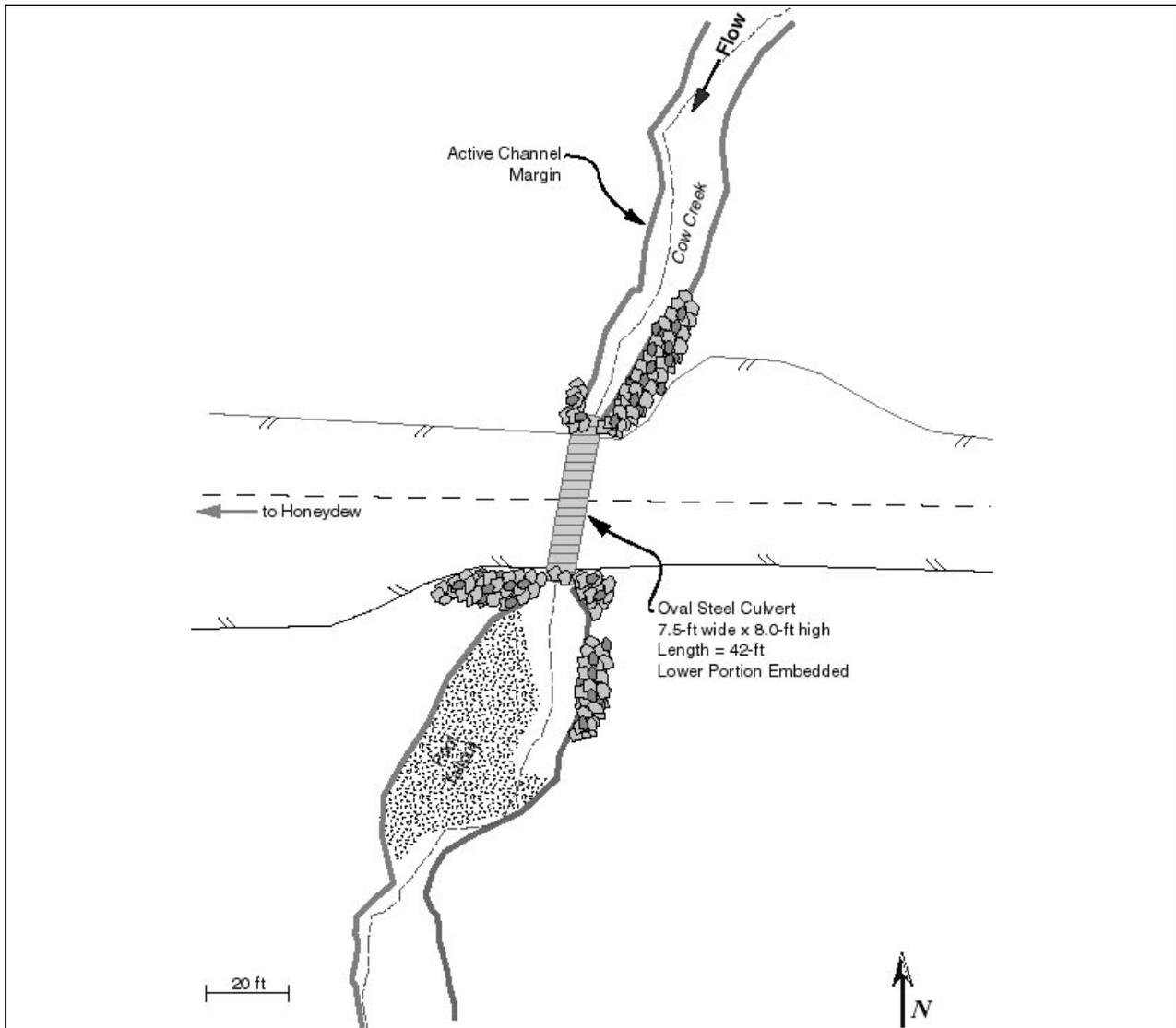
Clarks Creek downstream cross section, located at the tailwater control.



Clarks Creek water surface profiles. Manning's roughness calculated using the water surface slope within the barrel: $Q = 29.7$ cfs, $n = 0.151$; $Q = 4.8$ cfs, $n = 0.431$.

Cow Creek Culvert

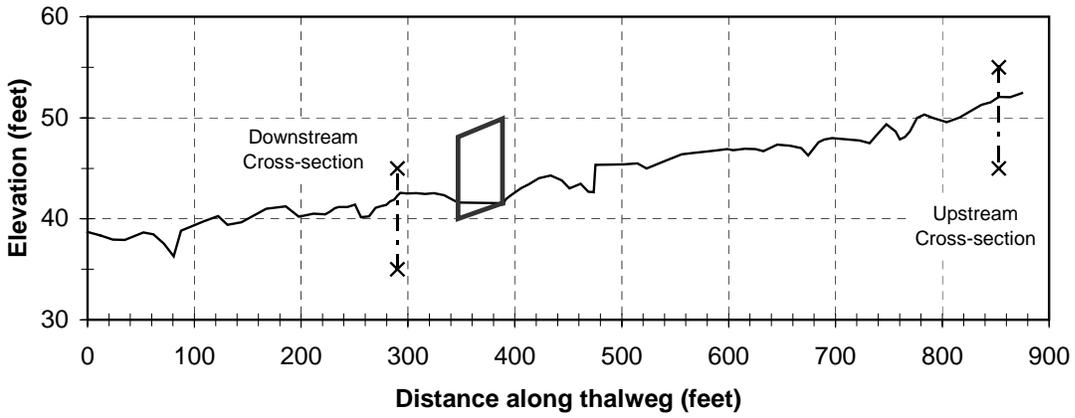
Location/Ownership	Honeydew Rd / Humboldt County
Drainage Area	2.38 sq mi (6.16 km ²)
Culvert Description	Elliptical, corrugated steel culvert with 2 2/3"x 1/2" corrugations Height x Width = 8 ft x 7.5 ft Length = 42 ft Slope = 4.4% Embedded No baffles or weirs
Inlet	Projecting
Outlet	At stream grade and backwatered
Channel Constriction (Culvert Width/Bankfull Width)	0.35
Inlet Alignment with Channel (angle from culvert centerline)	10 degrees



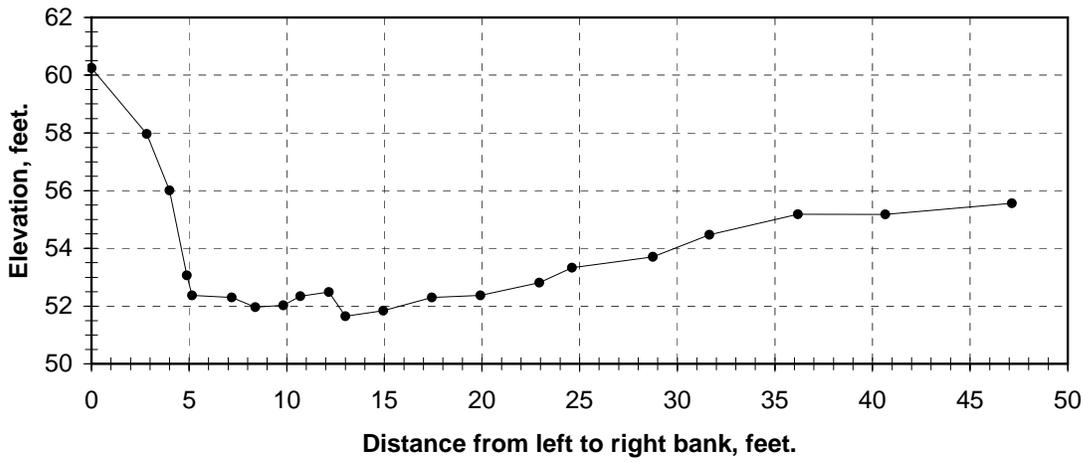
Cow Creek plan map.



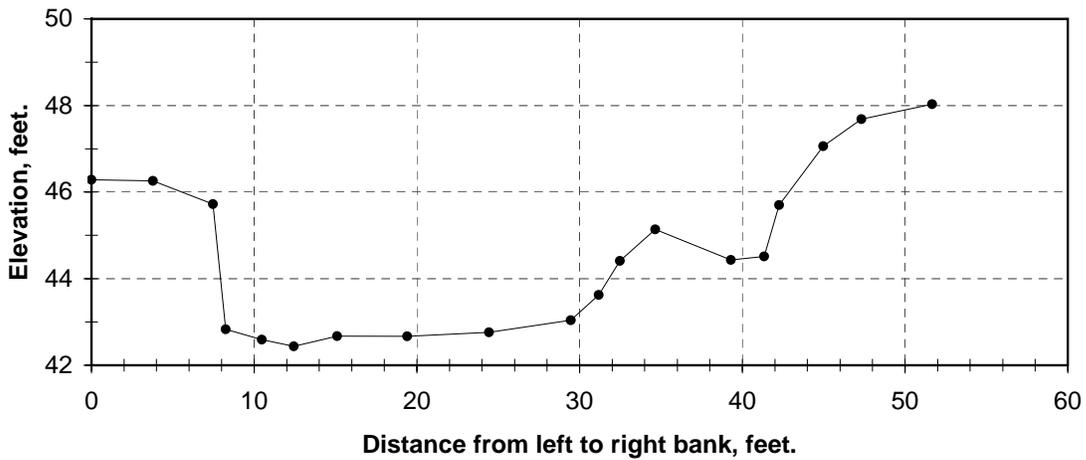
Cow Creek outlet



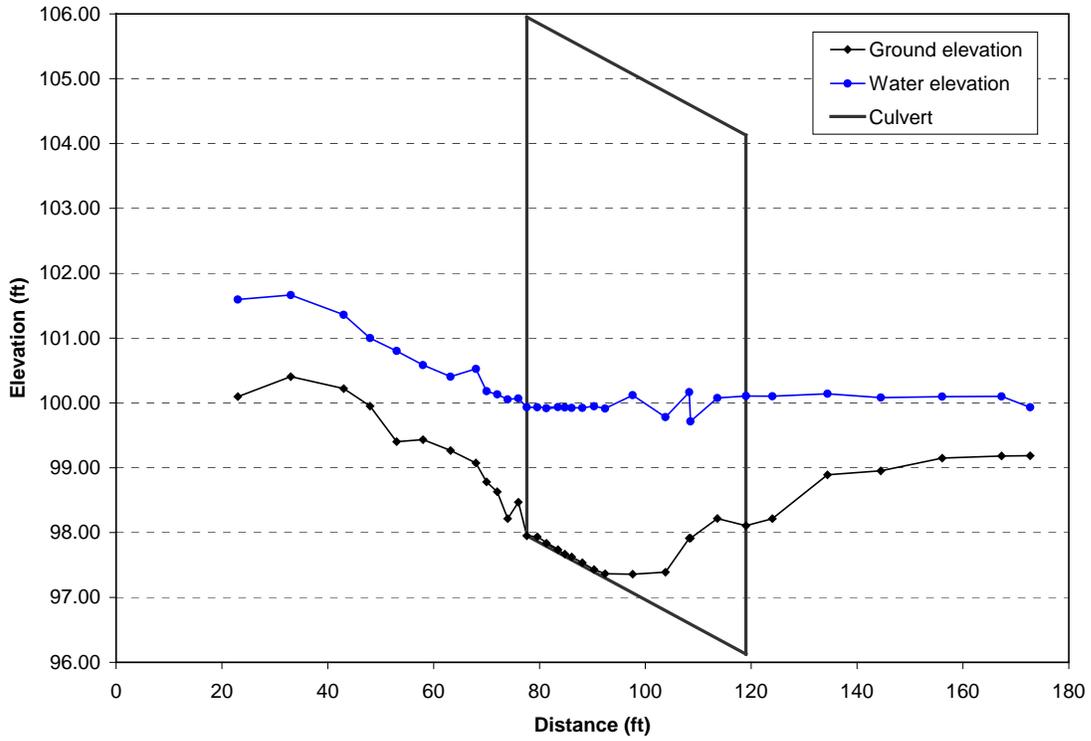
Cow Creek longitudinal profile.



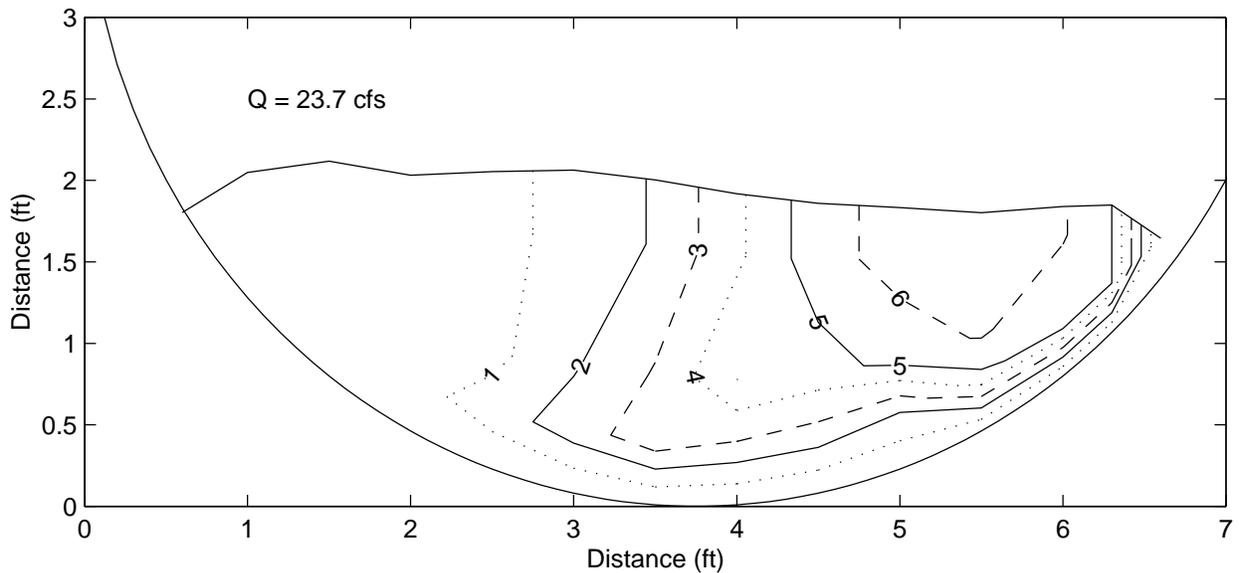
Cow Creek upstream cross section.



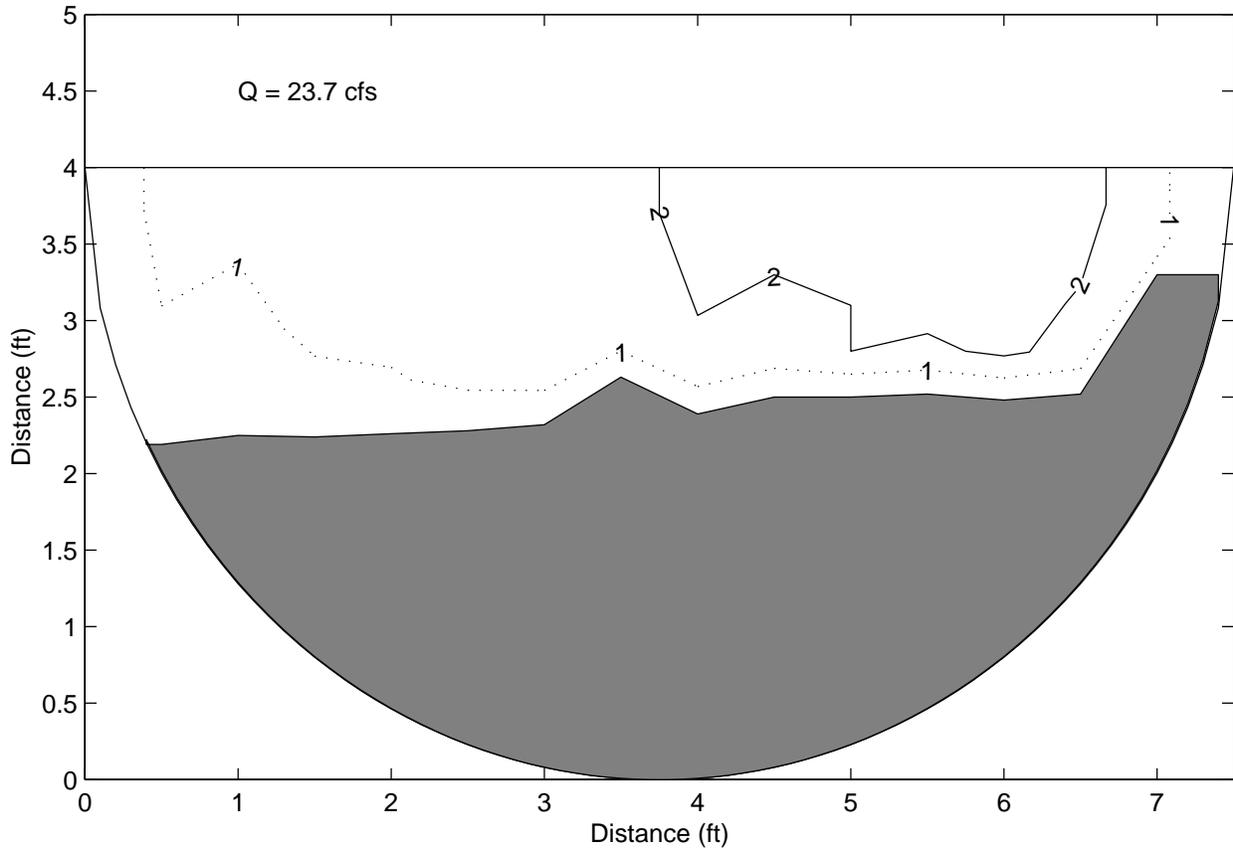
Cow Creek downstream cross section, located at the tailwater control.



Cow Creek water surface profiles. Roughness coefficients were not calculated because the substrate distribution is very uneven.



Cow Creek velocity cross section at the inlet. Average water velocity within the cross-section was 2.8 ft/s.



Cow Creek velocity cross section at the outlet. Average water velocity within the cross-section was 1.5 ft/s.

Summary of Occupied Velocity Analysis

Velocities in the table represent the lowest average velocity calculated within the culvert cross-section in the square areas used to represent the swimming area presented by different fish size classes.

Cross Section	Juvenile Fish (0.3 x 0.3 sq ft)	Resident trout (0.6 x 0.6 sq ft)	Adult Salmonids (0.8 x 0.8 sq ft)	Cross Section Ave Velocity
Inlet, Q = 24 cfs	0.3 ft/s	0.4 ft/s	0.5 ft/s	2.8 ft/s
Outlet, Q = 24 cfs	0.4 ft/s	0.6 ft/s	0.7 ft/s	1.5 ft/s

Durphy Creek Culverts

Upstream Culvert

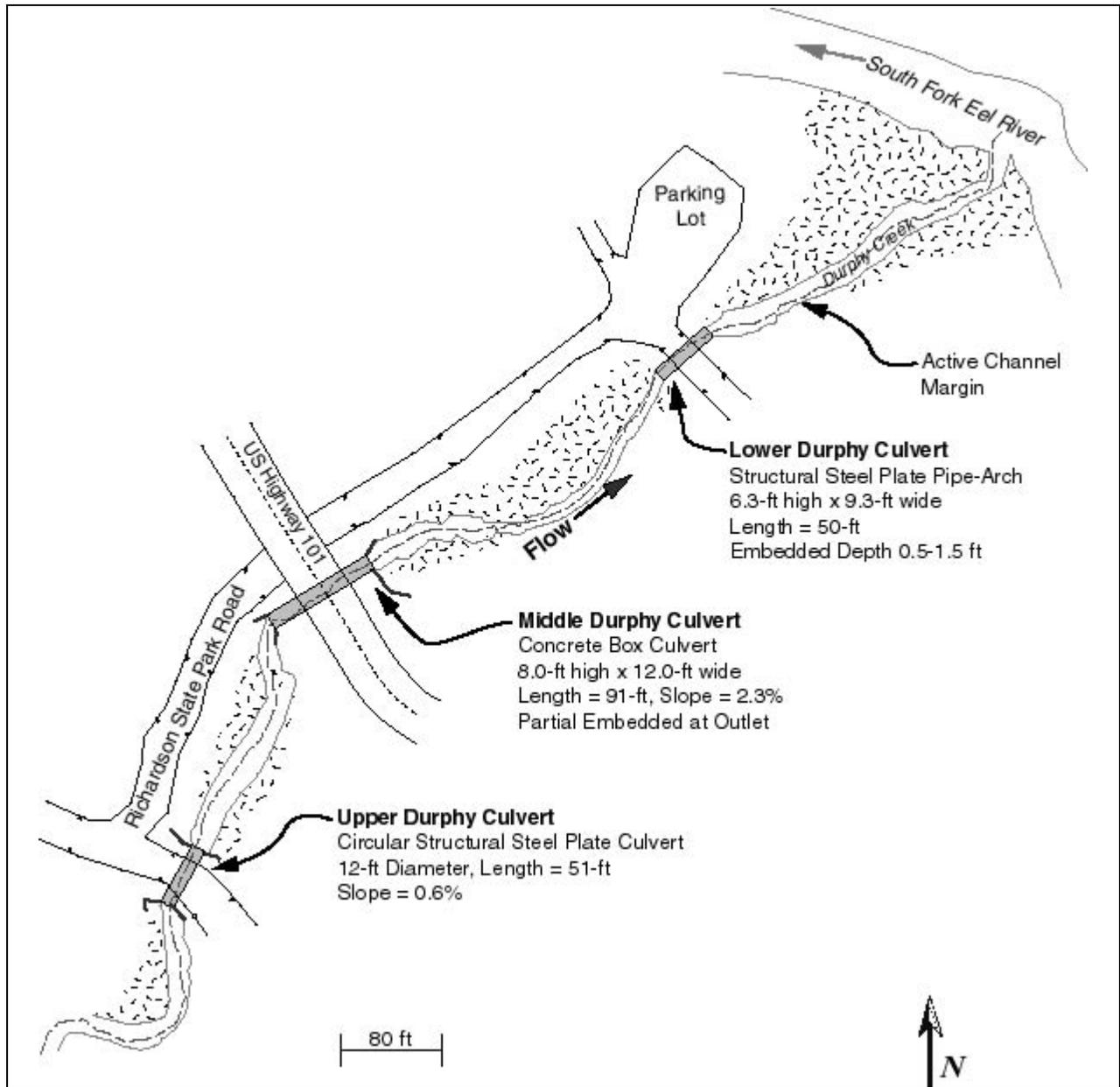
Location/Ownership	Upper Rd / Richardson Grove State Park
Drainage Area	2.42 sq mi (6.27 km ²)
Culvert Description	Circular, corrugated steel culvert with 6"x 2" corrugations Diameter = 10 ft Length = 50 ft Slope = 0.7% Not embedded No baffles or weirs
Inlet	Wing wall and head wall
Outlet	At stream grade
Channel Constriction (Culvert Width/Bankfull Width)	0.25
Inlet Alignment with Channel (angle from culvert centerline)	40 degrees

Middle Culvert

Location/Ownership	Hwy 101, post mile / Caltrans
Drainage Area	2.48 sq mi (6.42 km ²)
Culvert Description	Box, concrete Height x Width = 8 ft x 12 ft Length = 91 ft Slope = 1.4% Not embedded No baffles or weirs
Inlet	Wing wall
Outlet	At stream grade
Channel Constriction (Culvert Width/Bankfull Width)	0.25
Inlet Alignment with Channel (angle from culvert centerline)	20 degrees

Downstream culvert

Location/Ownership	Lower Rd / Richardson Grove SP
Drainage Area	2.49 sq mi (6.45 km ²)
Culvert Description	Pipe arch, corrugated steel culvert with 5"x 1" corrugations Height x Width = 6.25 ft x 9.3 ft Length = 50 ft Slope = 1.4% Embedded No baffles or weirs
Inlet	Mitered
Outlet	At stream grade
Channel Constriction (Culvert Width/Bankfull Width)	0.2
Inlet Alignment with Channel (angle from culvert centerline)	5 degrees



Durphy Creek plan map.



Lower Durphy culvert inlet



Lower Durphy culvert outlet



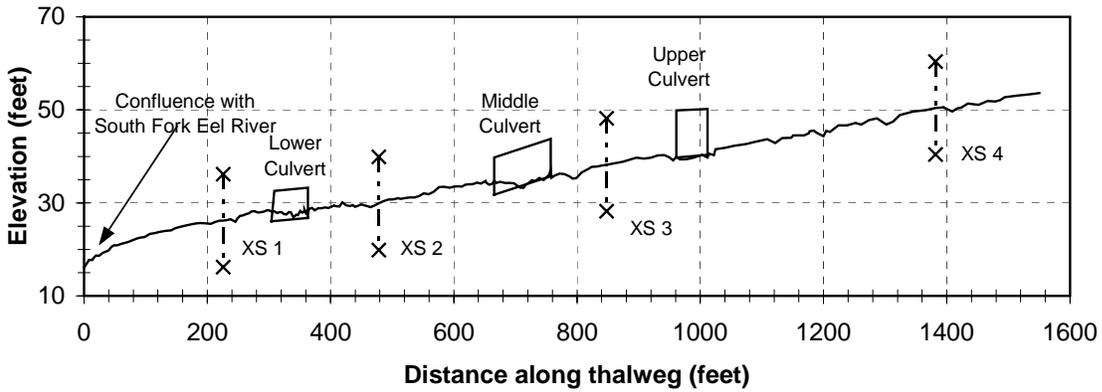
Middle Durphy culvert inlet



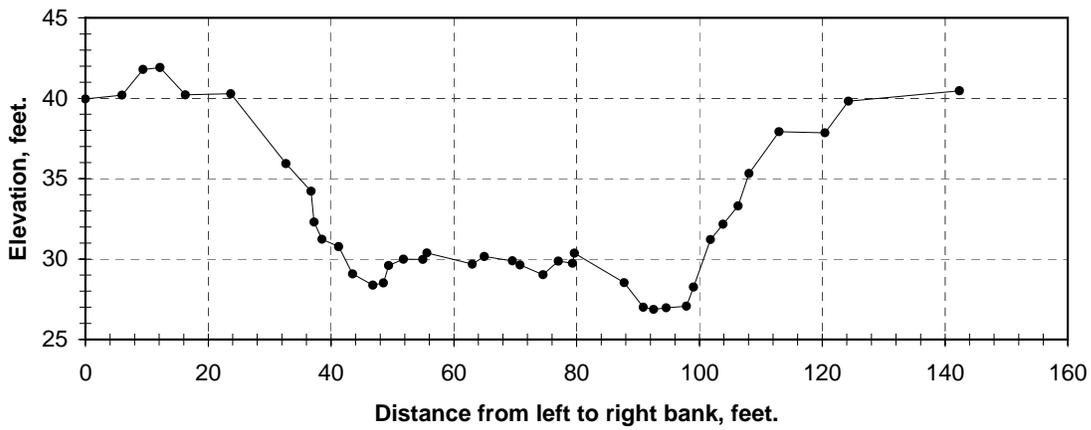
Middle Durphy culvert outlet



Upper Durphy culvert Creek inlet



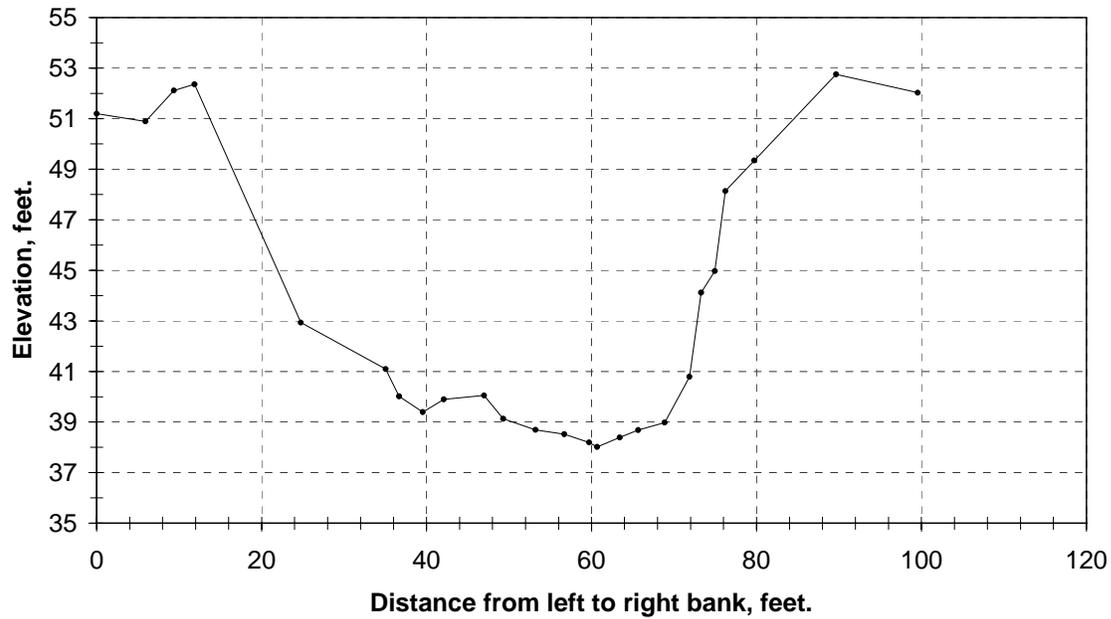
Durphy Creek longitudinal profile.



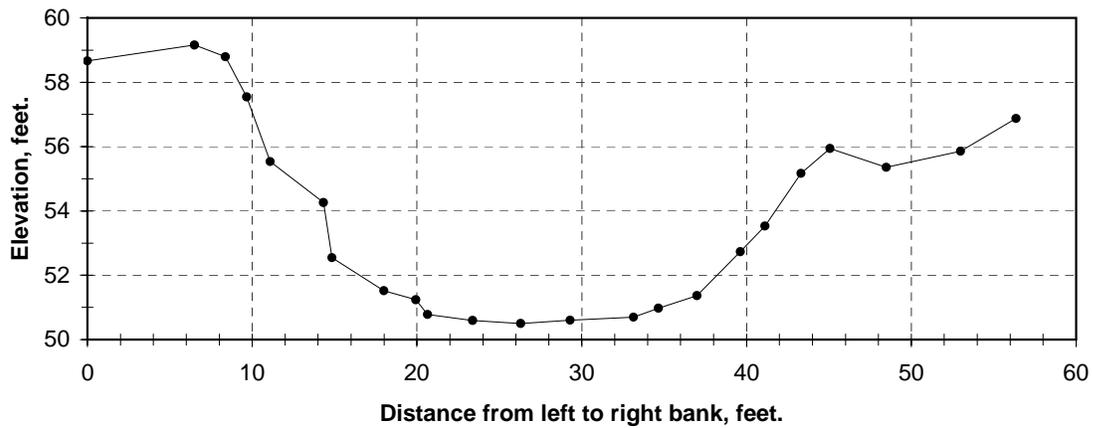
Durphy Creek XS 1.



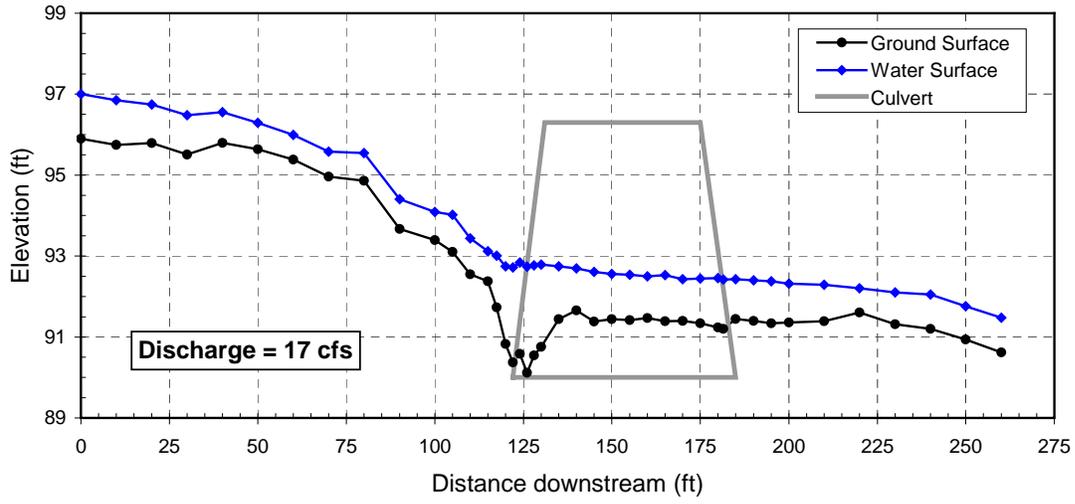
Durphy Creek XS 2.



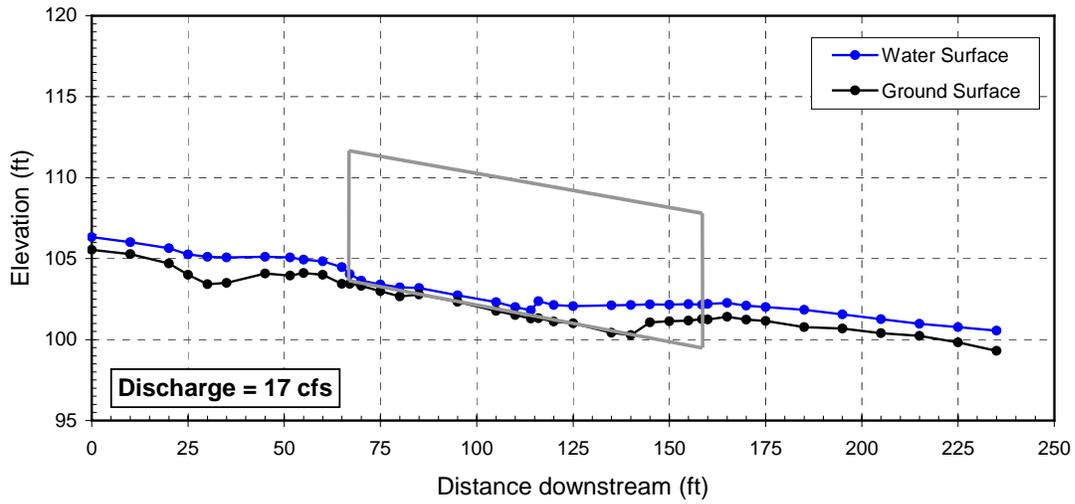
Durphy Creek XS 3.



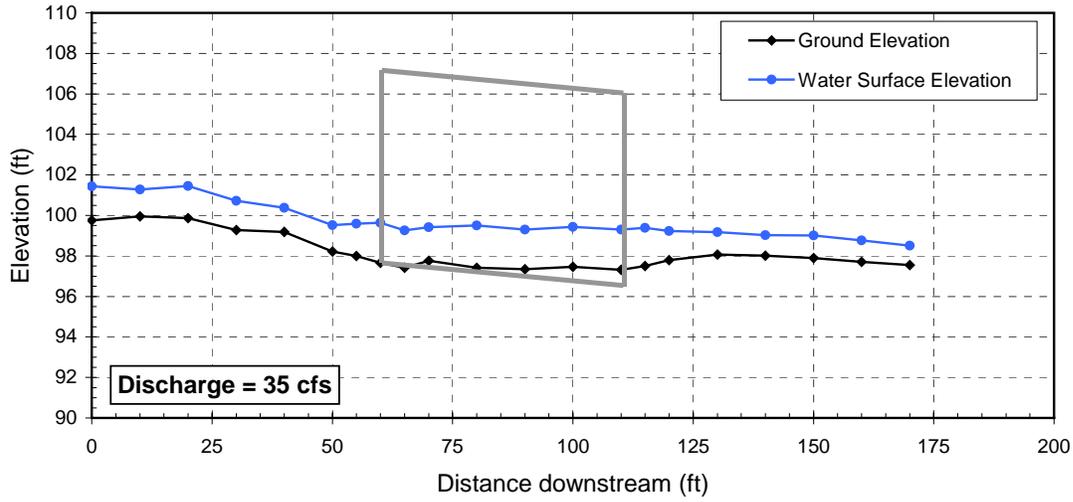
Durphy Creek XS 4.



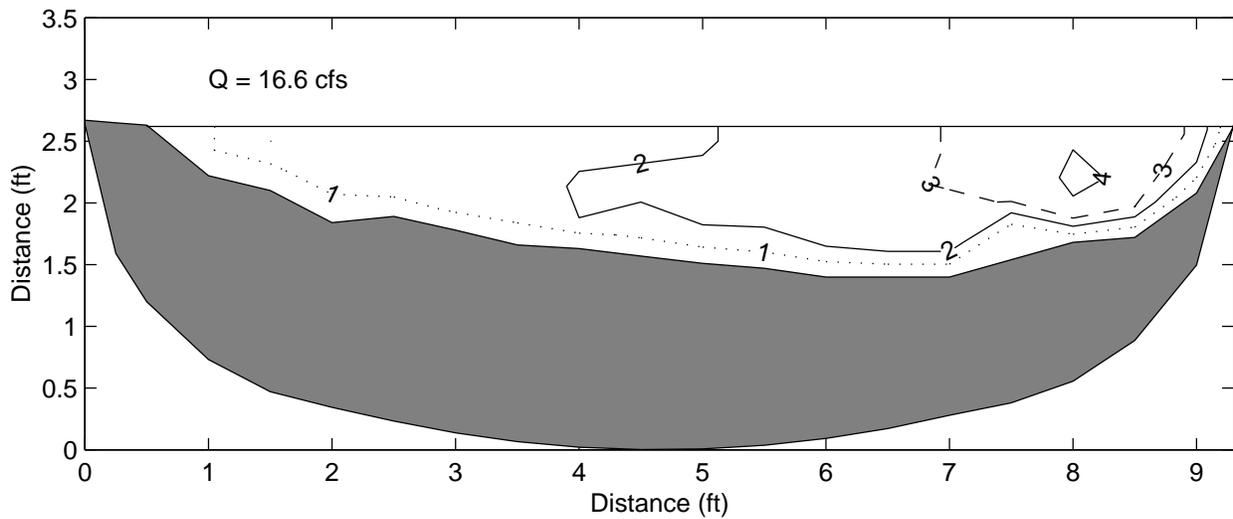
Lower Durphy Creek culvert water surface profiles. Roughness coefficients were not calculated because the substrate distribution is very uneven.



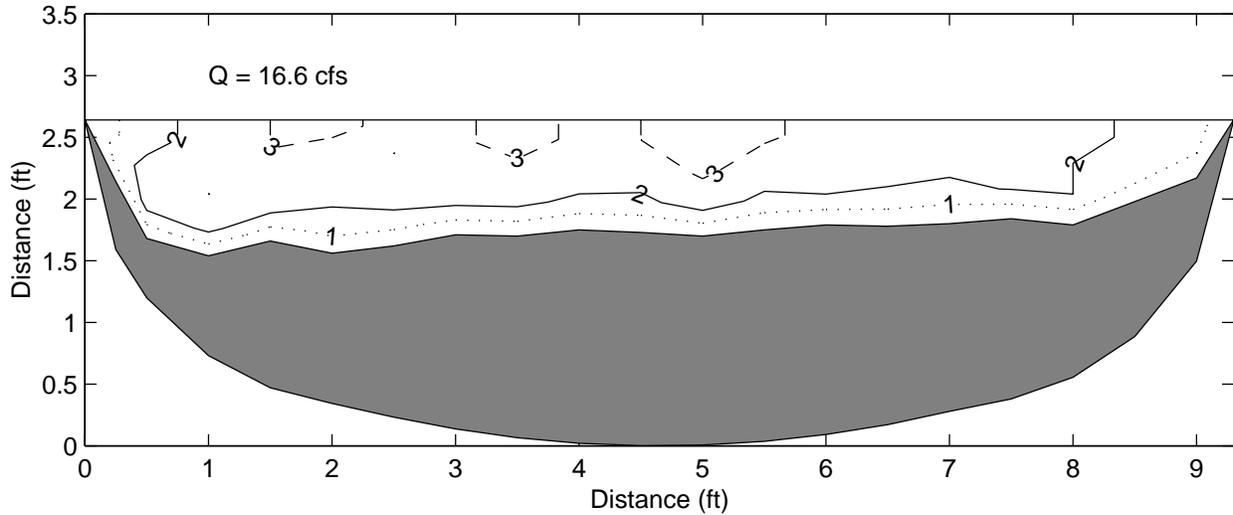
Middle Durphy Creek culvert water surface profiles. Roughness coefficients were not calculated because the substrate distribution is very uneven.



Upper Durphy Creek culvert water surface profiles. Roughness coefficients were not calculated because the substrate distribution is very uneven.



Durphy Creek (Lower Rd culvert) velocity cross section 16 ft downstream of the culvert inlet. Average water velocity within the cross-section was 2.1 ft/s.



Durphy Creek (Lower Rd culvert) velocity cross section 46 ft downstream of the culvert inlet. Average water velocity within the cross-section was 2.2 ft/s.

Summary of Occupied Velocity Analysis

Velocities in the table represent the lowest average velocity calculated within the culvert cross-section in the square areas used to represent the swimming area presented by different fish size classes.

Lower Durphy

Cross Section	Juvenile Fish (0.3 x 0.3 sq ft)	Resident trout (0.6 x 0.6 sq ft)	Adult Salmonids (0.8 x 0.8 sq ft)	Cross Section Ave Velocity
In Barrel, 16 ft DS of inlet, Q = 17 cfs	0.8 ft/s	1.3 ft/s	1.5 ft/s	2.1 ft/s
In Barrel, 46 ft DS of inlet, Q = 17 cfs	1.1 ft/s	1.7 ft/s	2.0 ft/s	2.2 ft/s

Middle Durphy

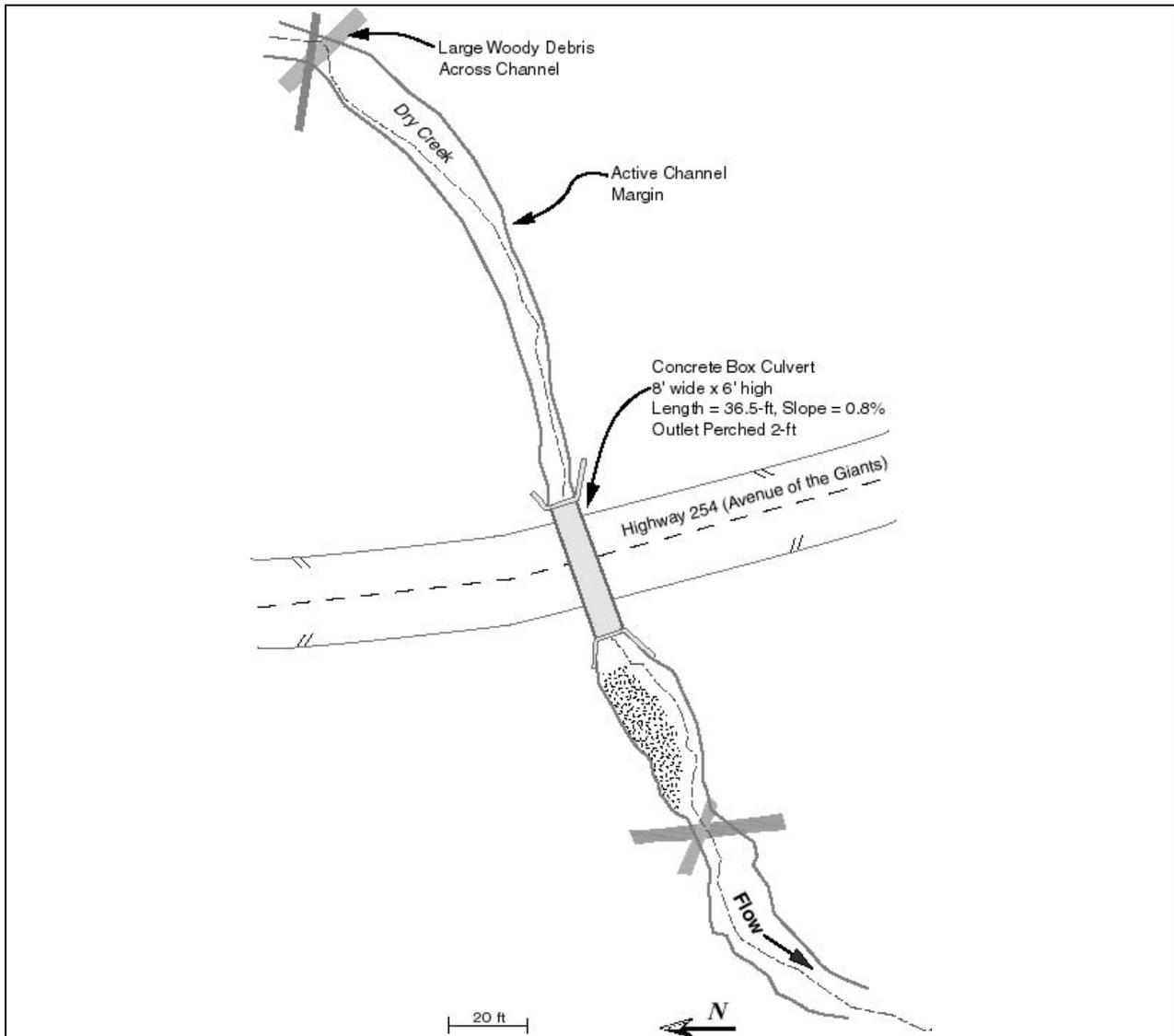
Cross Section	Juvenile Fish (0.3 x 0.3 sq ft)	Resident trout (0.6 x 0.6 sq ft)	Adult Salmonids (0.8 x 0.8 sq ft)	Cross Section Ave Velocity
Outlet, Q = 17 cfs	0.6 ft/s	0.8 ft/s	1.2 ft/s	1.8 ft/s

Upper Durphy

Cross Section	Juvenile Fish (0.3 x 0.3 sq ft)	Resident trout (0.6 x 0.6 sq ft)	Adult Salmonids (0.8 x 0.8 sq ft)	Cross Section Ave Velocity
Inlet, Q = 35 cfs	0.7 ft/s	1.6 ft/s	2.3 ft/s	3.7 ft/s
Mid-barrel, Q = 35 cfs	0.6 ft/s	1.1 ft/s	1.4 ft/s	2.7 ft/s

Dry Creek Culvert

Location/Ownership	Hwy 254, post mile 7.69 / Caltrans
Drainage Area	1.28 sq mi (3.32 km ²)
Culvert Description	Box, concrete Height x Width = 6 ft x 8 ft Length = 36.5 ft Slope = 0.5% Not embedded No baffles or weirs
Inlet	Wing wall
Outlet	Perched outlet. Bank and bed scour have formed an outlet pool
Channel Constriction (Culvert Width/Bankfull Width)	0.6
Inlet Alignment with Channel (angle from culvert centerline)	0 degrees



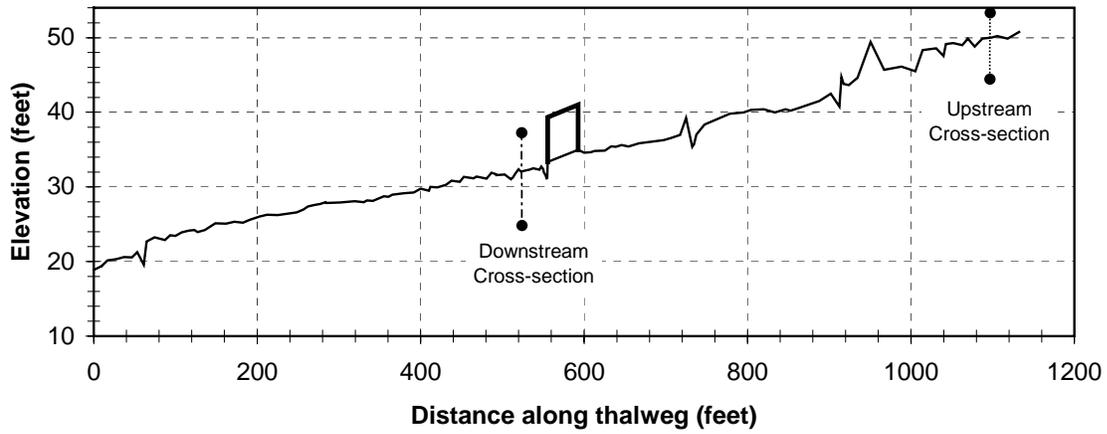
Dry Creek plan map.



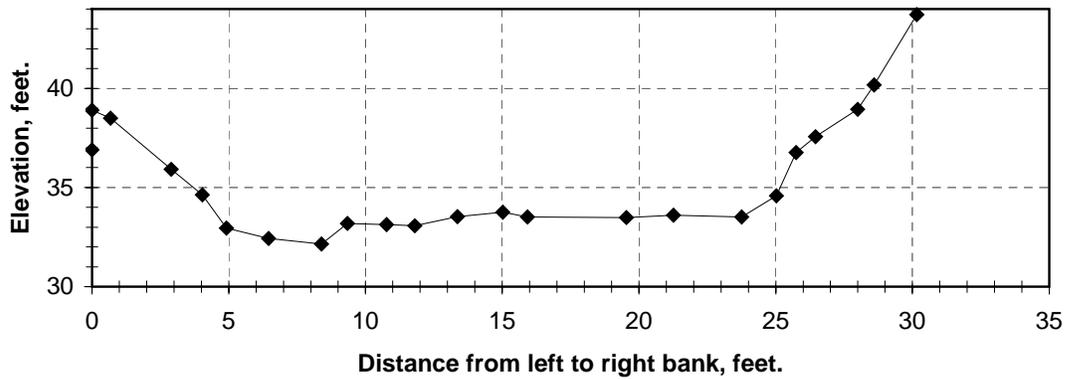
Dry Creek Inlet



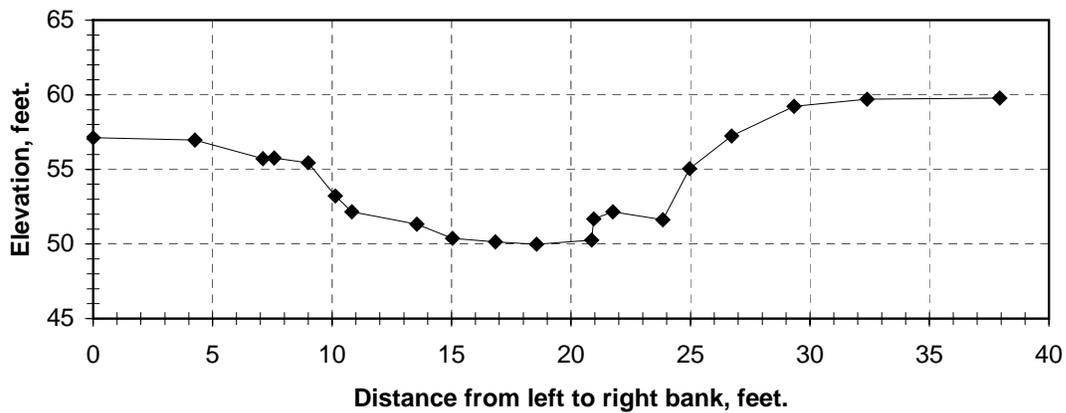
Dry Creek Outlet



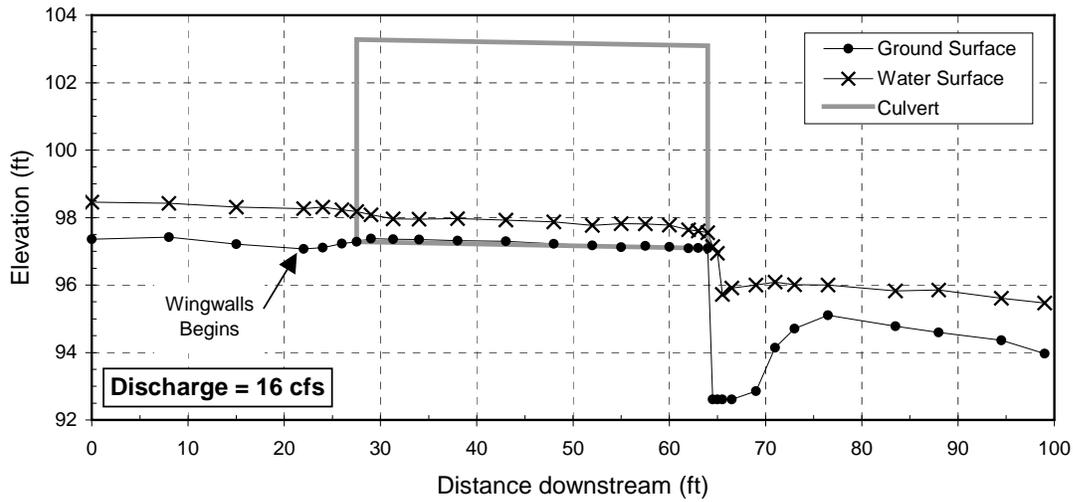
Dry Creek longitudinal profile.



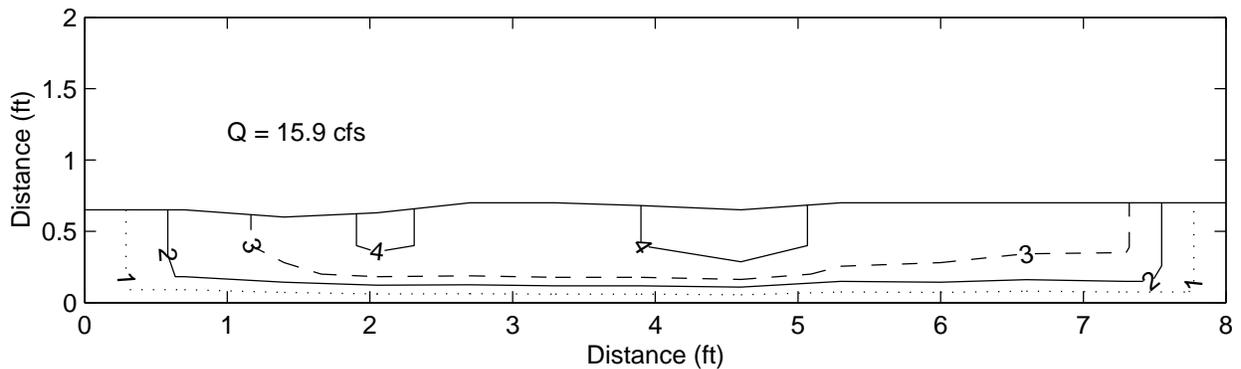
Dry Creek upstream cross section.



Dry Creek downstream cross section, located at the tailwater control.



Dry Creek water surface profiles. Manning's roughness calculated using water surface slope within the barrel: $Q = 16$ cfs, $n = 0.027$.



Dry Creek velocity cross section at the culvert mid-point. Average water velocity within the cross-section was 3.0 ft/s.

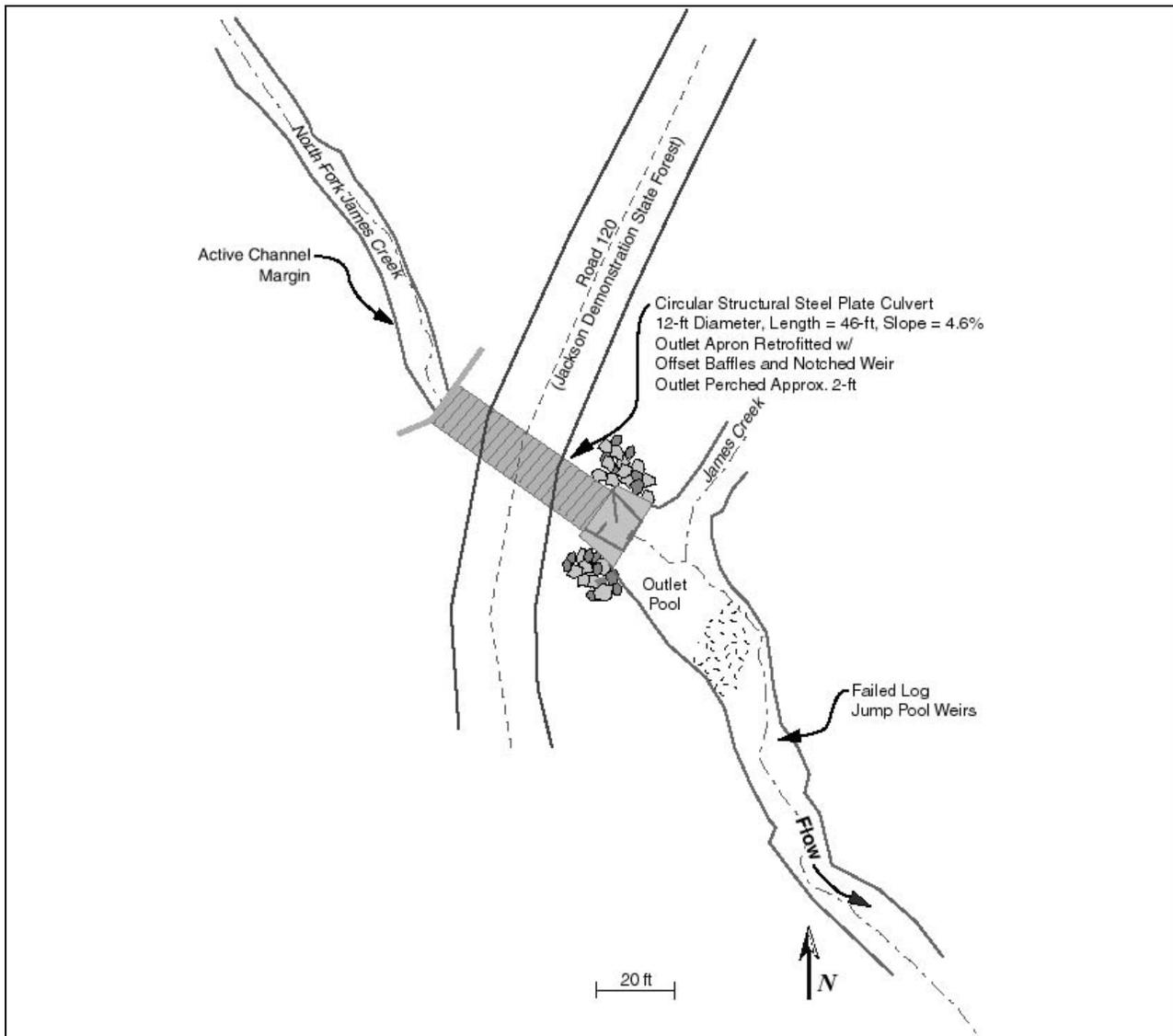
Summary of Occupied Velocity Analysis

Velocities in the table represent the lowest average velocity calculated within the culvert cross-section in the square areas used to represent the swimming area presented by different fish size classes.

Cross Section	Juvenile Fish (0.3 x 0.3 sq ft)	Resident trout (0.6 x 0.6 sq ft)	Adult Salmonids (0.8 x 0.8 sq ft)	Cross Section Ave Velocity
Mid-barrel, $Q = 16$ cfs	0.6 ft/s	1.3 ft/s	N/A	3.0 ft/s

James Creek Culvert

Location/Ownership	Rd 120 / Jackson State Forest
Drainage Area	1.78 sq mi (4.61 km ²)
Culvert Description	Circular, corrugated steel culvert with 6"x 2" corrugations Diameter = 12 ft Length = 46 ft Slope = 4.6% Not embedded No baffles or weirs
Inlet	Head wall
Outlet	Perched outlet. Bed and bank scour have formed a pool at the outlet. Outlet apron with weir.
Channel Constriction (Culvert Width/Bankfull Width)	0.5
Inlet Alignment with Channel (angle from culvert centerline)	35 degrees



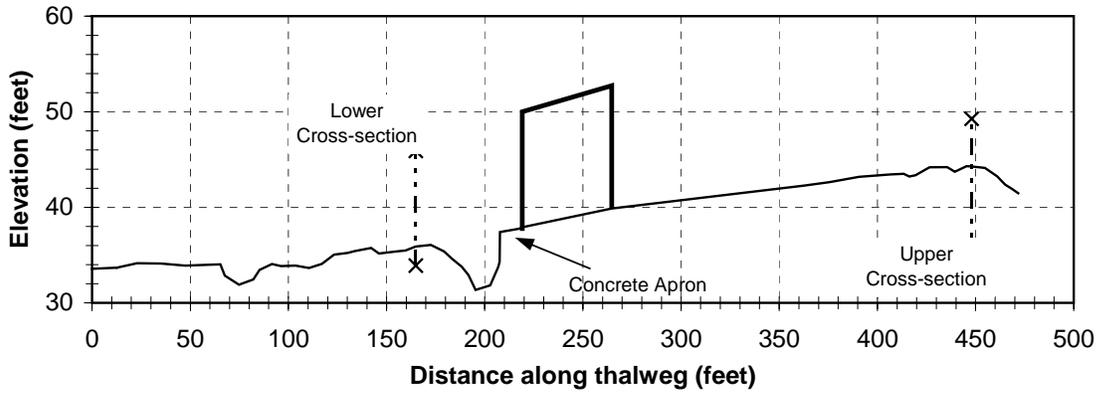
James Creek plan map.



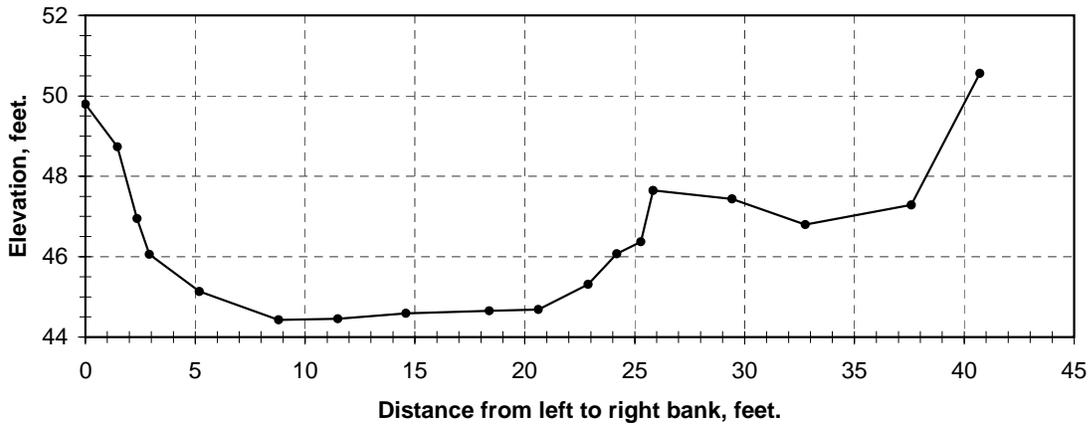
James Creek outlet



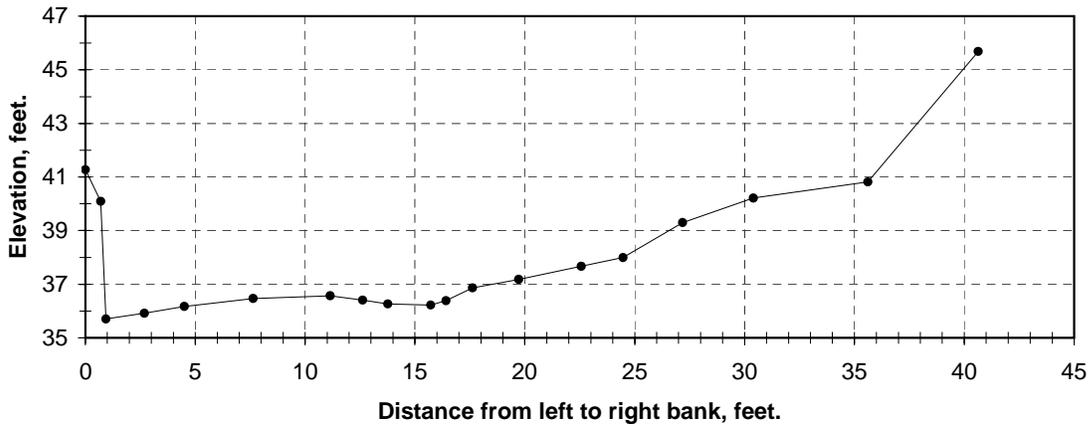
James Creek inlet



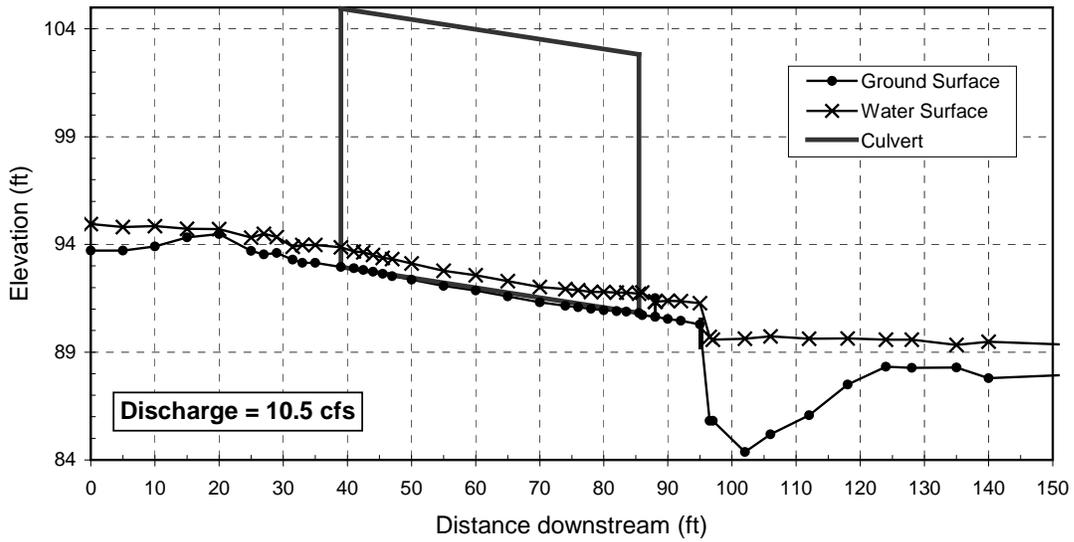
James Creek longitudinal profile.



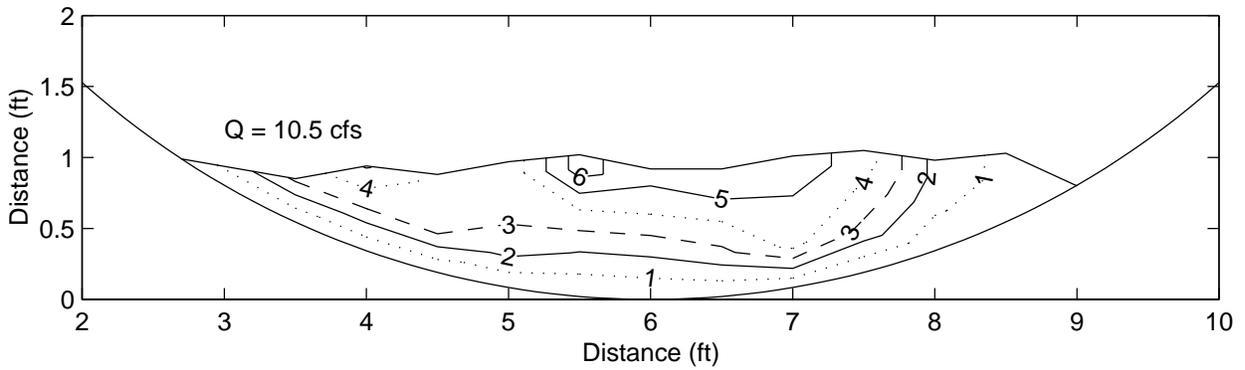
James Creek upstream cross section.



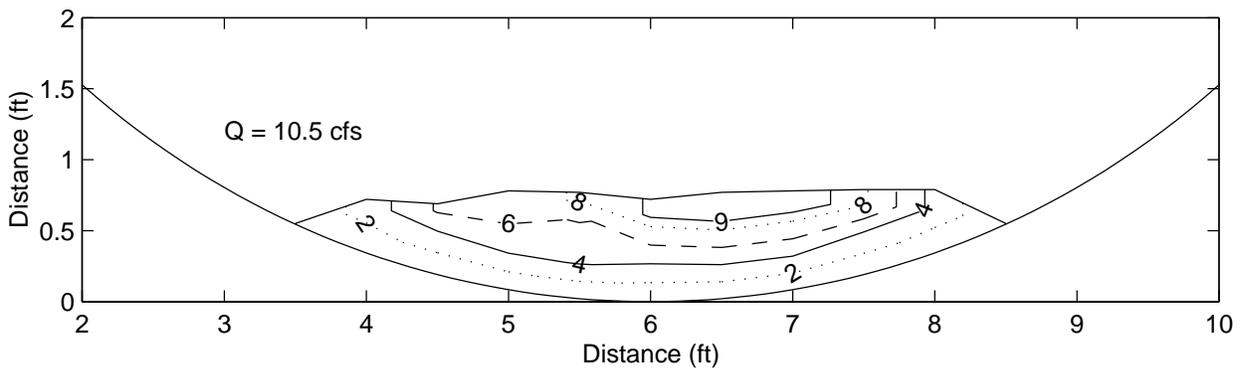
James Creek downstream cross section, located at the tailwater control.



James Creek water surface profiles. Manning's roughness calculated using water surface slope within the barrel: $Q = 10.5$ cfs, $n = 0.059$.



James Creek velocity cross section at the culvert inlet. Average water velocity within the cross-section was 3.1 ft/s.



James Creek velocity cross section at the culvert mid-point. Average water velocity within the cross-section was 4.7 ft/s.

Summary of Occupied Velocity Analysis

Velocities in the table represent the lowest average velocity calculated within the culvert cross-section in the square areas used to represent the swimming area presented by different fish size classes.

Cross Section	Juvenile Fish (0.3 x 0.3 sq ft)	Resident trout (0.6 x 0.6 sq ft)	Adult Salmonids (0.8 x 0.8 sq ft)	Cross Section Ave Velocity
Inlet, Q = 10.5 cfs	0.8 ft/s	2.2 ft/s	3.0	3.1 ft/s
Mid-barrel, Q = 10.5 cfs	2.5 ft/s	4.6 ft/s	N/A	4.7 ft/s

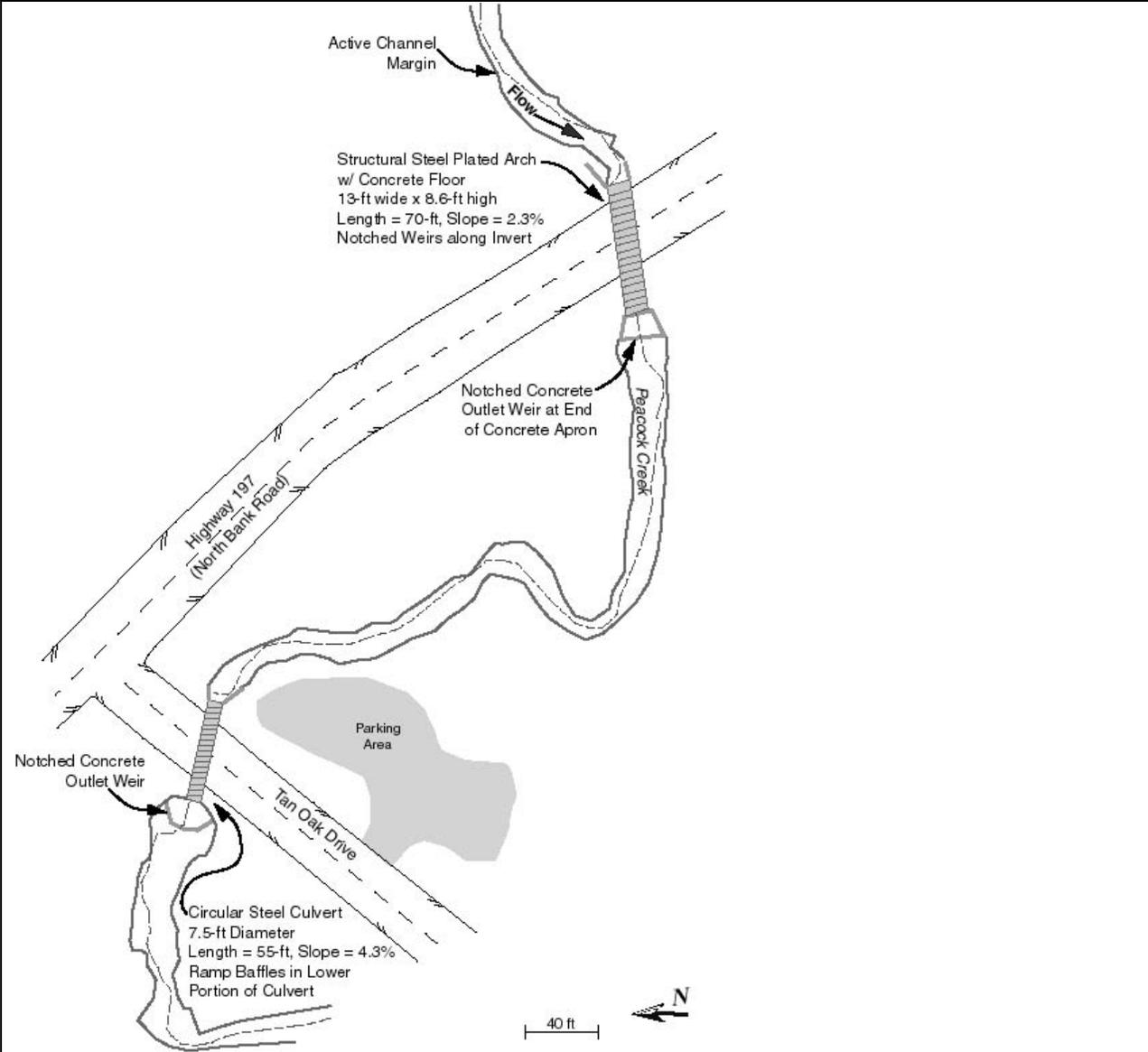
Peacock Creek Culverts

Upstream Culvert – Hwy 197 (North Bank Rd)

Location/Ownership	Hwy 197, post mile 2.12 / Caltrans
Drainage Area	2.06 sq mi (5.34 km ²)
Culvert Description	Pipe arch, corrugated steel culvert with 6"x 2" corrugations Height x Width = 8.5 ft x 13 ft Length = 70 ft Slope = 3.6% Not embedded Notched wooden weir-baffles inserted along the culvert invert
Inlet	Wing wall
Outlet	Perched outlet. Bed and bank scour have formed a pool at the outlet. Outlet apron with weir.
Channel Constriction (Culvert Width/Bankfull Width)	0.6
Inlet Alignment with Channel (angle from culvert centerline)	35 degrees

Downstream Culvert – Tan Oak Drive

Location/Ownership	Tan Oak Dr/ Del Norte County
Drainage Area	2.10 sq mi (5.44 km ²)
Culvert Description	Circular, corrugated steel culvert with 6"x 2" corrugations Diameter = 7.5 ft Length = 55 ft Slope = 3.0% Not embedded Ramp baffles on right side only. Ramps are 0.9 ft high, 2.0 ft wide, and 2.6 ft long. Only downstream baffles remain, others have been blown out.
Inlet	Head wall
Outlet	Perched outlet. Bed and bank scour have formed a pool at the outlet. Outlet apron with weir.
Channel Constriction (Culvert Width/Bankfull Width)	0.5
Inlet Alignment with Channel (angle from culvert centerline)	30 degrees



Peacock Creek plan map.



Peacock Creek Tan Oak Drive culvert outlet. Culvert was replaced in 2003.



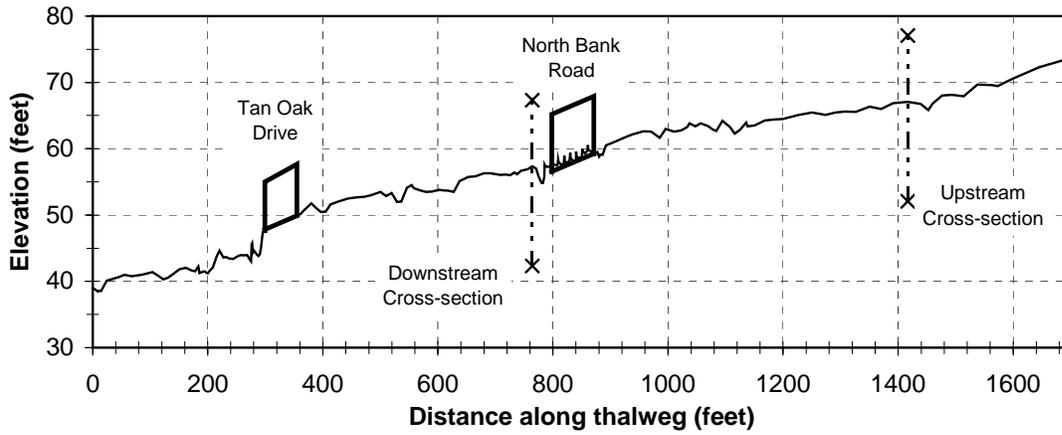
Peacock Creek North Bank Rd (Highway 197) culvert inlet



Peacock Creek North Bank Rd (Highway 197) culvert outlet



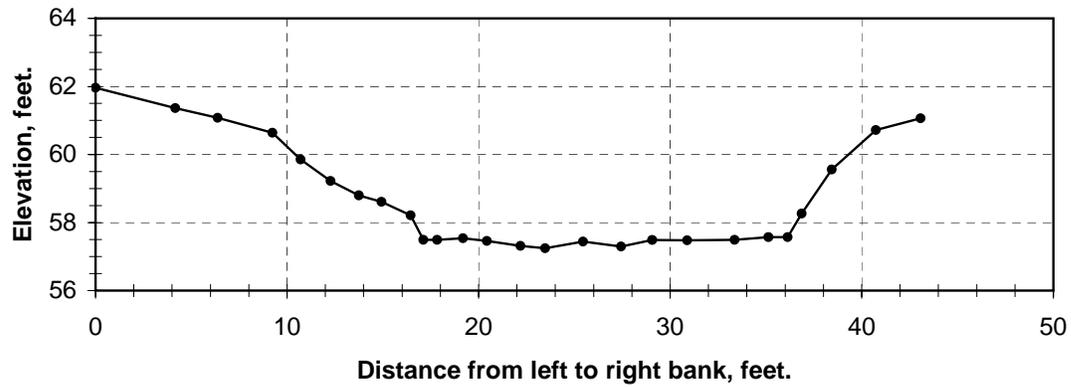
Peacock Creek North Bank Rd (Highway 197) culvert wooden baffles looking upstream.



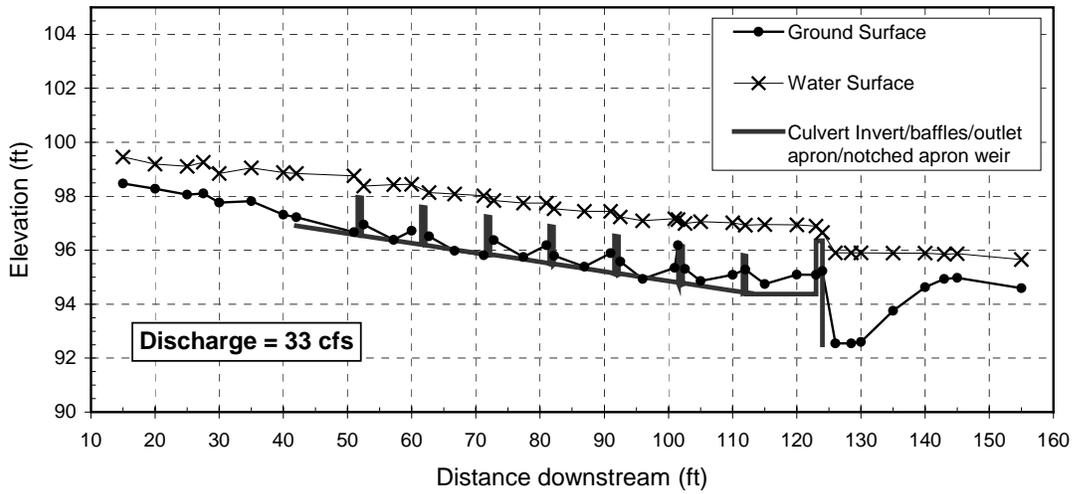
Peacock Creek longitudinal profile.



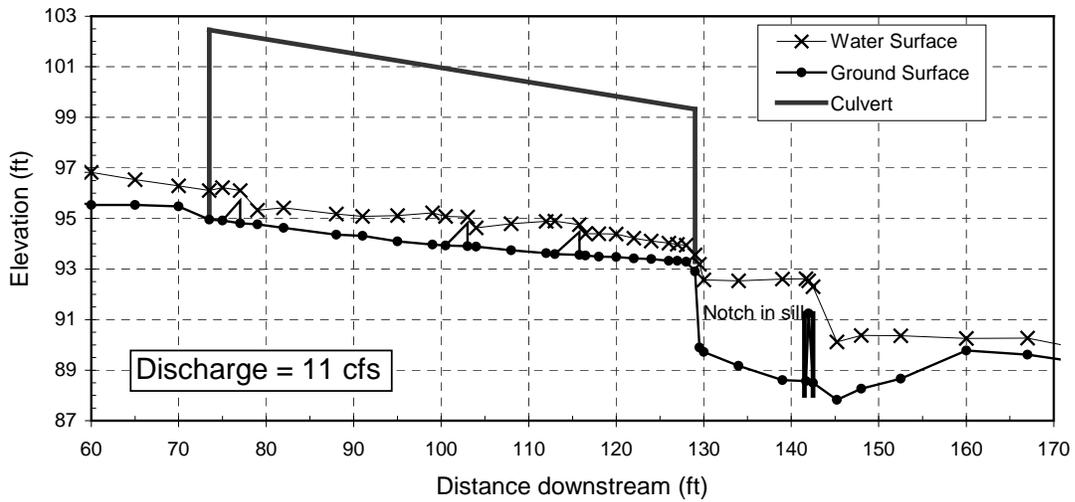
Peacock Creek upstream cross section.



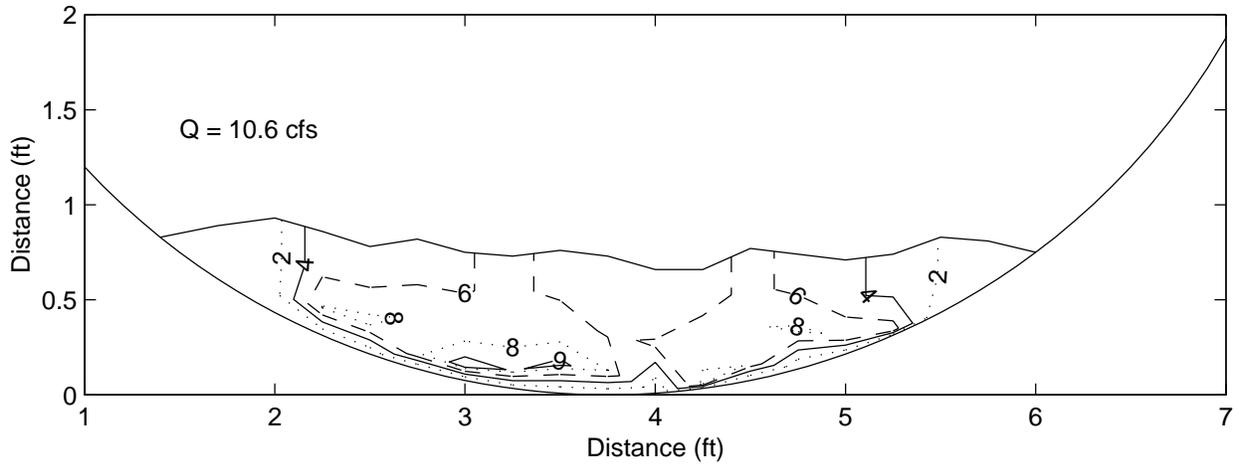
Peacock Creek downstream cross section, located at the tailwater control.



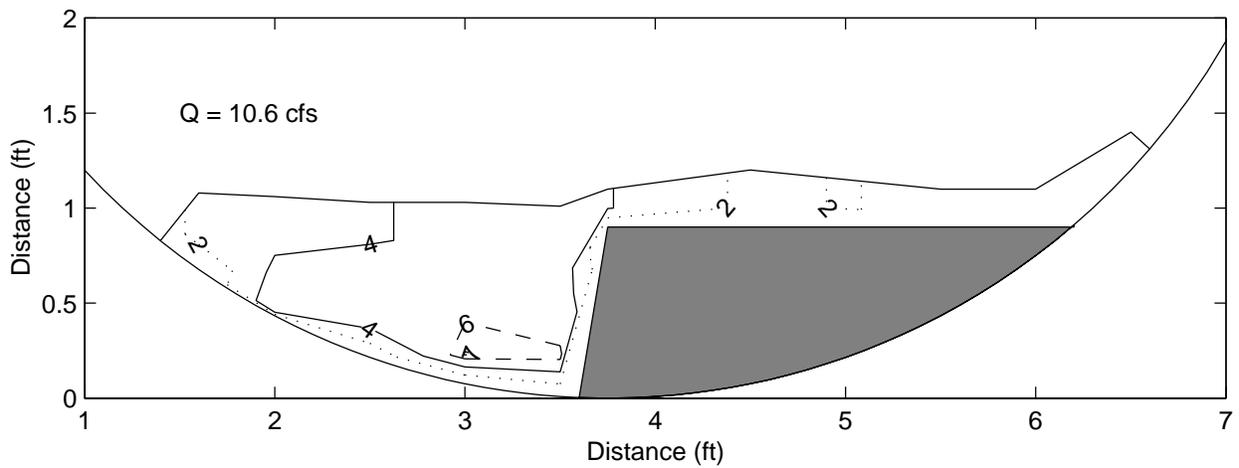
Peacock Creek (Hwy 197) water surface profiles. Manning's roughness calculated using water surface slope within the barrel: $Q = 33$ cfs, $n = 0.163$.



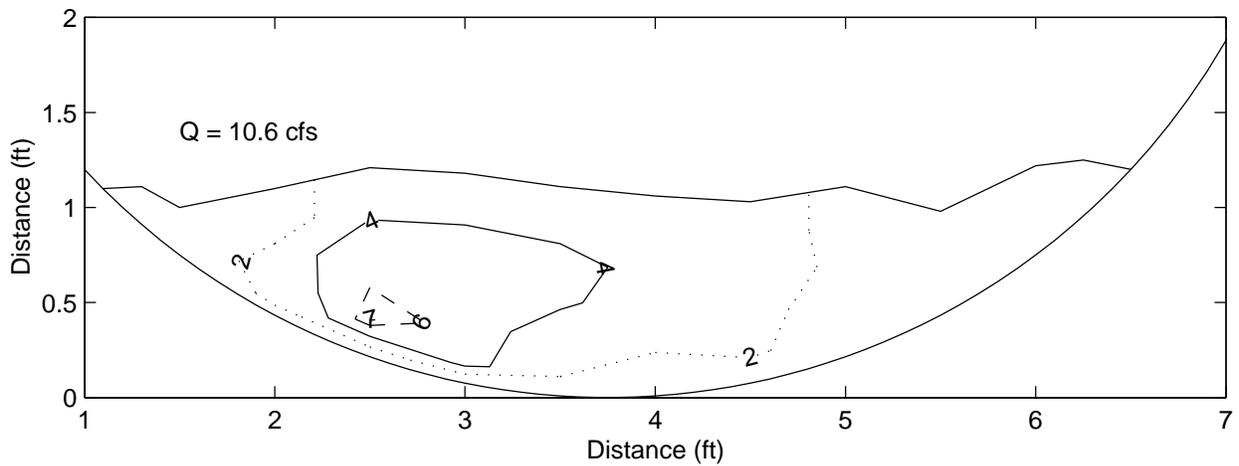
Peacock Creek (Tan Oak Dr) water surface profiles. Manning's roughness calculated using water surface slope within the barrel: $Q = 11$ cfs, $n = 0.036$.



Peacock Creek (Tan Oak Dr) velocity cross section 18 ft downstream of the inlet, out of the influence of the ramp baffles. Average water velocity within the cross-section was 5.4 ft/s.



Peacock Creek (Tan Oak Dr) velocity cross section 30 ft downstream of the culvert inlet at a ramp baffle. Average water velocity within the cross-section was 3.6 ft/s.



Peacock Creek (Tan Oak Dr) velocity cross section 36 ft downstream of the culvert inlet between two baffles. Average water velocity within the cross-section was 2.8 ft/s.

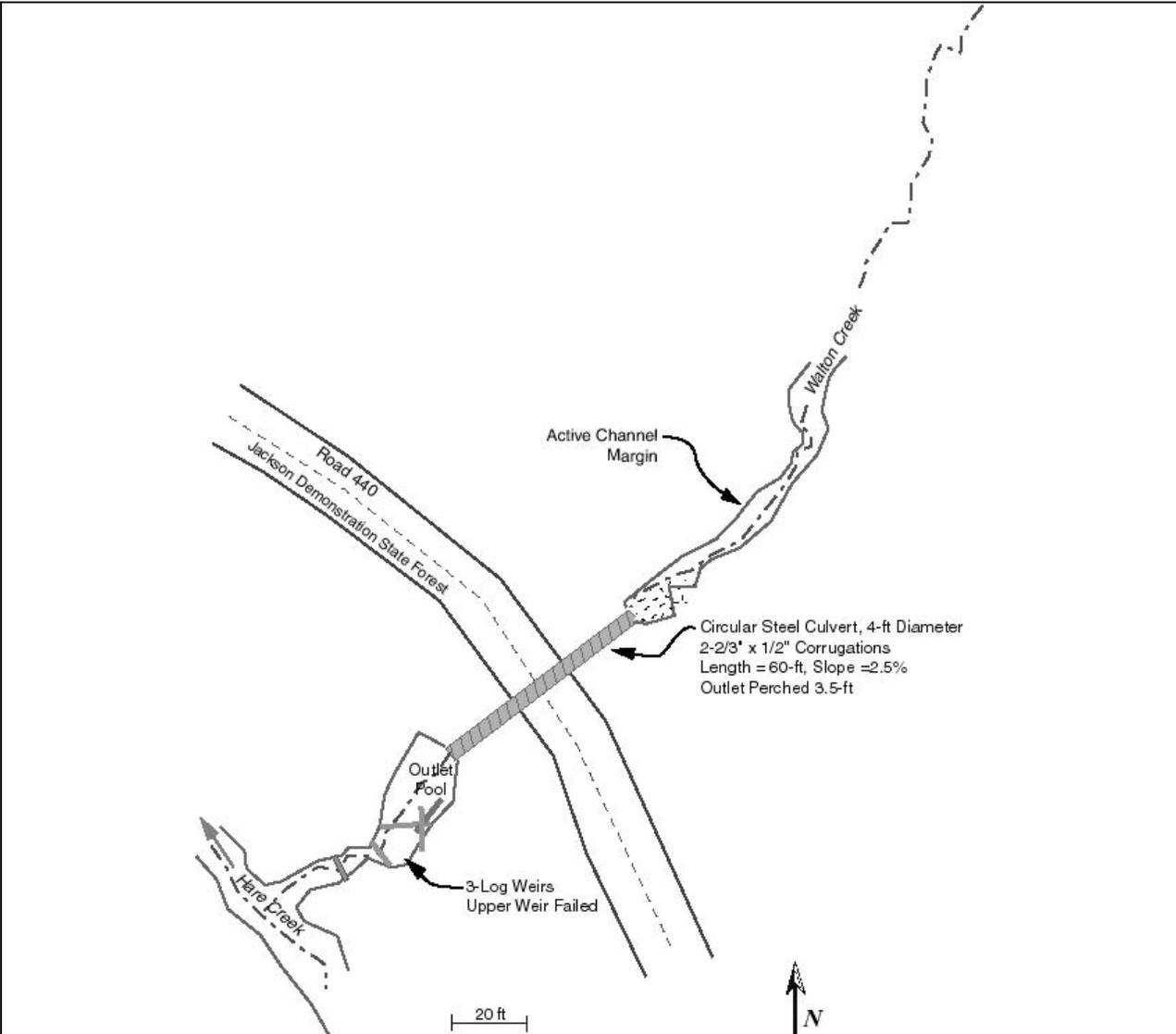
Summary of Occupied Velocity Analysis

Velocities in the table represent the lowest average velocity calculated within the culvert cross-section in the square areas used to represent the swimming area presented by different fish size classes.

Cross Section	Juvenile Fish (0.3 x 0.3 sq ft)	Resident trout (0.6 x 0.6 sq ft)	Adult Salmonids (0.8 x 0.8 sq ft)	Cross Section Ave Velocity
18 ft DS of Inlet, Q = 10.5 cfs	1.5 ft/s	5.4 ft/s	N/A	5.4 ft/s
30 ft DS of Inlet at baffle, Q = 10.5 cfs	2.6 ft/s	4.1 ft/s	4.6 ft/s	3.6 ft/s
36 ft DS of Inlet between baffles, Q = 10.5 cfs	0.5 ft/s	1.0 ft/s	1.5 ft/s	2.8 ft/s

Walton Creek Culvert

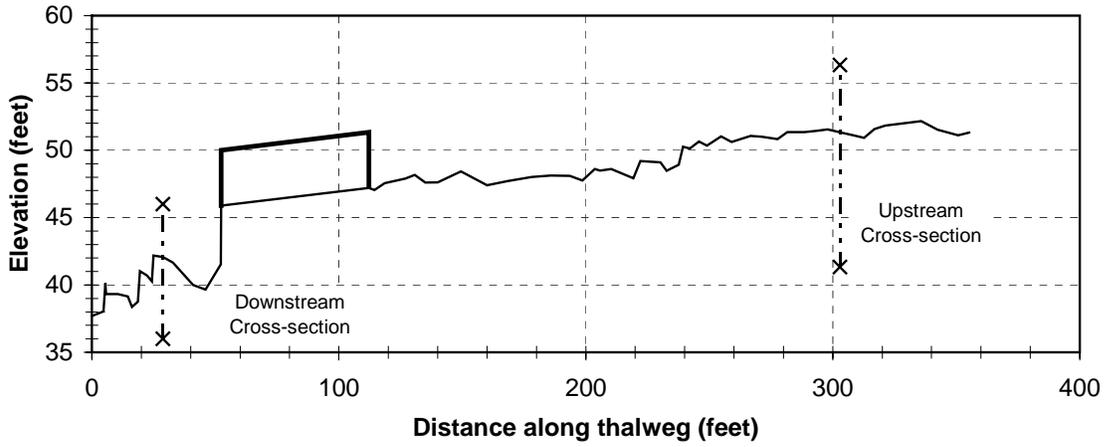
Location/Ownership	Rd 440 / Jackson State Forest
Drainage Area	0.50 sq mi (1.39 km ²)
Culvert Description	Circular, corrugated steel culvert with 2 2/3" x 1/2" corrugations Diameter = 4 ft Length = 60 ft Slope = 2.2% Not embedded No baffles or weirs
Inlet	Projecting
Outlet	Perched outlet. Bed and bank scour have formed a pool at the outlet. Step pools
Channel Constriction (Culvert Width/Bankfull Width)	0.35
Inlet Alignment with Channel (angle from culvert centerline)	20 degrees



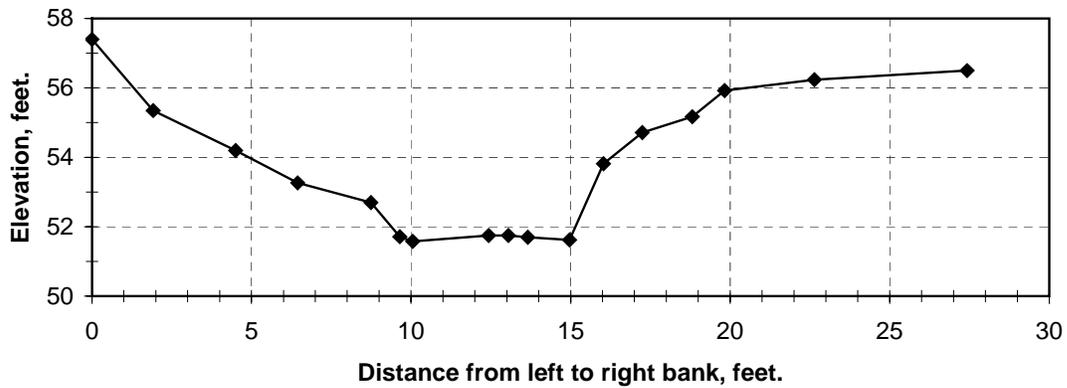
Walton Creek plan map.



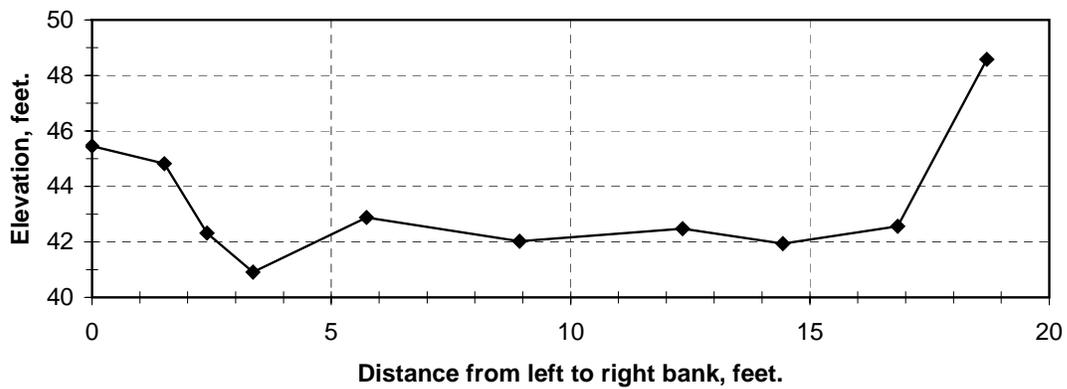
Walton Creek culvert inlet (left) and outlet (right) in December 1998.



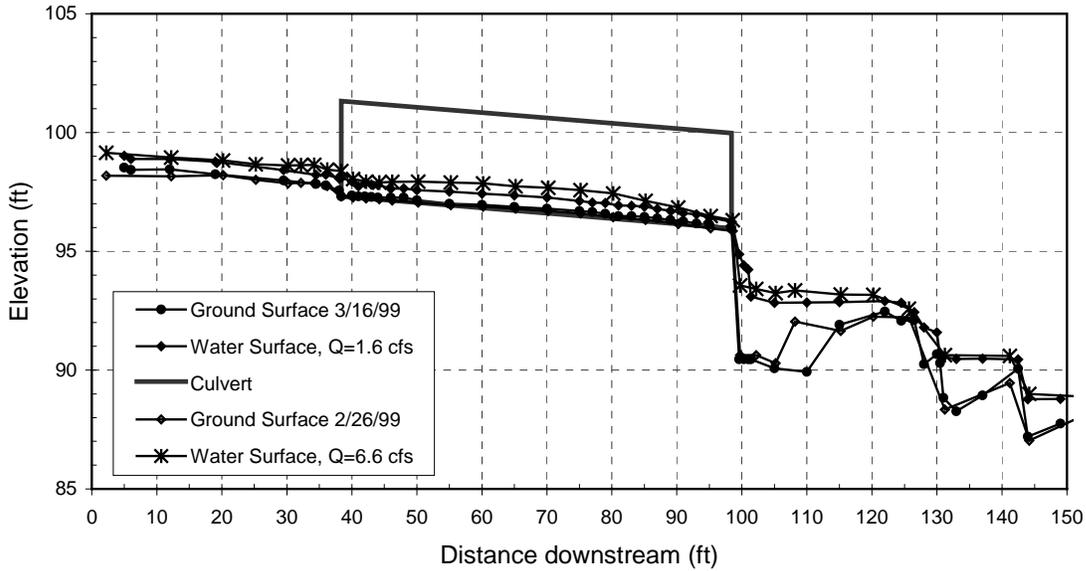
Walton Creek longitudinal profile.



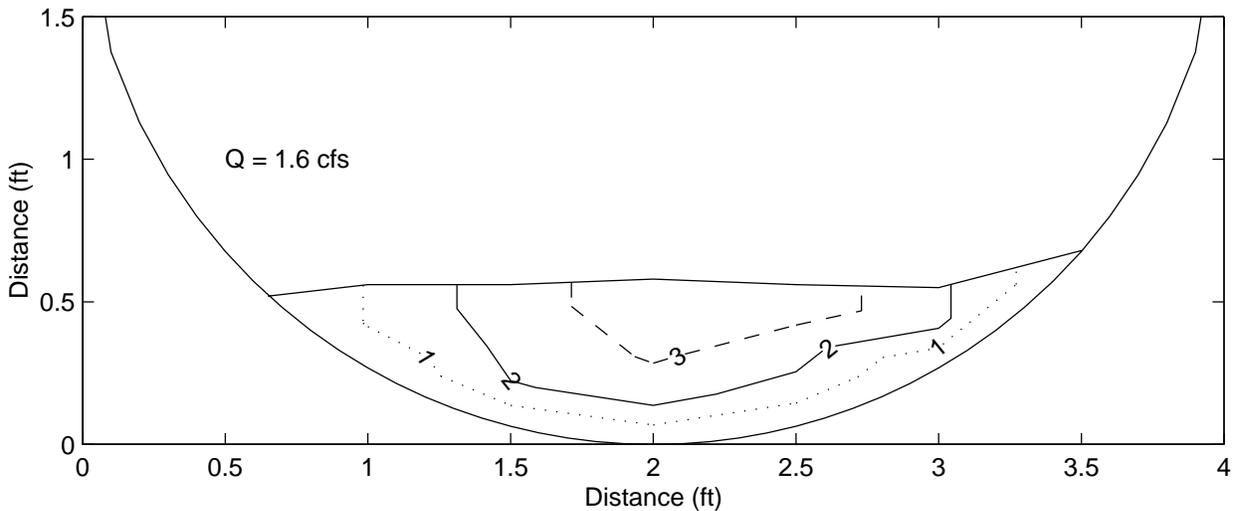
Walton Creek upstream cross section.



Walton Creek downstream cross section, located at the tailwater control.



Walton Creek water surface profiles. Manning's roughness calculated using water surface slope within the barrel: Q = 1.6 cfs, n = 0.044; Q = 6.6 cfs, n = 0.040.



Walton Creek velocity cross section at the inlet. Average water velocity within the cross-section was 2.3 ft/s.

Summary of Occupied Velocity Analysis

Velocities in the table represent the lowest average velocity calculated within the culvert cross-section in the square areas used to represent the swimming area presented by different fish size classes.

Cross Section	Juvenile Fish (0.3 x 0.3 sq ft)	Resident trout (0.6 x 0.6 sq ft)	Adult Salmonids (0.8 x 0.8 sq ft)	Cross Section Ave Velocity
Inlet, Q = 1.6 cfs	1.7 ft/s	N/A	N/A	2.3 ft/s