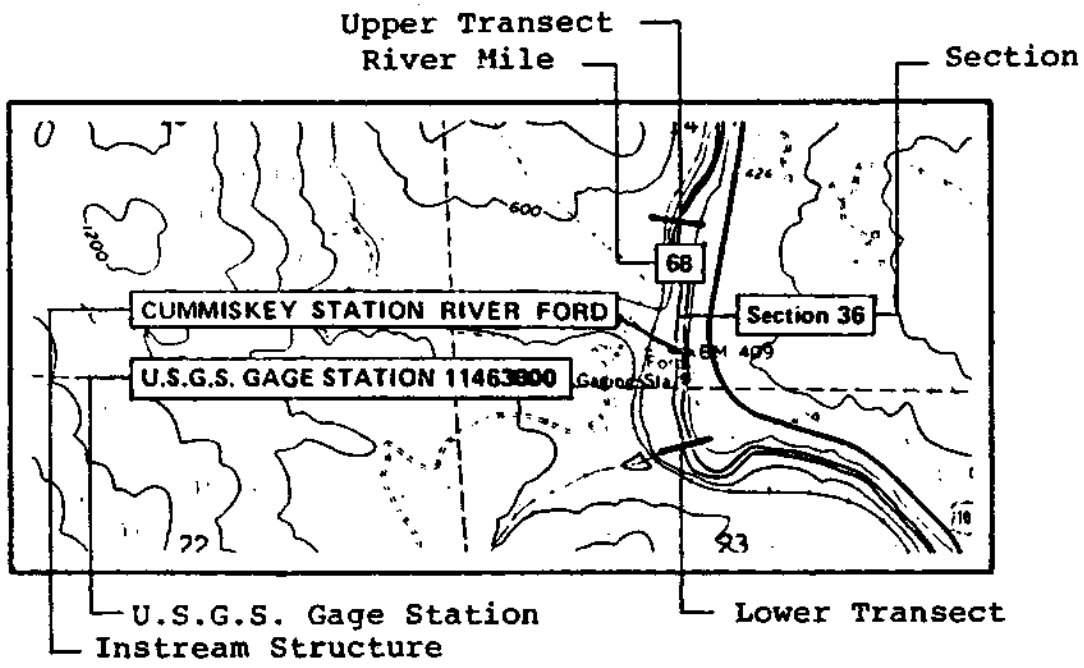
Appendix A

Location of Transects, Study Sections,
Instream Structures and U.S. Geological Survey Gage Stations
-Russian River and Lower Dry Creek

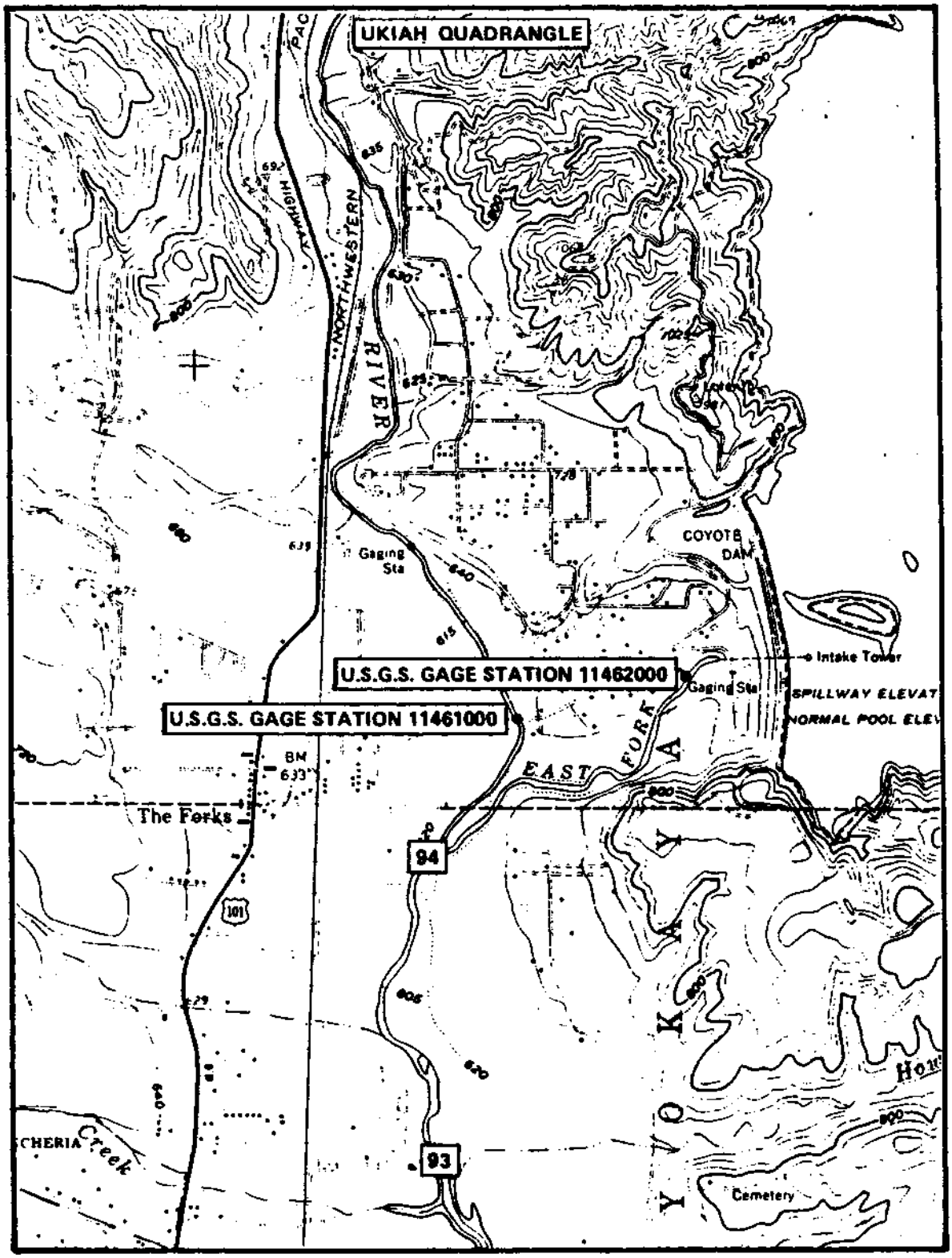
Symbols used are defined in the following example



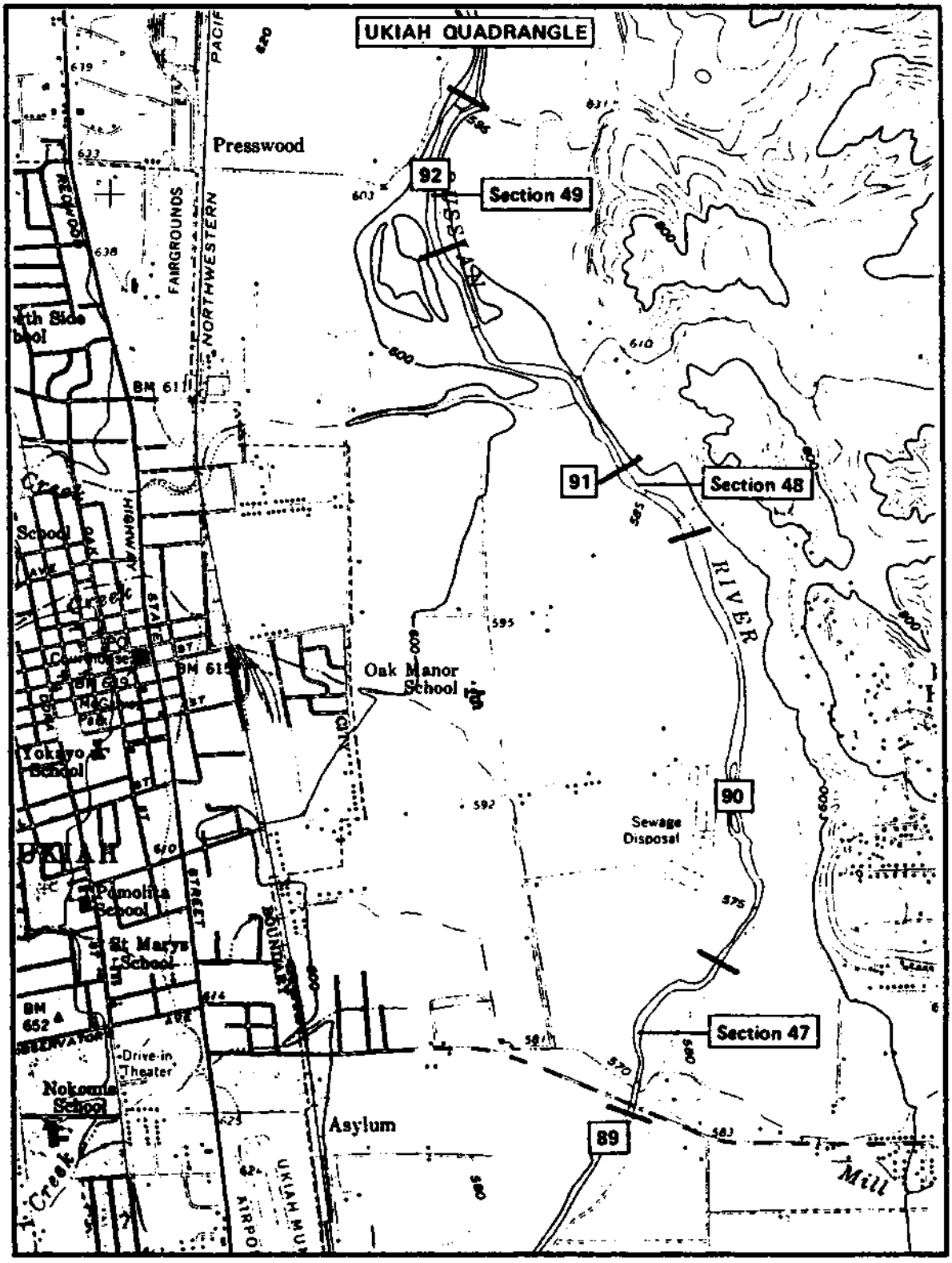
MAINSTEM

RUSSIAN

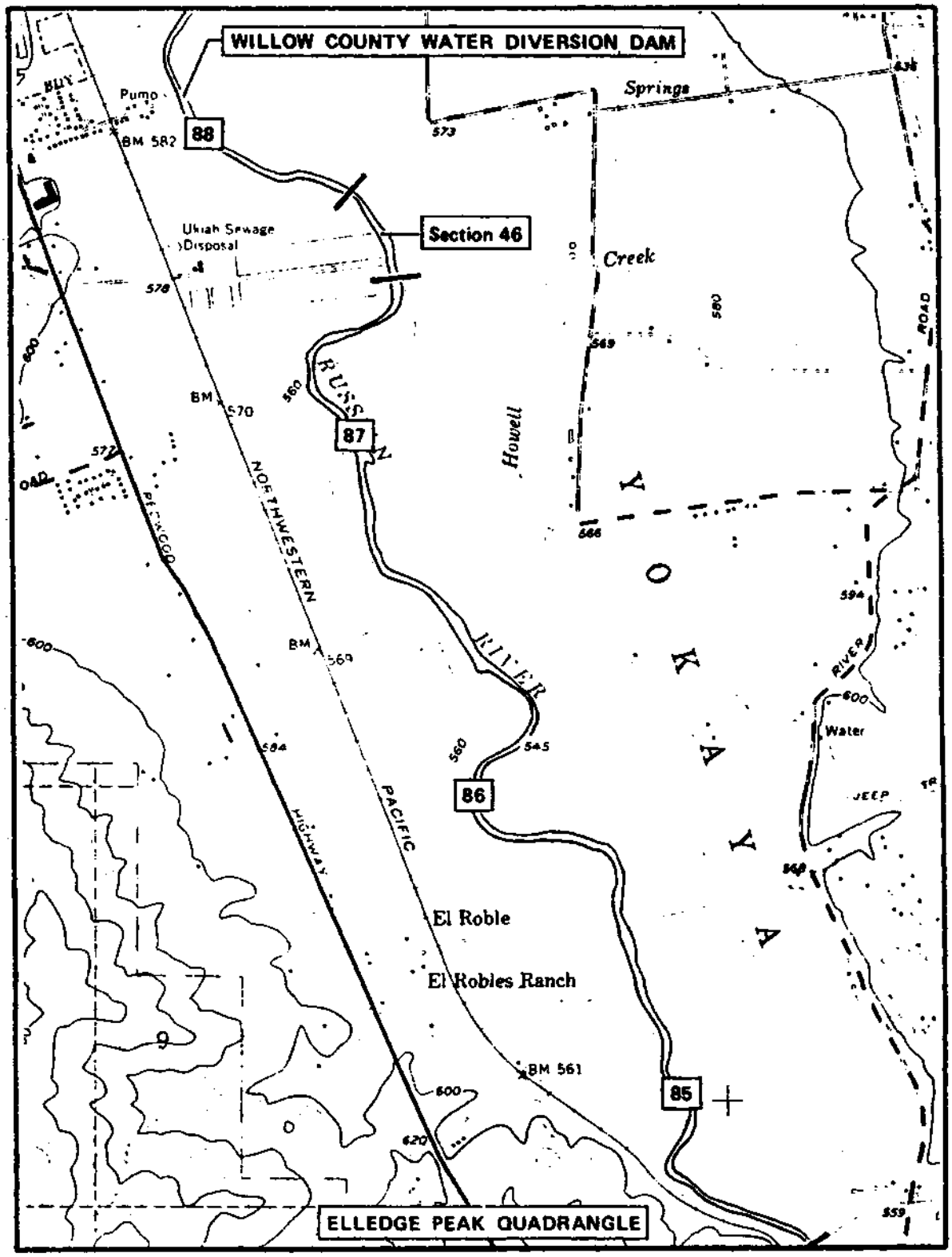
RIVER



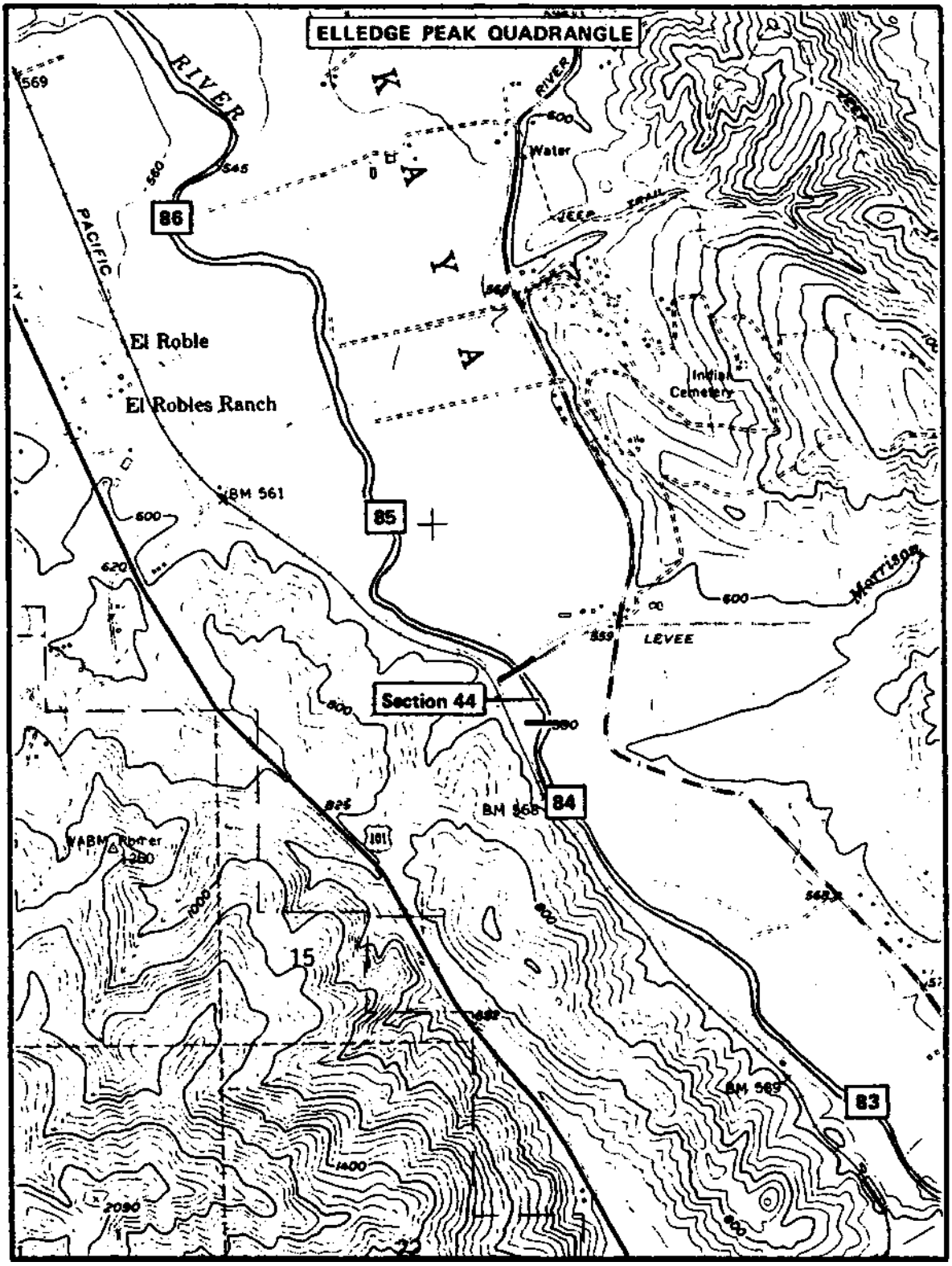
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



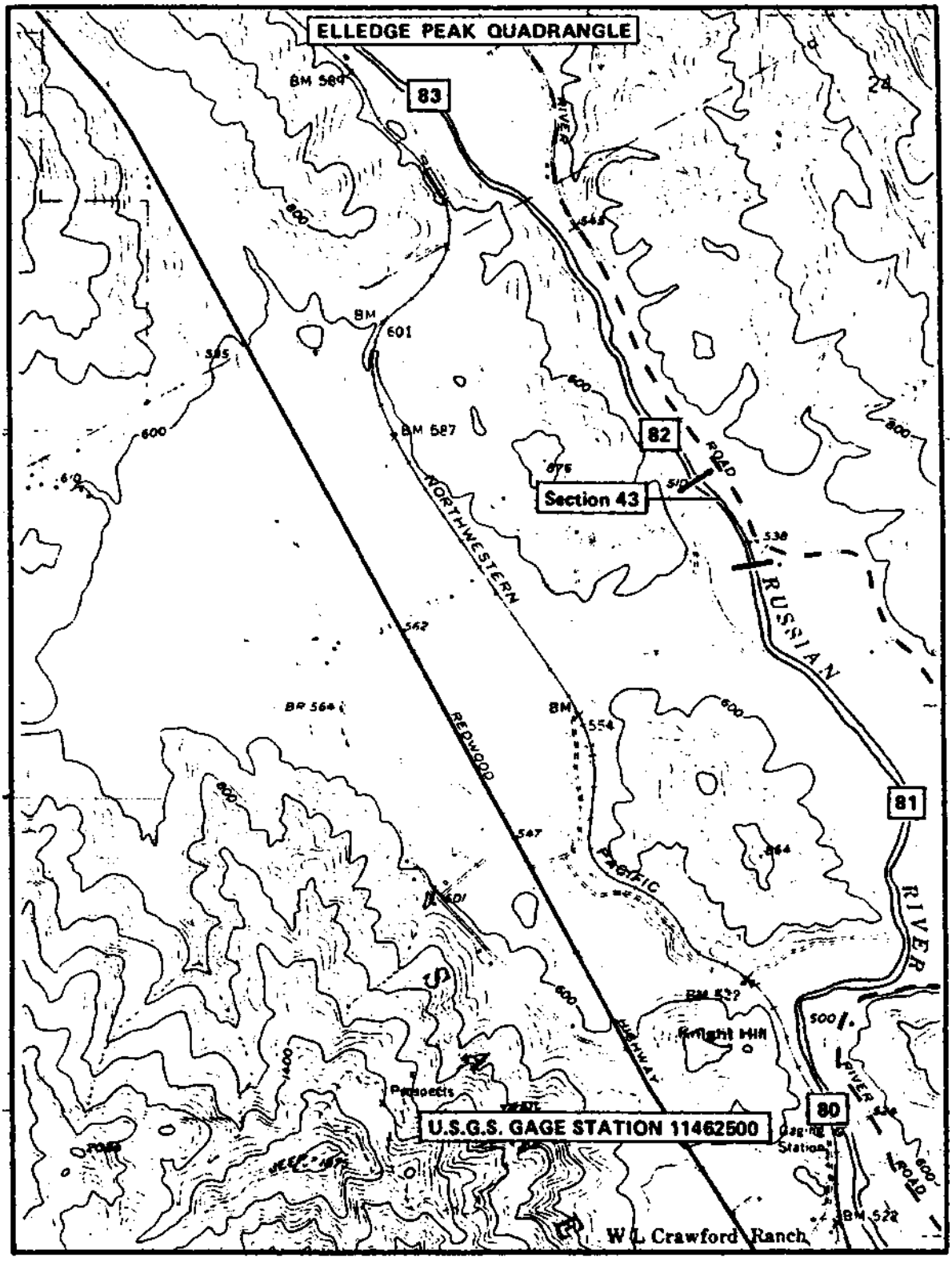
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



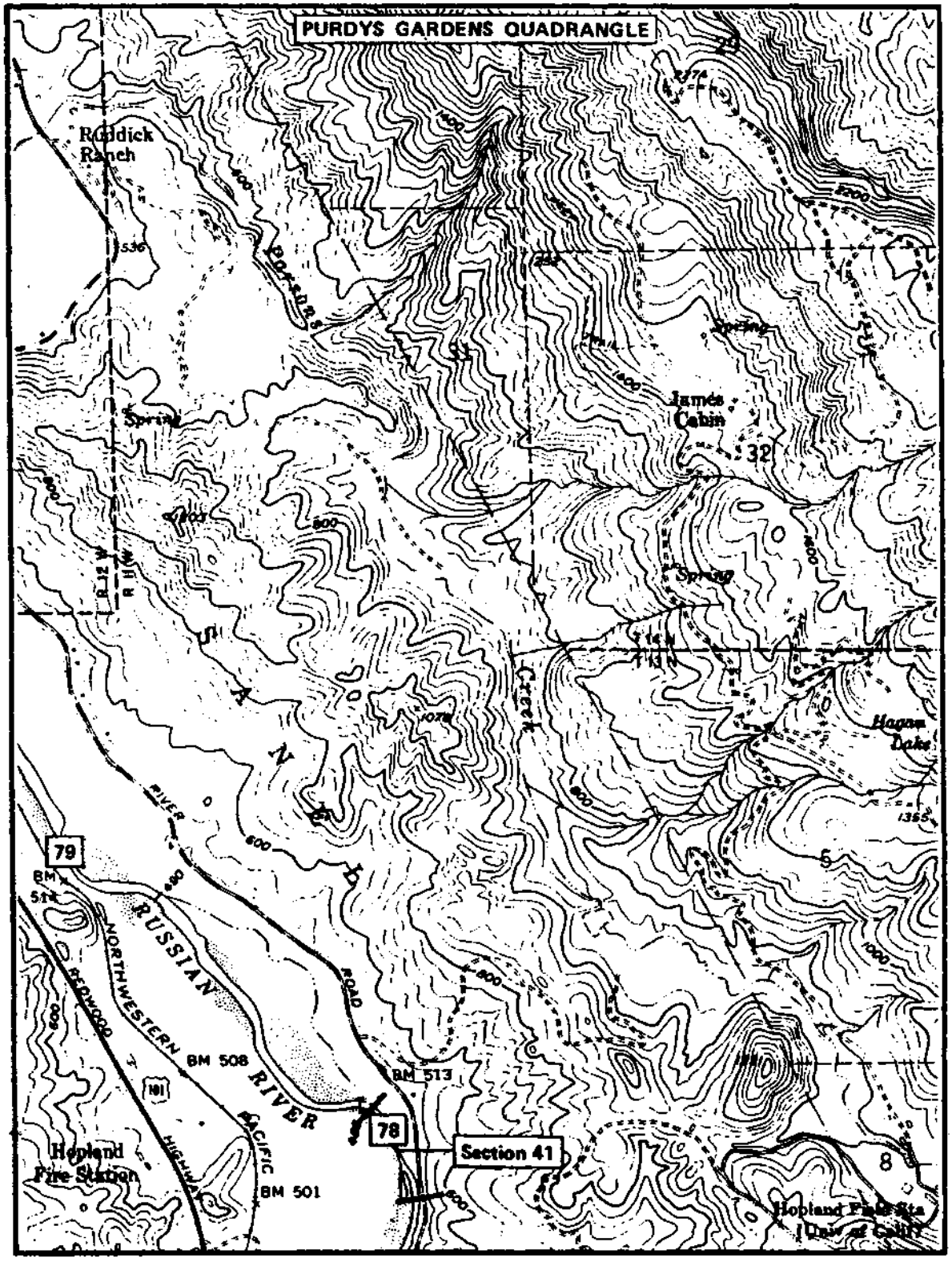
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



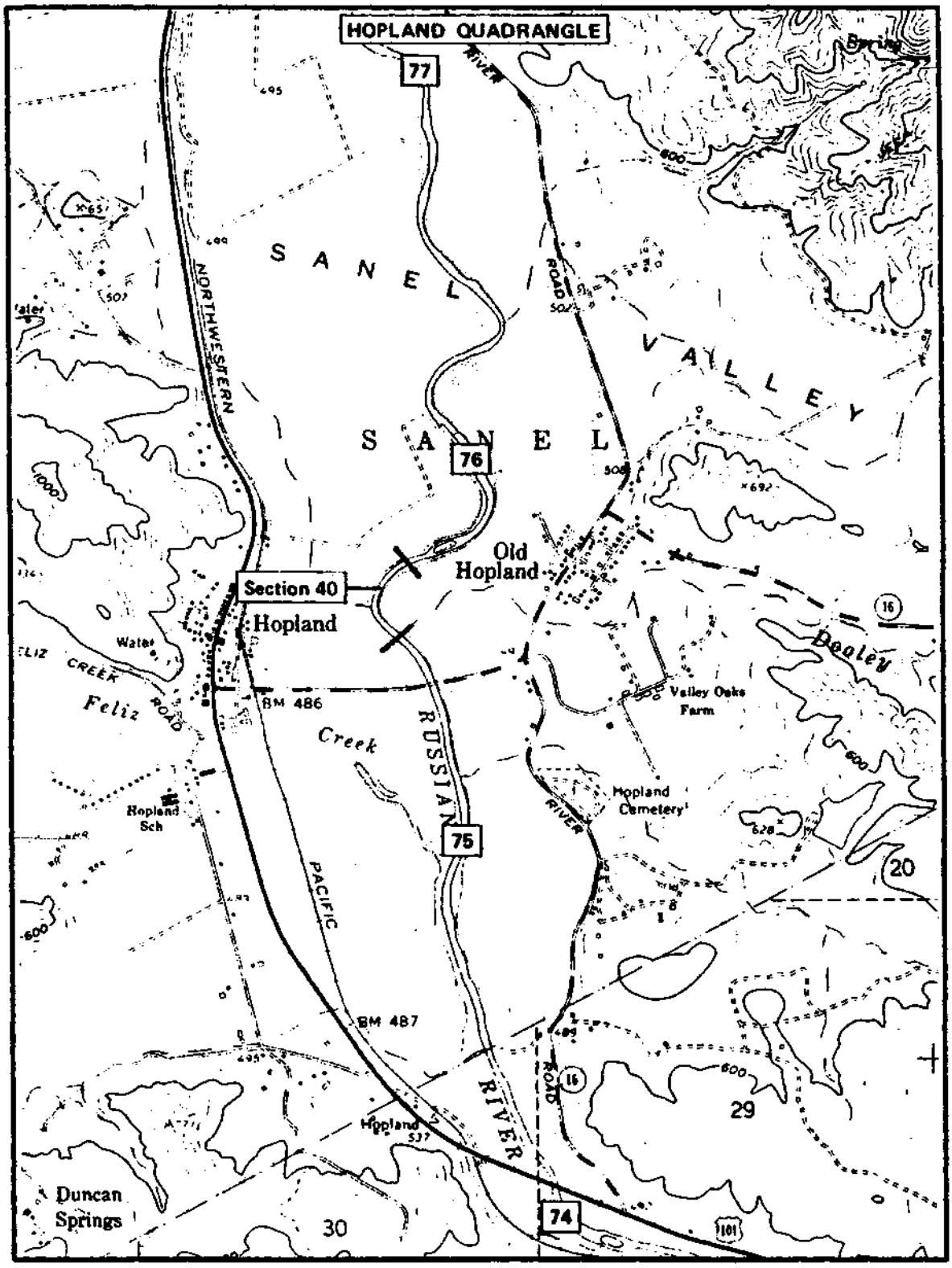
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



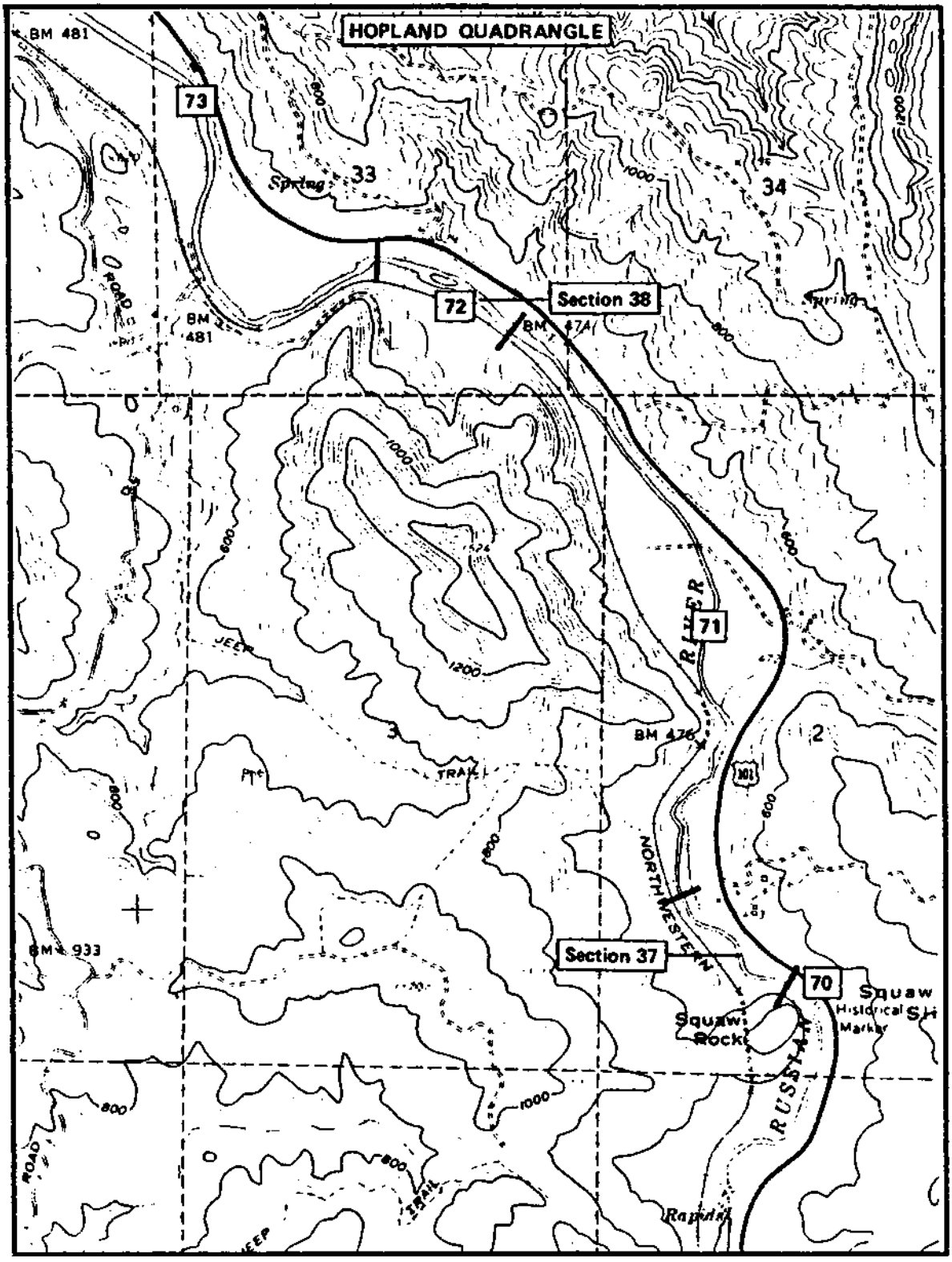
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



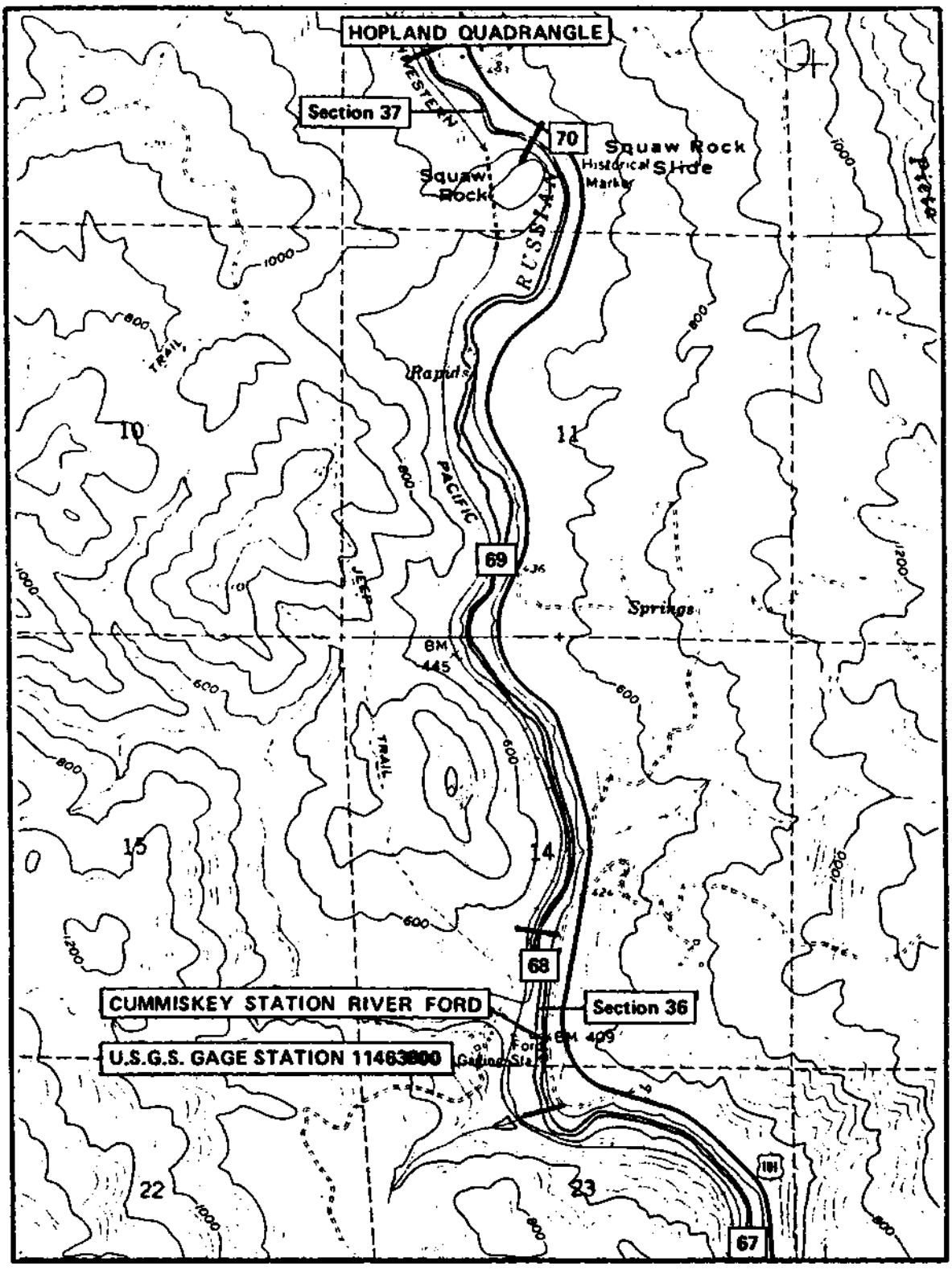
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



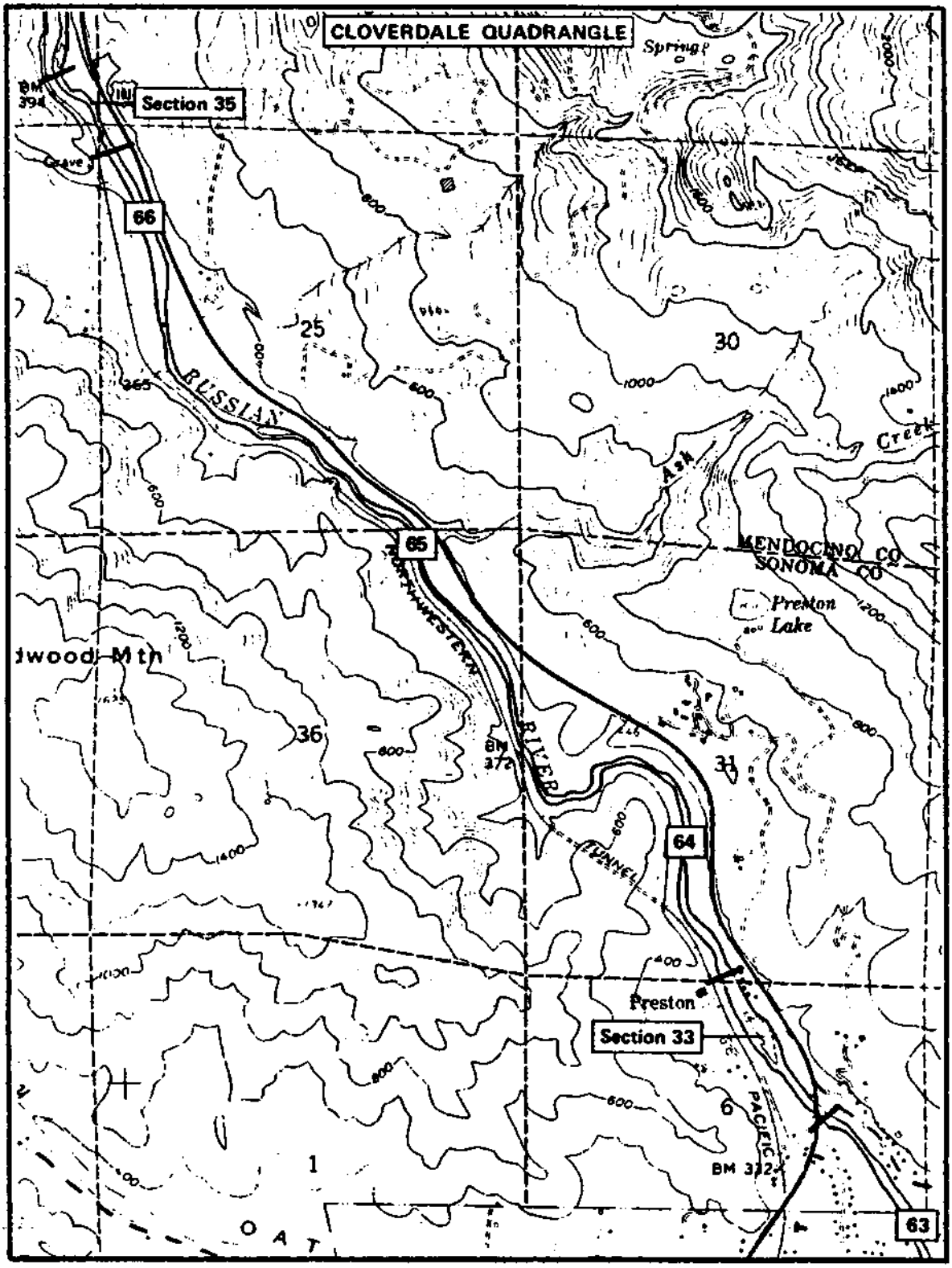
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



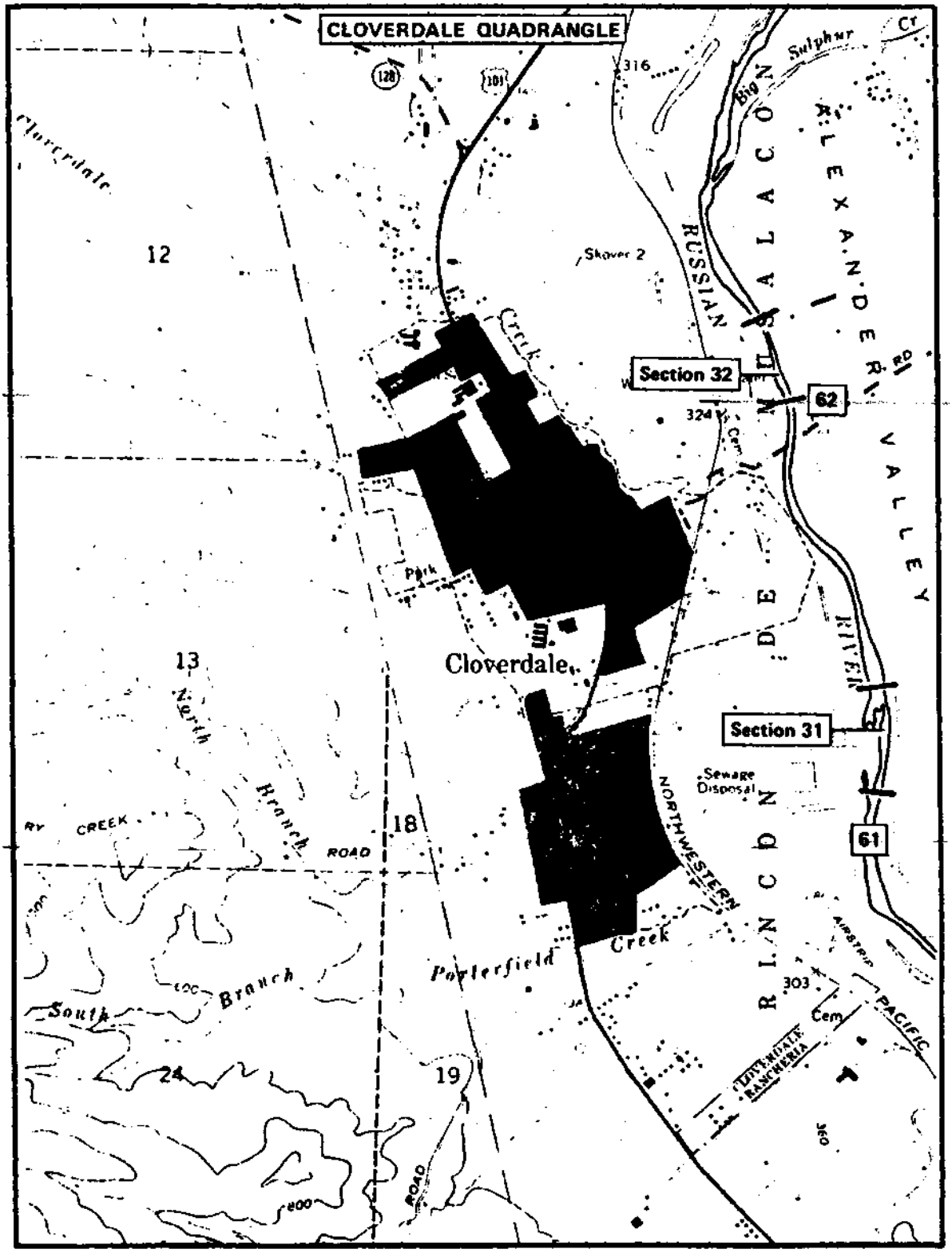
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



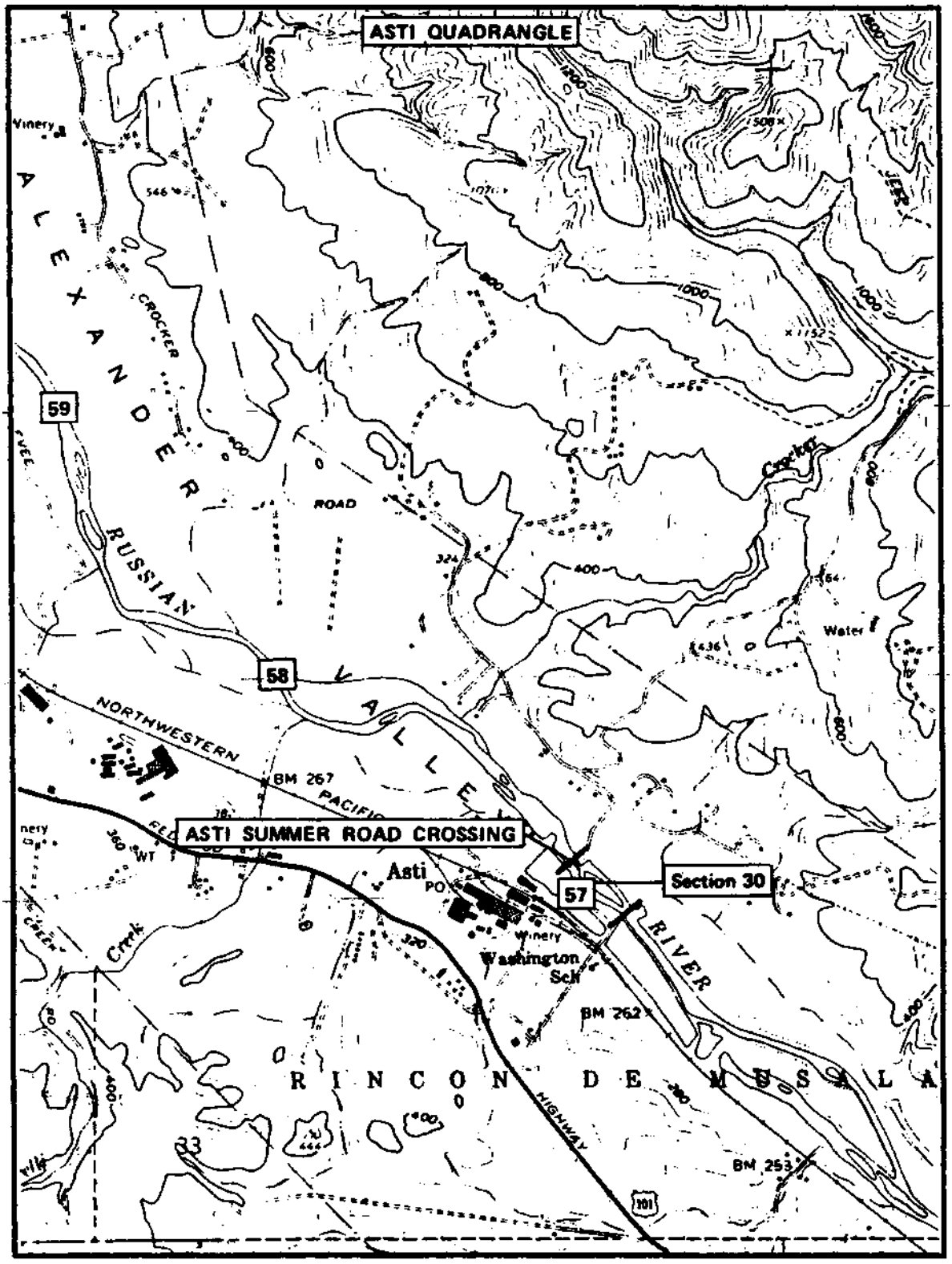
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



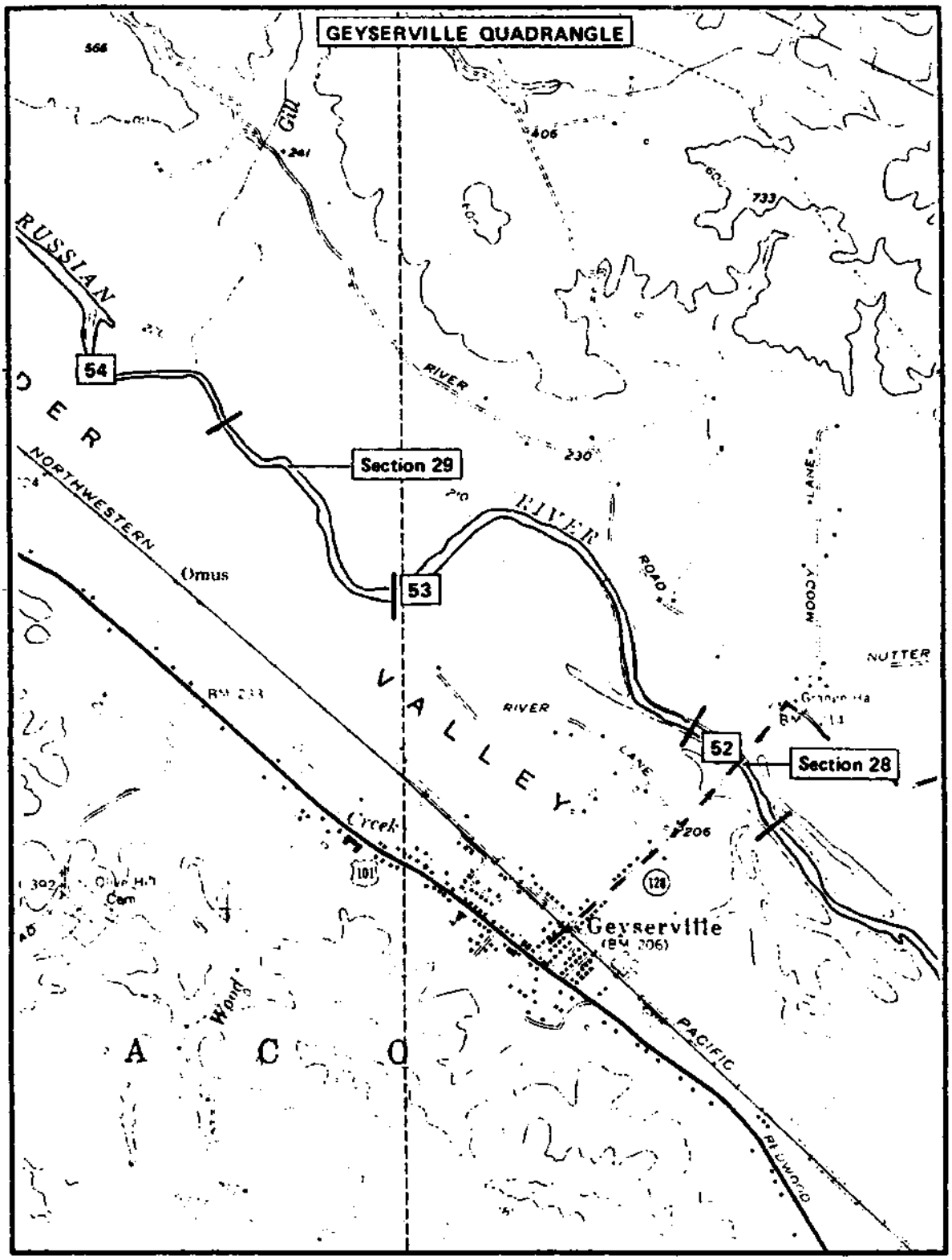
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



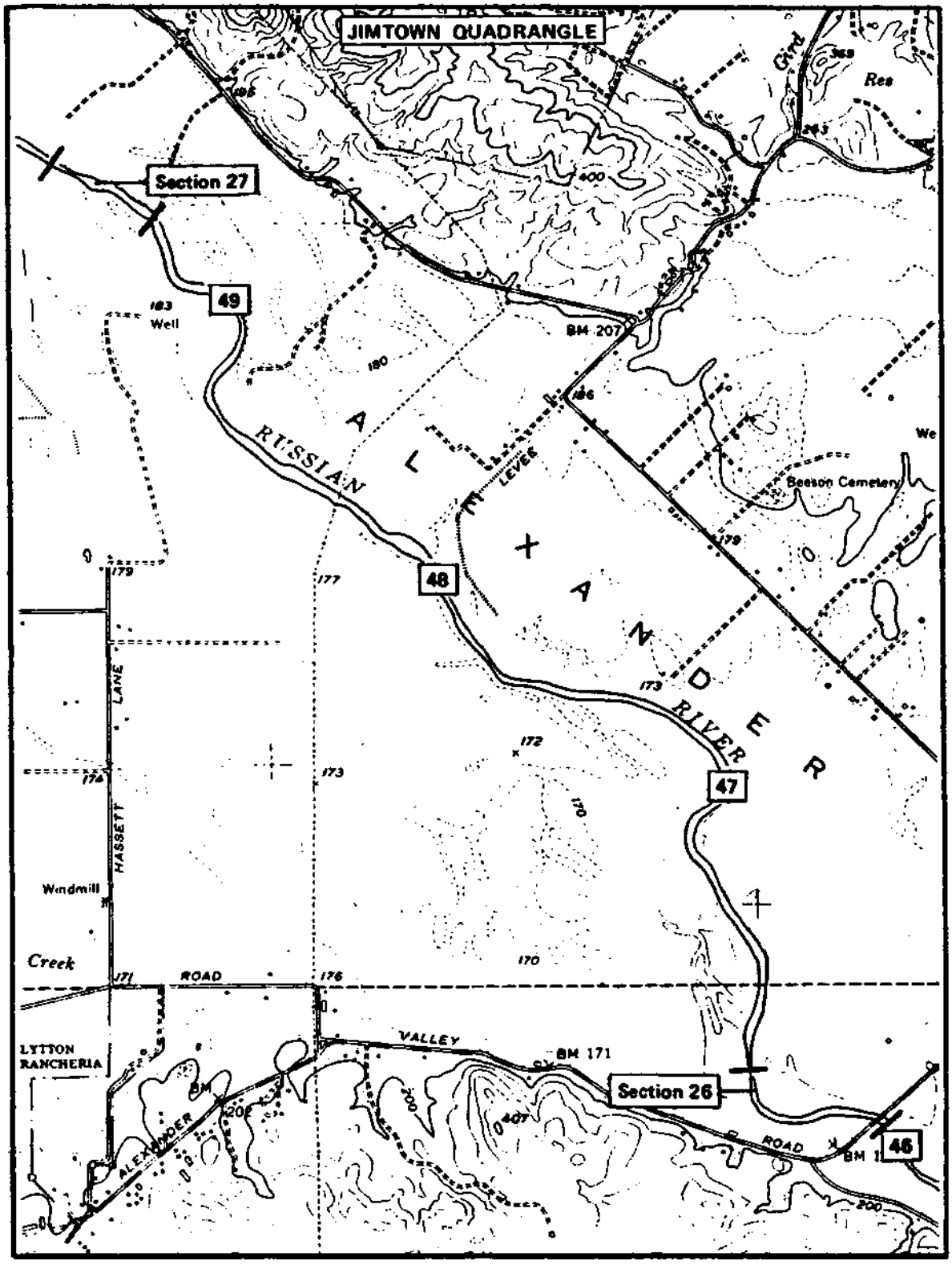
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



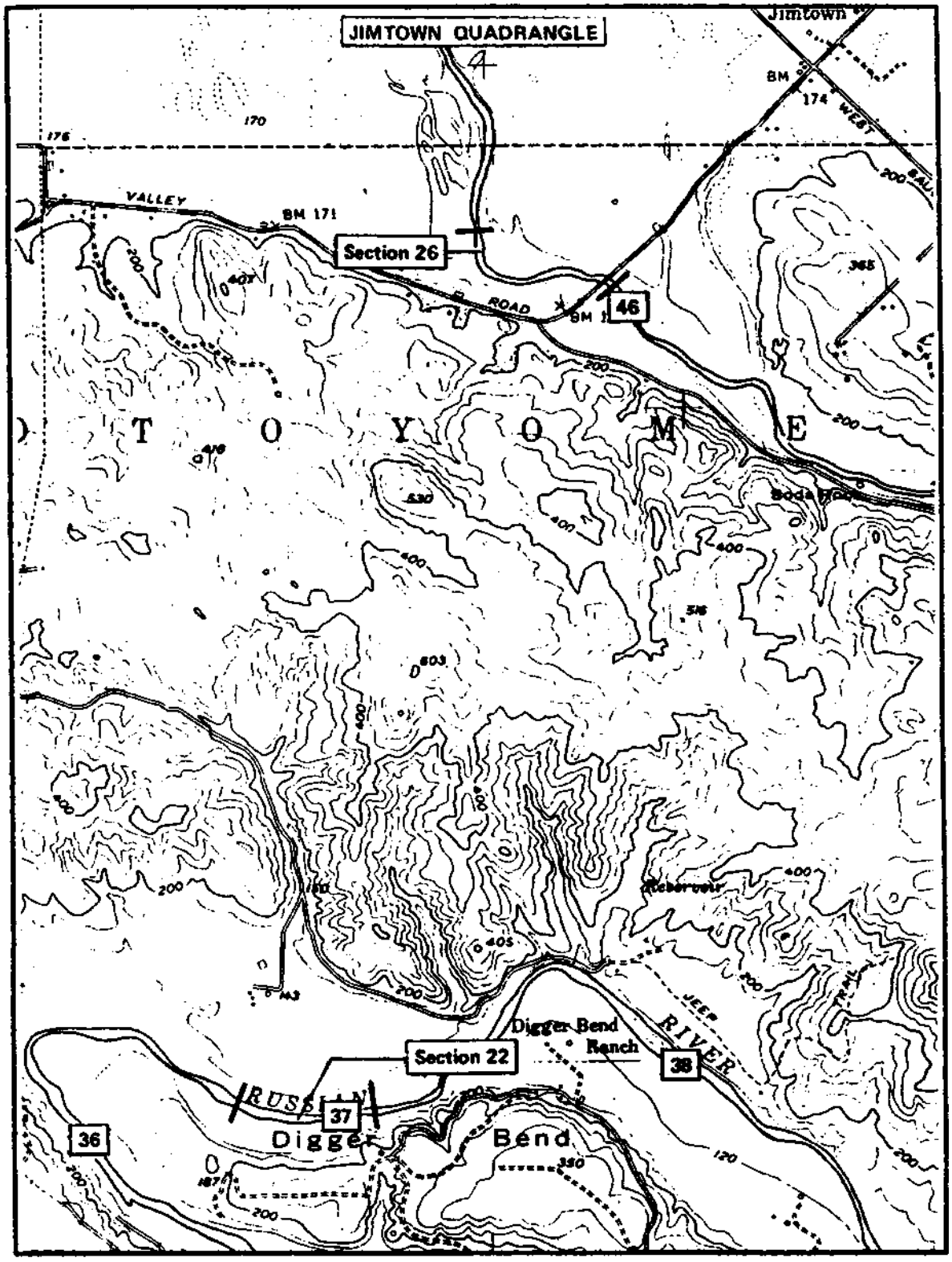
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



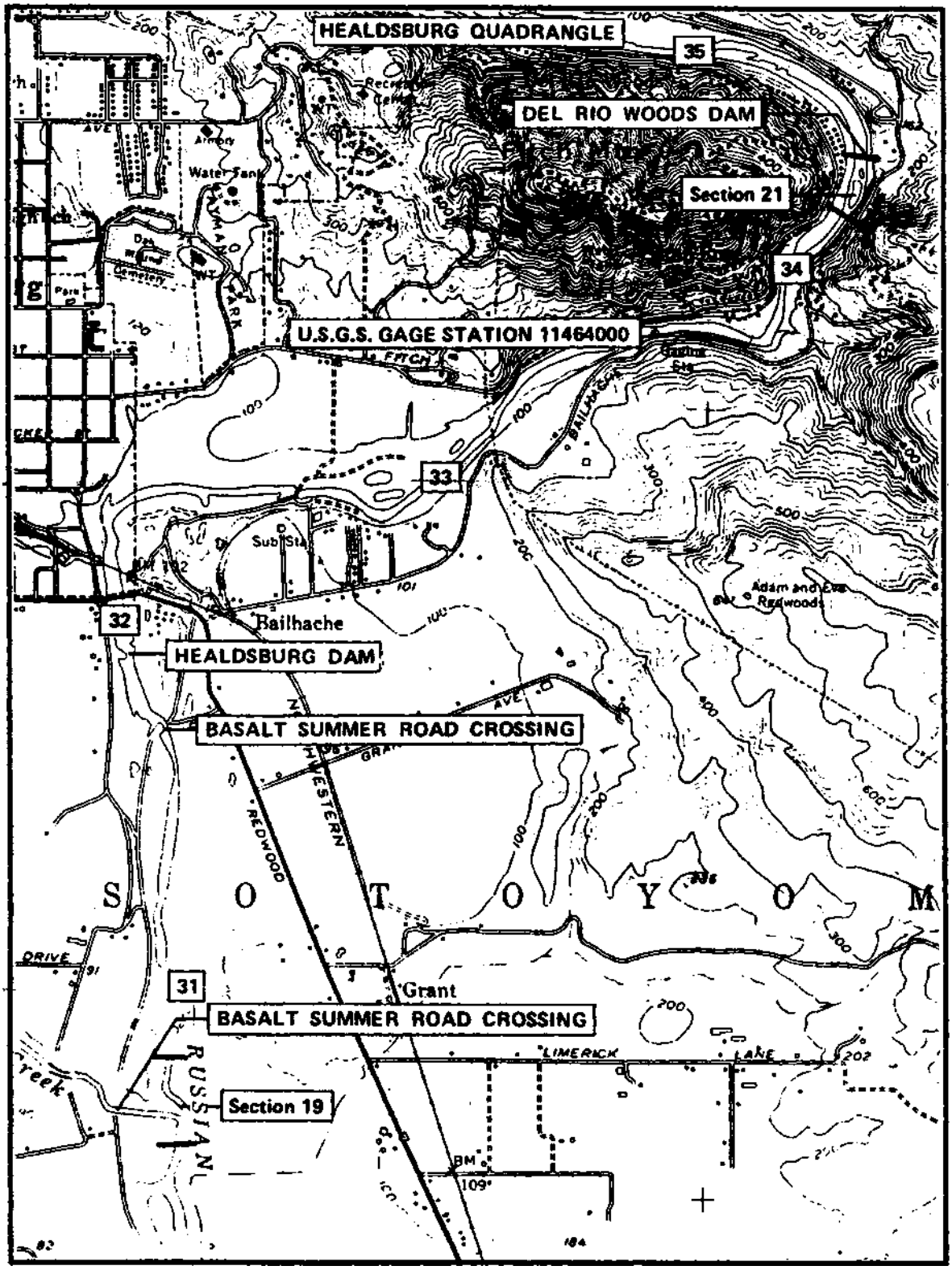
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



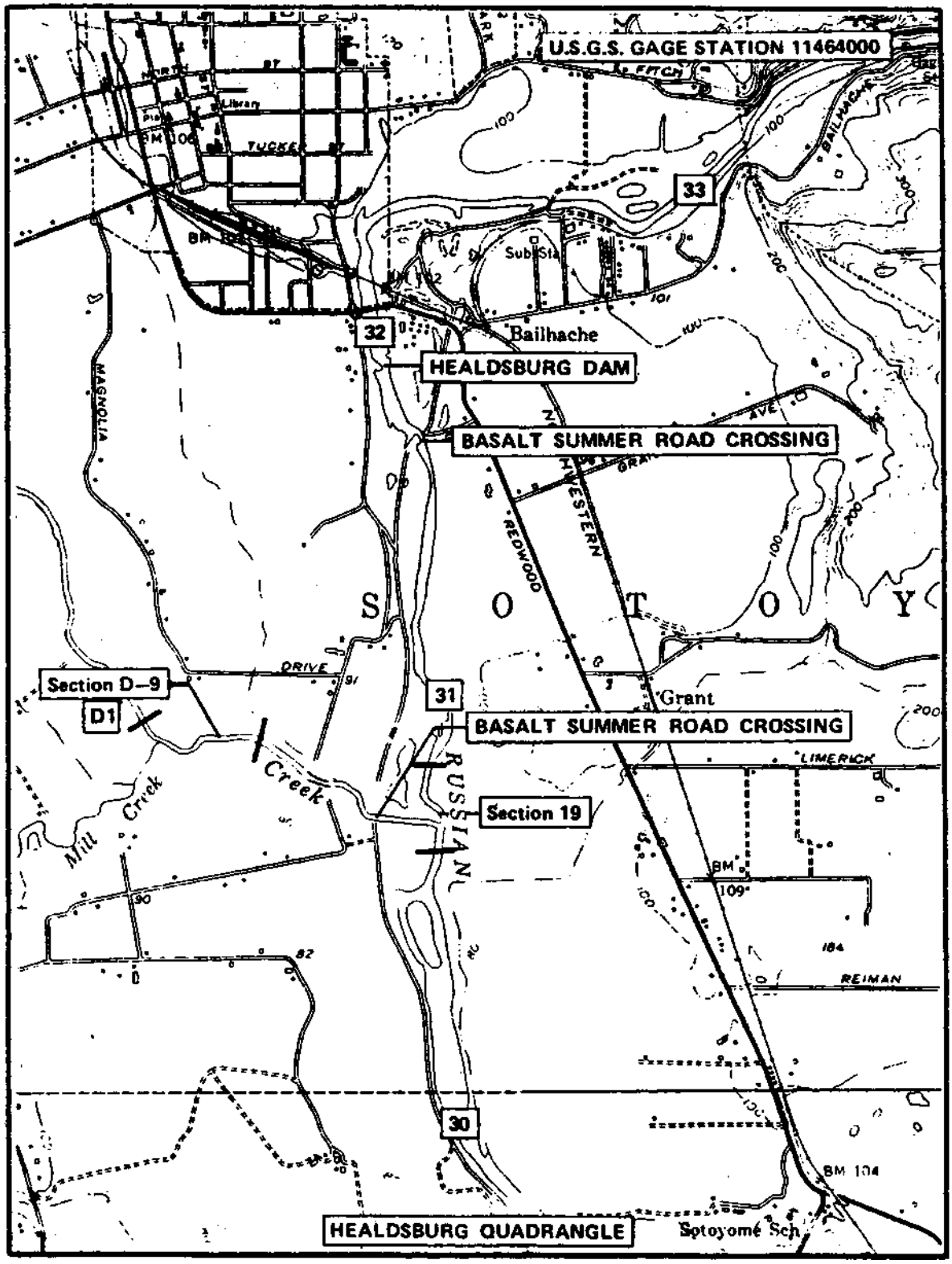
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



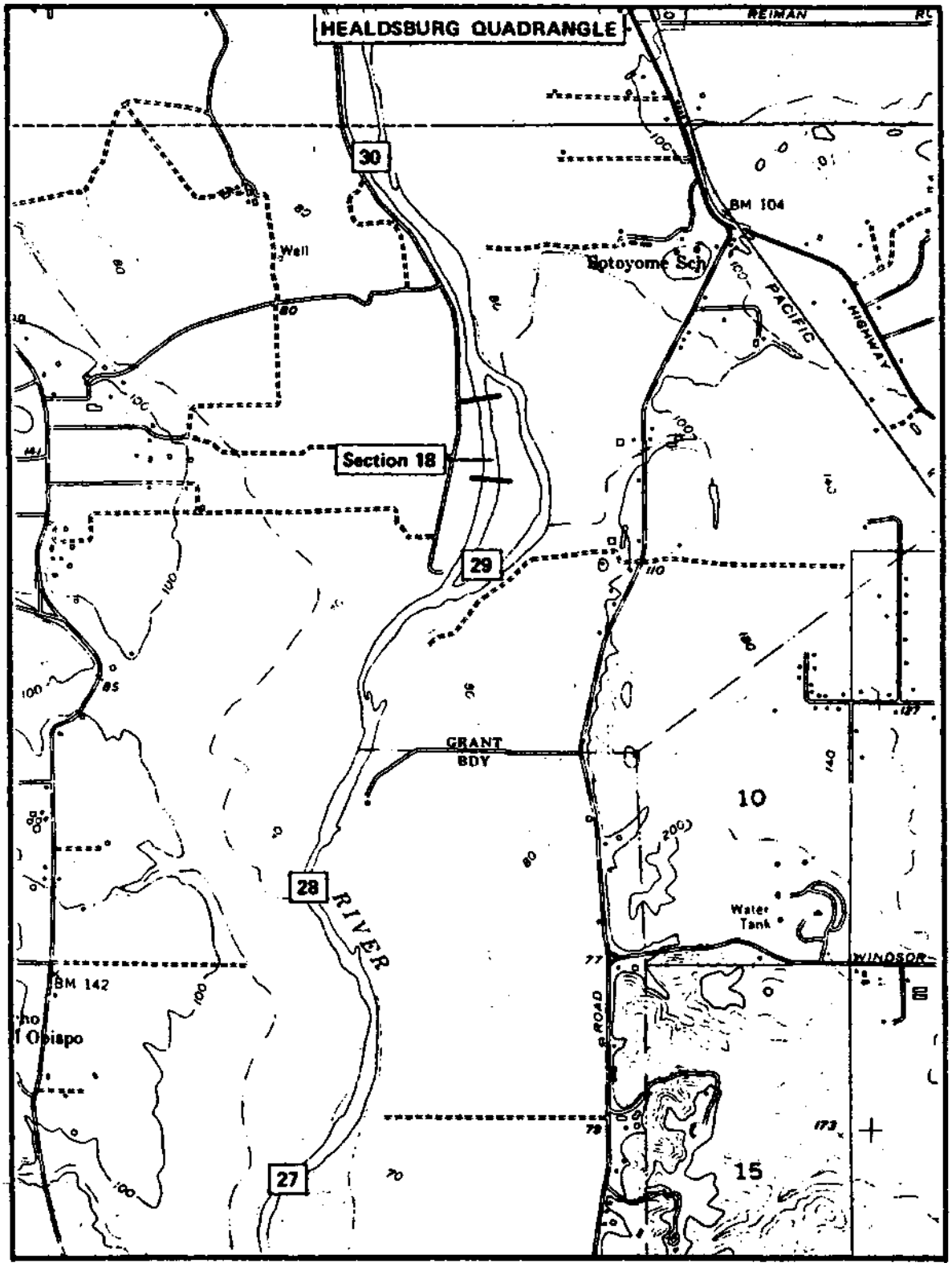
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



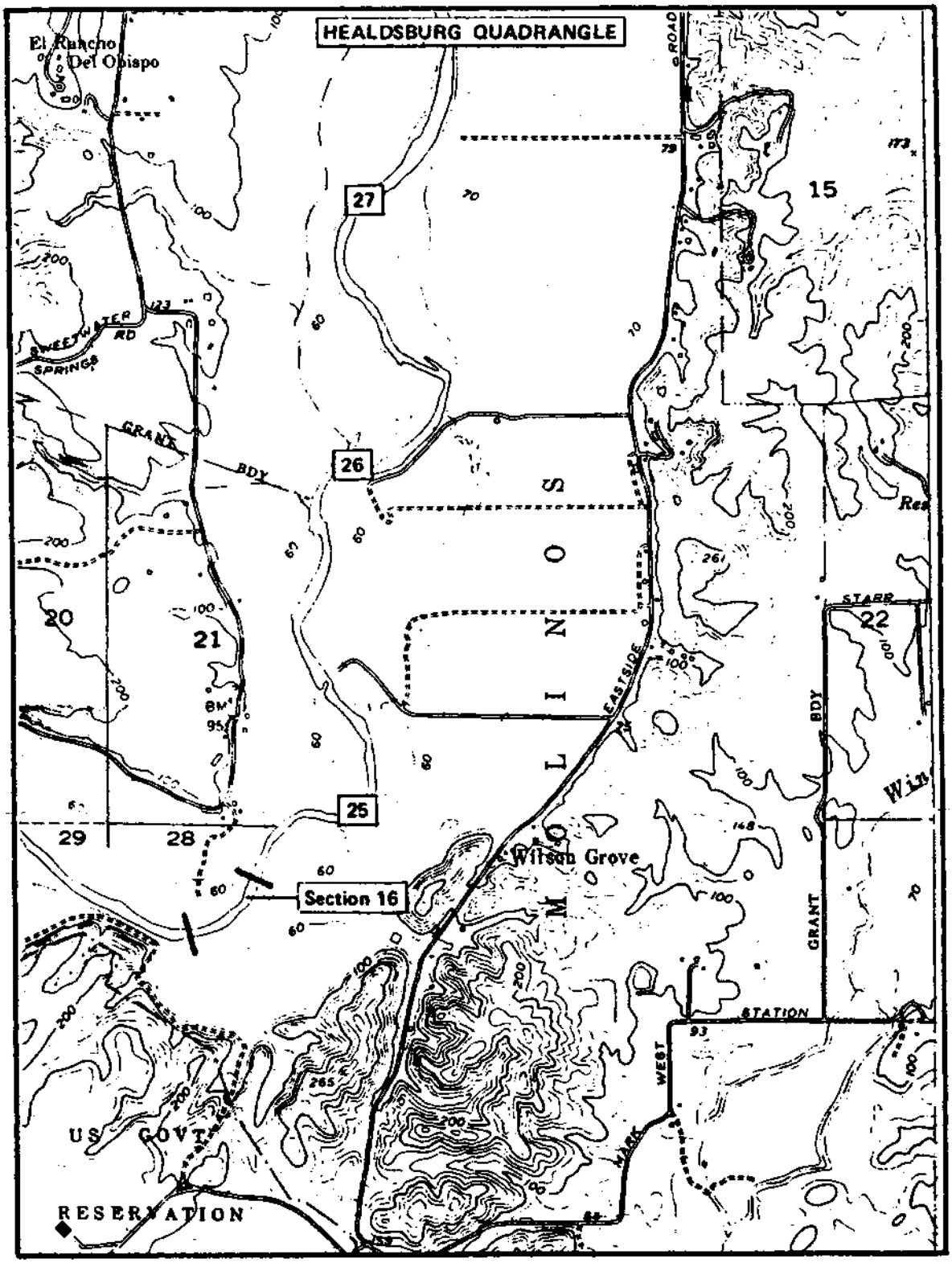
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



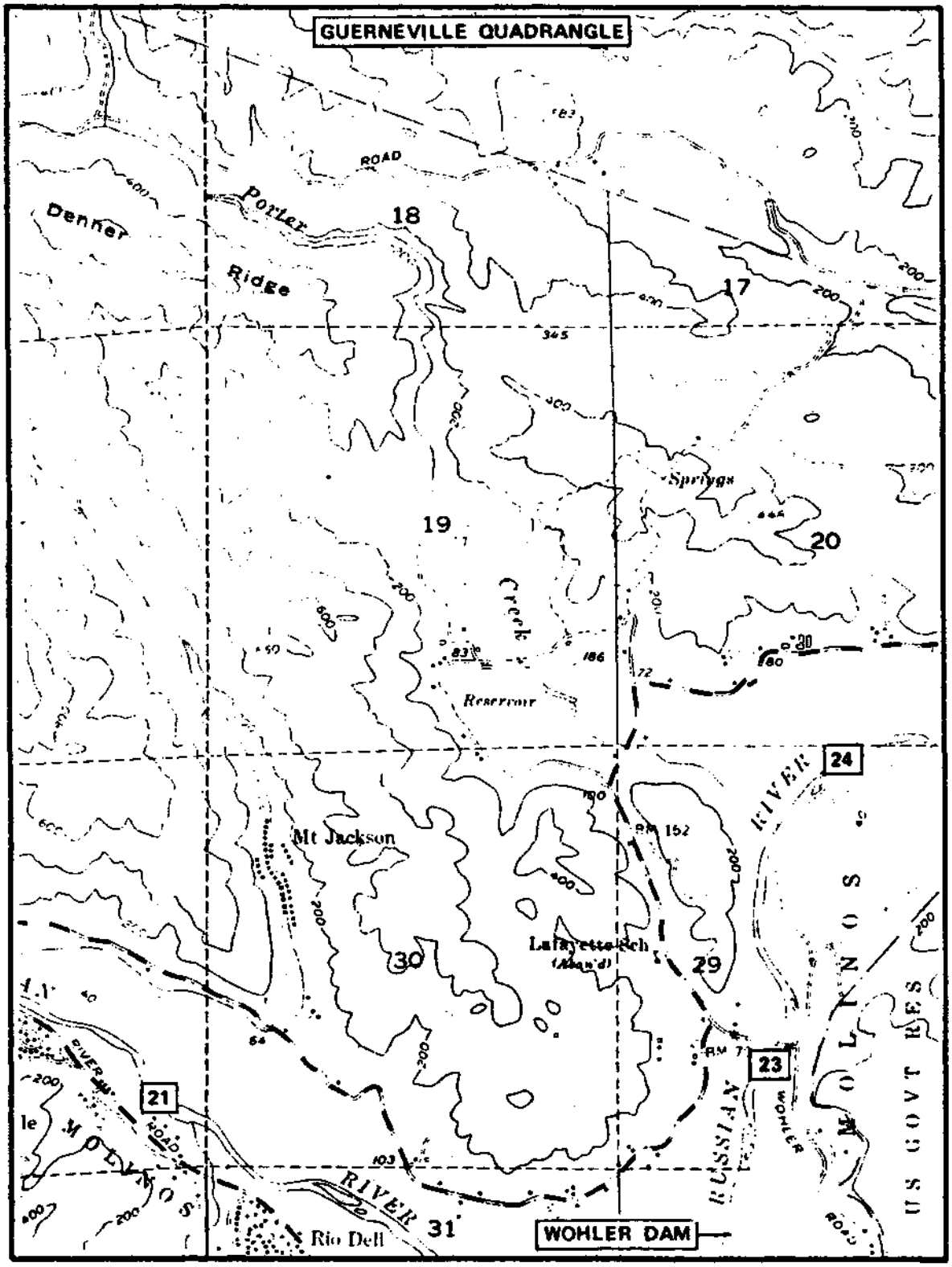
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



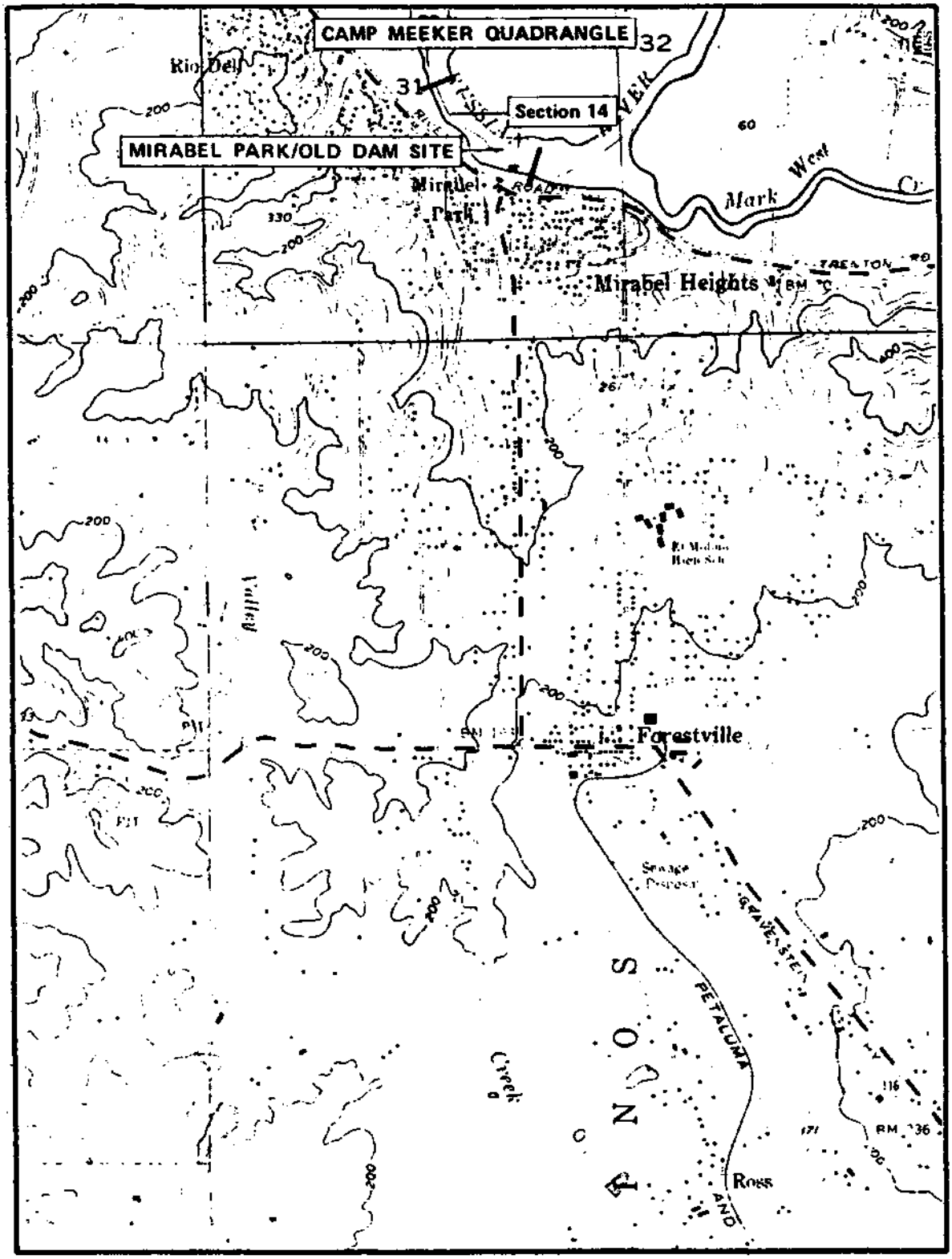
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



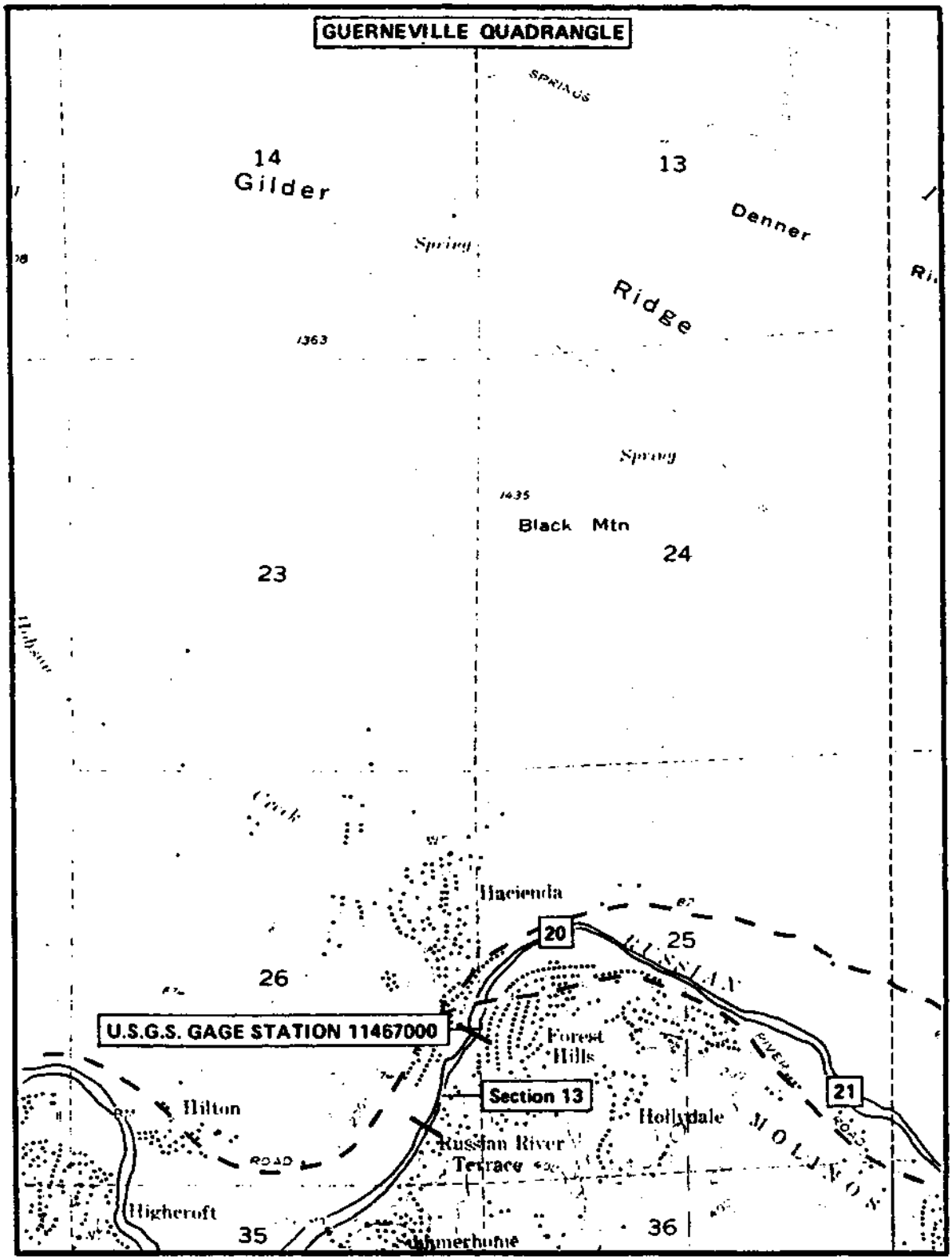
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



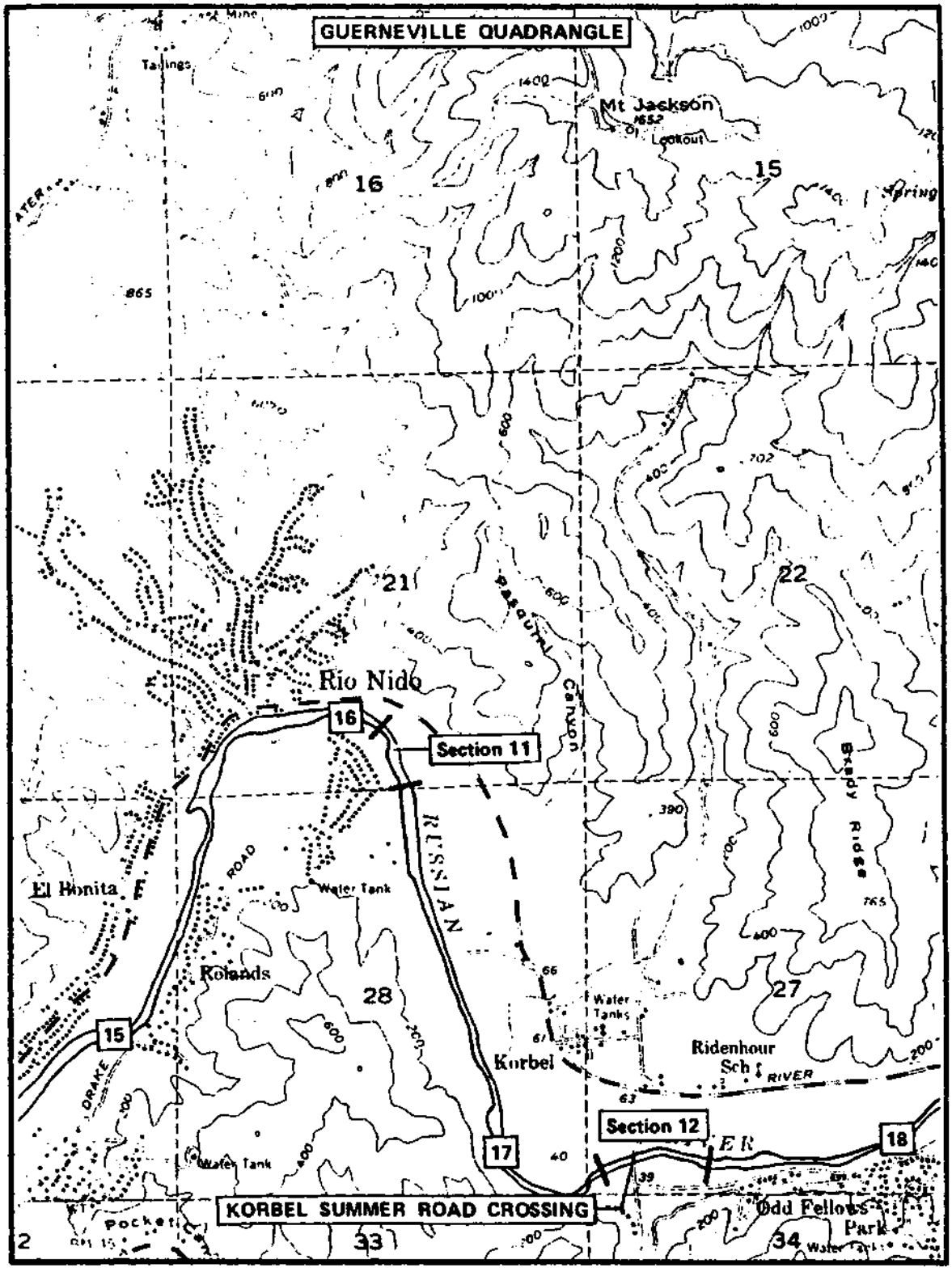
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



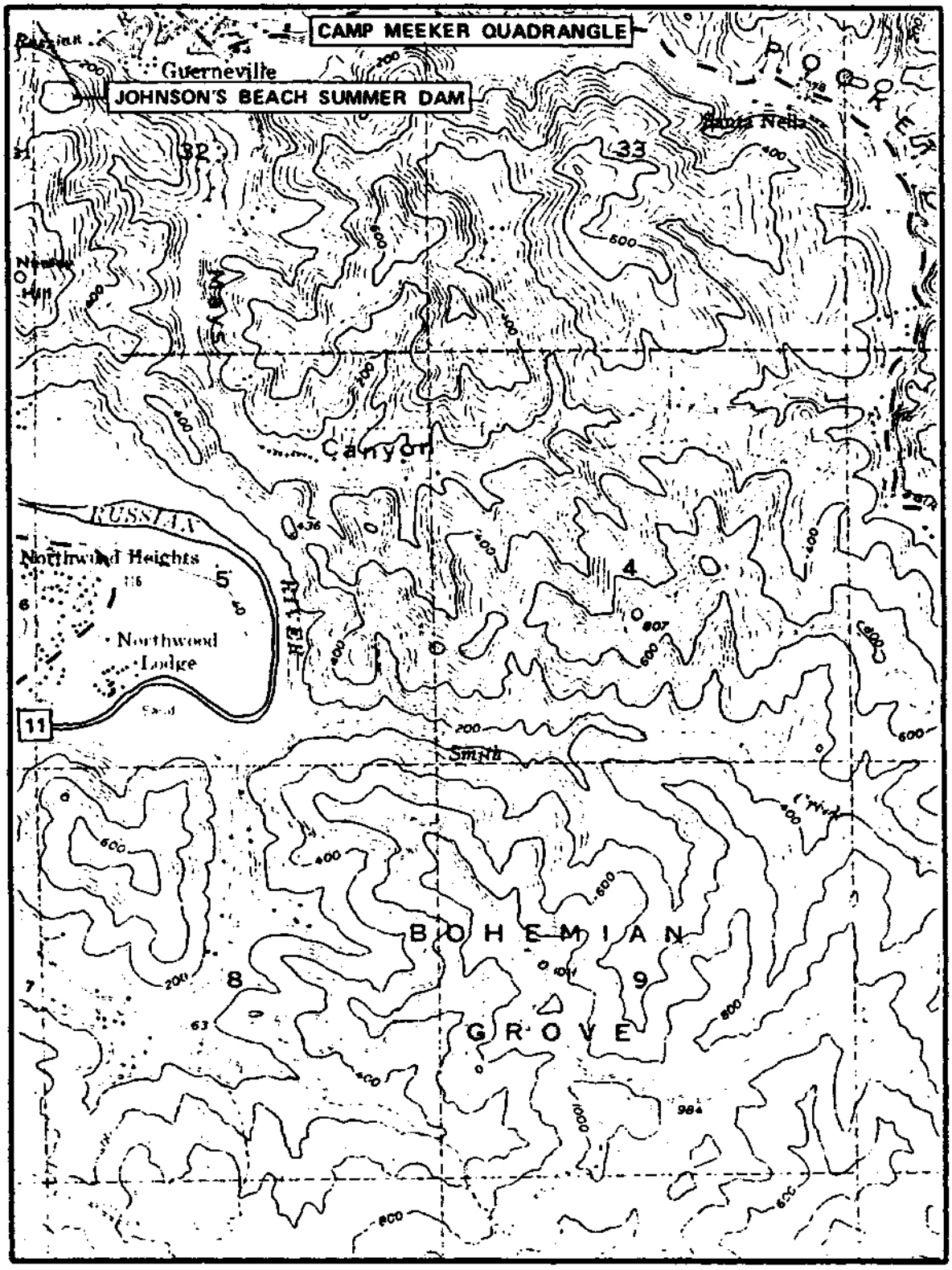
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



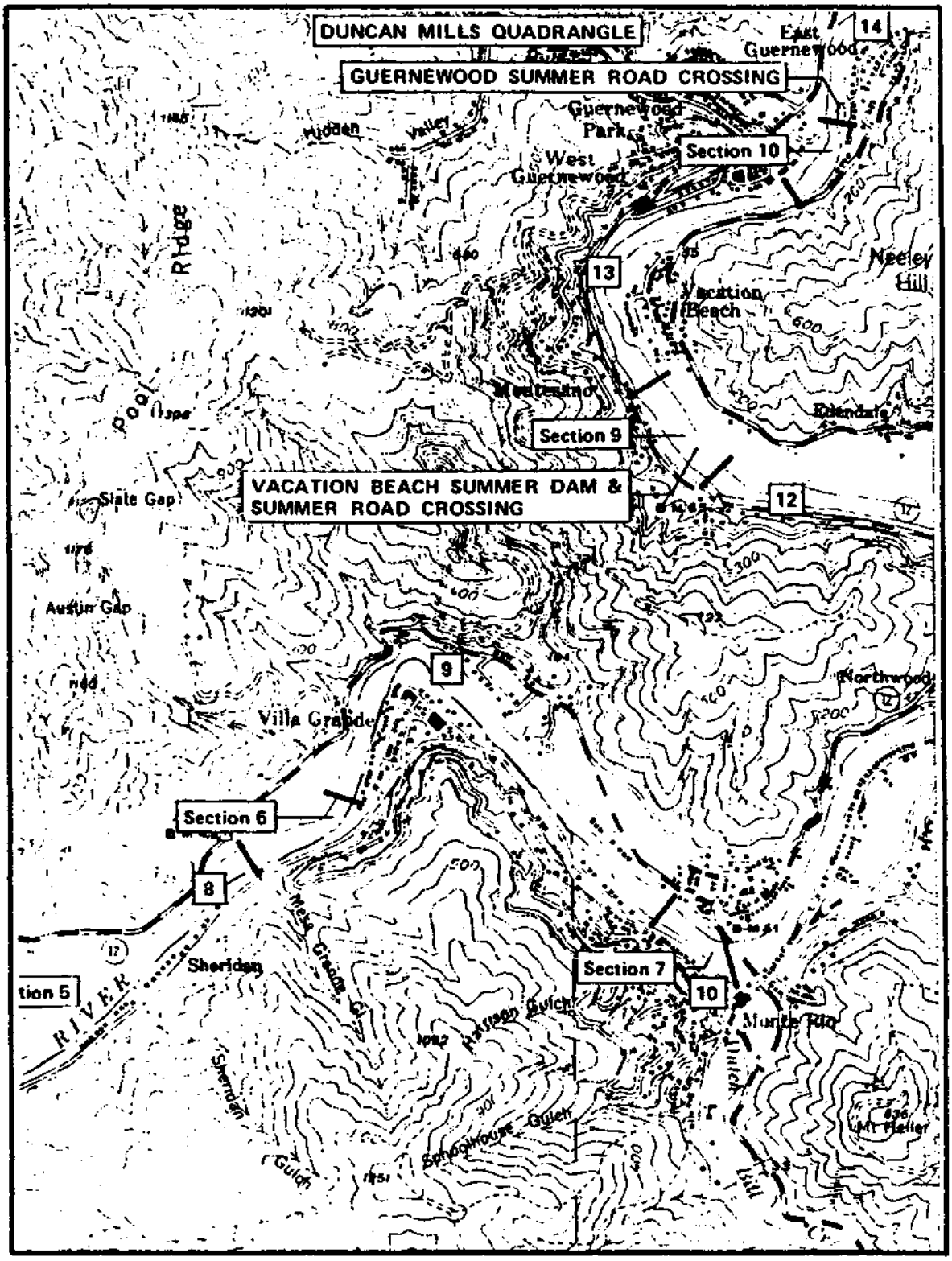
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



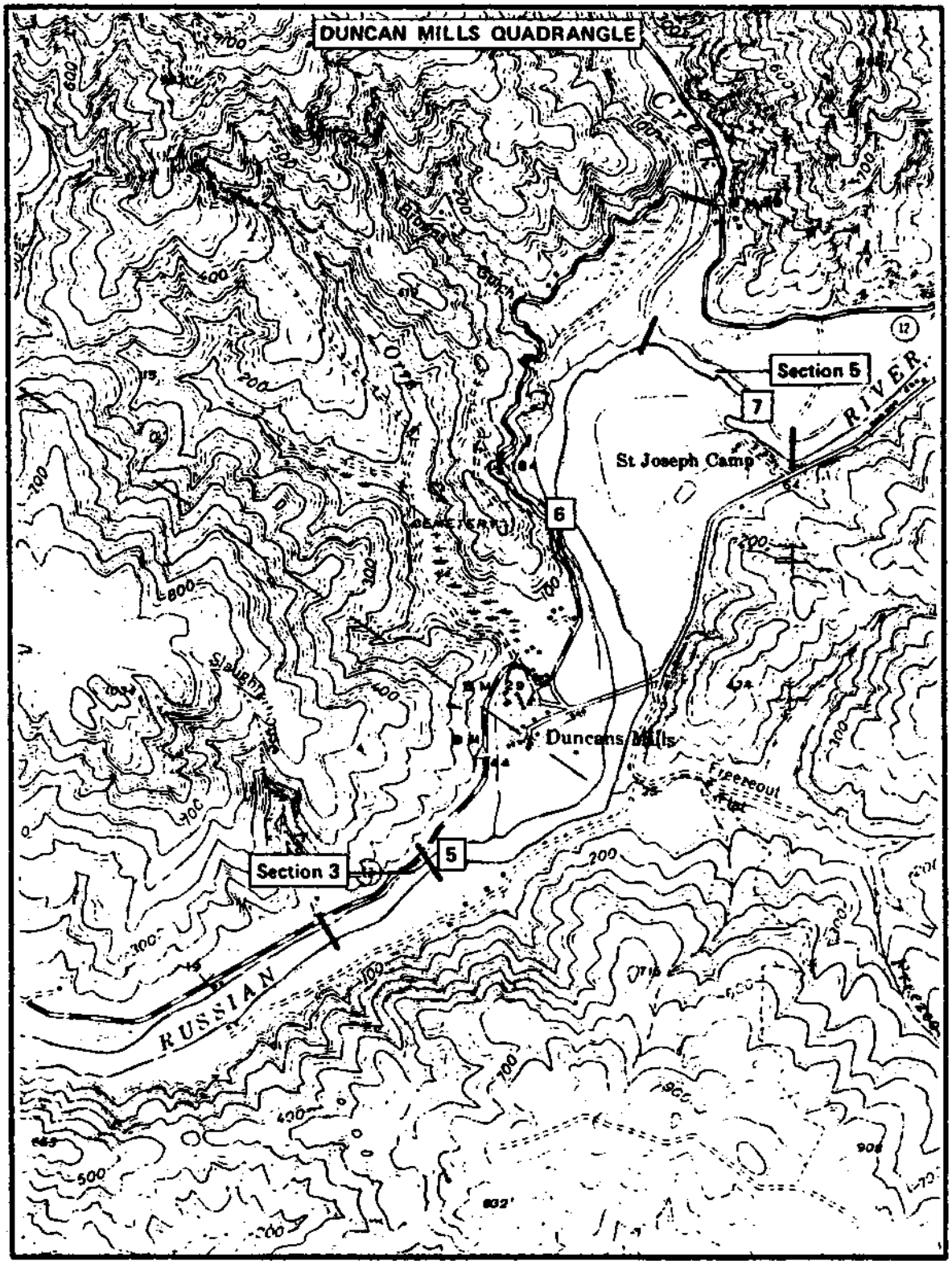
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



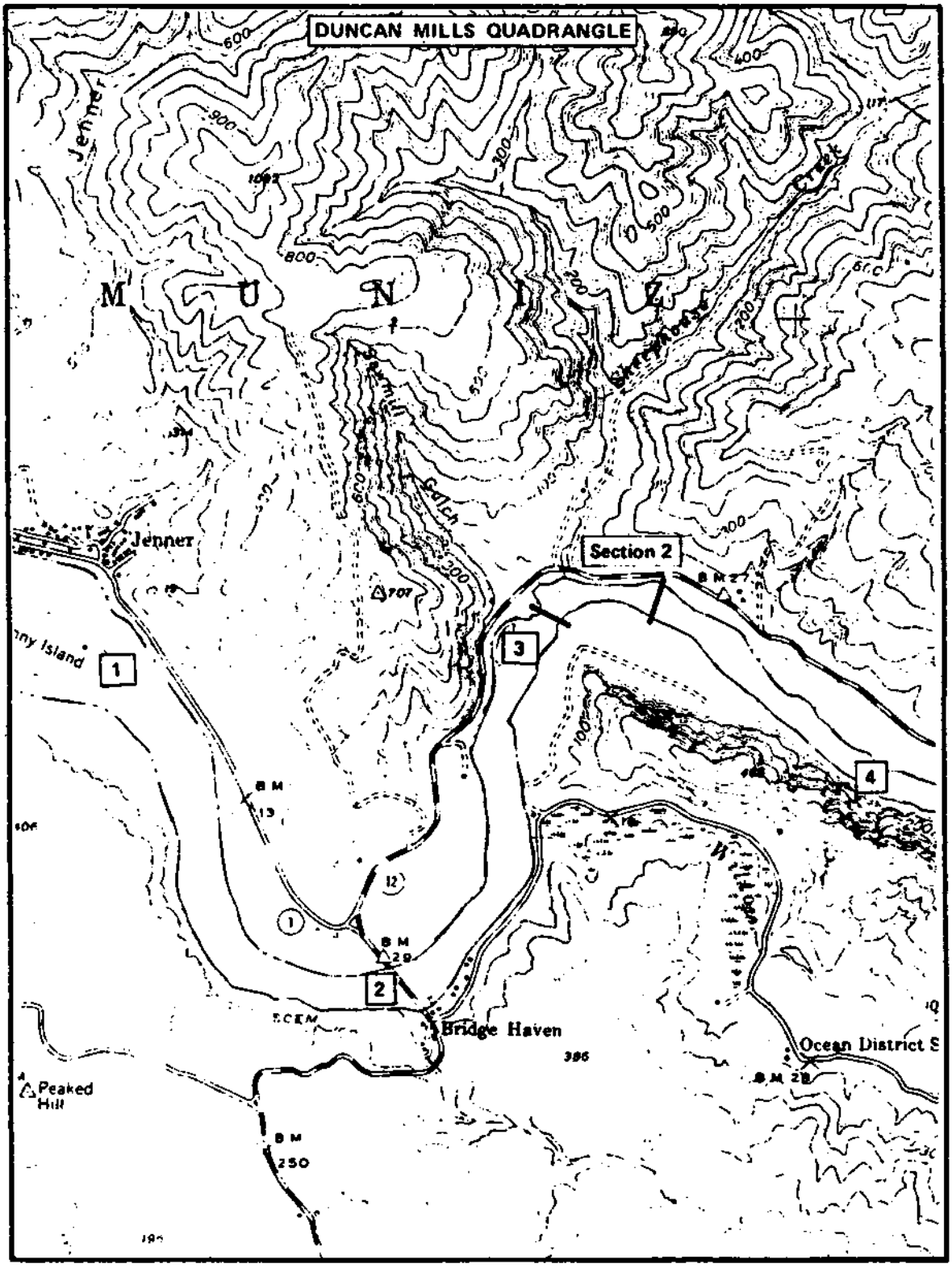
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



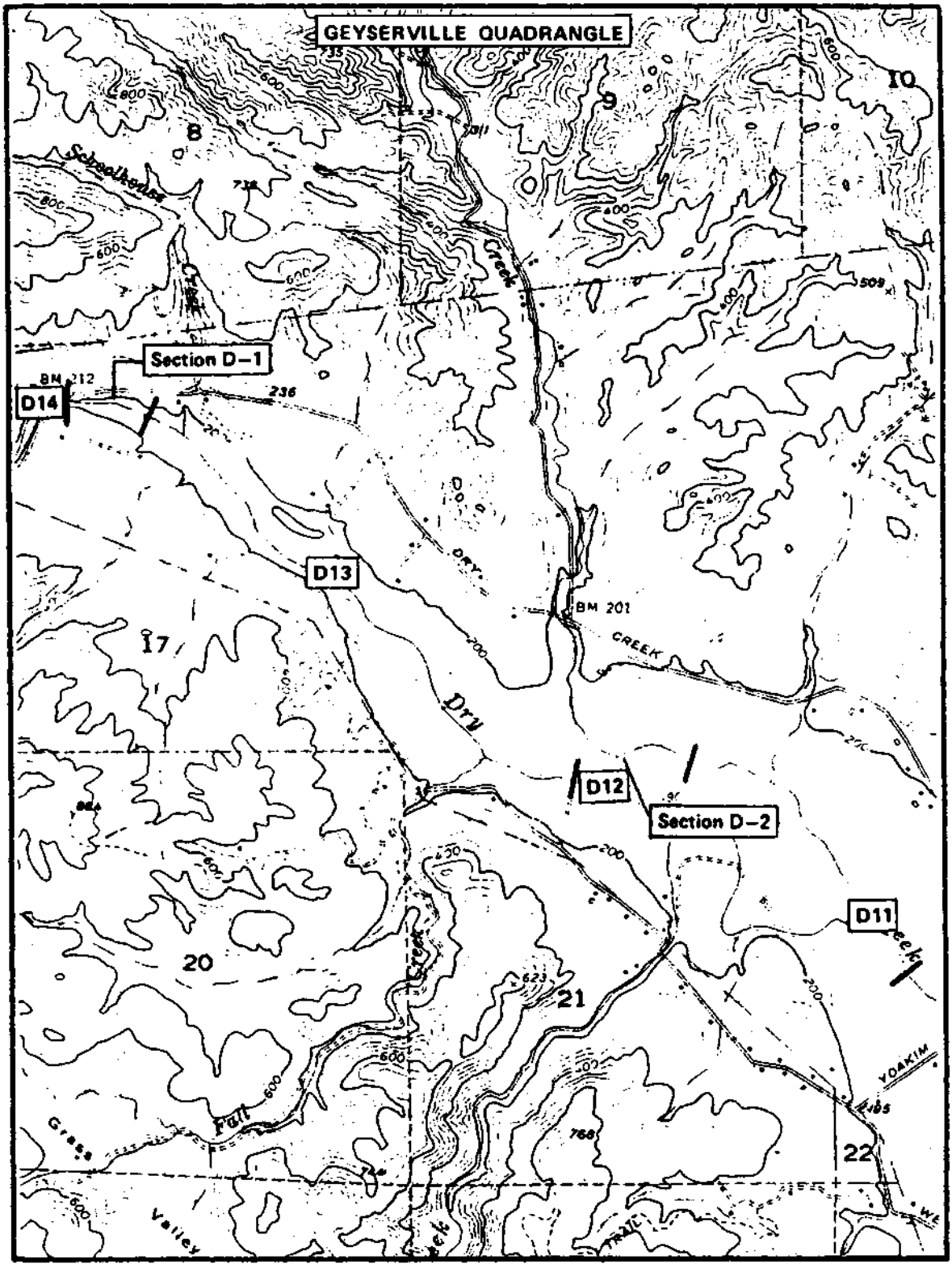
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



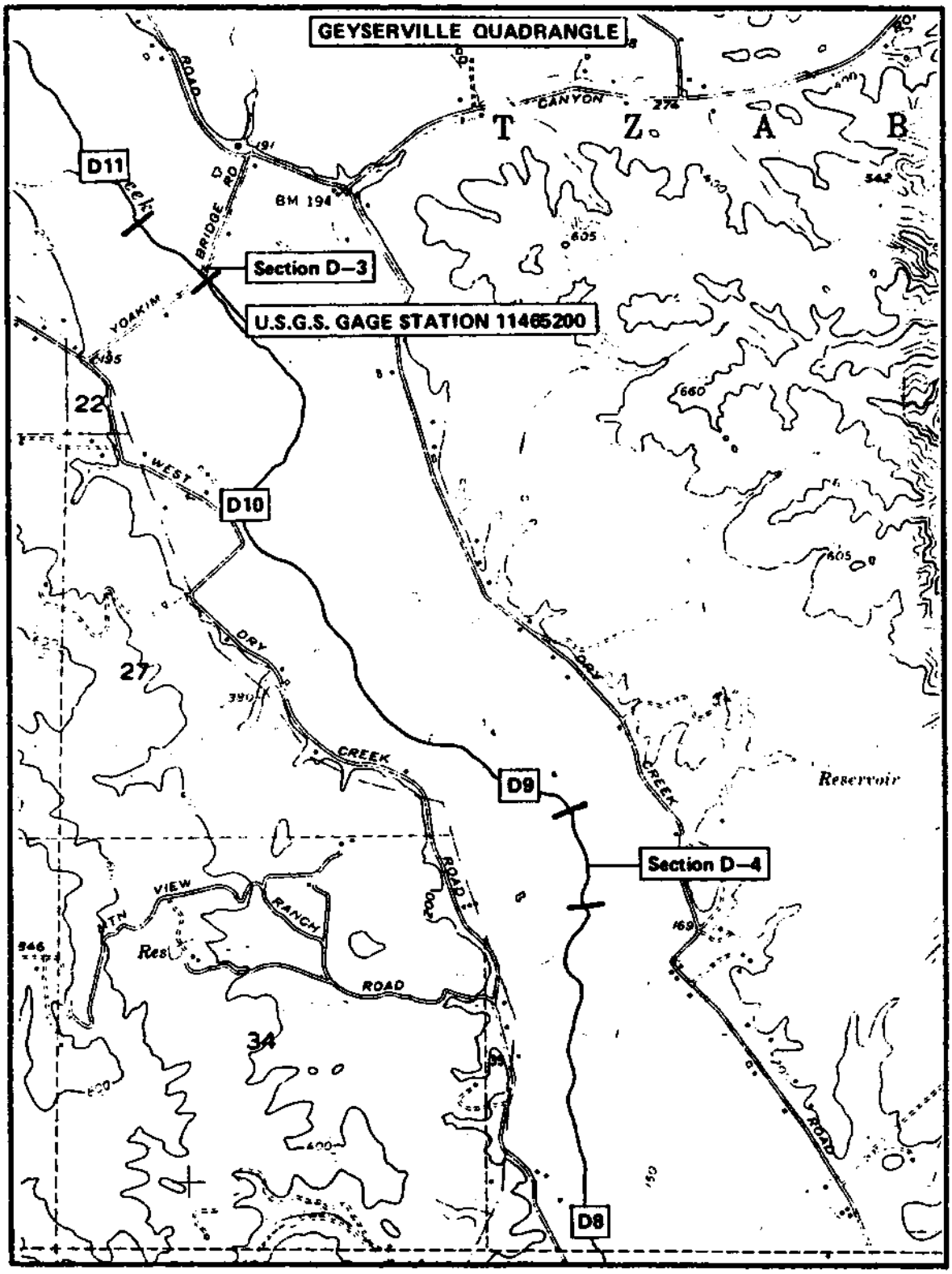
Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek

DRY

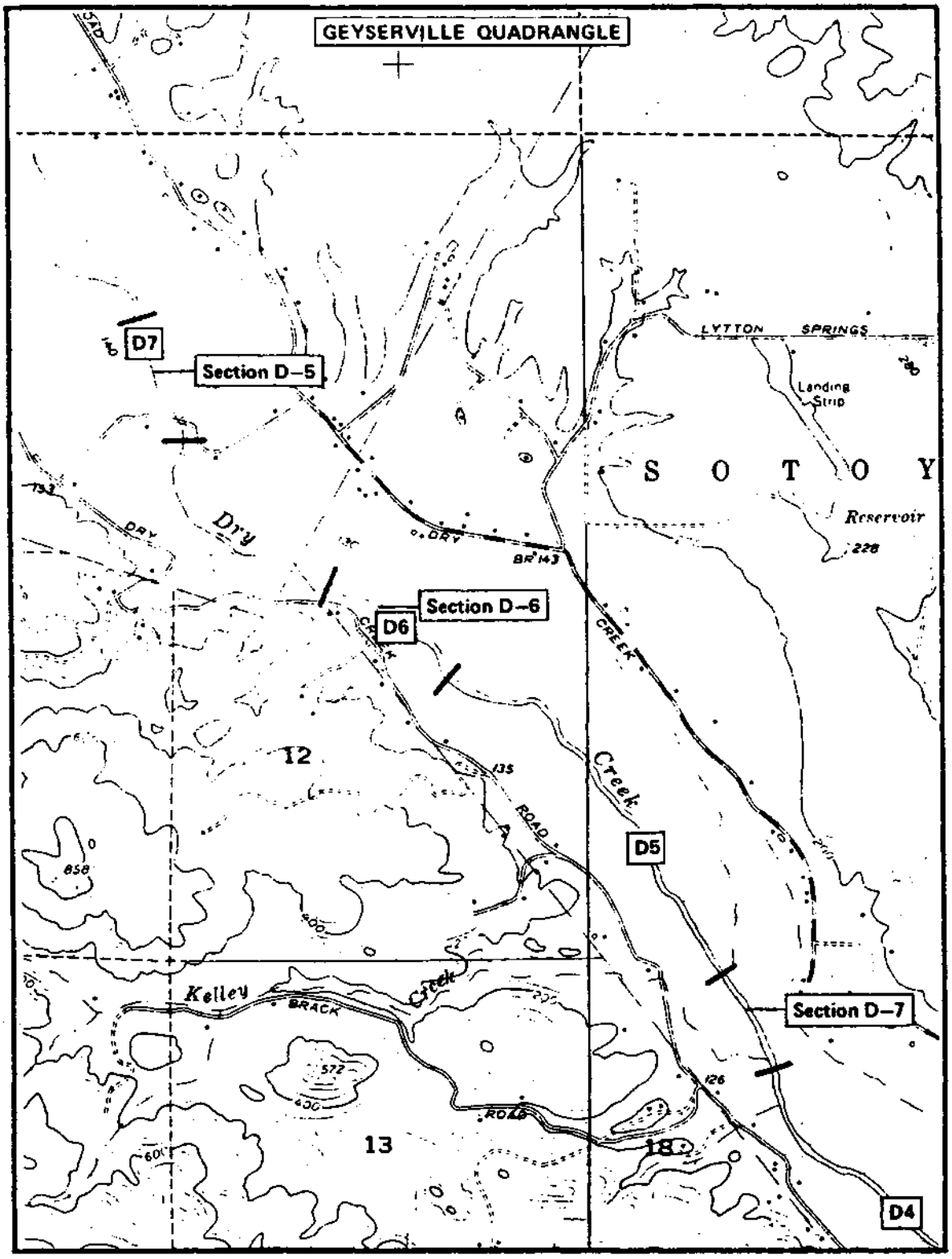
CREEK



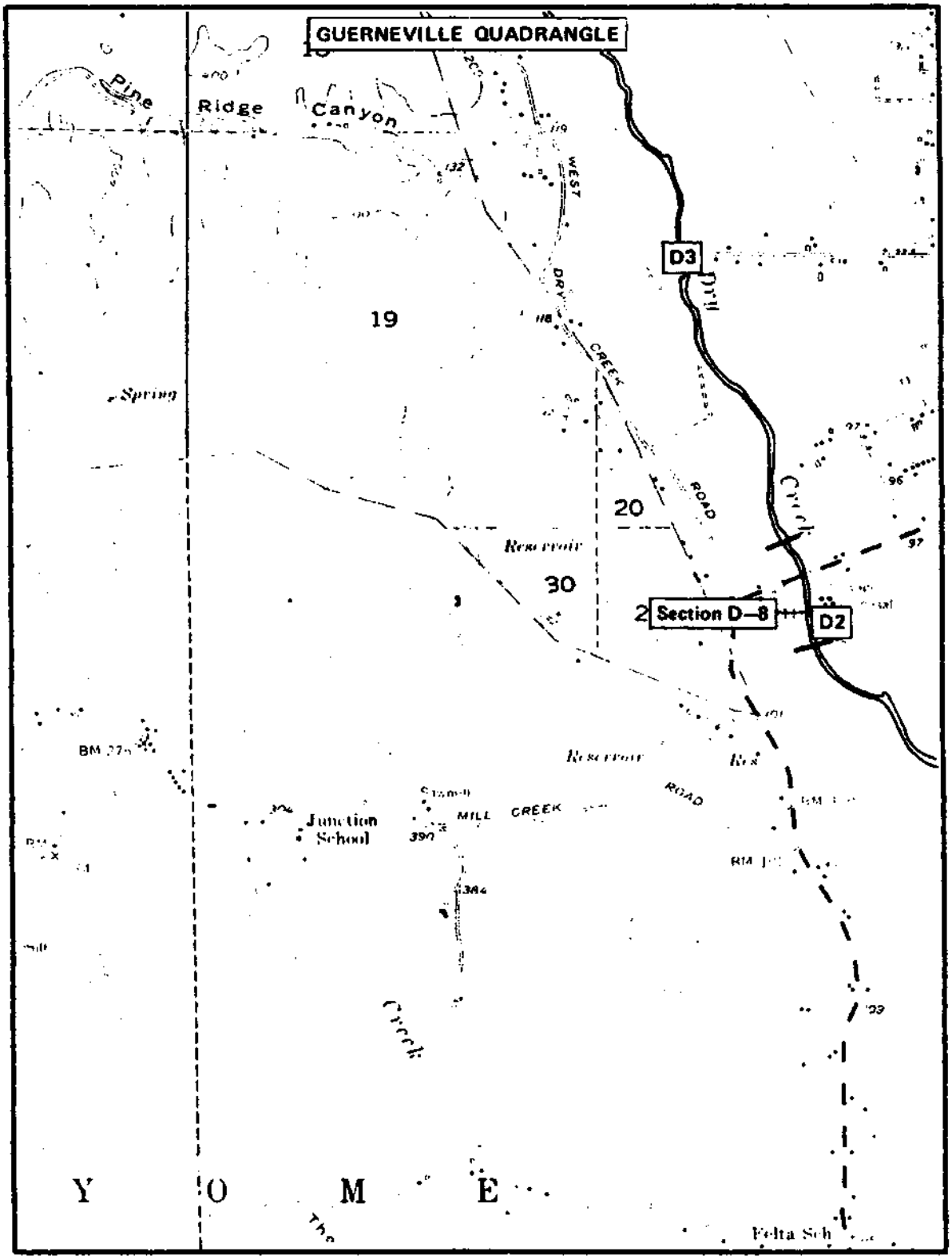
Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



Location of Study Sections, Instream Structures and U.S.G.S. Gage Stations - Russian River and Lower Dry Creek



Location of Study Sections, Instream Structures and
U.S.G.S. Gage Stations - Russian River and Lower Dry Creek

Appendix B

Mainstem Russian River and Lower Dry Creek
Instream Structure Data

Source: Literature Search
Agency Archives Inspection
Field Observations

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE Willow County Water Diversion Dam

LOCATION Russian River Mile 88 (Map Ref. Pg. A-3)

OWNER Willow County Water District

PURPOSE Irrigation and increased flows into well casings

OPERATION Permanent structure

CONSTRUCTION Dam is constructed of rock and slabs of old concrete sidewalks.

FISH PASSAGE East side of spillway is somewhat lower than rest and allows more flow. Migrating fish appear to use this section to a great extent.

REFERENCES California Department of Fish and Game, 1977

Instream Structure Observations and Water Quality
Mainstem

Structure- Willow County Water Diversion Dam
Location- Russian River Mile 88

Date of Observation 5/6/78
Observed Flow (cfs) 325 (estimate)

Cross Channel Width (Feet)	122
Dam Height (Feet)	6.7
Spillway Width (Feet)	106
Spillway Height (Feet)	6.7
Spillway Thickness (Feet)	20.0 (irregular)
Depth of Water over Spillway (Feet)	1.5
Spillway Velocity (Surface)	8.0 FPS
Plunge Pool Depth (Feet)	N/A
Maximum Depth Behind Dam (Feet)	N/A

Jumping Distance (vertical-water surface at spillway to water surface below spillway) 5.5 ft

Water Quality Information	Upstream	Downstream
Turbidity (NTU)		
Dissolved Oxygen (ppm)		
Temperature (°C) at Time of Day Taken		

Water quality data on 7/17/78 data form

Water Quality Information at Structure	Surface	Mid-depth	Bottom
Turbidity (NTU)			
Dissolved Oxygen (ppm)			
Temperature (°C) at Time of Day Taken			

Transparency (Feet)

Instream Structure Observations and Water Quality
Mainstem

Structure- Willow County Water Diversion Dam
Location- Russian River Mile 88

Date of Observation 7/17/78
Observed Flow (cfs) 227

Cross Channel Width (Feet)	122
Dam Height (Feet)	6.7
Spillway Width (Feet)	106
Spillway Height (Feet)	6.7
Spillway Thickness (Feet)	20.0 (irregular)
Depth of Water over Spillway (Feet)	1.0
Spillway Velocity (Surface)	7.2 FPS
Plunge Pool Depth (Feet)	5 (estimate)
Maximum Depth Behind Dam (Feet)	6.7
Jumping Distance (vertical-water surface at spillway to water surface below spillway)	6.0 ft.

Water Quality Information	Upstream	Downstream
Turbidity (NTU)	4.0 to 5.0 (est.)	4.0 to 5.0 (est.)
Dissolved Oxygen (ppm)	sample disturbed	sample disturbed
Temperature (°C) at Time of Day Taken	17.0@1320	17.0@1320

Water Quality Information at Structure	Surface	Mid-depth	Bottom
Turbidity (NTU)	4.0 to 5.0 estimate		
Dissolved Oxygen (ppm)	sample disturbed	sample disturbed	sample disturbed
Temperature (°C) at Time of Day Taken	17.0@1340	17.0@1340	17.0@1340
Transparency (Feet)	3.0		

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Cummiskey Station River Ford
LOCATION	Russian River Mile 67 (Map Ref. Pg. A-9)
OWNER	Russel V. Lee
PURPOSE	Summer access
OPERATION	Unknown - summer months
CONSTRUCTION	Consists of gravel and riprap abutments with railroad flat cars and concrete filled caissons.
FISH PASSAGE	Unknown
REFERENCES	California Department of Fish and Game 1975, Form 1603-III-257-75

Instream Structure Observations and Water Quality
Mainstem

Structure: Cummiskey Station River Ford Date of Observation 7/19/78

Location: Russian River Mile 67 Observed Flow (cfs) 238

Cross Channel Width (Feet)	240
Bridge Width (Feet)	bridge not installed*
Bridge Height Above Water Surface (Feet)	N/A
Number of Channels	N/A

Channel Information	Width (Feet)	Depth (Feet)	Surface Velocity (FPS)

Impounded Water Surface Width (Feet)	N/A
Flowing Water Surface Width (Feet)	240

Water Quality Data	Upstream	@ Structure	Downstream
Turbidity (NTU)			
Dissolved Oxygem (ppm)			
Water Temperature (°C) at Time of Day Taken			

*Note - There were no instream structures in place at Cummiskey Station.

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Asti Summer Road Crossing
LOCATION	Russian River Mile 56 (Map Ref. Pg. A-12)
OWNER	Sonoma County Public Works Department
PURPOSE	Summer road crossing
OPERATION	Approximately May 15 to October 31
CONSTRUCTION	Four concrete piers are permanently anchored in the river channel. Steel spans are placed on top of these piers in May and a gravel roadway is constructed across the rest of the channel.
FISH PASSAGE	Consists of the channels between the permanent concrete piers.
REFERENCES	Schultz, 1976 Robertson, 1978

Instream Structure Observations and Water Quality
Mainstem

Structure: Asti Summer Road Crossing Date of Observation 7/26

Location: Russian River Mile 56 Observed Flow (cfs) 214

Cross Channel Width (Feet)	570
Bridge Width (Feet)	60
Bridge Height-Above Water Surface (Feet)	4
Number of Channels	3

Channel Information	Width (Feet)	Depth (Feet)	Surface Velocity (FPS)
Left channel	18.0	1.0	1.62
Middle channel	18.0	4.0	3.05
Right channel	18.0	2.0	1.18

Impounded Water Surface Width (Feet)	(no impounded water)
Flowing Water Surface Width (Feet)	54

Water Quality Data	Upstream *	@ Structure	Downstream *
Turbidity (NTU)	N/A	2.4	N/A
Dissolved Oxygem (ppm)	N/A	11.1	N/A
Water Temperature (°C) at Time of Day Taken	N/A	20@0900	N/A

*Note - No impoundment of water was evident; water quality data should not vary either above or below the structure.

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Del Rio Woods Dam
LOCATION	Russian River Mile 35 (Map Ref. Pg. A-16)
OWNER	Del Rio Woods Recreation District
PURPOSE	Summer recreation dam
OPERATION	Approximately Memorial Day to sometime after Labor Day
CONSTRUCTION	Permanent "U" shaped concrete steel and wood spillway anchored in the center of the channel. Gravel dikes constructed in the spring on either side of the permanent structure divert the channel flow over the spillway.
FISH PASSAGE	None available when dam is in place. During the winter the river flows around each side of the permanent structure.
REFERENCES	Schultz, 1976 Morrison, 1978 Harris, 1974

Instream Structure Observations and Water Quality
Mainstem

Structure- Del Rio Woods Dam Date of Observation 7/26

Location- Russian River Mile 35 Observed Flow (cfs) 198

Cross Channel Width (Feet)	160
Dam Height (Feet)	12.0
Spillway Width (Feet)	30
Spillway Height (Feet)	7.0 (in steps)
Spillway Thickness (Feet)	38.0
Depth of Water over Spillway (Feet)	1.5
Spillway Velocity (Surface)	7.0 FPS (estimate)
Plunge Pool Depth (Feet)	3.5
Maximum Depth Behind Dam (Feet)	11.0 (maximum)
Jumping Distance (vertical-water surface at spillway to water surface below spillway)	2.7 ft. (maximum)

Water Quality Information	Upstream	Downstream
Turbidity (NTU)	0.7	0.9
Dissolved Oxygen (ppm)	10.2	10.0
Temperature (°C) at Time of Day Taken	22.0@1140	22.0@1140

Water Quality Information at Structure		Surface	Mid-depth	Bottom
Turbidity (NTU)		0.7		
Dissolved Oxygen (ppm)		10.2	10.1	10.0
Temperature (°C) at Time of Day Taken		22.0@1200	22.0@1200	22.0@1200
Transparency (Feet)	8.0			

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Healdsburg Dam (War Memorial Dam)
LOCATION	Russian River Mile 32 (Map Ref. Pg. A-16)
OWNER	Sonoma County Regional Parks and Recreation District
PURPOSE	Summer recreation dam
OPERATION	Approximately Memorial Day to sometime after Labor Day
CONSTRUCTION	Permanent concrete sill with wooden floodgates or flashboards which are raised each spring and supported by steel I-beams.
FISH PASSAGE	None available - only passage is to jump the concrete dam. Total barrier when flashboards are in place.
REFERENCES	Schultz, 1976 Morrison, 1978 Harris, 1974

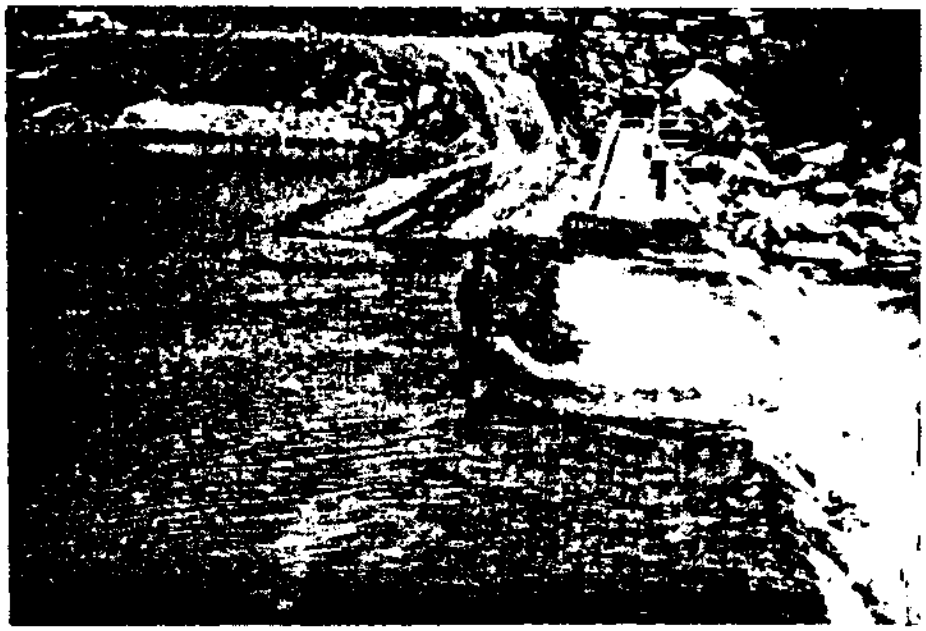
Instream Structure Observations and Water Quality
Mainstem

Structure- Healdsburg Dam

Location- Russian River Mile 32

Date of Observation 4/15/78

Observed Flow (cfs) 1800 (estimate)



Cross Channel Width (Feet)	287
Dam Height (Feet)	5.0
Spillway Width (Feet)	287
Spillway Height (Feet)	5.0
Spillway Thickness (Feet)	N/A
Depth of Water over Spillway (Feet)	1.5
Spillway Velocity (Surface)	8.7 FPS (maximum)
Plunge Pool Depth (Feet)	4 (estimate)
Maximum Depth Behind Dam (Feet)	3 (estimate)
Jumping Distance (vertical-water surface at spillway to water surface below spillway)	5.0 ft.

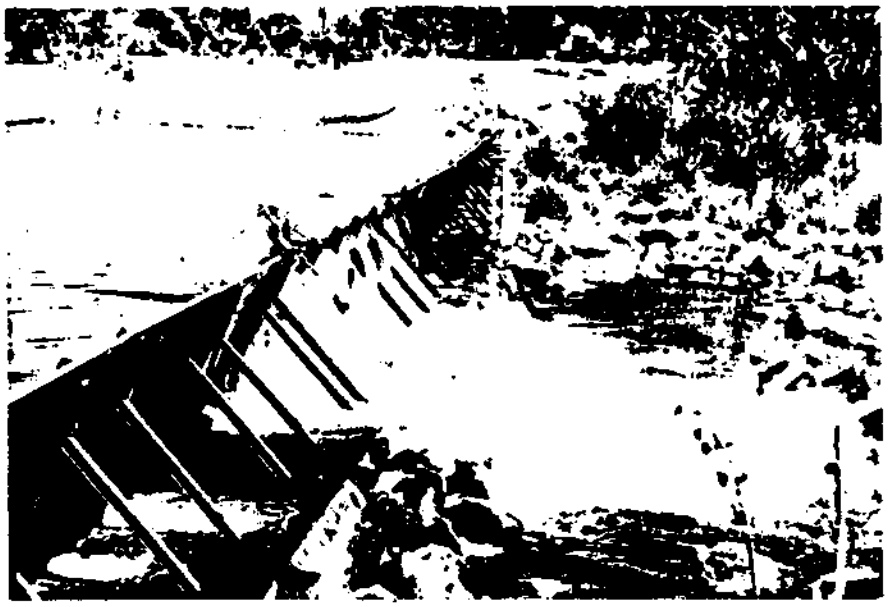
Water Quality Information	Upstream	Downstream
	No Information Recorded-Winter Conditions-Dam Not Constructed	
Turbidity (NTU)		
Dissolved Oxygen (ppm)		
Temperature (°C) at Time of Day Taken		

Water Quality Information at Structure	Surface	Mid-depth	Bottom
Turbidity (NTU)			
Dissolved Oxygen (ppm)			
Temperature (°C) at Time of Day Taken			
Transparency (Feet)			

Instream Structure Observations and Water Quality
Mainstem

Structure- Healdsburg Dam Date of Observation 7/9/78

Location- Russian River Mile 32 Observed Flow (cfs) 196



Cross Channel Width (Feet)	287
Dam Height (Feet)	16.5
Spillway Width (Feet)	37
Spillway Height (Feet)	15.5
Spillway Thickness (Feet)	0.5 (Flashboards)
Depth of Water over Spillway (Feet)	2.0 (estimate)
Spillway Velocity (Surface)	Freefall
Plunge Pool Depth (Feet)	2.5 to 3.0
Maximum Depth Behind Dam (Feet)	11.5

Jumping Distance (vertical-water surface at spillway to water surface below spillway) 12.0

Water Quality Information	Upstream	Downstream
Turbidity (NTU)	1.7	1.7
Dissolved Oxygen (ppm)	9.6	10.8
Temperature (°C) at Time of Day Taken	23.5@1400	23.5@1400

Water Quality Information at Structure	Surface	Mid-depth	Bottom
Turbidity (NTU)	1.7		
Dissolved Oxygen (ppm)	9.6	8.7	9.9
Temperature (°C) at Time of Day Taken	23.5@1415	23.5@1415	23.0@1415

Transparency (Feet) 9.0

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Basalt Summer Road Crossing
LOCATION	Russian River Mile 31 (Map Ref. Pg. A-16)
OWNER	Basalt Company
PURPOSE	Summer road crossing
OPERATION	Approximately Memorial Day to sometime after Labor Day
CONSTRUCTION	Permanent concrete abutments on the left side of the river (looking downstream). Gravel road constructed each year channels the river between the abutments.
FISH PASSAGE	Channel between the abutments.
REFERENCES	U.S. Army Corps of Engineers aerial photos

Instream Structure Observations and Water Quality
Mainstem

Structure: Basalt Summer Road Crossing Date of Observation 7/9/78

Location: Russian River Mile 31 Observed Flow (cfs) 196

Cross Channel Width (Feet)	424
Bridge Width (Feet)	50
Bridge Height-Above Water Surface (Feet)	19.2
Number of Channels	2

Channel Information	Width (Feet)	Depth (Feet)	Surface Velocity (FPS)
Left channel	21.0	3.9	3.26
Right channel	21.0	3.5	3.26

Impounded Water Surface Width (Feet)	424
Flowing Water Surface Width (Feet)	42

Water Quality Data	Upstream	@ Structure	Downstream
Turbidity (NTU)	1.7	1.7	0.12
Dissolved Oxygem (ppm)	10.8	10.8	9.5
Water Temperature (°C) at Time of Day Taken	24.0@1500	24.0@1500	23.5@1500

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Two summer dams
LOCATION	Russian River Mile 23 (just above Wohler Bridge) (Map Ref. Pg. A-20)
OWNER	No longer in operation after construction of Wohler Dam
PURPOSE	Unknown
OPERATION	Unknown
CONSTRUCTION	Appeared to be gravel dams with narrow wooden spillways.
FISH PASSAGE	Unknown
REFERENCES	U.S. Army Corps of Engineers aerial photos

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Wohler Dam
LOCATION	Russian River Mile 23 (Map Ref. Pg. A-20)
OWNER	Sonoma County Water Agency
PURPOSE	Utility - water diversion dam for irrigation and municipal water use
OPERATION	Approximately Memorial Day through Labor Day
CONSTRUCTION	Permanent concrete sill with an inflatable dam.
FISH PASSAGE	Two denil fishways are in permanently, one on each side.
REFERENCES	Schultz, 1976 Morrison, 1978

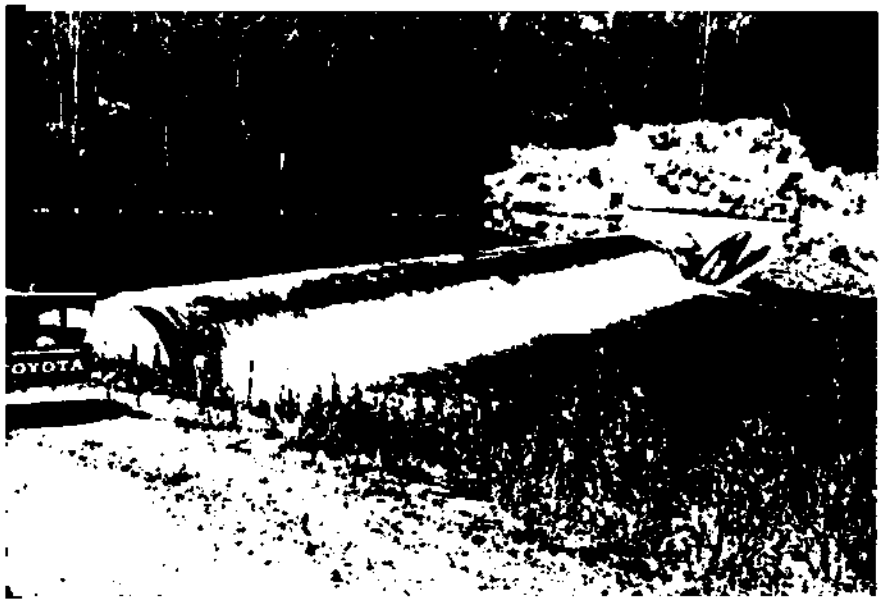
Instream Structure Observations and Water Quality
Mainstem

Structure- Wohler Dam

Location- Russian River 22

Date of Observation 7/26/78

Observed Flow (cfs) 198



Cross Channel Width (Feet)	190
Dam Height (Feet)	15.0
Spillway Width (Feet)	165
Spillway Height (Feet)	13.0
Spillway Thickness (Feet)	20.0 (inflated)
Depth of Water over Spillway (Feet)	1.0
Spillway Velocity (Surface)	Freefall
Plunge Pool Depth (Feet)	3.0
Maximum Depth Behind Dam (Feet)	11.5
Jumping Distance (vertical-water surface at spillway to water surface below spillway)	8.5 ft. over dam; 2 Denil fishways

Water Quality Information	Upstream	Downstream
Turbidity (NTU)	1.3	2.1
Dissolved Oxygen (ppm)	10.2	9.7
Temperature (°C) at Time of Day Taken	25.0@1545	25.0@1545

Water Quality Information at Structure	Surface	Mid-depth	Bottom
Turbidity (NTU)	1.3		
Dissolved Oxygen (ppm)	10.2	9.5	9.4
Temperature (°C) at Time of Day Taken	25.0@1600	24.0@1600	23.5@1600
Transparency (Feet)	7.0		

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Mirabel Park (old dam site)
LOCATION	Russian River Mile 22 (Map Ref. Pg. A-21)
OWNER	No longer in operation
PURPOSE	Old dam foundation
OPERATION	No longer in operation
CONSTRUCTION	Jagged wooden piles from an old wooden dam remain in the river.
FISH PASSAGE	Channels between the old wooden piles.
REFERENCES	Schultz, 1976 Harris, 1974

Instream Structure Observations and Water Quality
Mainstem

Structure- Mirabel Park Old Dam Site Date of Observation 7/25/78

Location- Russian River Mile 22 Observed Flow (cfs) 204

Cross Channel Width (Feet) _____
Dam Height (Feet) _____
Spillway Width (Feet) _____
Spillway Height (Feet) _____
Spillway Thickness (Feet) _____
Depth of Water over Spillway (Feet) _____
Spillway Velocity (Surface) _____
Plunge Pool Depth (Feet) _____
Maximum Depth Behind Dam (Feet) _____
Jumping Distance (vertical-water surface at spillway to water surface below spillway) _____

No Data Taken - No Longer an Impoundment

Water Quality Information	Upstream	Downstream
Turbidity (NTU)		
Dissolved Oxygen (ppm)		
Temperature (°C) at Time of Day Taken		

Water Quality Information at Structure	Surface	Mid-depth	Bottom
Turbidity (NTU)			
Dissolved Oxygen (ppm)			
Temperature (°C) at Time of Day Taken			

Transparency (Feet) _____

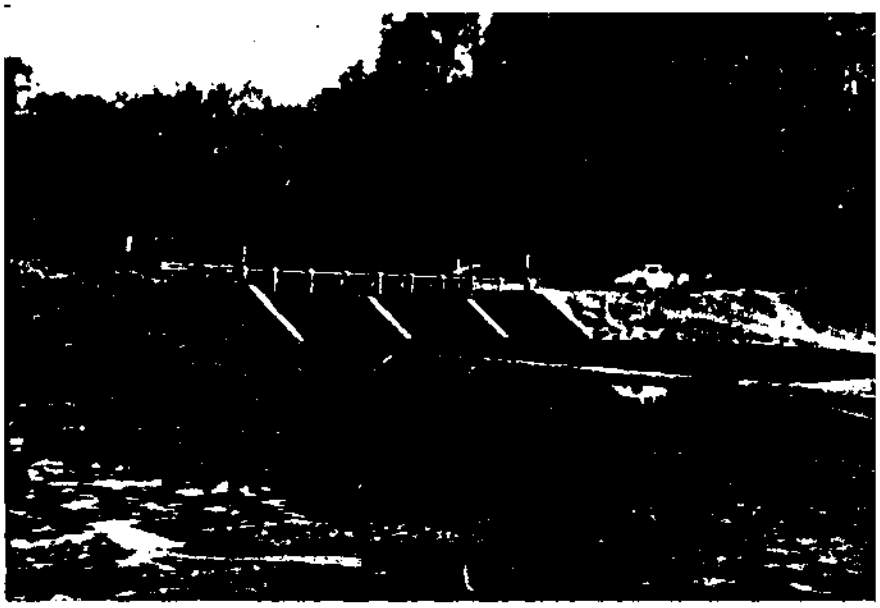
RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Korbel Summer Road Crossing
LOCATION	Russian River Mile 17 (Map Ref. Pg. A-23)
OWNER	Sonoma County Public Works Department
PURPOSE	Summer road crossing
OPERATION	Approximately May 15 to October 31
CONSTRUCTION	Steel piles were driven 30 feet into bedrock and four 8-foot high concrete piers were constructed as permanent instream structures. Three 20-foot steel spans are laid across the piers each year and a gravel dike is built out to the structure, thus diverting the river to a flow between the piers.
FISH PASSAGE	Consists of the channels formed between the permanent concrete piers.
REFERENCES	Robertson, 1978

Instream Structure Observations and Water Quality
Mainstem

Structure: Korbel Summer Road Crossing Date of Observation: 7/25

Location: Russian River Mile 17 Observed Flow (cfs): 123



Cross Channel Width (Feet)	373
Bridge Width (Feet)	60
Bridge Height-Above Water Surface (Feet)	7.7
Number of Channels	3

Channel Information	Width (Feet)	Depth (Feet)	Surface Velocity (FPS)
Left channel	18.0	1.1	2.11
Middle channel	18.0	1.6	3.20
Right channel	18.0	1.6	3.05

Impounded Water Surface Width (Feet)	200
Flowing Water Surface Width (Feet)	54

Water Quality Data *	Upstream	@ Structure	Downstream
Turbidity (NTU)	N/A	N/A	N/A
Dissolved Oxygem (ppm)	N/A	N/A	N/A
Water Temperature (°C) at Time of Day Taken	N/A	24.5@1100	N/A

*Note - No impoundment was evident except for standing back-water isolated from the free flowing channel.

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Johnson's Beach Dam
LOCATION	Russian River Mile 14 (Map Ref. Pg. A-24)
OWNER	Russian River Parks and Recreation District
PURPOSE	Recreational summer dam
OPERATION	Approximately Memorial Day to sometime after Labor Day.
CONSTRUCTION	Consists of permanent concrete piers across the river. Wooden flashboards are slid into place between the piers in May and gravel dikes are built up to channel the river over the spillway.
FISH PASSAGE	A denil fishway was installed in 1973 and modified in 1975 to reduce fishway velocities by reducing the slope.
REFERENCES	Schultz, 1976 Morrison, 1978 California Department of Fish and Game, 1978c Robertson, 1978 Harris, 1974

Instream Structure Observations and Water Quality
Mainstem

Structure- Johnson's Beach Dam

Location- Russian River Mile 14

Date of Observation 7/24/78

Observed Flow (cfs) 123

Cross Channel Width (Feet)	210
Dam Height (Feet)	8.0
Spillway Width (Feet)	180
Spillway Height (Feet)	7.0
Spillway Thickness (Feet)	0.5 (Flashboards)
Depth of Water over Spillway (Feet)	1.0
Spillway Velocity (Surface)	Freefall
Plunge Pool Depth (Feet)	5.0
Maximum Depth Behind Dam (Feet)	6.8

Jumping Distance (vertical-water surface at spillway to water surface below spillway) Denil Fishway

Water Quality Information	Upstream	Downstream
Turbidity (NTU)	4.6	4.8
Dissolved Oxygen (ppm)	11.0	9.3
Temperature (°C) at Time of Day Taken	24.0 @0930	23.0 @0930

Water Quality Information at Structure	Surface	Mid-depth	Bottom
Turbidity (NTU)	4.6		
Dissolved Oxygen (ppm)	11.0	N/A	11.4
Temperature (°C) at Time of Day Taken	24.0 @0945	23.5 @0945	23.5 @0945
Transparency (Feet)	3.0		

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Guernewood Summer Road Crossing
LOCATION	Russian River Mile 13 (Map Ref. Pg. A-25)
OWNER	Sonoma County Public Works Department
PURPOSE	Summer road crossing
OPERATION	Approximately Memorial Day through October. Allowed to wash out with high winter flows.
CONSTRUCTION	Consists of six permanent wood pilings approximately 20 feet high and 20 feet apart on the left side of the channel. A gravel dike constructed in May blocks off the remaining river channel.
FISH PASSAGE	Consists of the channels between the wooden piers.
REFERENCES	Robertson, 1978

Instream Structure Observations and Water Quality
Mainstem

Structure: Guernewood Summer Road Crossing
Location: Russian River Mile 13

Date of Observation 7/25/78
Observed Flow (cfs) 123

Cross Channel Width (Feet)	539
Bridge Width (Feet)	100
Bridge Height-Above Water Surface (Feet)	9.0 to 12.0
Number of Channels	5

Channel Information		Width (Feet)	Depth (Feet)	Surface Velocity (FPS)
(Left channel)	1	32.0	5.0	
	2	16.0	9.0	
	3	16.0	7.0	0.82 (average)
	4	16.0	3.7	
	5	16.0	2.0	

Impounded Water Surface Width (Feet)	395
Flowing Water Surface Width (Feet)	96

Water Quality Data	Upstream	@ Structure	Downstream
Turbidity (NTU)	4.6	5.6	4.9
Dissolved Oxygem (ppm)	9.3	9.3	9.9
Water Temperature (°C) at Time of Day Taken	24.5@1200	24.5@1200	24.5@1200

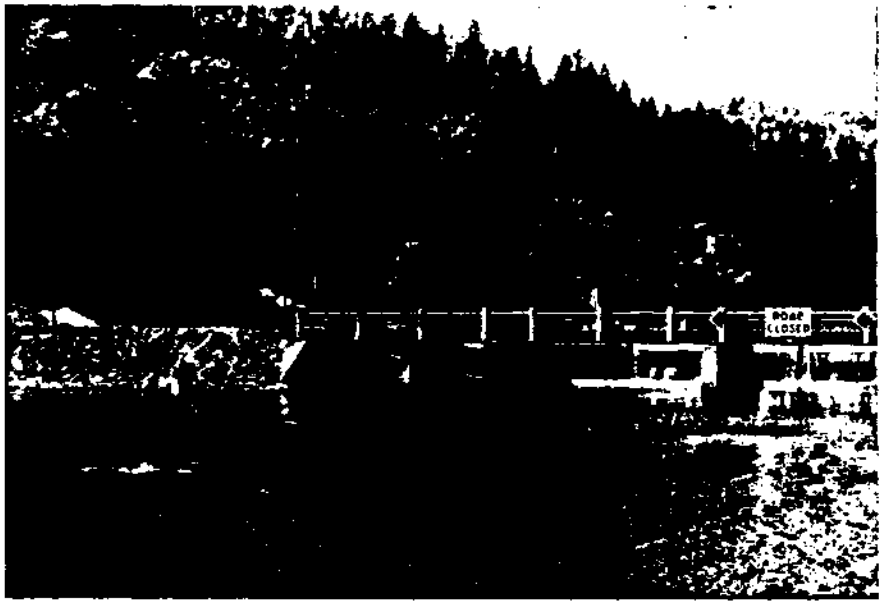
RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Vacation Beach Road Crossing
LOCATION	Russian River Mile 12 (Map Ref. Pg. A-25)
OWNER	Sonoma County Road Department
PURPOSE	Summer road crossing
OPERATION	Approximately Memorial Day to end of October
CONSTRUCTION	Crossing consists of steel piles driven 30 feet into bedrock with four permanent 8-foot high concrete piers on which three 20-foot steel spans are bolted during the summer. Gravel dikes are then constructed out to the structure, thus restricting river flow to the channels between the piers.
FISH PASSAGE	The river at the bridge is divided into three channels between the concrete piers.
REFERENCES	Schultz, 1976 Morrison, 1978 California Department of Fish and Game, 1978c Robertson, 1978

Instream Structure Observations and Water Quality
Mainstem

Structure: Vacation Beach Summer Road Crossing
Location: Russian River Mile 12

Date of Observation 7/24/78
Observed Flow (cfs) 123



Cross Channel Width (Feet)	265
Bridge Width (Feet)	60
Bridge Height Above Water Surface (Feet)	5.5
Number of Channels	3

Channel Information	Width (Feet)	Depth (Feet)	Surface Velocity (FPS)
Left channel	18.0	2.1	
Middle channel	18.0	3.0	2.25 (Average)
Right channel	18.0	2.0	

Impounded Water Surface Width (Feet)	240
Flowing Water Surface Width (Feet)	54

Water Quality Data	Upstream*	@ Structure	Downstream
Turbidity (NTU)	N/A	4.7	N/A
Dissolved Oxygen (ppm)	N/A	10.2	N/A
Water Temperature (°C) at Time of Day Taken	N/A	26.0@1400	N/A

*Note - Turbidity, D.O. and temperature data for upstream and downstream areas are indicated on Vacation Beach Summer Dam data form.

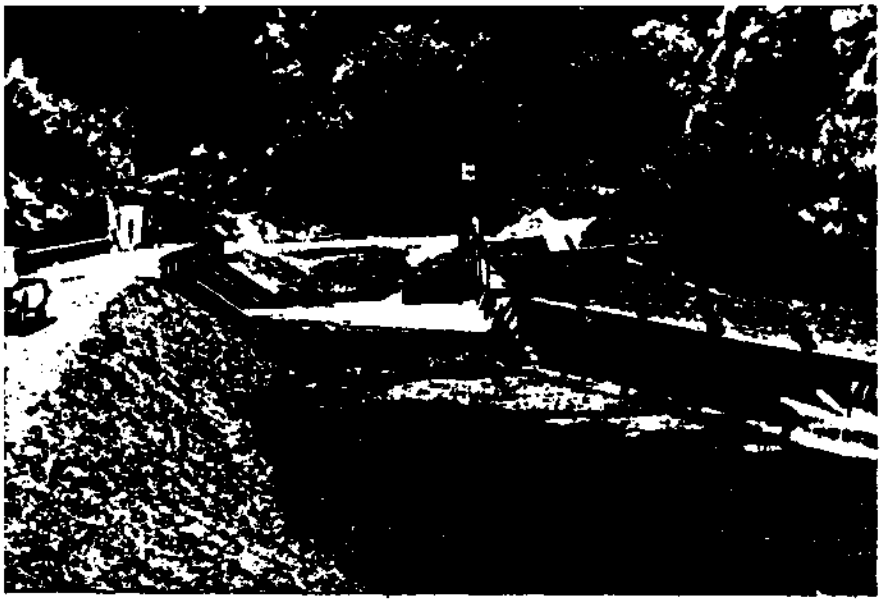
RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Vacation Beach Summer Dam
LOCATION	Russian River Mile 12 (Map Ref. Pg. A-25)
OWNER	Russian River Parks and Recreation District
PURPOSE	Recreation
OPERATION	Approximately Memorial Day to sometime after Labor Day
CONSTRUCTION	Permanent concrete foundation with wooden flashboards on hinges that are raised and supported by steel I beams during summer months. Dam is constructed by Russian River Parks and Recreation District.
FISH PASSAGE	A denil fishway was installed at the dam in 1973 and modified in 1975 to reduce fishway velocities.
REFERENCES	Schultz, 1976 Morrison, 1978 California Department of Fish and Game, 1978c Robertson, 1978

Instream Structure Observations and Water Quality
Mainstem

Structure- Vacation Beach Summer Dam Date of Observation 7/24/78

Location- Russian River Mile 12 Observed Flow (cfs) 123



Cross Channel Width (Feet)	270
Dam Height (Feet)	8.1
Spillway Width (Feet)	40
Spillway Height (Feet)	7.1
Spillway Thickness (Feet)	0.5 (Flashboards)
Depth of Water over Spillway (Feet)	1.0
Spillway Velocity (Surface)	Freefall
Plunge Pool Depth (Feet)	3.0
Maximum Depth Behind Dam (Feet)	7.0

Jumping Distance (vertical-water surface at spillway to water surface below spillway) Denil Fishway

Water Quality Information	Upstream	Downstream
Turbidity (NTU)	4.9	4.7
Dissolved Oxygen (ppm)	9.9	10.2
Temperature (°C) at Time of Day Taken	26.0@1350	26.0@1350

Water Quality Information at Structure	Surface	Mid-depth	Bottom
Turbidity (NTU)	4.9		
Dissolved Oxygen (ppm)	9.9	9.7	10.1
Temperature (°C) at Time of Day Taken	26.0@1400	25.5@1400	25.5@1400

Transparency (Feet) 3.0

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

STRUCTURE	Gravel operations
LOCATION	Dry Creek Mile 1 near West Side Road Bridge (Map Ref. pg. A-31)
OWNER	Unknown
PURPOSE	Gravel extraction
OPERATION	Summer months
CONSTRUCTION	Removal of gravel has created deep ponds in the river channel.
FISH PASSAGE	None. River is completely blocked. Appears to go underground and there are large areas of barren gravel with no flow.
REFERENCES	U.S. Army Corps of Engineers aerial photos

RUSSIAN RIVER/DRY CREEK
INSTREAM STRUCTURES

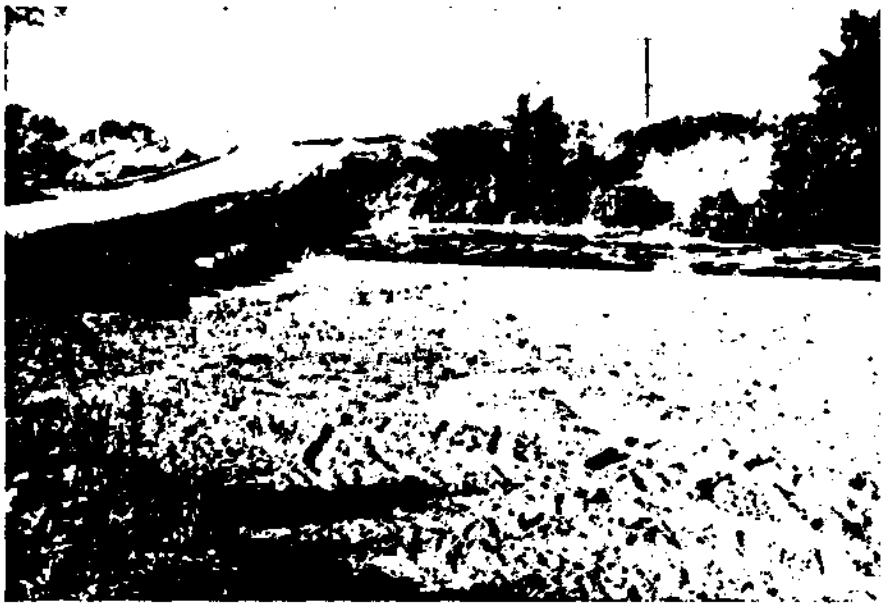
STRUCTURE	Basalt Summer Crossing - Dry Creek
LOCATION	Dry Creek Mile 0 (Map Ref. Pg. A-17)
OWNER	Basalt Company
PURPOSE	Summer access
OPERATION	Approximately Memorial Day to sometime after Labor Day
CONSTRUCTION	Gravel dam with six culverts to allow flow.
FISH PASSAGE	Only through culverts
REFERENCES	U.S. Army Corps of Engineers aerial photos California Department of Fish and Game 1976, Form 1603-III-099-76

Instream Structure Observations and Water Quality

Dry Creek

Structure- Basalt Summer Crossing Date of Observation 7/9/78

Location- Dry Creek Mile 0 Observed Flow (cfs) 0



Cross Channel Width (Feet)			297	
Bridge Width (Feet)			N/A	
Bridge Height-Above Water Surface (Feet)			13.7 (top of road)	
Number of Channels			6 culverts *	
Channel Information		Width (Feet)	Depth (Feet)	Surface Velocity (FPS)
(left edge of water)	1	3.5	0	0
	2	3.5	0	0
	3	3.5	0	0
	4	3.5	0	0
	5	3.5	0	0
	6	3.5	0	0
Impounded Water Surface Width (Feet)			100	
Flowing Water Surface Width (Feet)			32 (below structure)	

Water Quality Data	Upstream	@ Structure	Downstream
Turbidity (NTU)	**no data taken		
Dissolved Oxygem (ppm)	no data taken		
Water Temperature (°C) at Time of Day Taken	no data taken		

*Note - Culverts high and dry

**Note - Insufficient water to measure

Appendix C

Fish Habitat Data for Russian River and Dry Creek

Data are organized by study section and river mile and are presented for nursery and spawning habitat observations. Transect cross section profile data for the mainstem and Dry Creek are also presented.

Russian River mainstem spawning habitat observations were made during the period of May 5 through May 18, 1978. Dry Creek spawning habitat observations were made during the period of April 13 through April 15 and on May 15, 1978. Maximum, minimum and average streamflow for these periods is indicated below:

Gage Station	Maximum Streamflow (cfs)	Average Streamflow (cfs)	Minimum Streamflow (cfs)
Hopland	646	416	218
Cloverdale	795	575	285
Healdsburg	1090	839	578
Guerneville	1290	1060	707
Dry Creek	165	124	58

Russian River mainstem and Dry Creek nursery habitat observations were made during the period of July 6 through July 30, 1978. Maximum, minimum and average streamflow for this period is indicated below:

Gage Station	Maximum Streamflow (cfs)	Average Streamflow (cfs)	Minimum Streamflow (cfs)
Hopland	240	216	193
Cloverdale	238	215	193
Healdsburg	246	214	196
Guerneville	299	170	119
Dry Creek	2	<1	<1

Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-2

		Upper Transect	Lower Transect
Section	49		
Section Length (feet)	1320		
River Mile	92		
Habitat Type		riffle-run	pool-run
Water Surface Width (feet)		150	140
Water Temperature (°C) @ Time of Day Taken		13.0 @ 1330	14.0 @ 1420
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 2.0 0.5 2.3 0.75 2.3 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.08 0.5 2.33 0.75 2.05 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 2.33

Lower Transect

Water Depth (Feet) at:
0.25 1.0 0.5 0.85 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 3.05 0.5 4.14 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.31

Section Habitat

This section is composed primarily of deep willow-lined run habitat. The upper transect is located just above the only example of riffle in this section.

Pool/Riffle Ratio 3:1

Spawning Substrate Observations

The riffle section below the upper transect contains water up to 1.5 feet in depth with good turbulence. Substrate is suitable spawning size with some larger (6 to 12 inch) material. Exposed material along the left edge of the water is suitable for spawning in selected patches. Several Juvenile steelhead were observed and collected in a riffle near the upper transect.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-2

		Upper Transect	Lower Transect
Section	49		
Section Length (feet)	1320		
River Mile	92		
Habitat Type		run-tail	pool
Water Surface Width (feet)		121	123
Maximum Water Depth (feet)		2.4	2.8
Water Temperature (°C) @ Time of Day Taken		15.0 @ 1110	15.0 @ 1150
Water Transparency (feet)		3.0	3.0
In-Channel Cover (feet)		21	41
In-Channel Vegetative Canopy (feet)		26	26
In-Stream Cover (feet)		15	10
In-Stream Vegetative Canopy (feet)		20	13

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	2.07
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	1.54

Section Pool Quality

Pool and run habitat are good with respect to depth, cover and canopy. Substrate is typically good through the pool habitat sections.

Section Riffle Quality

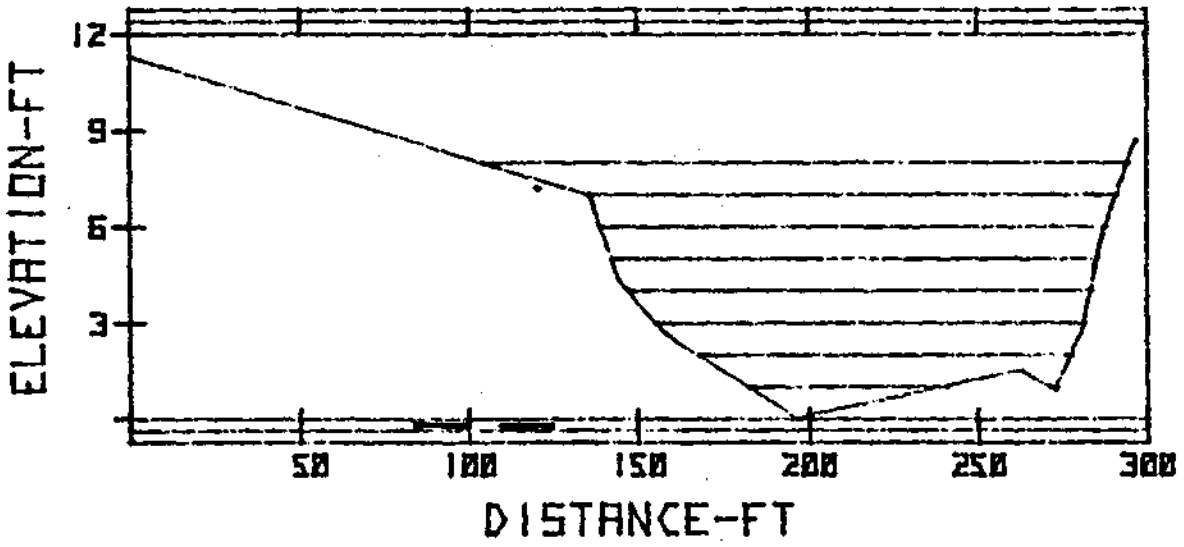
Riffle habitat immediately below the upper transect is good with respect to depth (up to 1.5 feet) and substrate (generally spawning size material). Invertebrate abundance 100 orgamisms/ft^2.

Pool/Riffle Ratio 3:1

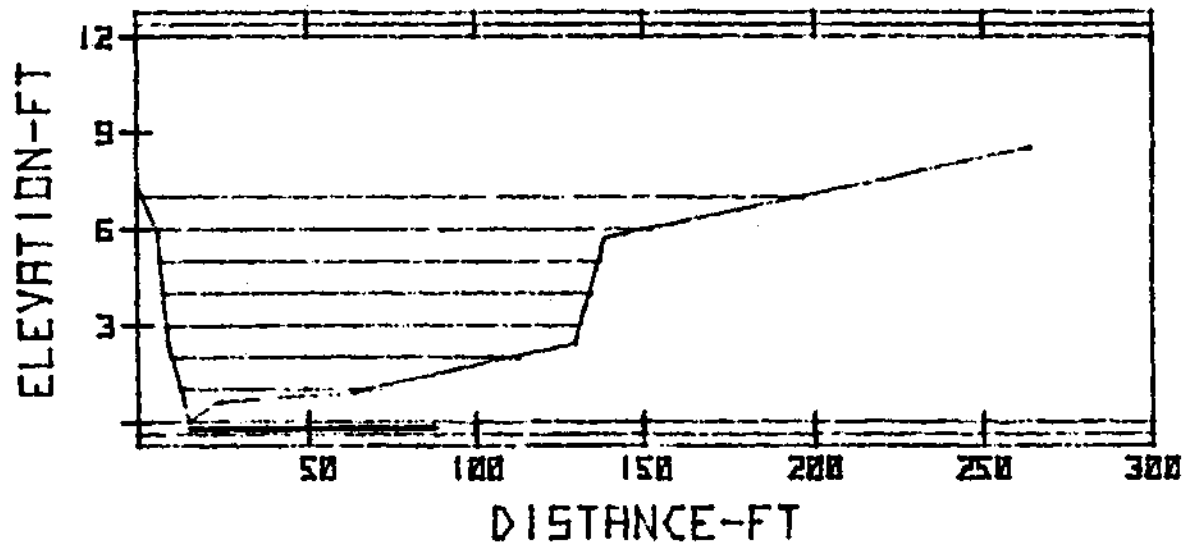
General Section Comments

Juvenile steelhead were collected at the upper transect, indicating potentially satisfactory summer nursery habitat.

RUSSIAN RIVER
CROSS SECTION NUMBER 49
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 49
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-2

		Upper Transect	Lower Transect
Section	48		
Section Length (feet)	1320		
River Mile	90		
Habitat Type		run	pool-run
Water Surface Width (feet)		100	125
Water Temperature (°C) @ Time of Day Taken		14.0 @ 1725	14.0 @ 1645
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 0.7 0.5 1.6 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 1.07 0.5 1.83 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.83

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A. 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.28

Section Habitat
Section is composed of pool and deep run habitat.

Pool/Riffle Ratio 100% pool

Spawning Substrate Observations
Very little spawning habitat is available in this section. Just above the upper transect a pool tail is located with potentially usable spawning substrate. Communication with a local fisherman indicated the presence of yearling salmonids in the pool at the lower transect.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-2

		Upper Transect	Lower Transect
Section	48		
Section Length (feet)	1320		
River Mile	90		
Habitat Type		run	pool
Water Surface Width (feet)		80	103
Maximum Water Depth (feet)		3.0	5.7
Water Temperature (°C) @ Time of Day Taken		16.5 @ 1200	15.0 @ 1045
Water Transparency (feet)		3.0	3.0
In-Channel Cover (feet)		7	16
In-Channel Vegetative Canopy (feet)		23	0
In-Stream Cover (feet)		17	1
In-Stream Vegetative Canopy (feet)		28	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 4.92
Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 1.03

Section Pool Quality

Pool quality is very good. Much of this section contains habitat greater than 3 feet in depth. Pool substrate is generally fine material. Canopy and cover are generally available on the right edge of water through the upper half of the section and on the left edge of water through the lower half.

Section Riffle Quality --

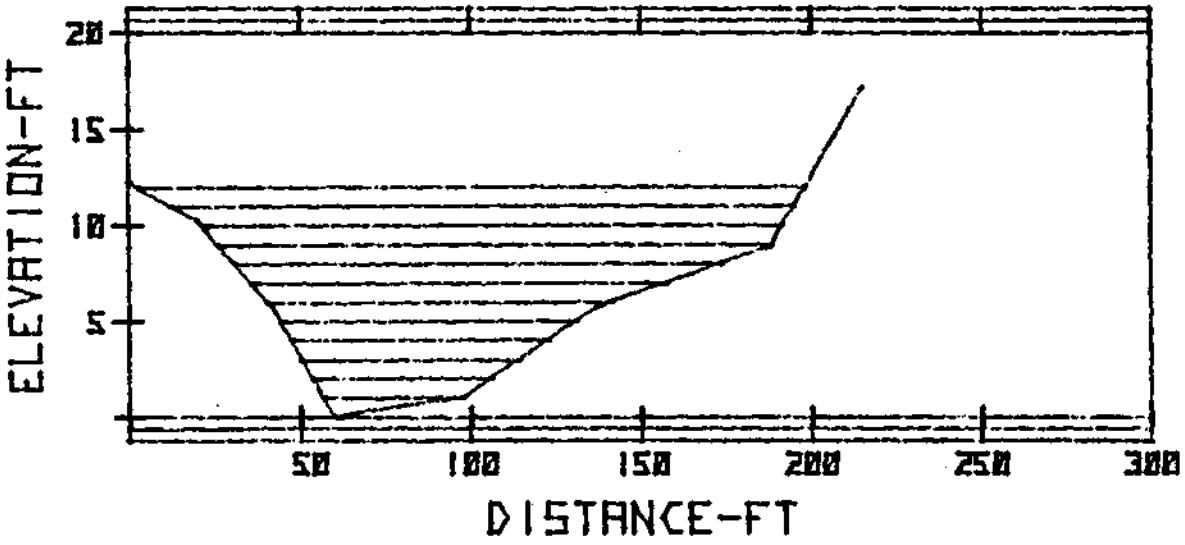
Section 48 contains no riffle habitat. Sixty invertebrates/ft^2 were discovered in the pool tail-riffle above the upper transect.

Pool/Riffle Ratio 100% pool

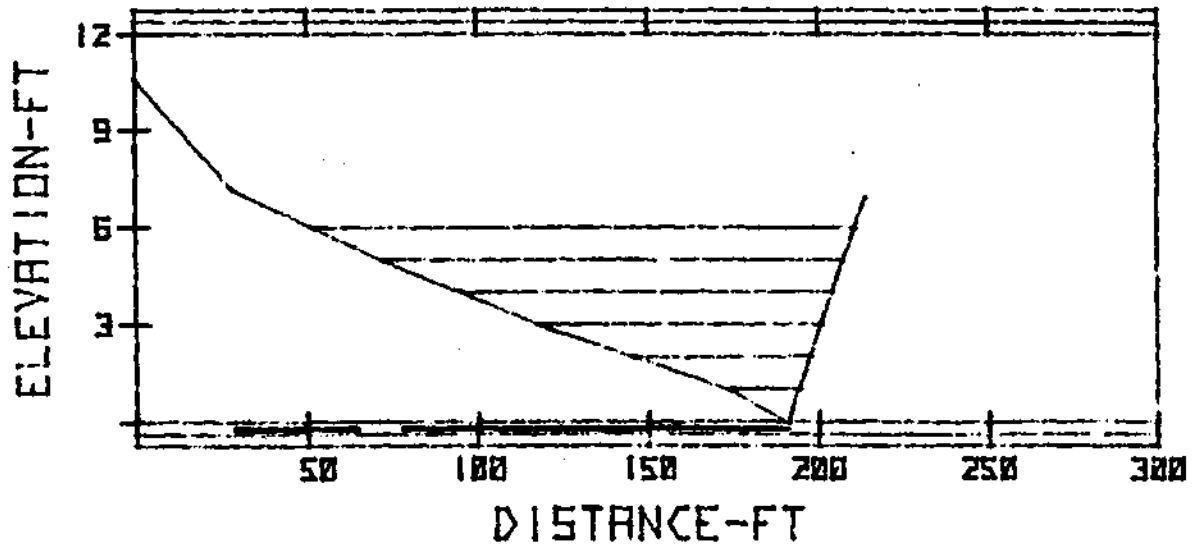
General Section Comments

Section offers a considerable amount of deep canopy- and cover-sheltered nursery habitat.

RUSSIAN RIVER
CROSS SECTION NUMBER 48
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 48
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-2

		Upper Transect	Lower Transect
Section	47		
Section Length (feet)	2300		
River Mile	89		
Habitat Type		run-riffle	run-riffle
Water Surface Width (feet)		140	120
Water Temperature (°C) @ Time of Day Taken		11.5 @ 0800	11.5 @ 0830
Water Transparency (feet)		2.5	2.0

Upper Transect

Water Depth (Feet) at:
0.25 1.7 0.5 1.4 0.75 2.2 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.95 0.5 2.91 0.75 2.26 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.38

Lower Transect

Water Depth (Feet) at:
0.25 2.2 0.5 1.0 0.75 1.7 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 3.31 0.5 5.38 0.75 3.09 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 6.74

Section Habitat
The majority of this section is a relatively deep, swift, narrow run created by an in-channel gravel operation. A levee constructed to isolate their work is responsible for the river channelization. Short sections of riffle and pool habitat are available above and below the long run section.

Pool/Riffle Ratio 7.2:1

Spawning Substrate Observations
Two juvenile steelhead were seined from a small riffle below the lower transect. Spawning-size substrate is generally abundant at the mouth of McClure Creek during winter conditions. In addition potentially usable substrate is located at the upper and lower transects.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-2

		Upper Transect	Lower Transect
Section	47		
Section Length (feet)	2300		
River Mile	39		
Habitat Type		riffle	riffle
Water Surface Width (feet)		139	95
Maximum Water Depth (feet)		4.7	2.9
Water Temperature (°C) @ Time of Day Taken		16.5 @ 1200	15.0 @ 1045
Water Transparency (feet)		3.0	3.0
In-Channel Cover (feet)		7	16
In-Channel Vegetative Canopy (feet)		23	0
In-Stream Cover (feet)		17	1
In-Stream Vegetative Canopy (feet)		28	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	2.76
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	4.24

Section Pool Quality

Runs are prevalent in this section. Pools are located near the upper transect and at the lower transect under the highway bridge. Cover and canopy are very good at each pool location. Maximum depths exceeding 4 feet are available.

Section Riffle Quality

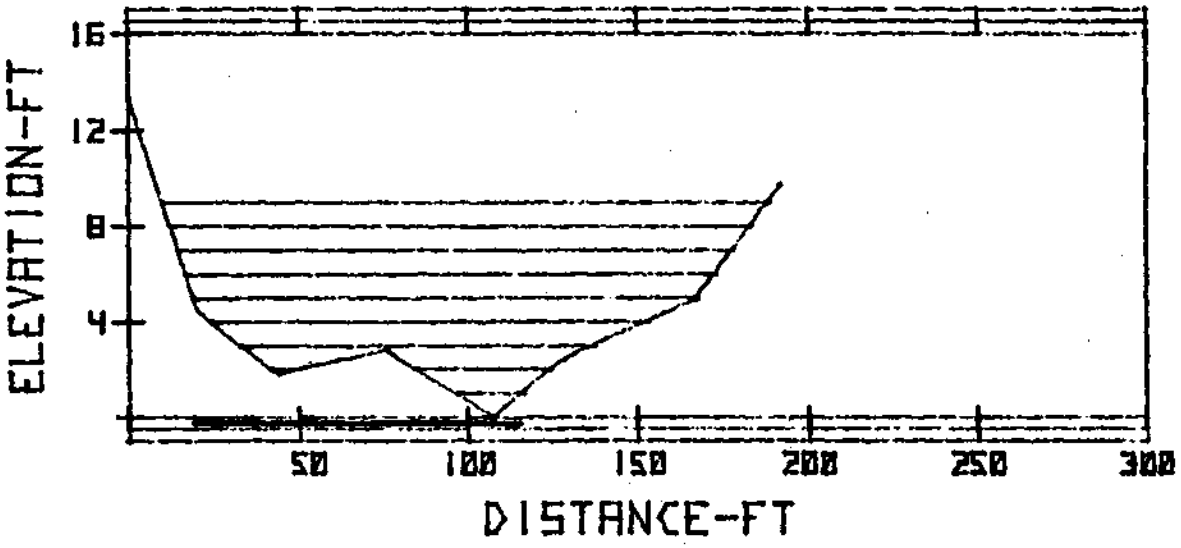
Riffles contain suitable spawning-size substrate and offer a range of depths and velocities. Riffles are generally scarce in this stream section and are not well shoded.

Pool/Riffle Ratio 7.2:1

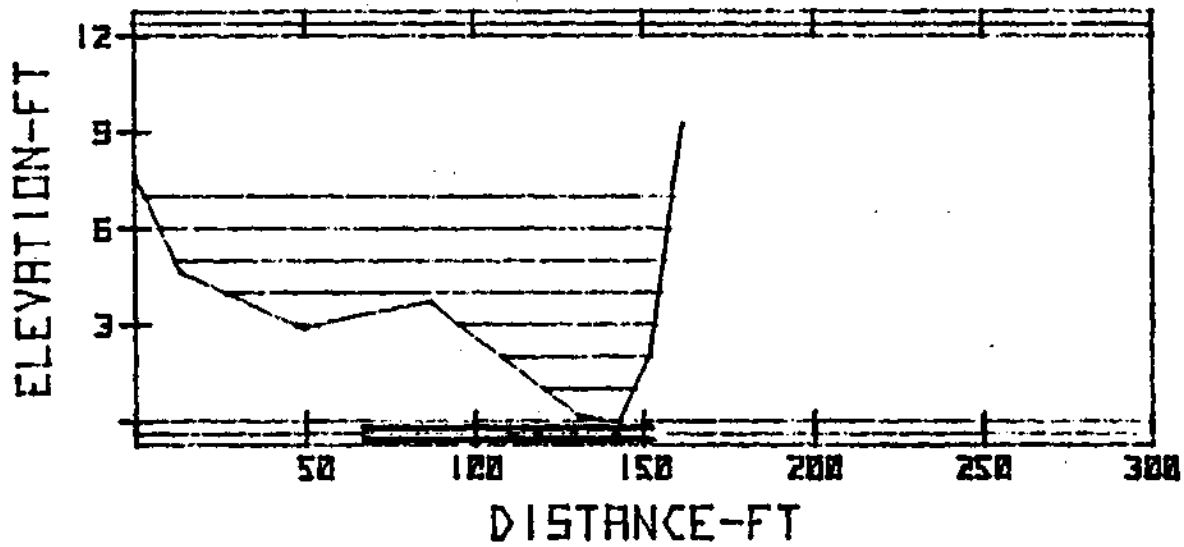
General Section Comments

Canopy is very good on the right edge of the water adjacent to the majority of this river section (run habitat).
An in-channel gravel operation has created most of this run section by constructing a levee to isolate the work. This activity constricts the flow, creating faster, deeper, run habitat. The gravel operation is located at the now-dry mouth of McClure Creek.

RUSSIAN RIVER
CROSS SECTION NUMBER 47
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 47
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-3

		Upper Transect	Lower Transect
Section	46		
Section Length (feet)	1200		
River Mile	87		
Habitat Type		run	riffle-run
Water Surface Width (feet)		62	63
Water Temperature (°C) @ Time of Day Taken		11.5 @ 1020	11.5 @ 1040
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.93

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N /A 0.5 N/A 0.75 N/A Distance from Left Edge of
Water Velocity (FPS) Measured on the Surface at Midstream 4.70

Section Habitat
The majority of this section is composed of run habitat with maximum depths greater than 5 feet. Both banks are heavily lined with willow and other riparian vegetation. A stretch of riffle habitat is located at and just above the lower transect.

Pool/Riffle Ratio 2.1:1 S

Spawning Substrate Observations
Riffle section at the lower transect is relatively swift and deep (depth 1 to 3 feet). Substrate is suitable spawning-size material. Elsewhere, very little spawning substrate is available in this section except for a minor amount of exposed material on the gravel bar at the upper transect.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-3

Section 46

Section Length (feet) 1200

River Mile 87

	Upper Transect	Lower Transect
Habitat Type	run	riffle
Water Surface Width (feet)	58	60
Maximum Water Depth (feet)	4.0	3.0
Water Temperature (°C) @ Time of Day Taken	18.5 @ 1610	18.5 @ 1530
Water Transparency (feet)	3.0	3.0
In-Channel Cover (feet)	11	33
In-Channel Vegetative Canopy (feet)	40	32
In-Stream Cover (feet)	1	3
In-Stream Vegetative Canopy (feet)	20	11

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 2.76

Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 4.70

Section Pool Quality

The majority of this section is run habitat with the exception of one riffle stretch above the lower transect. Runs are generally well shaded and depths exceeding 5 feet are available.

Section Riffle Quality

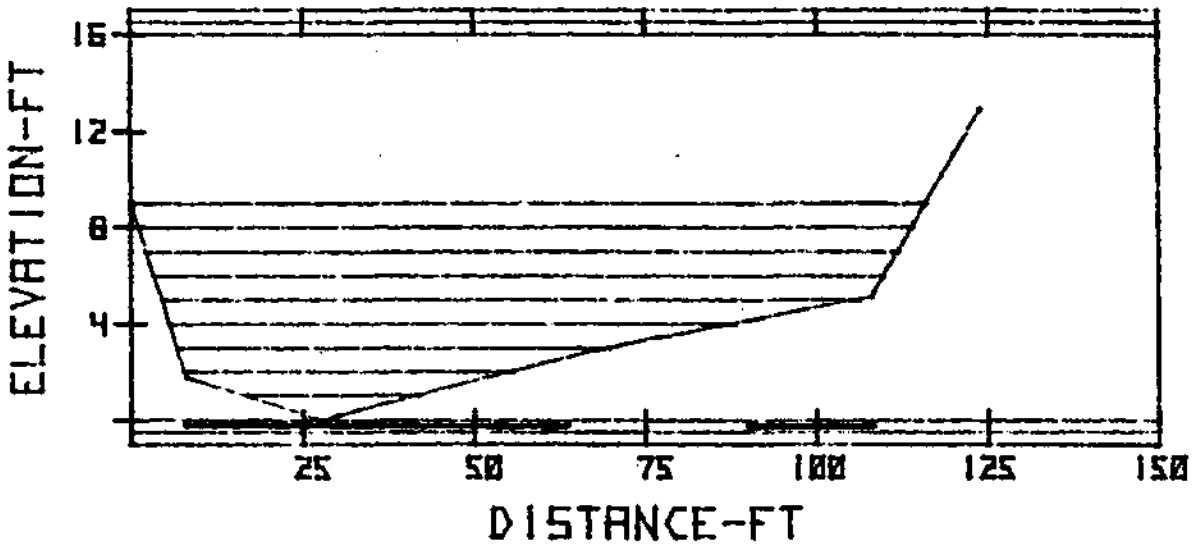
Riffle habitat at the lower transect contains suitable spawning size substrate. In addition, canopy and cover are very good. Depths extend to 3 feet and velocities in the main flow reach a relatively swift 4.70 fps.

Pool/Riffle Ratio 2.1:1

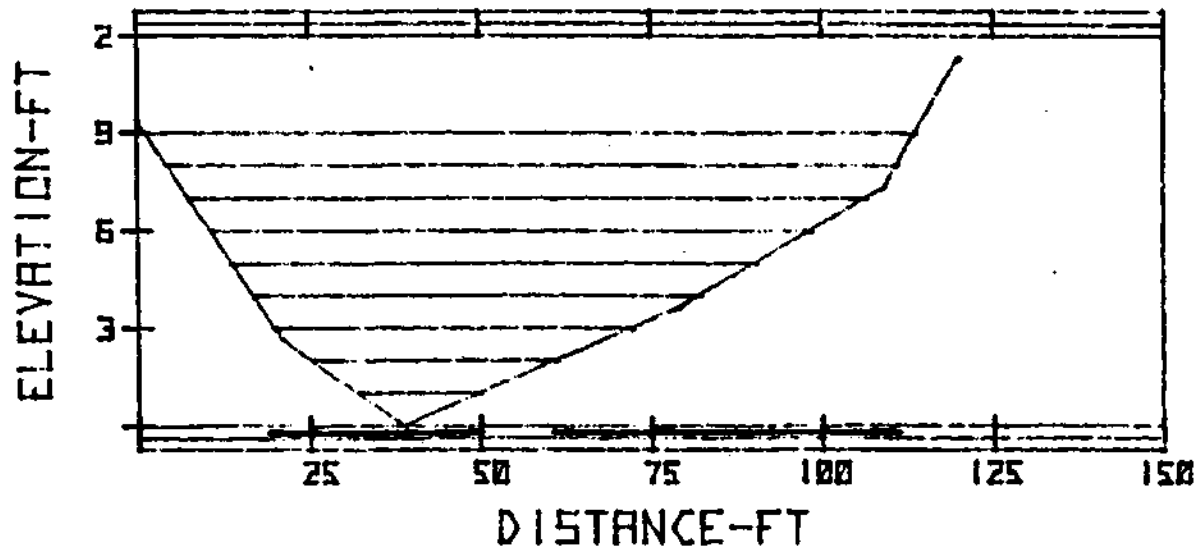
General Section Comments

This section is the most uniform example encountered of run habitat extending practically the length of a stream section. It is also significant in that it contains the greatest amount of riparian vegetation encountered in any sample section. This section is adjacent the Ukiah City Sewage Treatment Plant.

RUSSIAN RIVER
CROSS SECTION NUMBER 46
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 46
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-4

		Upper Transect	Lower Transect
Section	44		
Section Length (feet)	800		
River Mile	84		
Habitat Type		pool– run	run
Water Surface Width (feet)		80	150
Water Temperature (°C) @ Time of Day Taken		15.0 @ 1420	15.0 @ 1500
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.92

Lower Transect

Water Depth (Feet) at:
0.25 1.8 0.5 1.6 0.75 1.1 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.91 0.5 2.26 0.75 1.58 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 2.51

Section Habitat
The McDonald Creek confluence is at the upper transect; approximately 1 cfs is flowing in McDonald Creek. At the upper transect is pool habitat; run habitat is below the upper transect extending downstream to the riffle at the lower transect.

Pool/Riffle Ratio 4.2:1

Spawning Substrate Observations
Young of the year salmonids were observed at the McDonald Creek confluence in May. Very good spawning substrate is available at the Creek confluence. Potentially usable substrate is also located at the lower transect and on the in-channel island exposed midway in the section.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-4

		Upper Transect	Lower Transect
Section	44		
Section Length (feet)	800		
River Mile	84		
Habitat Type		pool	riffle
Water Surface Width (feet)		76	134
Maximum Water Depth (feet)		6.0	2.9
Water Temperature (°C) @ Time of Day Taken		15.0 @ 0940	14.5 @ 0830
Water Transparency (feet)		3.0	3.0
In-Channel Cover (feet)		16	19
In-Channel Vegetative Canopy (feet)		33	45
In-Stream Cover (feet)		0	2
In-Stream Vegetative Canopy (feet)		0	15

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 2.11

Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 3.16

Section Pool Quality

The only pool habitat in this section is located at the upper transect. A maximum depth of 6 feet is available in the pool. Very little shading is provided at the observed flow. A stretch of run extends most of the length of this section. Depths are fair and shading is good on the left edge of water.

Section Riffle Quality

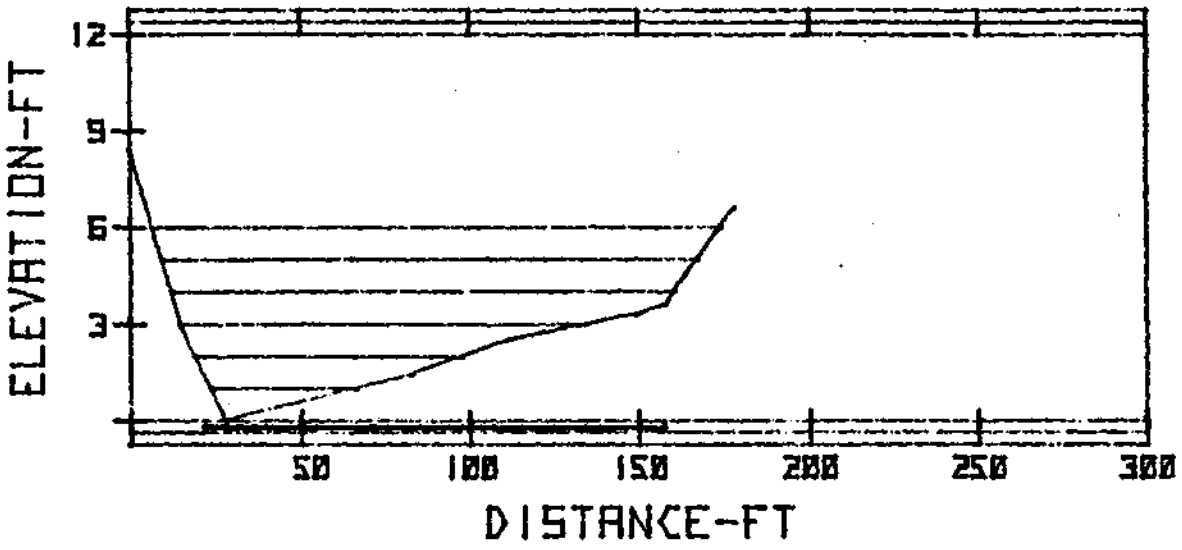
The riffle stretch at the lower transect contains primarily good substrate suitable for spawning, although the concentration of fine material is relatively high. Sixty invertebrates/ft2 were discovered on this riffle.

Pool/Riffle Ratio 4.2:1

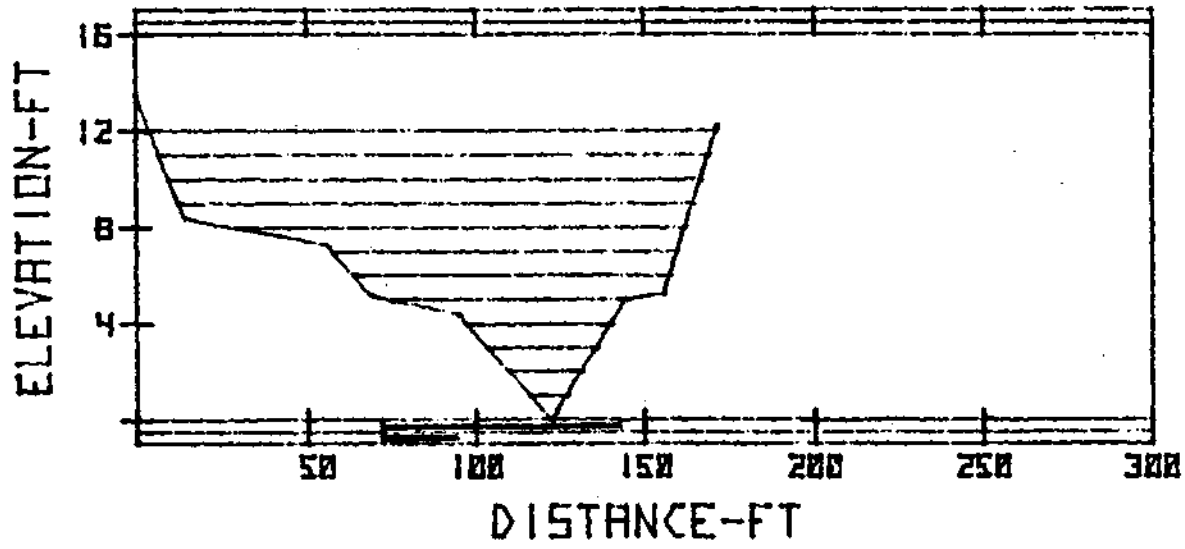
General Section Comments

The upper transect is located at the mouth of McDonald Creek. Juvenile salmonids were observed in May. There was no sign of salmonids in July.

RUSSIAN RIVER
CROSS SECTION NUMBER 44
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 44
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-5

		Upper Transect	Lower Transect
Section	43		
Section Length (feet)	1500		
River Mile	81		
Habitat Type		run	run
Water Surface Width (feet)		60	83
Water Temperature (°C) @ Time of Day Taken		12.0 @ 0840	12.0 @ 0905
Water Transparency (feet)		2.0	2.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 1.7 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 2.65 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.52

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.20

Section Habitat
The entire stream section is a relatively deep run with very good riparian cover and canopy on the left edge of the water.

Pool/Riffle Ratio 100% pool

Spawning Substrate Observations
Instream spawning substrate is poor at the observed flow. However, the exposed gravel bar on the right edge of the water contains considerable spawning substrate that would be potentially usable at higher flows.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-5

		Upper Transect	Lower Transect
Section	43		
Section Length (feet)	1500		
River Mile	81		
Habitat Type		run	run-tail
Water Surface Width (feet)		58	79
Maximum Water Depth (feet)		2.5	2.7
Water Temperature (°C) @ Time of Day Taken		16.0 @ 1055	16.0 @ 1115
Water Transparency (feet)		3.0	3.0
In-Channel Cover (feet)		26	13
In-Channel Vegetative Canopy (feet)		25	17
In-Stream Cover (feet)		5	3
In-Stream Vegetative Canopy (feet)		12	17

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	4.06
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	2.91

Section Pool Quality

Entire section consists of deep run habitat. Depths are generally greater than 2.5 feet adjacent to the bank on the left edge of the water.

Section Riffle Quality

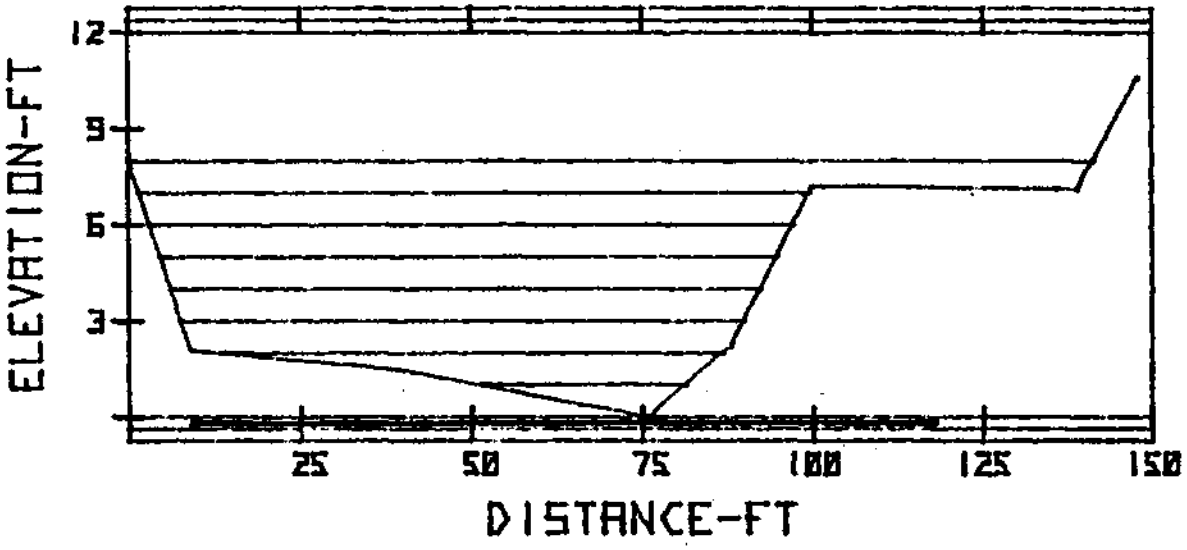
Section contains no riffle habitat

Pool/Riffle Ratio 100% pool

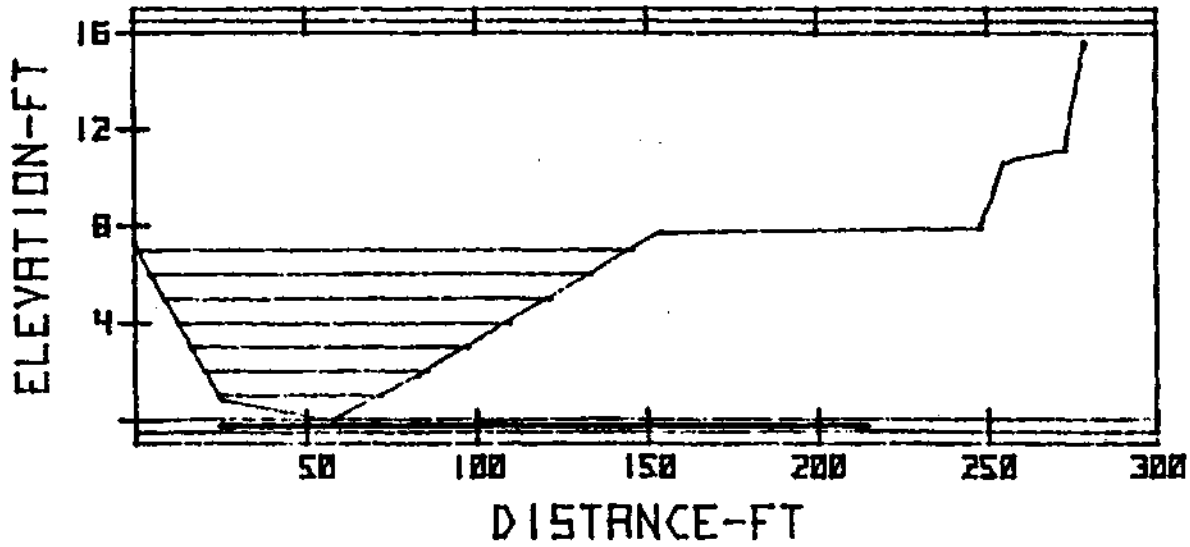
General Section Comments

The section consists of deep run habitat with good left edge riparian cover and canopy. Section water surface width is relatively narrow, providing relatively deep moving water with less surface exposure than usual.

RUSSIAN RIVER
CROSS SECTION NUMBER 43
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 43
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-6

		Upper Transect	Lower Transect
Section	41		
Section Length (feet)	825		
River Mite	78		
Habitat Type		riffle	run
Water Surface Width (feet)		145	110
Water Temperature (°C) @ Time of Day Taken		16.0 @ 1715	15.0 @ 1800
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 1.0 0.5 0.9 0.75 1.8 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 4.2 0.5 5.06 0.75 4.10 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 7.11

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.41

Section Habitat
The section is composed primarily of deep runs with one stretch of riffle at and just below the upper transect.

Pool/Riffle Ratio 2.8:1

Spawning Substrate Observations
The riffle at the upper transect and the pool tail immediately above the upper transect provide very good, clean, spawning-size substrate. Pockets of exposed suitable size substrate are available at the gravel bar near the left edge of the water.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-6

		Upper Transect	Lower Transect
Section	41		
Section Length (feet)	825		
River Mile	78		
Habitat Type		pool tail	run
Water Surface Width (feet)		142	70
Maximum Water Depth (feet)		2.0	5.0
Water Temperature (°C) @ Time of Day Taken		18.5 @ 1245	18.0 @ 1155
Water Transparency (feet)		3.0	3.0
In-Channel Cover (feet)		3	8
In-Channel Vegetative Canopy (feet)		11	16
In-Stream Cover (feet)		7	0
In-Stream Vegetative Canopy (feet)		0	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	1.83
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	2.40

Section Pool Quality

Non-riffle habitat is mostly run habitat in this stream section. Runs are deep (4.0 feet maximum depth) and provide good instream cover consisting of submerged branches and rip-rap.

Section Riffle Quality

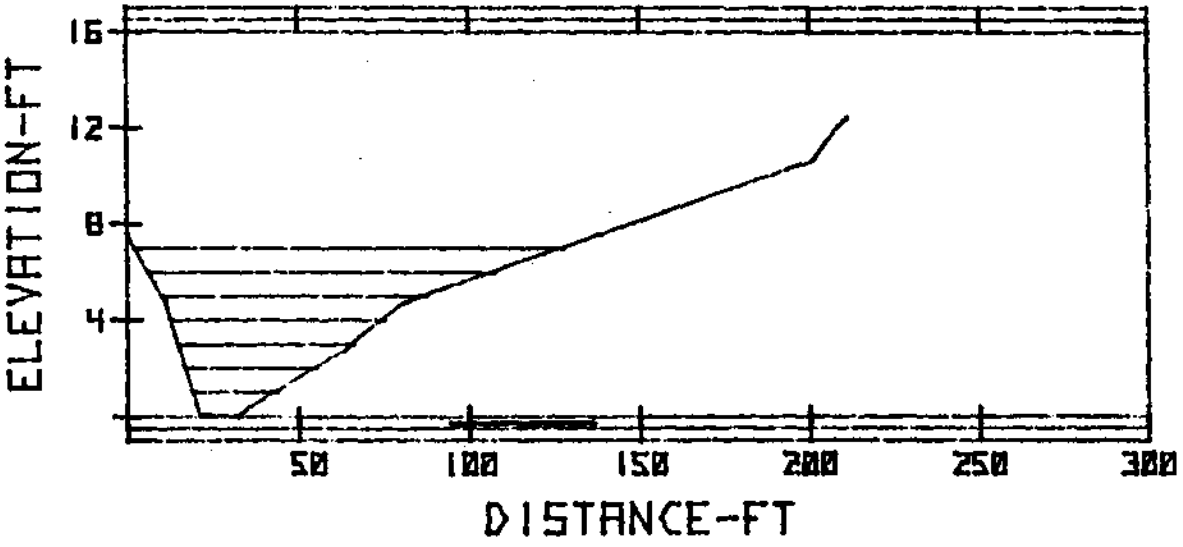
The one riffle in this section is located Just below the upper transect. Depths are on the shallow side (1.0 feet), although limited deep habitat is available. Substrate is optimal salmonid spawning material.

Pool/Riffle Ratio 2.8:1

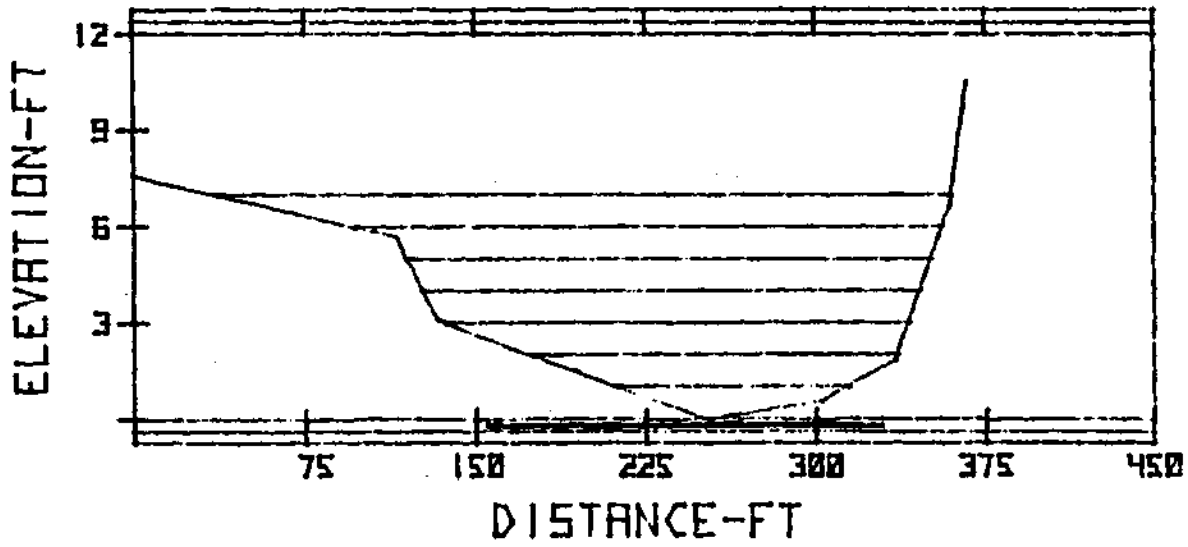
General Section Comments

Section contains good, deep run habitat.

RUSSIAN RIVER
CROSS SECTION NUMBER 41
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 41
UPPER TRANSECT



Fish Habitat Observation
Spawning Habitat
Mainstem

Map Ref. Pg. A-7

		Upper Transect	Lower Transect
Section	40		
Section Length (feet)	730		
River Mite	75		
Habitat Type		riffle-run	run
Water Surface Width (feet)		85	84
Water Temperature (°C) @ Time of Day Taken		13.5 @ 1100	13.0 @ 1020
Water Transparency (feet)		2.5	2.0

Upper Transect

Water Depth (Feet) at:
0.25 1.1 0.5 2.0 0.75 N/A Distance from Left Edge of
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 3.20 0.5 2.69 0.75 N/A Distance from Left Edge of
Water Velocity (FPS) Measured on the Surface at Midstream 4.52

Lower Transect

Water Depth (Feet) at:
0.2 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.2 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of
Water Velocity (FPS) Measured on the Surface at Midstream 5.48

Section Habitat
Section is composed of deep runs and riffles; pool habitat is absent.

Pool/Riffle Ratio 2.6:1

Spawning Substrate Observations
Instream spawning substrate is very good in riffle sections. Substrate is very clean with respect to content of fine material. Exposed substrate is also very good. The gravel bar on the left edge of water contains potentially usable substrate.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg . A-7

		Upper Transect	Lower Transect
Section	40		
Section Length (feet)	730		
River Mile	75		
Habitat Type		run-tail	pool-run
Water Surface Width (feet)		63	63
Maximum Water Depth (feet)		2.3	3.6
Water Temperature (°C) @ Time of Day Taken		21.0 @ 1505	21.0 @ 1445
Water Transparency (feet)		3.0	3.0
In-Channel Cover (feet)		13	12
In-Channel Vegetative Canopy (feet)		33	25
± In-Stream Cover (feet)		0	0
In-Stream Vegetative Canopy (feet)		3	7

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	4.42
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	2.50

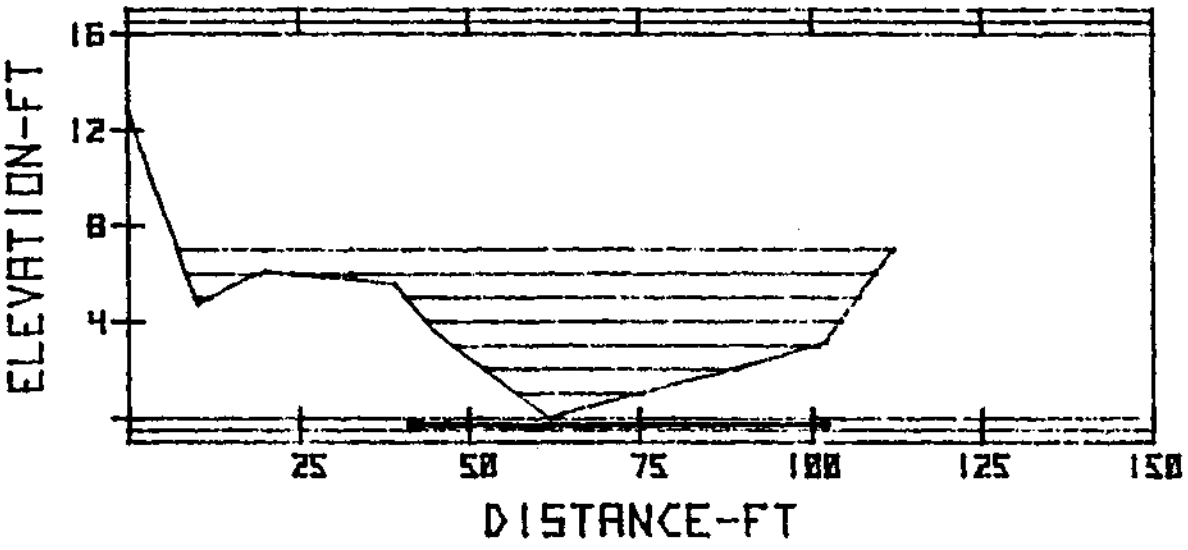
Section Pool Quality
Pool habitat is absent, but a considerable portion of the section is deep run. Right edge of water provides excellent riparian cover and canopy. Run sections contain very good holding water habitat.

Section Riffle Quality
Riffles are generally 0.5 to 2.0 feet in depth and composed of very good size spawning substrate. Canopy is available on the right edge of water.

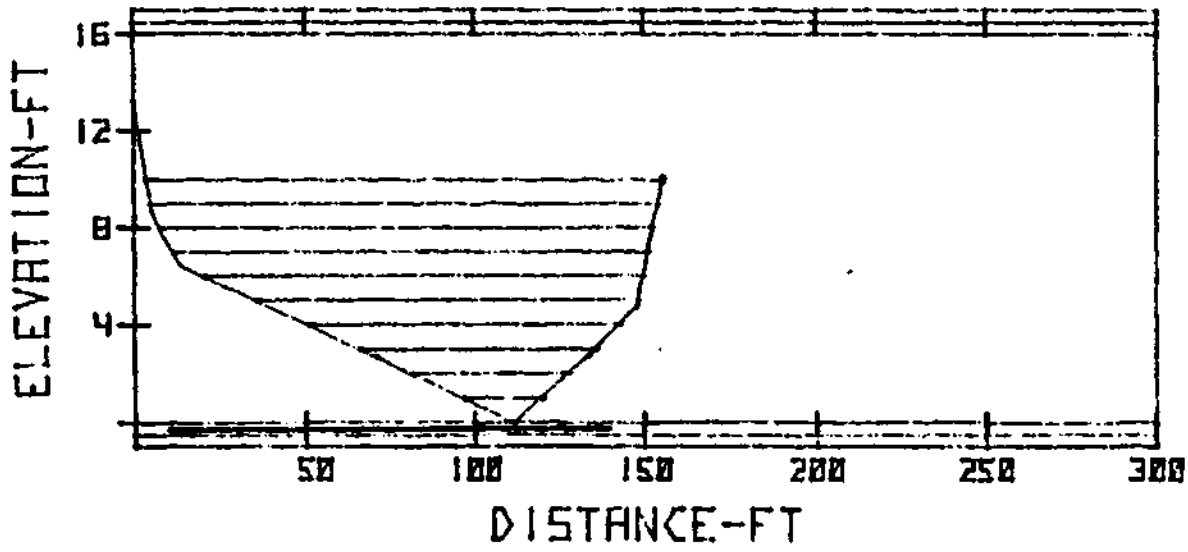
Pool/Riffle Ratio 2.6:1

General Section Comments
Section provides (potentially) very good run holding habitat and riffle spawning habitat. Army Corps of Engineers "jack" lines stabilize approximately 600 feet of this section.

RUSSIAN RIVER
CROSS SECTION NUMBER 40
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 40
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-8

		Upper Transect	Lower Transect
Section	38		
Section Length (feet)	3500		
River Mile	71		
Habitat Type		pool-run	riffle
Water Surface Width (feet)		150	128
Water Temperature (°C) @ Time of Day Taken		14.0 @ 1200	15.0 @ 1300
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.18

Lower Transect

Water Depth (Feet) at:
0.25 0.9 0.5 1.6 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 1.87 0.5 2.54 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 2.76

Section Habitat
Section consists primarily of relatively deep (>2.5 feet) and shallow (<2.5 feet) run habitat with very little riffle and pool habitat. Pools are located Just below the upper transect and just above the lower transect. Riffles exist at the upper transect and midway in the section.

Pool/Riffle Ratio 12.5:1

Spawning Substrate Observations
Instream spawning substrate is good only at the upper transect, although velocities appear restrictive for spawning (see above data). Exposed substrate is generally sub-optimal with respect to size and is often compacted.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-8

		Upper Transect	Lower Transect
Section	38		
Section Length (feet)	3500		
River Mile	71		
Habitat Type		run	run
Water Surface Width (feet)		46	86
Maximum Water Depth (feet)		2.5	4.5
Water Temperature (°C) @ Time of Day Taken		23.5 @ 1630	22.5 @ 1600
Water Transparency (feet)		3.0	3.0
In-Channel Cover (feet)		7	8
In-Channel Vegetative Canopy (feet)		50	12
In-Stream Cover (feet)		0	3
In-Stream Vegetative Canopy (feet)		0	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	6.00
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	2.15

Section Pool Quality

Pool habitat is limited to two small pools near the upper and lower transects. Depth, cover and canopy are very good in each pool.

Section Riffle Quality

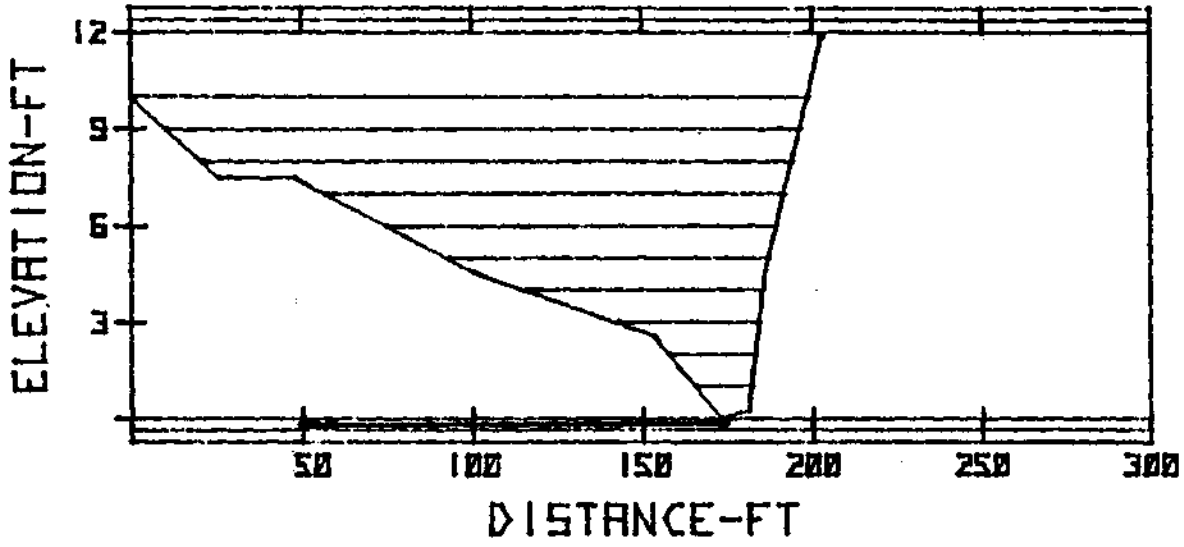
Riffle habitat is limited in this section. Riffle habitat at the upper transect is very good with respect to substrate size. Velocity is rather high due to the narrowness of the channel. The other riffle stretch in mid-section is very shallow and is composed of sub-optimal substrate.

Pool/Riffle Ratio 12.5:1

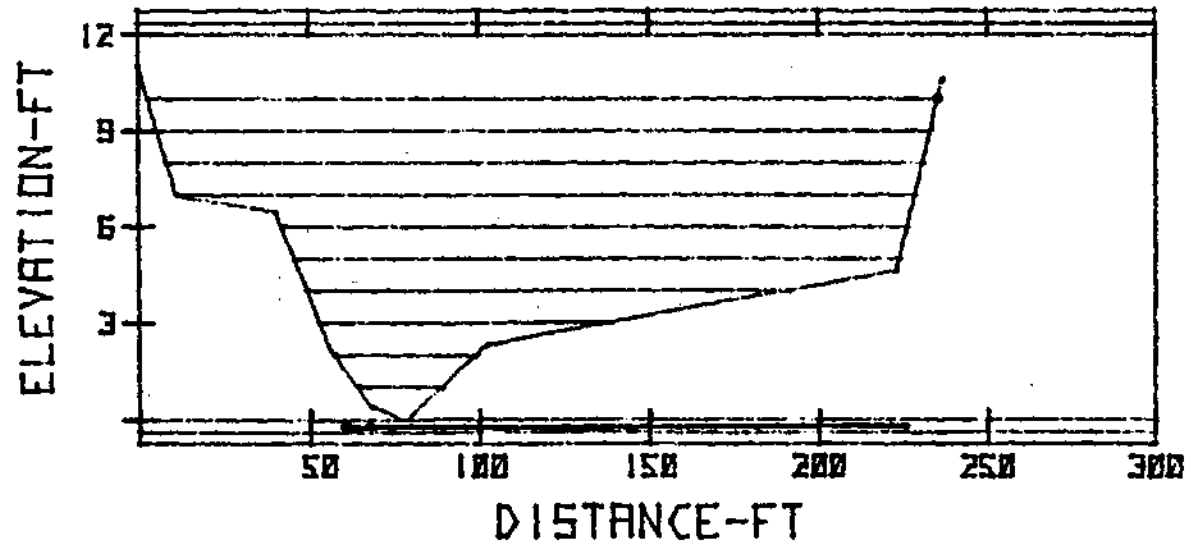
General Section Comments

Section contains predominantly run habitat. Quality varies depending on several variables. Considerable holding habitat with riparian protection is available in this section.

RUSSIAN RIVER
CROSS SECTION NUMBER 38
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 38
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-8

		Upper Transect	Lower Transect
Section	37		
Section Length (feet)	2520		
River Mile	70		
Habitat Type		run	pool
Water Surface Width (feet)		85	65
Water Temperature (°C) @ Time of Day Taken		15.5 @ 1520	15.5 @ 1400
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 2.6 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 1.54 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 5.56

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.88

Section Habitat
Section composed primarily of deep run, riffle, and rapids habitat. Some pool habitat is available at the lower transect.

Pool/Riffle Ratio 3.8:1

Spawning Substrate Observations
Instream substrate is generally larger than optimal spawning-size material. Instream substrate is typically rubble, boulders and bedrock with a high percentage of fines also. Exposed substrate is similar with the exception of a few isolated pockets of suitable spawning substrate.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-8

		Upper Transect	Lower Transect
Section	37		
Section Length (feet)	2520		
River Mile	70		
Habitat Type		riffle-run	pool
Water Surface Width (feet)		53	59
Maximum Water Depth (feet)		2.5	5.4
Water Temperature (°C) @ Time of Day Taken		17.0 @ 0930	16.5 @ 0850
Water Transparency (feet)		2.5	2.5
In-Channel Cover (feet)		7	35
In-Channel Vegetative Canopy (feet)		12	31
In-Stream Cover (feet)		0	59
In-Stream Vegetative Canopy (feet)		5	10

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	4.20
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	2.87

Section Pool Quality

Pool quality is very good at the lower transect (immediately above Squaw Rock Shoot). The majority of the transect is run, riffle, and rapids habitat. Run sections are basically deep with boulder cover on the bottom. Pool habitat at the lower transect is deep and contains instream bedrock cover.

Section Riffle Quality

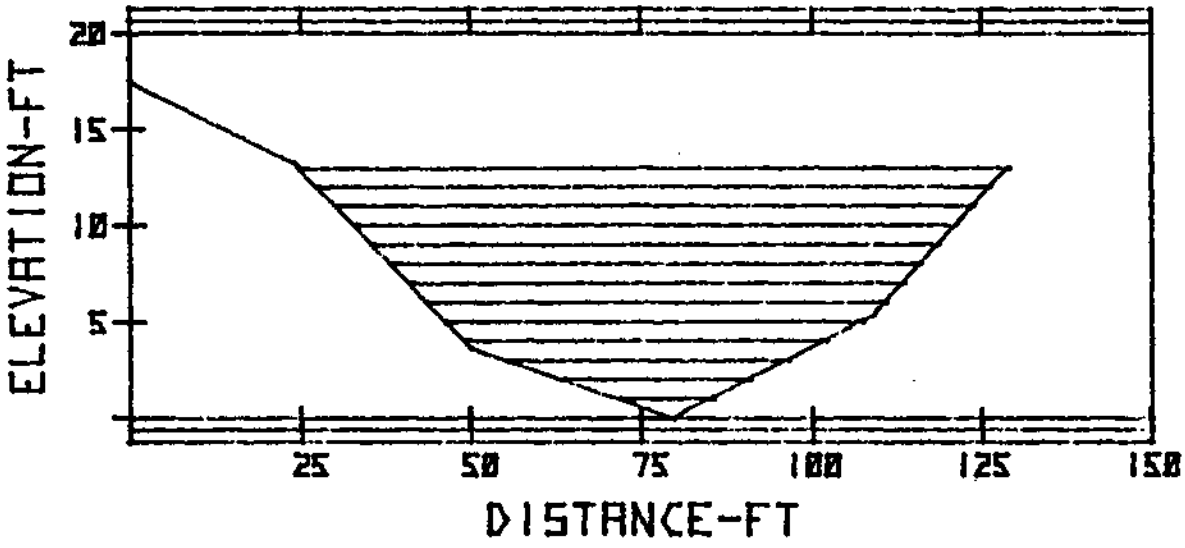
Riffle quality good. Substrate is coarse, providing very Rood instream cover. Depths up to 1.5 feet and bank instream cover are available. Shading is fair to good. One stretch of rapids (245 feet) exists at approximately mid-section.

Pool/Riffle Ratio 3.8:1

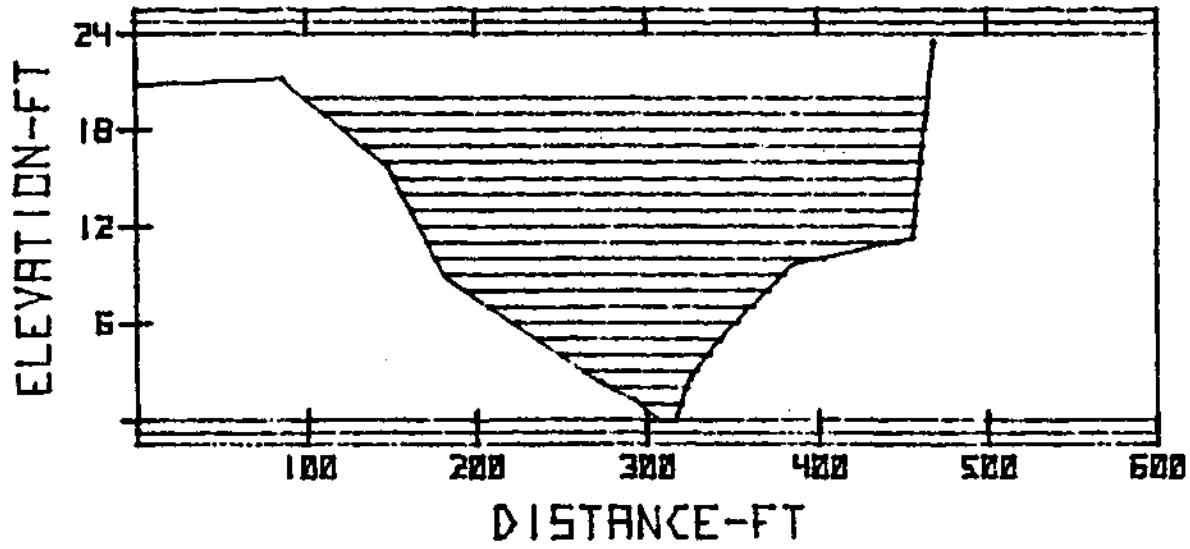
General Section Comments

River begins to descend more rapidly (20-30 feet drop/mile) below this section for a short distance.

RUSSIAN RIVER
CROSS SECTION NUMBER 37
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 37
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-9

		Upper Transect	Lower Transect
Section	36		
Section Length (feet)	2250		
River Mile	67		
Habitat Type		pool	riffle
Water Surface Width (feet)		113	144
Water Temperature (°C) @ Time of Day Taken		16.0 @ 1600	16.0 @ 1630
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.55

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.70

Section Habitat
Section is composed primarily of run habitat with a few pool and riffle sections. Runs are generally slow moving and contain some deep (>2.5 feet) water near the left edge of water.

Pool/Riffle Ratio 8 : 1

Spawning Substrate Observations
Spawning substrate is available above the lower transect at the mouth of Cummiskey Creek. A summer ford is located immediately below the mouth of the creek. Spawning gravel is very clean at the site of the ford.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-9

		Upper Transect	Lower Transect
Section	36		
Section Length (feet)	2250		
River Mile	67		
Habitat Type		run	riffle-run
Water Surface Width (feet)		109	123
Maximum Water Depth (feet)		3.0	2.9
Water Temperature (°C) @ Time of Day Taken		18.0 @ 0850	18.0 @ 0915
Water Transparency (feet)		< 4.0	< 4.0
In-Channel Cover (feet)		6	1
In-Channel Vegetative Canopy (feet)		17	10
In-Stream Cover (feet)		7	0
In-Stream Vegetative Canopy (feet)		0	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 2.40
Water Velocity (FPS) in Midstream at the Surface (Lower Transect) N/A

Section Pool Quality

Limited pool habitat is available in this section. The main concentration of pool habitat is located just below the upper transect. Boulders are available instream for cover and maximum depths are generally greater than 4.0 feet.

Section Riffle Quality

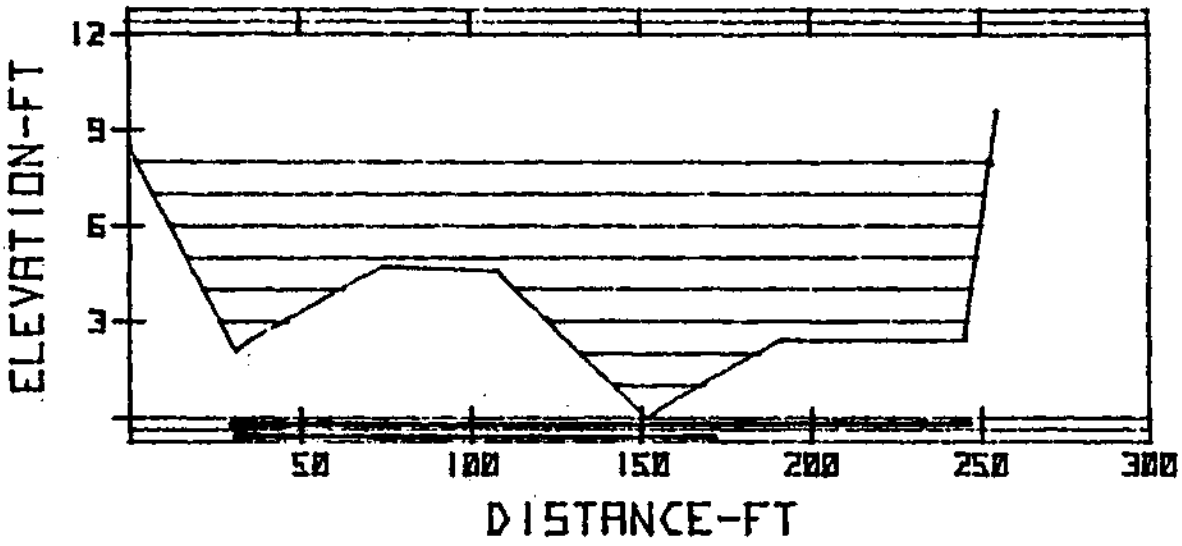
Riffle habitat is variable. A very good quality section of deep riffle (1.5 to 2 feet) exists upstream from the lower transect at the site of the summer ford.

Pool/Riffle Ratio 8:1

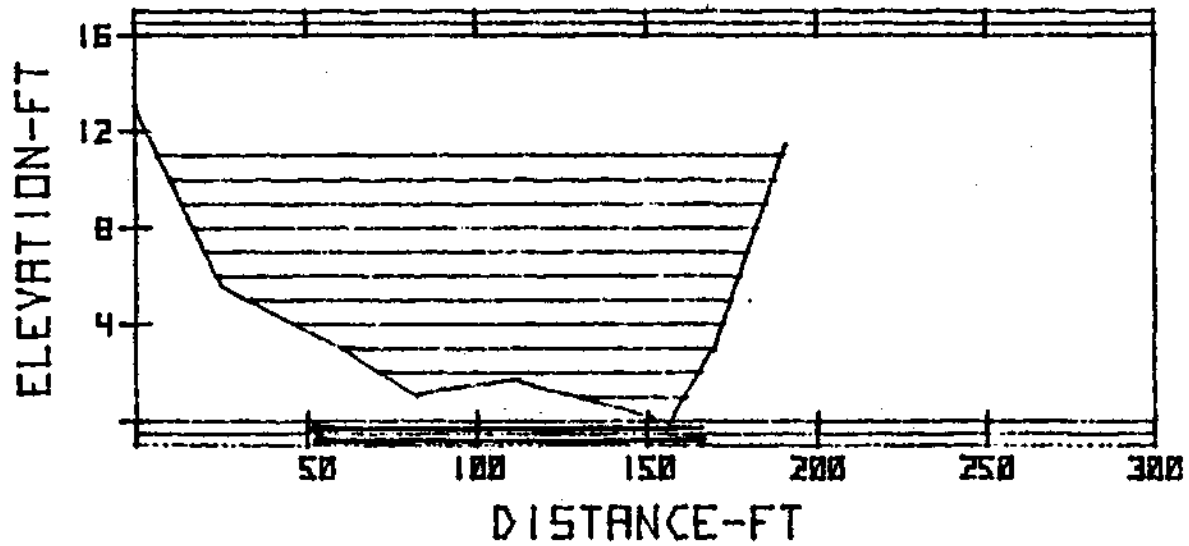
General Section Comments

The summer ford at Cummiskey Creek mouth is also the site of the best spawning habitat in this section. Good pool habitat is available upstream just below the upper transect.

RUSSIAN RIVER
CROSS SECTION NUMBER 36
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 36
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-10

		Upper Transect	Lower Transect
Section	35		
Section Length (feet)	1200		
River Mile	66		
Habitat Type		rapids	pool
Water Surface Width (feet)		70	108
Water Temperature (°C) @ Time of Day Taken		14.0 @ 0840	14.5 @ 0810
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 9.04

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.89

Section Habitat
Section is a series of pools and runs through boulders and bedrock.

Pool/Riffle Ratio 6.5:1
Spawning Substrate Observations
Very little spawning habitat is available.
Most substrate is larger than optimal (boulders-bedrock).

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-10

		Upper Transect	Lower Transect
Section	35		
Section Length (feet)	1200		
River Mile	66		
Habitat Type		rapids	pool
Water Surface Width (feet)		49	108
Maximum Water Depth (feet)		4.0	3.4
Water Temperature (°C) @ Time of Day Taken		18.5 @ 1015	19.5 @ 1120
Water Transparency (feet)		<4.0	<4.0
In-Channel Cover (feet)		60	17
In-Channel Vegetative Canopy (feet)		0	18
In-Stream Cover (feet)		49	108
In-Stream Vegetative Canopy (feet)		0	13

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	5.42
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	2.69

Section Pool Quality

Pool quality is very good. Depths exceed 4 feet in most pools and an abundance of instream cover (boulders and bedrock) is present.

Section Riffle Quality

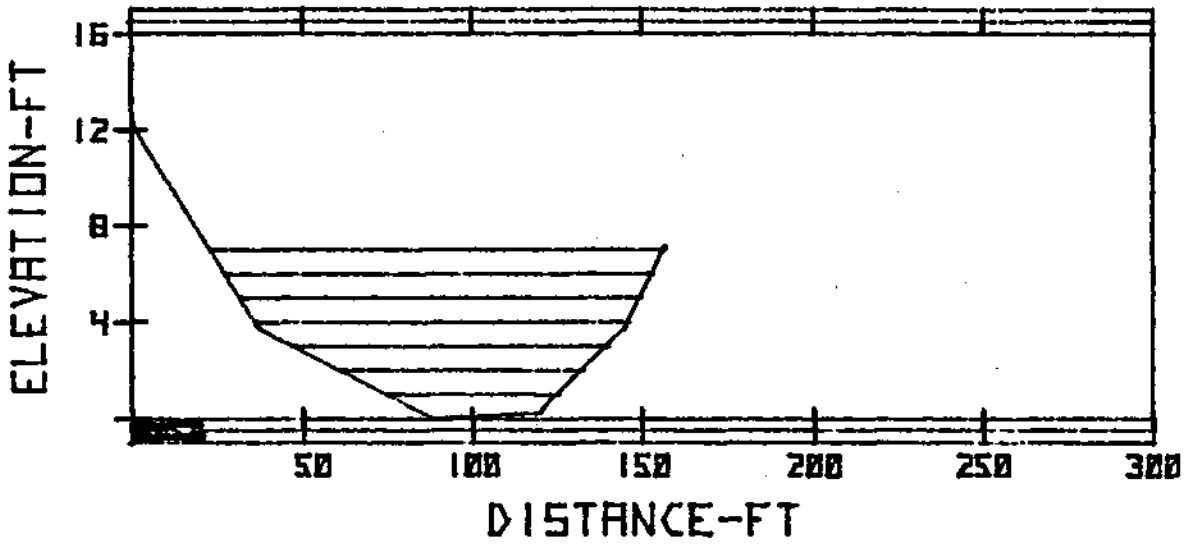
One stretch of rapids exists in this section. All other habitat is pool or run.

Pool/Riffle Ratio 6.5:1

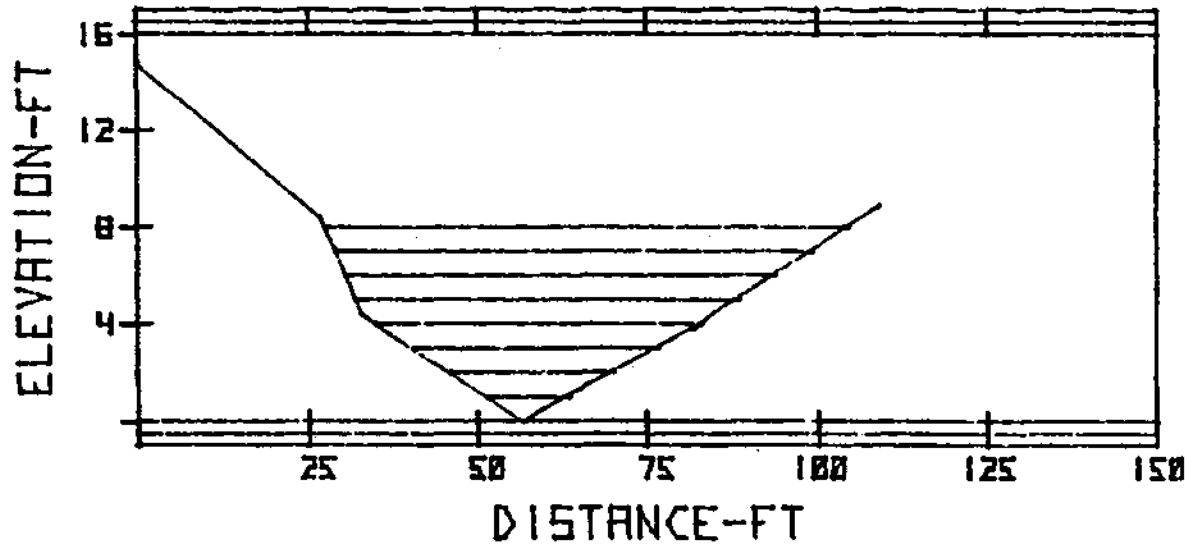
General Section Comments

Section is composed primarily of boulder and bedrock pool and run habitat.

RUSSIAN RIVER
CROSS SECTION NUMBER 35
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 35
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-10

		Upper Transect	Lower Transect
Section	33		
Section Length (feet)	1900		
River Mile	63		
Habitat Type		riffle	pool
Water Surface Width (feet)		175	106
Water Temperature (°C) @ Time of Day Taken		15.0 @ 1020	15.0 @ 0945
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 1.6 0.5 1.6 0.75 1.8 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 3.88 0.5 5.20 0.75 4.63 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 7.15

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.20

Section Habitat
The section contains primarily run habitat with some isolated riffle, rapids and pool habitat.

Pool/Riffle Ratio 9.8:1

Spawning Substrate Observations
The riffle section at the upper transect contains suitable size spawning substrate. Isolated pockets of spawning gravel are available on the left exposed gravel bar, interspersed with patches of in-channel willows.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-10

		Upper Transect	Lower Transect
Section	33		
Section Length (feet)	1900		
River Mile	63		
Habitat Type		riffle	pool
Water Surface Width (feet)		111	103
Maximum Water Depth (feet)		1.8	5.0
Water Temperature (°C) 9 Time of Day Taken		21.0 @ 1510	21.5 @ 1610
Water Transparency (feet)		4.0	4.0
In-Channel Cover (feet)		55	10
In-Channel Vegetative Canopy (feet)		66	0
In-Stream Cover (feet)		0	2
In-Stream Vegetative Canopy (feet)		0	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	5.71
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	1.22

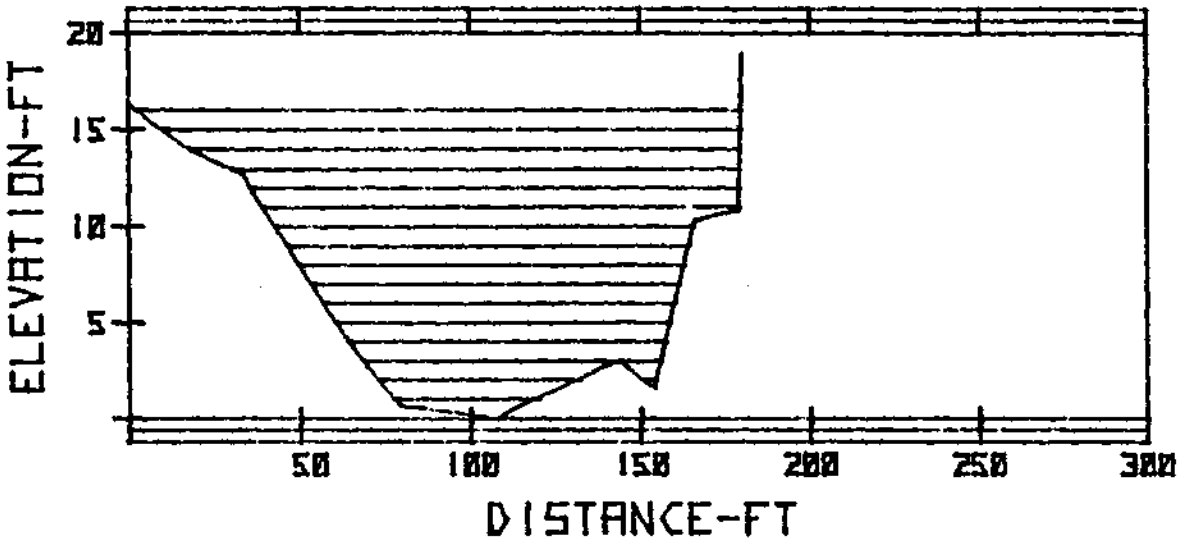
Section Pool Quality
Runs are predominant in this section except for a large deep pool under the Highway 101 bridge at the lower transect. Runs contain deep segments along the right bank where cover and canopy are available.

Section Riffle Quality
Riffles are not abundant in this section. A short shallow riffle is located at the upper transect and a section of rapids is located just above the lower transect.

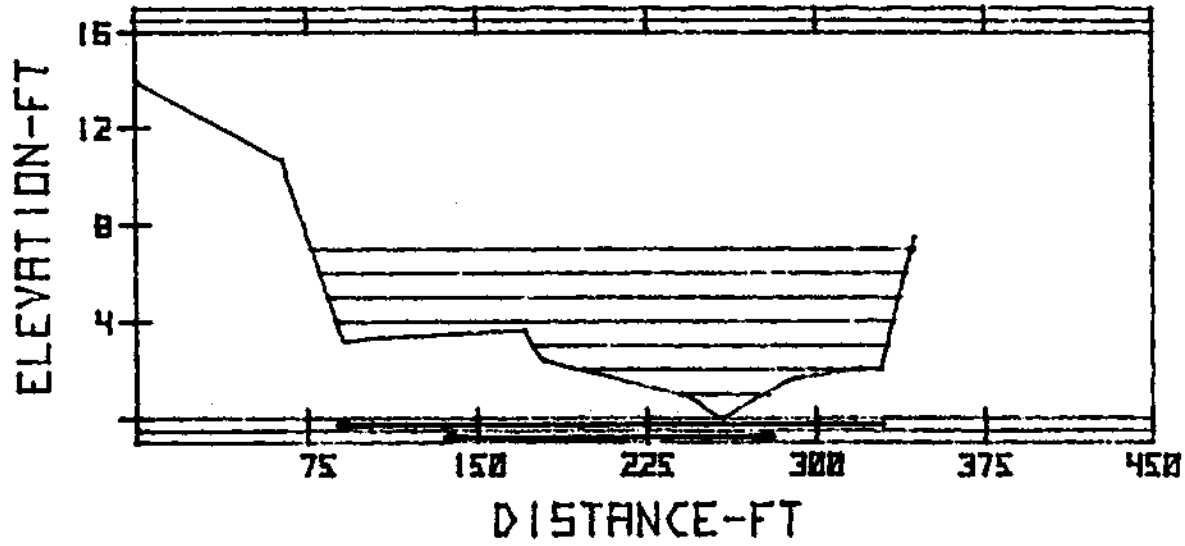
Pool/Riffle Ratio 9.8:1

General Section Comments
Section contains a good holding stretch of run located just upstream from a section of rapids.

RUSSIAN RIVER
CROSS SECTION NUMBER 33
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 33
UPPER TRANSECT



Fish Habitat Observations Spawning Habitat

Map Ref. Pg. A-11

		Upper Transect	Lower Transect
Section	32		
Section Length (feet)	620		
River Mile	62		
Habitat Type		run	riffle-run
Water Surface Width (feet)		105	--
Water Temperature (°C) @ Time of Day Taken		15.5 @ 1100	16.0 @ 1150
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:

0.25 2.2 0.5 2.7 0.75 N/A Distance from Left Edge of Water

Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:

0.25 2.9 0.5 N/A 0.75 N/A Distance from Left Edge of Water

Water Velocity (FPS) Measured on the Surface at Midstream 4.24

Lower Transect

Water Depth (Feet) at:

0.25 3.2 0.5 N/A 0.75 N/A Distance from Left Edge of Water

Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:

0.25 3.3 0.5 N/A 0.75 N/A Distance from Left Edge of Water

Water Velocity (FPS) Measured on the Surface at Midstream 3.63

Section Habitat

The section is composed primarily of deep runs and riffles.

Pool/Riffle Ratio 3.1:1

Spawning Substrate Observations

The exposed gravel bar on the left edge of water contains spawning size material. A strip approximately 100 feet wide extends the length of the transect, but the content of fine materials is very high.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-11

		Upper Transect	Lower Transect
Section	32		
Section Length (feet)	620		
River Mile	62		
Habitat Type		run	riffle
Water Surface Width (feet)		98	105
Maximum Water Depth (feet)		3.7	2.8
Water Temperature (°C) @ Time of Day Taken		22.0 @ 1340	22.0 @ 1430
Water Transparency (feet)		4.0	4.0
In-Channel Cover (feet)		60	20
In-Channel Vegetative Canopy (feet)		14	50
In-Stream Cover (feet)		7	0
In-Stream Vegetative Canopy (feet)		5	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	1.73
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	2.40

Section Pool Quality

The section is primarily run and riffle habitat. Run quality is good; generally consisting of deep narrow runs with riparian canopy on the right edge of water only.

Section Riffle Quality

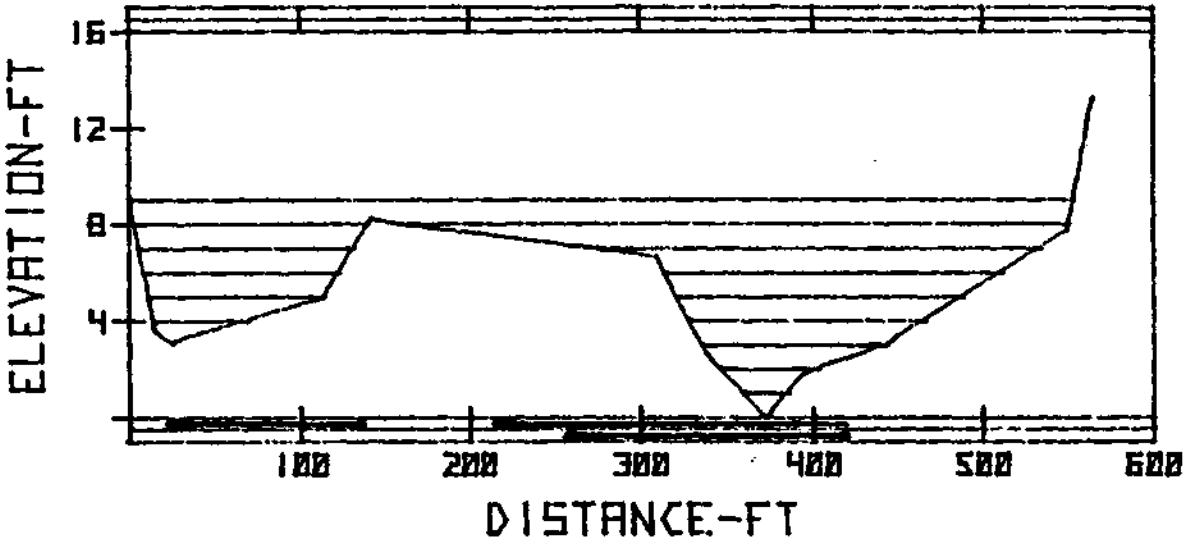
The riffle stretch of this section is good habitat from a depth and velocity standpoint. The substrate contains many fines and the riffle is completely exposed.

Pool/Riffle Ratio 3.1:1

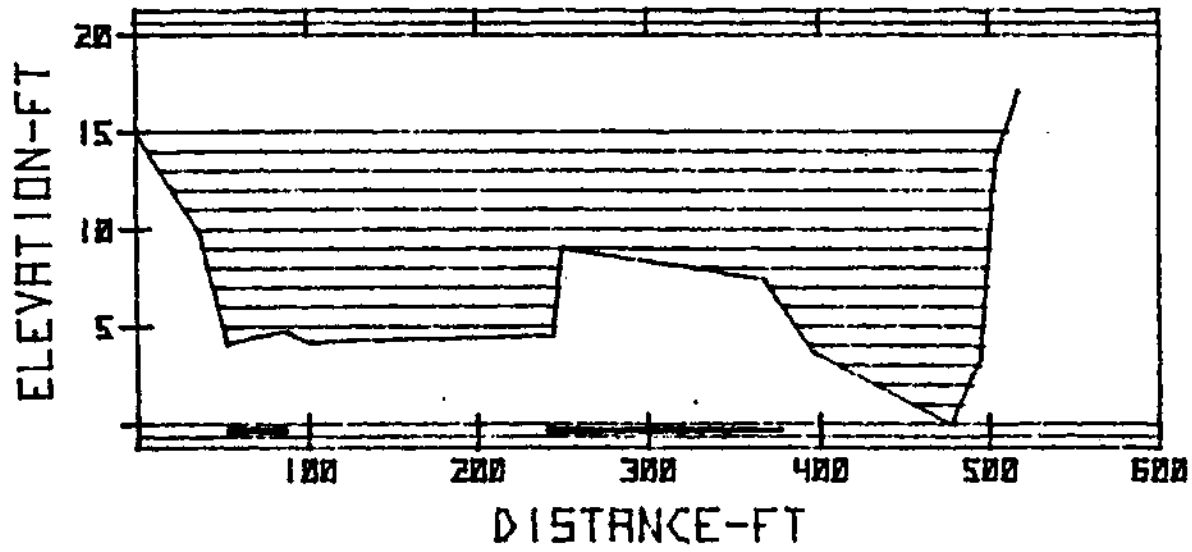
General Section Comments

This section is opposite a large operating gravel company.

RUSSIAN RIVER
CROSS SECTION NUMBER 32
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 32
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-11

		Upper Transect	Lower Transect
Section	31		
Section Length (feet)	1320		
River Mile	61		
Habitat Type		pool	riffle-run
Water Surface Width (feet)		215	180
Water Temperature (°C) @ Time of Day Taken		17.0 @ 1300	17.0 @ 1330
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 2.7 0.75 2.8 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 1.94 0.75 1.94 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.83

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 2.7 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 4.05 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 5.30

Section Habitat
The section is composed primarily of deep, left bank runs with some riffle habitat.

Pool/Riffle Ratio 0.6:1

Spawning Substrate Observations
Suitable spawning substrate was observed in the pool tail just below the upper transect. Other areas observed contained too high a concentration of fine material for optimal spawning conditions.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-11

		Upper Transect	Lower Transect
Section	31		
Section Length (feet)	1320		
River Mile	61		
Habitat Type		pool	riffle
Water Surface Width (feet)		140	65
Maximum Water Depth (feet)		1.7	2.4
Water Temperature (°C) @ Time of Day Taken		20.5 @ 1145	20.5 @ 1220
Water Transparency (feet)		>4.0	>4.0
In-Channel Cover (feet)		63	9
In-Channel Vegetative Canopy (feet)		98	25
In-Stream Cover (feet)		7	0
In-Stream Vegetative Canopy (feet)		20	2

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 1.90
Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 6.52

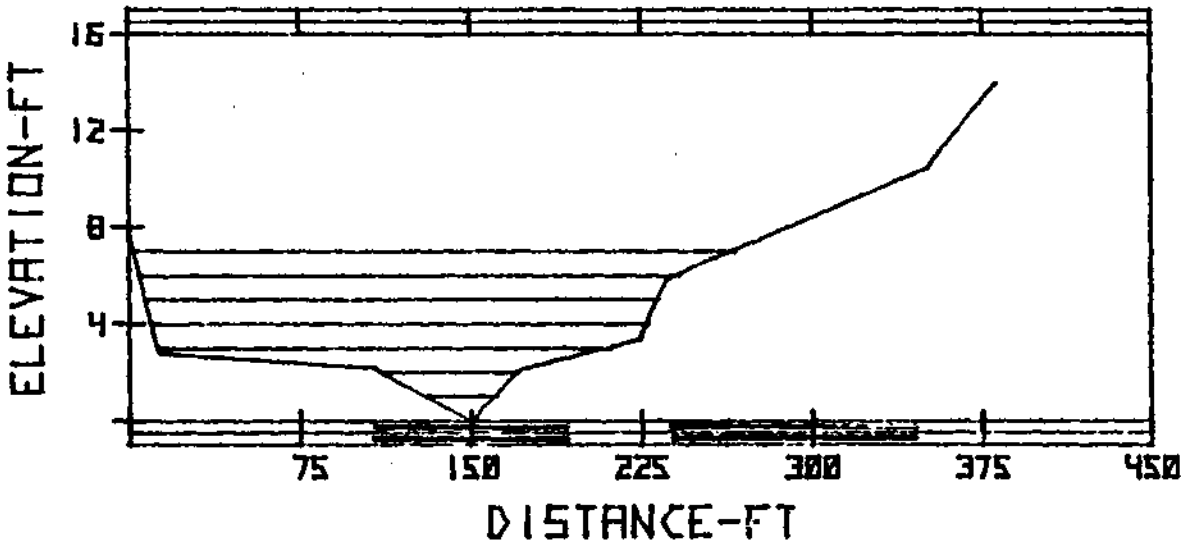
Section Pool Quality
The section contains mostly run and riffle habitat with the exception of one stretch of pool at the upper transect. Run quality is generally good; depths up to 8 feet exist along the left edge of the water. Cover and canopy are good on the left edge of the water.

Section Riffle Quality
Riffle quality is variable in this section primarily because of the range of riffle depths. Substrate is generally coarse material.

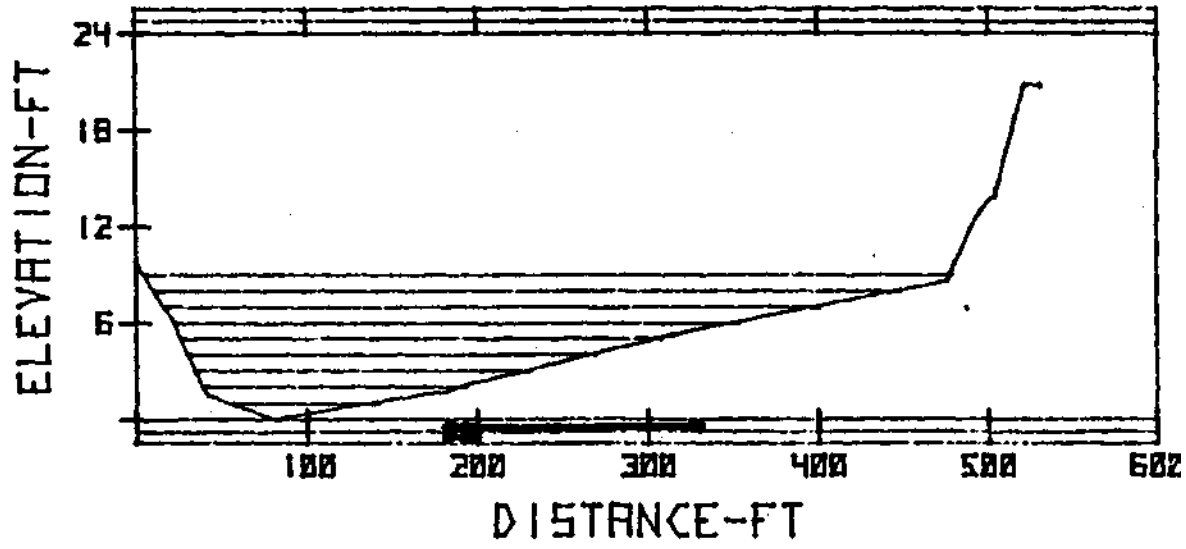
Pool/Riffle Ratio 0.6:1

General Section Comments
The section is narrow, resulting in deep, fast-moving water. Less surface area is exposed at the run and more surface area is covered by riparian vegetation.

RUSSIAN RIVER
CROSS SECTION NUMBER 31
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 31
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-12

		Upper Transect	Lower Transect
Section	30		
Section Length (feet)	820		
River Mile	57		
Habitat Type		riffle	pool-run
Water Surface Width (feet)		160	85
Water Temperature (°C) @ Time of Day Taken		18.5 @ 1700	20.0 @ 1640
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 2.6 0.75 1.6 Distance from Left Edge of
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 2.34 0.75 1.98 Distance from Left Edge of
Water Velocity (FPS) Measured on the Surface at Midstream 2.87

Lower Transect

Water Depth (Feet) at:
0.2 2.1 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.2 0.18 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.69

Section Habitat
The section contains riffle, run, and pool habitat. The main flowing channel is against bedrock on the right edge of the river channel.

Pool/Riffle Ratio 0.6:1

Spawning Substrate Observations
Spawning habitat is suitable in riffle stretches of this section from a substrate size standpoint. Exposed gravel bar substrate on the left edge of the water is also of suitable spawning size.

Fish Habitat Observations Nursery Habitat Mainstem

Map Ref. Pg. A-12

		Upper Transect	Lower Transect
Section	30		
Section Length (feet)	1320		
River Mile	57		
Habitat Type		N/A	pool-run
Water Surface Width (feet)		N/A split channel	lt.-20 rt.-81 (main chnl.)
Maximum Water Depth (feet)		N/A	rt.-2.2 lt.-4.0
Water Temperature (°C) @ Time of Day Taken		N/A	20.0 @ 1015
Water Transparency (feet)		N/A	4.0
In-Channel Cover (feet)		N/A	45
In-Channel Vegetative Canopy (feet)		N/A	35
In-Stream Cover (feet)		N/A	23
In-Stream Vegetative Canopy (feet)		N/A	9

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	N/A
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	lt.-3.81 rt.-1.35

Section Pool Quality

The pool section at the lower transect contains good habitat with respect to depth and bedrock cover on the right edge of the water.

Section Riffle Quality

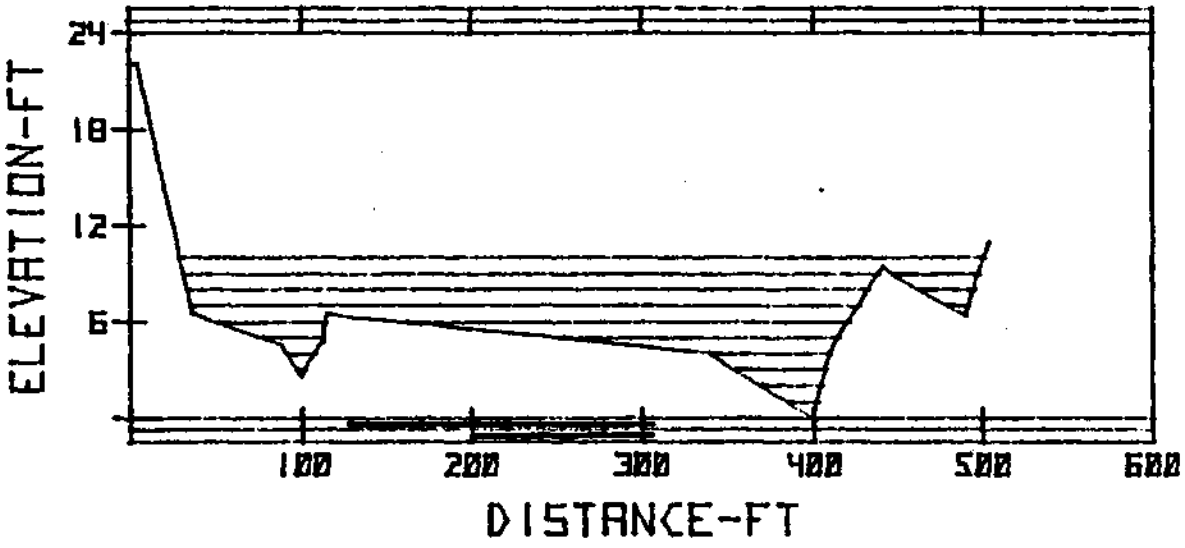
Riffle quality is good. Substrate is suitable for spawning and relatively free of fine material. Forty invertebrates/ft2 of riffle substrate were found.

Pool/Riffle Ratio 0.6:1

General Section Comments

The upper transect was eliminated because the transect was disturbed by construction of the summer Asti road crossing.

RUSSIAN RIVER
CROSS SECTION NUMBER 30
LOWER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-13

		Upper Transect	Lower Transect
Section	29		
Section Length (feet)	3000		
River Mile	53		
Habitat Type		pool tail	riffle-run
Water Surface Width (feet)		200	110
Water Temperature (°C) @ Time of Day Taken		15.0 @ 0930	15.5 @ 0900
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 0.9 0.5 1.4 0.75 1.9 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.11 0.5 2.75 0.75 3.26 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.26

Lower Transect

Water Depth (Feet) at:
0.2 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.2 N/A 0.5 N/A 0 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.50

Section Habitat
Runs and riffles are predominant in this section. Depth and velocity are good. The channel is very exposed. The section is opposite one of the larger mainstem gravel extraction operations.

Pool/Riffle Ratio 3.4:1

Spawning Substrate Observations
Riffles contain generally good spawning habitat in this section. The substrate is clean and of suitable spawning size. A wide expanse of exposed substrate exists at this section. The majority of it contains too great a percentage of fines or is compacted.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-13

		Upper Transect	Lower Transect
Section	29		
Section Length (feet)	3000		
River Mile	53		
Habitat Type		riffle	run
Water Surface Width (feet)		162	96
Maximum Water Depth (feet)		1.2	3.4
Water Temperature (°C) @ Time of Day Taken		19.0 @ 0935	19.0 @ 0815
Water Transparency (feet)		> 4.0	>4.0
In-Channel Cover (feet)		22	8
In-Channel Vegetative Canopy (feet)		30	12
In-Stream Cover (feet)		2	8
In-Stream Vegetative Canopy (feet)		2	6

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	4.20
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	1.83

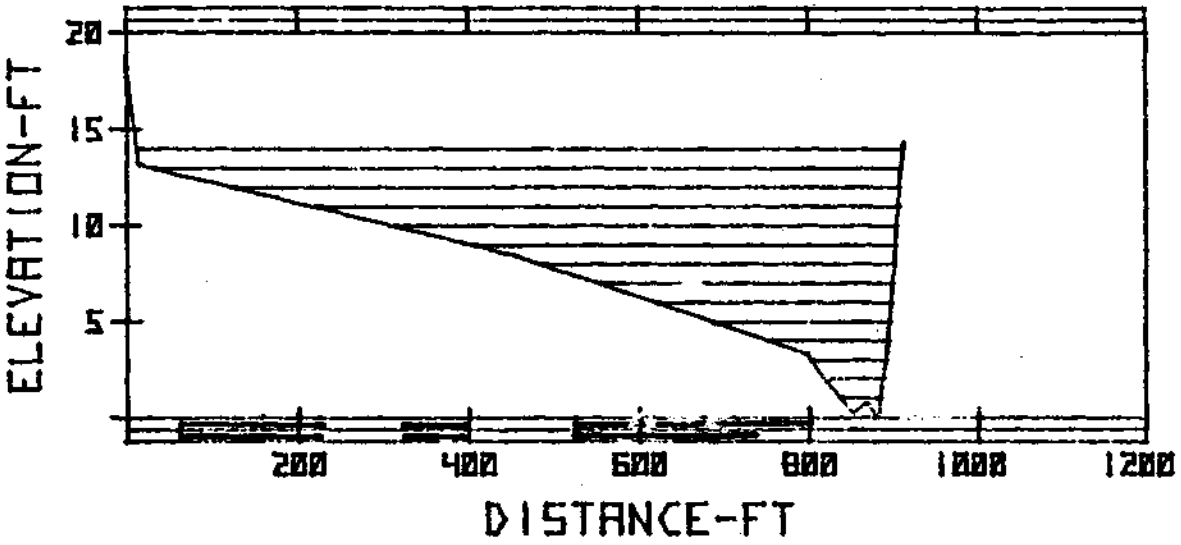
Section Pool Quality
Pool quality is good. Depths are up to 3 feet, velocity and turbulence are fairly good and the substrate is mostly coarse material. Runs are more abundant than pools in this section.

Section Riffle Quality
Riffles are generally good quality with clean substrate. Exposure is excessive.

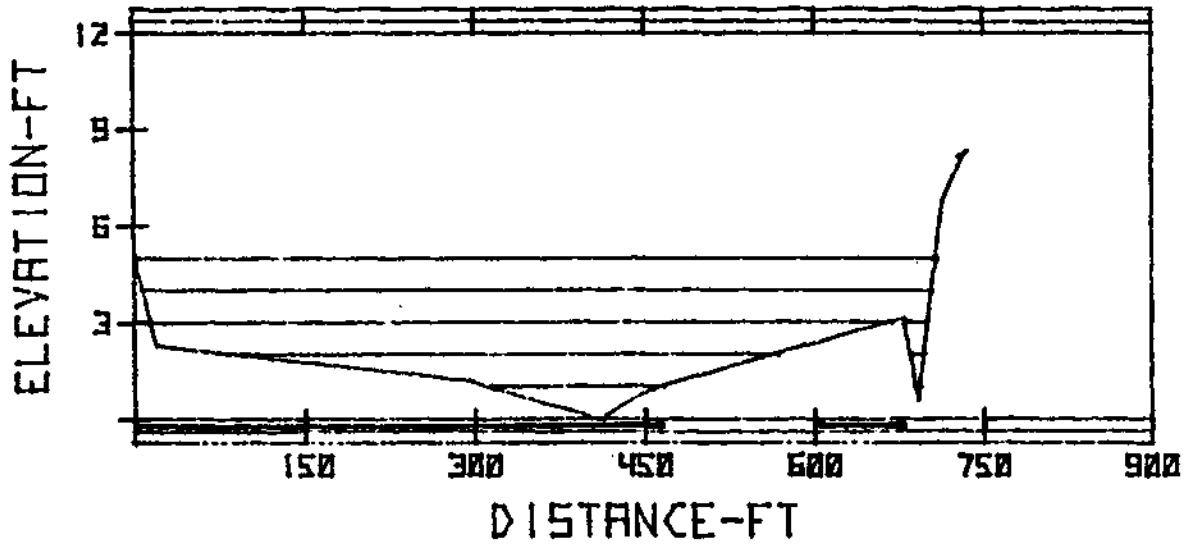
Pool/Riffle Ratio 3.4:1

General Section Comments
The water surface is exposed in this section.
The section is opposite a large gravel extraction operation.

RUSSIAN RIVER
CROSS SECTION NUMBER 29
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 29
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-13

		Upper Transect	Lower Transect
Section	28		
Section Length (feet)	1860		
River Mile	52		
Habitat Type		run	run
Water Surface Width (feet)		160	55
Water Temperature (°C) @ Time of Day Taken		19.5 @ 1445	20.0 @ 1515
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 2.66

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.31

Section Habitat
The section is composed of run and deep riffle habitat. Little pool habitat is available. Depth through most of the section is good (30% of section is greater than 2.5 feet deep).

Pool/Riffle Ratio 2.4:1

Spawning Substrate Observations
Very good spawning habitat is located under the highway bridge in the wet channel. Exposed substrate under the highway bridge is very good King Salmon spawning substrate. Most exposed substrate is severely altered by gravel extraction.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-13

		Upper Transect	Lower Transect
Section	28		
Section Length (feet)	1860		
River Mile	52		
Habitat Type		pool-run	riffle
Water Surface Width (feet)		12A	50
Maximum Water Depth (feet)		4.0	2.0
Water Temperature (°C) @ Time of Day Taken		25.5 @ 1630	26.0 @ 1700
Water Transparency (feet)		>4.0	>4.0
In-Channel Cover (feet)		47	6
In-Channel Vegetative Canopy (feet)		47	10
In-Stream Cover (feet)		4	6
In-Stream Vegetative Canopy (feet)		0	3

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 1.31

Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 2.80

Section Pool Quality

Pool habitat is isolated in this section below the upper transect and just above the lower transect. Depths are good but exposure is poor. Instream cover is fair and little shading is available.

Section Riffle Quality

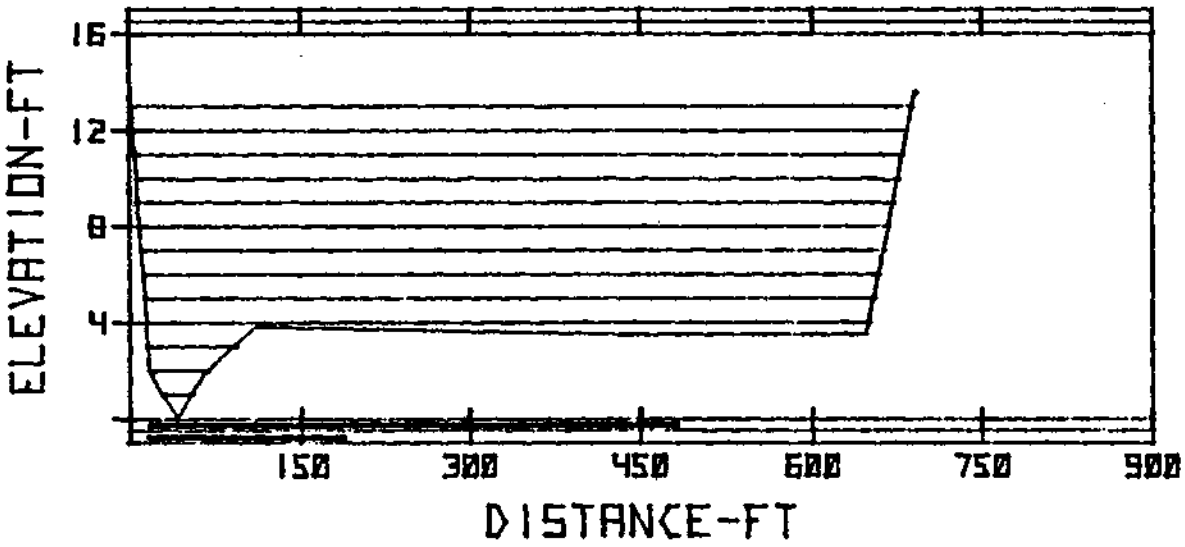
Very good riffle habitat is located below the upper transect under the highway bridge. Depths of 0.5 to 4.0 feet are available. Substrate up to 12 inches is available.

Pool/Riffle Ratio 2.4:1

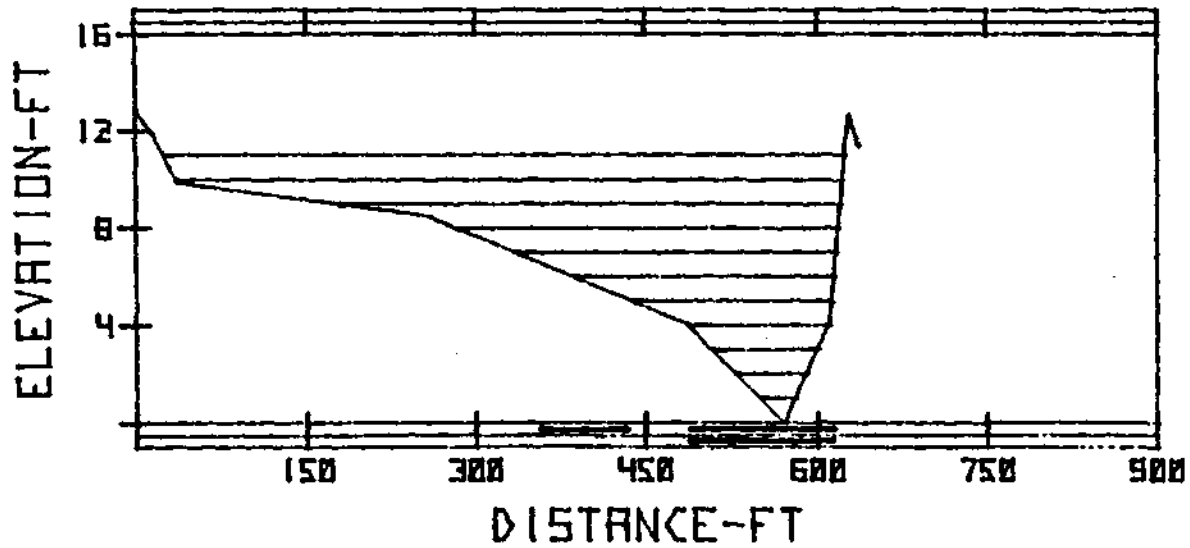
General Section Comments

A very extensive gravel operation exists on the right side of the channel. Mass excavation on one extensive plane is progressing downstream from just below the highway bridge.

RUSSIAN RIVER
CROSS SECTION NUMBER 28
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 28
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-14

		Upper Transect	Lower Transect
Section	27		
Section Length (feet)	2000		
River Mile	49		
Habitat Type		pool tail	riffle
Water Surface Width (feet)		180	150
Water Temperature (°C) @ Time of Day Taken		15.5 @ 1021	16.0 @ 1045
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 0.8 0.5 1.8 0.75 2.4 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 1.73 0.5 2.57 0.75 3.55 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 2.78

Lower Transect

Water Depth (Feet) at:
0.25 0.7 0.5 1.8 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 3.7 0.5 3.92 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 6.14

Section Habitat
The channel is wide and generally exposed. The upper third of the section is run habitat consisting of shallow water with fine substrate. The lower two thirds of the section is riffle and pool habitat.

Pool/Riffle Ratio 3.7:1

Spawning Substrate Observations
Very good spawning habitat (riffle) is located midway in the section. In addition, the exposed substrate on the left edge of the channel contains considerable clean spawning-size material.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-14

		Upper Transect	Lower Transect
Section	27		
Section Length (feet)	2000		
River Mile	49		
Habitat Type		pool tail	run
Water Surface Width (feet)		134	144
Maximum Water Depth (feet)		1.9	2.7
Water Temperature (°C) @ Time of Day Taken		24.0 @ 1500	24.5 @ 1545
Water Transparency (feet)		>4.0	>4.0
In-Channel Cover (feet)		3	21
In-Channel Vegetative Canopy (feet)		5	25
In-Stream Cover (feet)		0	2
In-Stream Vegetative Canopy (feet)		0	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	1.43
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	1.15

Section Pool Quality

Pool habitat is good near the lower transect. Considerable instream cover (branches, tree trunks) is available, but the canopy is mostly poor. Pool habitat is lacking elsewhere in this section.

Section Riffle Quality

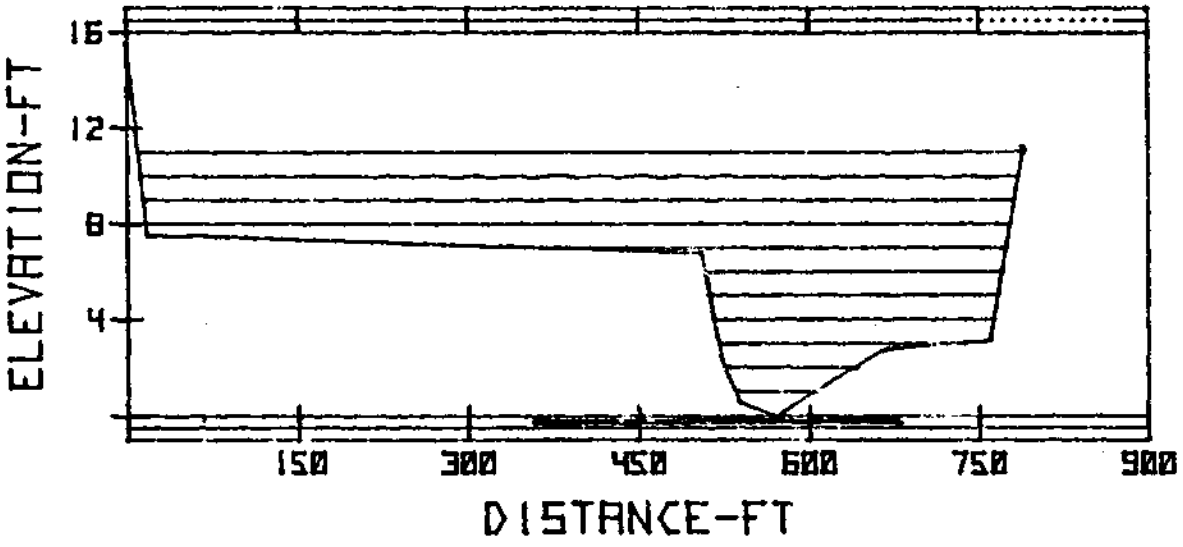
Riffle quality is good. Depths extend to 1.5 feet; turbulence cover is good; and substrate is coarse (4-8 inches). No cover or canopy is available. The benthic invertebrate count is 36 individuals/ft^2.

Pool/Riffle Ratio 3.7:1

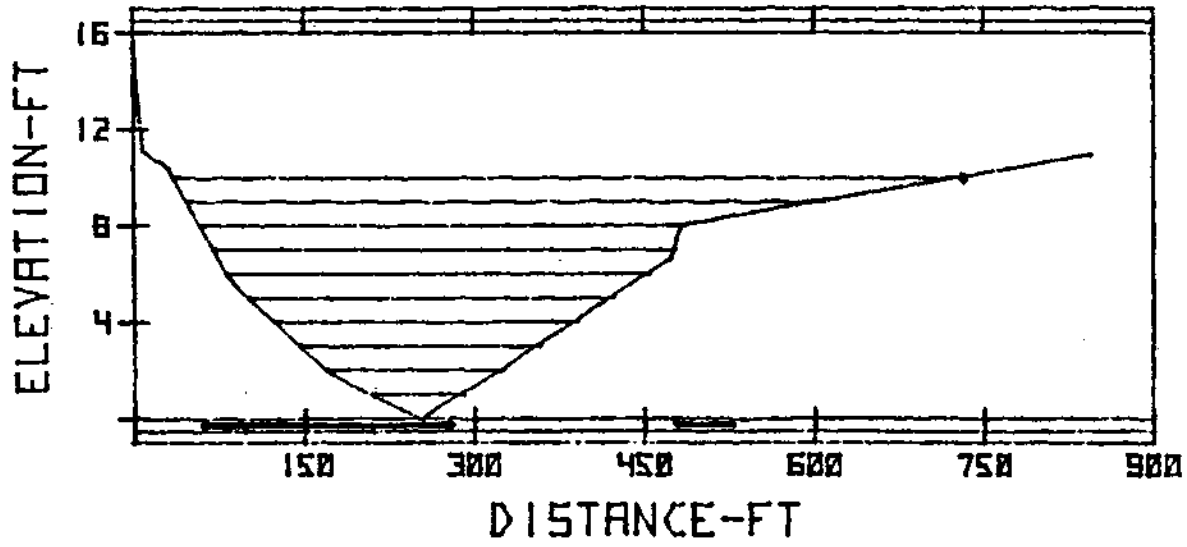
General Section Comments

The section is very exposed. Good spawning gravel is available. Limited deep pool habitat is available.

RUSSIAN RIVER
CROSS SECTION NUMBER 27
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 27
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-14, A-15

		Upper Transect	Lower Transect
Section	26		
Section Length (feet)	1800		
River Mile	46		
Habitat Type		run	run
Water Surface Width (feet)		92	90
Water Temperature (°C) @ Time of Day Taken		16.5 @ 1150	17.0 @ 1230
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 5.64

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 2.7 0.75 1.3 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 1.75 0.75 2.61 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.83

Section Habitat
This section contains very good pool and riffle habitat. Cover and canopy are present. Three main spawning riffles exist in this section.

Pool/Riffle Ratio 1.8:1

Spawning Substrate Observations
Very good spawning habitat is available in this section. Approximately 70% of this section is available for spawning from a substrate standpoint.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-14, A-15

		Upper Transect	Lower Transect
Section	26		
Section Length (feet)	1800		
River Mile	46		
Habitat Type		riffle-run	pool
Water Surface Width (feet)		71	68
Maximum Water Depth (feet)		2.5	3.4
Water Temperature (°C) @ Time of Day Taken		24.0 @ 1330	24.0 @ 1410
Water Transparency (feet)		>4.0	>4.0
In-Channel Cover (feet)		21	43
In-Channel Vegetative Canopy (feet)		24	15
In-Stream Cover (feet)		0	15
In-Stream Vegetative Canopy (feet)		0	15

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 1.90

Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 2.40

Section Pool Quality

Pool quality is very good. Depths up to 8 to 10 ft, undercut banks, submerged willow trunks, and good canopy are present in this section.

Section Riffle Quality

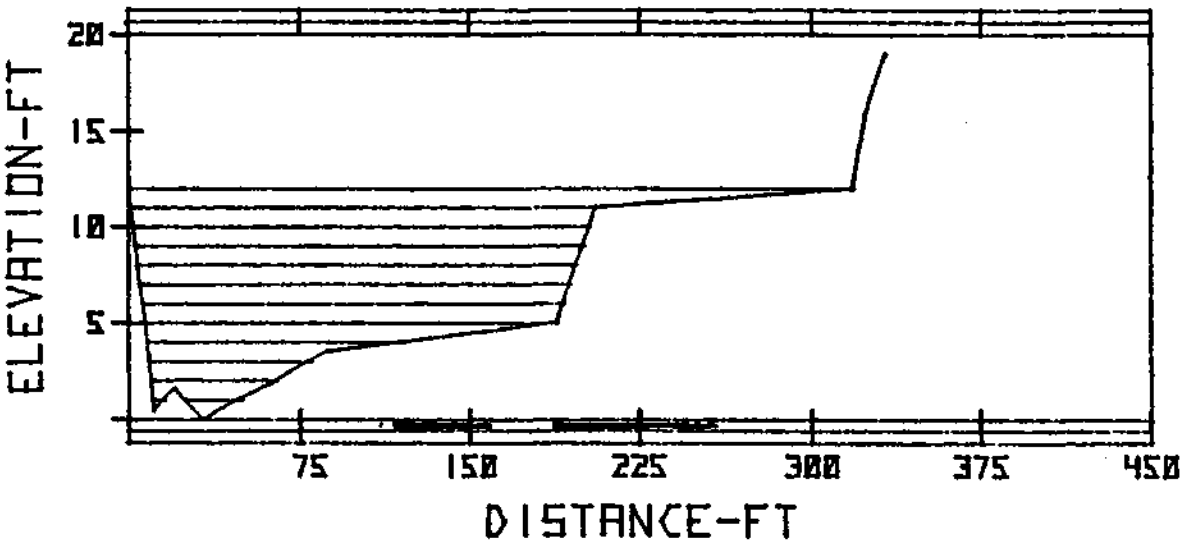
Riffle habitat is very good. The substrate is of spawning size and relatively free of fine material. Good riffle depth and velocity are present.

Pool/Riffle Ratio 1.8:1

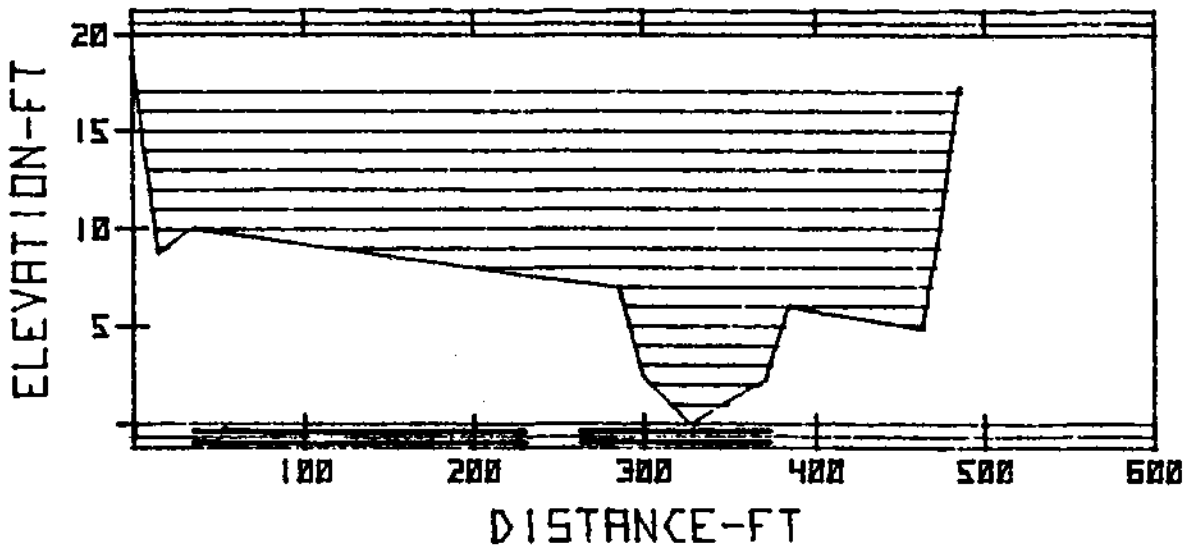
General Section Comments

This section contained the best pool and riffle habitat observed from the mouth upstream to this point. Large (2 ft long) squawfish (Ptychocheilus grandis) were observed.

RUSSIAN RIVER
CROSS SECTION NUMBER 26
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 26
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-15

		Upper Transect	Lower Transect
Section	22		
Section Length (feet)	1000		
River Mile	36		
Habitat Type		riffle	riffle-run
Water Surface Width (feet)		160	68
Water Temperature (°C) @ Time of Day Taken		20.5 @ 1700	20.0 @ 1620
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 1.5 0.5 2.7 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.30 0.5 3.39 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 6.46

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 5.02

Section Habitat
The section is composed primarily of run and riffle habitat. The upper transect is riffle-run habitat. Sections of run and riffle habitat exist between the transects. The lower transect is run habitat.

Pool/Riffle Ratio 2.3:1

Spawning Substrate Observations
Instream substrate is suitable in patches at the upper and lower transects. The riffle section just above the lower transect contains potentially usable substrate. Isolated, exposed pockets of spawning gravel exist on the left bank at the lower transect.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-15

		Upper Transect	Lower Transect
Section	22		
Section Length (feet)	1000		
River Mile	36		
Habitat Type		pool-run	riffle-run
Water Surface Width (feet)		85	63
Maximum Water Depth (feet)		3.4	3.3
Water Temperature (°C) @ Time of Day Taken		22.0 @ 1130	21.5 @ 1005
Water Transparency (feet)		>4.0	>4.0
In-Channel Cover (feet)		35	18
In-Channel Vegetative Canopy (feet)		85	45
In-Stream Cover (feet)		6	6
In-Stream Vegetative Canopy (feet)		25	8

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	0.82
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	2.43

Section Pool Quality

The section is primarily run habitat. Good riparian cover exists on both banks. Some deep (2.5 feet) slots are available near the edges of the water. The lower half of the section is more exposed than the upper half.

Section Riffle Quality

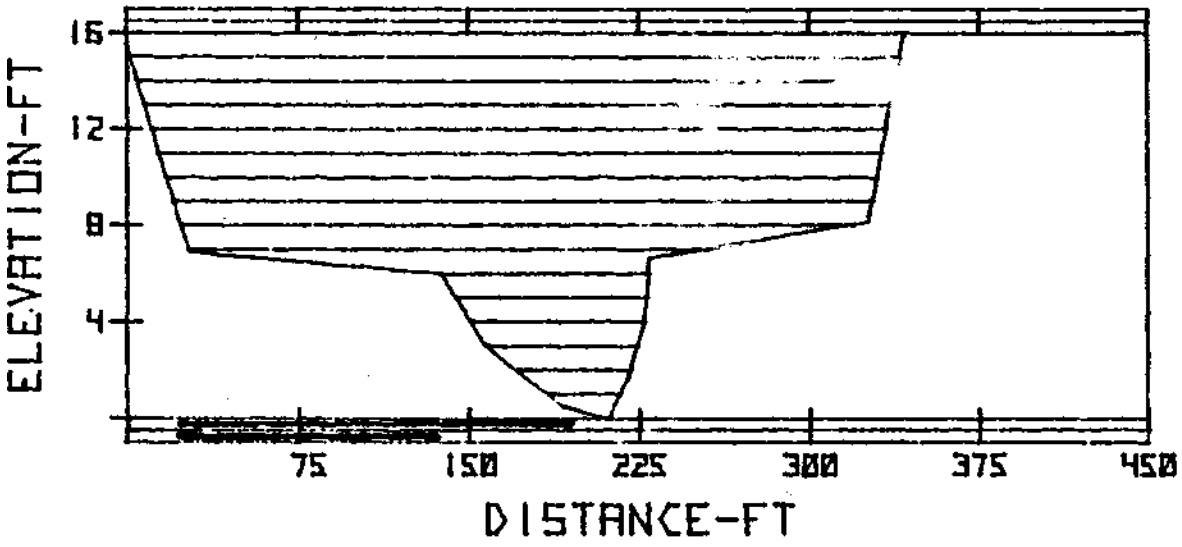
Riffle habitat is good. Depths are available up to 1.5 feet; the water surface is turbulent and the substrate is coarse (to 12 inches). Shading is available on the banks.

Pool/Riffle Ratio 2.3:1

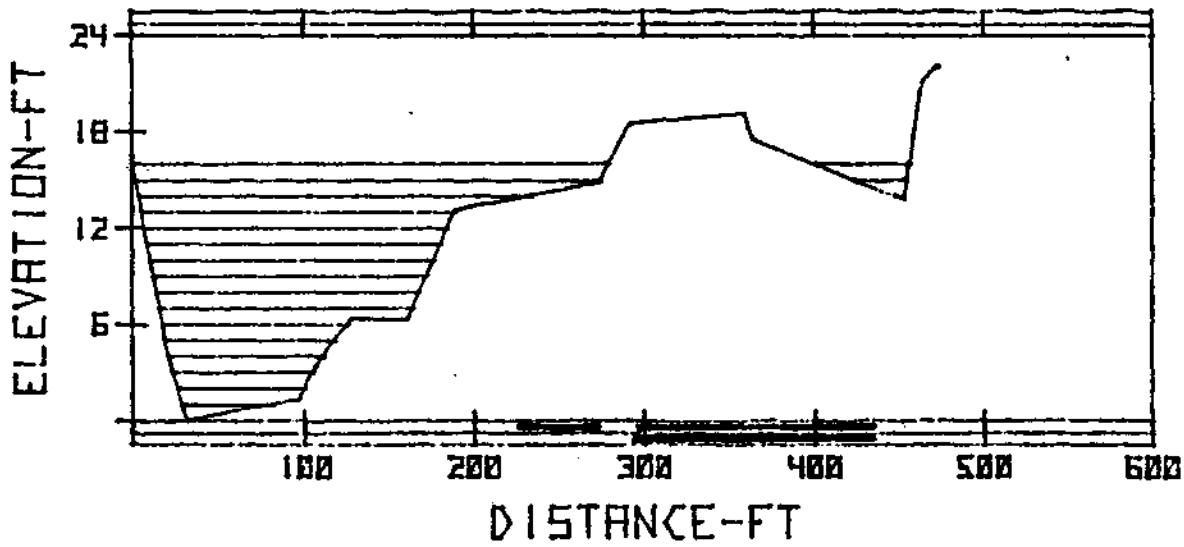
General Section Comments

Substrate through the run stretches is generally fine and poor with respect to invertebrate abundance. The section is narrow compared to most sections.

RUSSIAN RIVER
CROSS SECTION NUMBER 22
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 22
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-16

		Upper Transect	Lower Transect
Section	21		
Section Length (feet)	750		
River Mile	34		
Habitat Type		riffle-run	Pool-tail
Water Surface Width (feet)		130	178
Water Temperature (°C) @ Time of Day Taken		18.0 @ 0830	18.0 @ 0900
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 2.0 0.75 1.6 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 1.43 0.75 2.91 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.43

Lower Transect

Water Depth (Feet) at:
0.25 2.0 0.5 3.0 0.75 3.0 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.07 0.5 2.34 0.75 1.9 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.86

Section Habitat
Riffle habitat is located immediately below the upper transect. Run and pool habitat complete the section.

Pool/Riffle Ratio 8.4:1

Spawning Substrate Observations
Spawning-size substrate is located at the upper transect through the riffle section and into the run section. Exposed substrate on the right edge of channel is generally composed of fine material.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-16

		Upper Transect	Lower Transect
Section	21		
Section Length (feet)	750		
River Mile	34		
Habitat Type		riffle	run
Water Surface Width (feet)		119	109
Maximum Water Depth (feet)		N/A	2.7
Water Temperature (°C) @ Time of Day Taken		21.0 @ 0805	21.5 @ 0915
Water Transparency (feet)		>4.0	>4.0
In-Channel Cover (feet)		100	45
In-Channel Vegetative Canopy (feet)		3C	90
In-Stream Cover (feet)		3	2
In-Stream Vegetative Canopy (feet)		15	2

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 3.37
Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 1.47

Section Pool Quality

Section pool habitat is good. Bedrock cover and depths greater than 5 feet are available on the left bank of the pool section. Healdsburg dam influence probably extends up to this section.

Section Riffle Quality

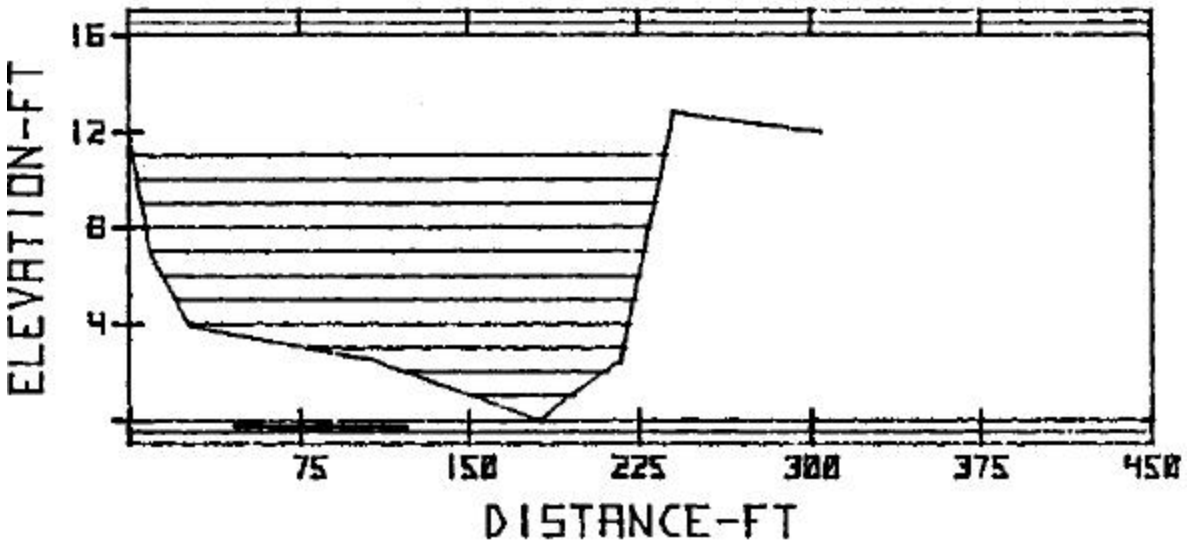
Riffle habitat is relatively deep (2.5 feet) and has good left bank cover and canopy. Undercut bank habitat is available on the left edge of the water through the riffle section below the upper transect.

Pool/Riffle Ratio 8.4:1

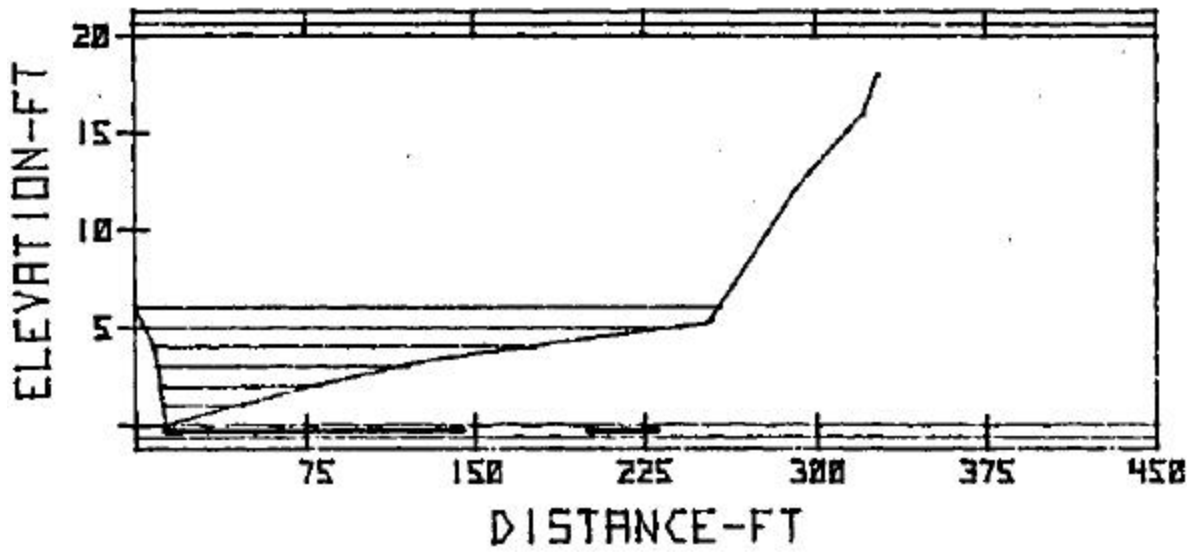
General Section Comments

Riffle and pool habitat is relatively good quality. Juvenile steelhead are reportedly caught in one deep pool section by a local angler.

RUSSIAN RIVER
CROSS SECTION NUMBER 21
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 21
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-16, A-17

		Upper Transect	Lower Transect
Section	19		
Section Length (feet)	2000		
River Mile	30		
Habitat Type		pool	riffle
Water Surface Width (feet)		150	80
Water Temperature (°C) @ Time of Day Taken		19.0 @ 1200	17.5 @ 1100
Water Transparency (feet)		2.5	3.0

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 2.72

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 1.0 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 4.24 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 7.04

Section Habitat
The section is composed primarily of run and riffle habitat. Deep runs with bank protection are available.

Pool/Riffle Ratio 4 : 1

Spawning Substrate Observations
Riffle habitat near the lower transect is suitable for spawning from a substrate standpoint. The exposed gravel bar (left edge of channel) contains considerable usable spawning habitat. The mouth of Dry Creek enters at the lower transect.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-16, A-17

		Upper Transect	Lower Transect
Section	19		
Section Length (feet)	2000		
River Mile	30		
Habitat Type		riffle	riffle
Water Surface Width (feet)		66	59
Maximum Water Depth (feet)		3.0	2.3
Water Temperature (°C) @ Time of Day Taken		24.0 @ 1625	24.0 @ 1515
Water Transparency (feet)		>4.0	>4.0
In-Channel Cover (feet)		9.0	3.0
In-Channel Vegetative Canopy (feet)		28.0	0
In-Stream Cover (feet)		2.0	3.0
In-Stream Vegetative Canopy (feet)		3.0	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	2.11
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	3.33

Section Pool Quality

Very little pool habitat is available in this section, and run habitat is predominant. Run quality is generally good. Depth is generally greater than 2.5 feet and the right edge of the water offers good cover and canopy.

Section Riffle Quality

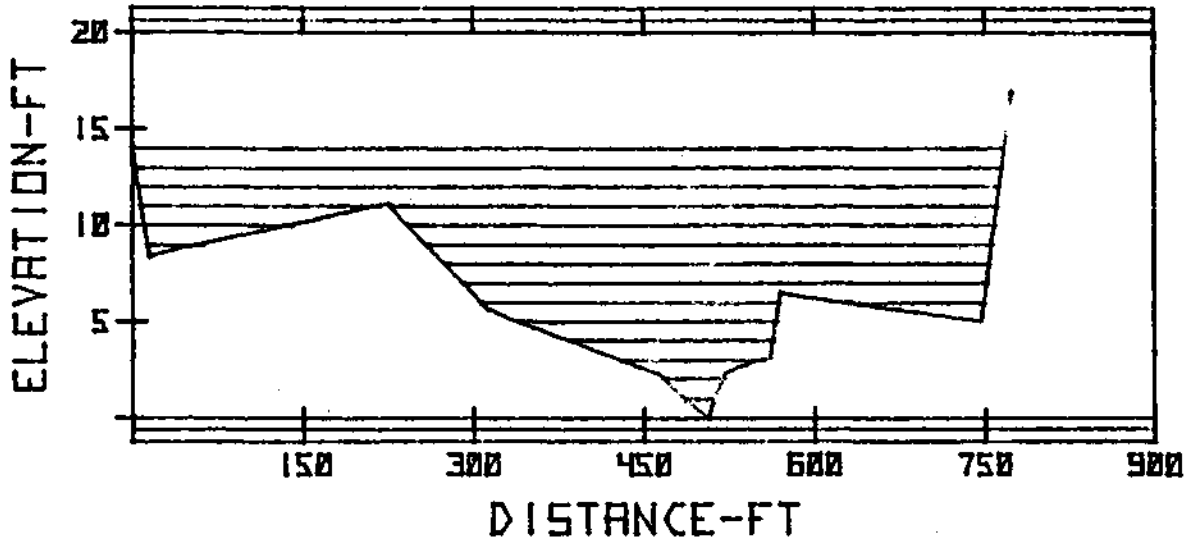
The riffles are exposed but possess good protective substrate (1-6 inch material). Invertebrate sampling produced 48 organisms/ft^2.

Pool/Riffle Ratio 4:1

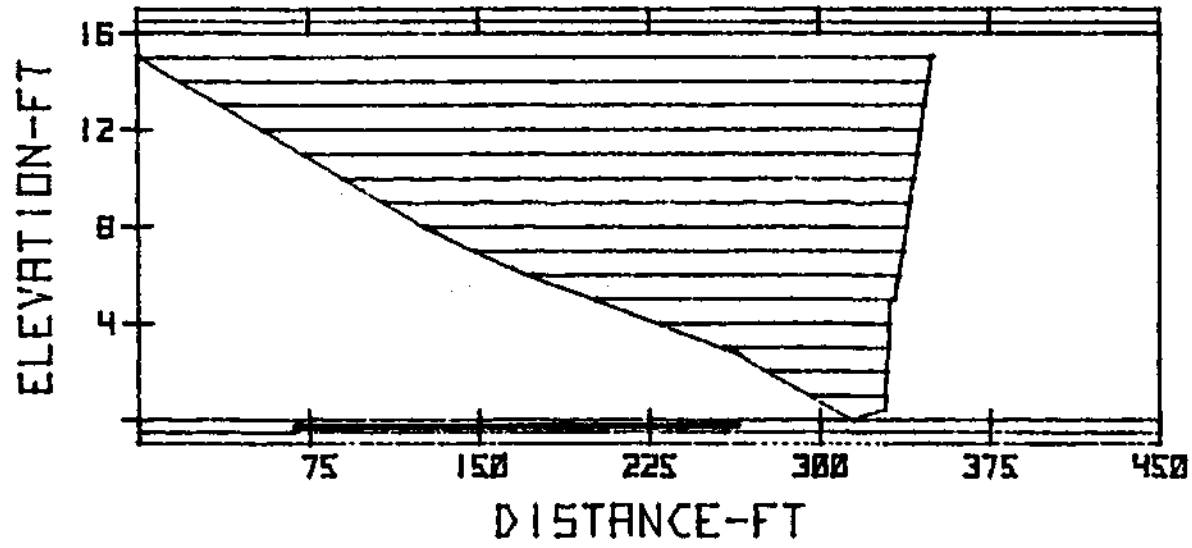
General Section Comments

The section contains good nursery and holding habitat based on availability of shading, water depth, velocity, and invertebrate presence.

RUSSIAN RIVER
CROSS SECTION NUMBER 19
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 19
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-18

		Upper Transect	Lower Transect
Section	18		
Section Length (feet)	1700		
River Mile	29		
Habitat Type		riffle-run	riffle
Water Surface Width (feet)		65	120
Water Temperature (°C) @ Time of Day Taken		19.5 @ 1315	19.0 @ 1400
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 2.5 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 1.98 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.98

Lower Transect

Water Depth (Feet) at:
0.25 3.0 0.5 2.4 0.75 1.4 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 3.47 0.5 2.22 0.75 2.01 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 2.65

Section Habitat

The section is primarily run and riffle habitat.

Pool/Riffle Ratio N/A

Spawning Substrate Observations

Spawning-size substrate is available through this entire section, although the quantity of fine material is high and potentially damaging to successful spawning.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-18

		Upper Transect	Lower Transect
Section	18		
Section Length (feet)	1700		
River Mile	29		
Habitat Type		run	riffle-run
Water Surface Width (feet)		60	102
Maximum Water Depth (feet)		3.1	2.1
Water Temperature (°C) @ Time of Day Taken		23.5 @ 1125	23.0 @ 1020
Water Transparency (feet)		> 4.0	>4.0
In-Channel Cover (feet)		10	87
In-Channel Vegetative Canopy (feet)		45	95
In-Stream Cover (feet)		2	0
In-Stream Vegetative Canopy (feet)		0	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 2.43
Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 2.11

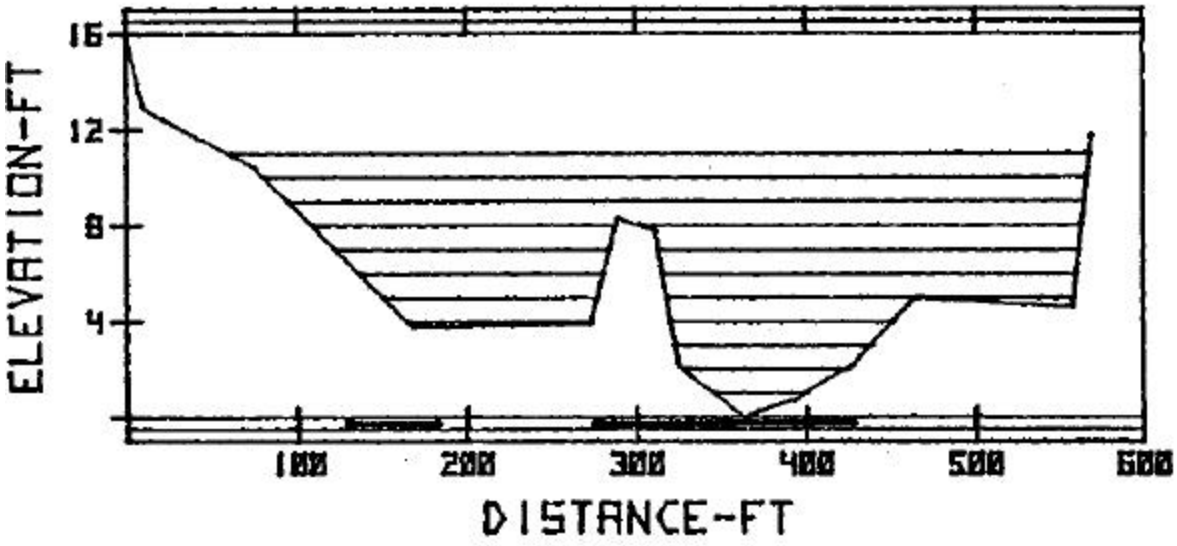
Section Pool Quality
The section is composed primarily of shallow runs and riffles. Very little pool habitat is available.

Section Riffle Quality
All riffles are shallow (2.5 feet) and greatly exposed. The substrate is generally less than 2-inch material.

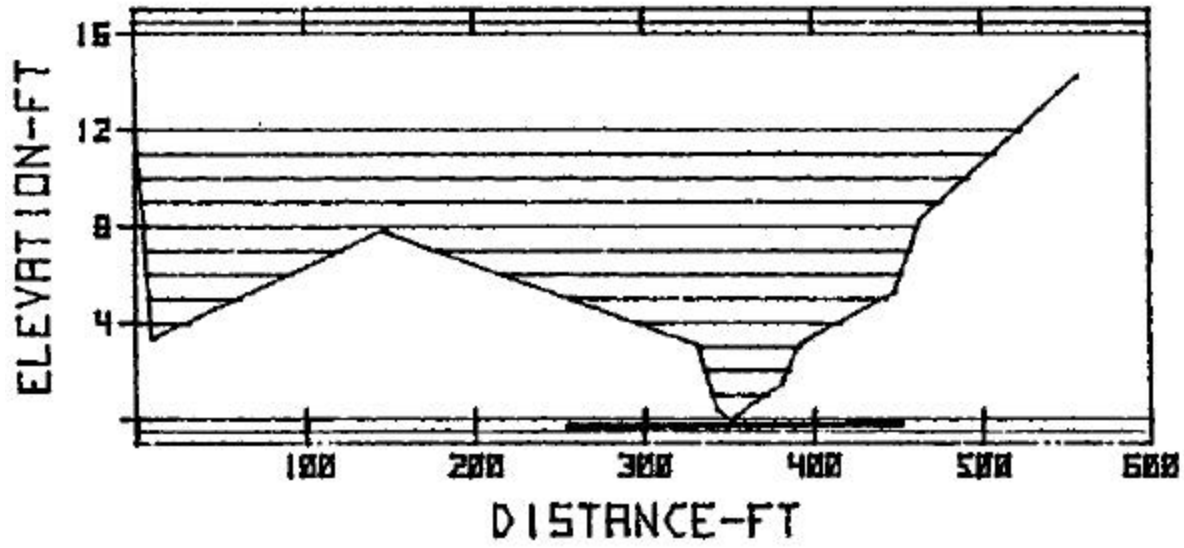
Pool/Riffle Ratio N/A

General Section Comments
The section is exposed and shallow. Very little instream cover and canopy is present.

RUSSIAN RIVER
CROSS SECTION NUMBER 18
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 18
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-19

		Upper Transect	Lower Transect
Section	16		
Section Length (feet)	1320		
River Mile	24		
Habitat Type		pool	pool
Water Surface Width (feet)		190	240
Water Temperature (°C) @ Time of Day Taken		17.0 @ 0900	17.0 @ 0945
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream <1.0

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 3.1 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 0.56 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 0.783

Section Habitat
The section is inundated by Wohler Dam. The entire section is pool-like with surface velocities of 1.0 fps.

Pool/Riffle Ratio 100% pool

Spawning Substrate Observations
The exposed sediment is mostly less than 1 inch in size.
The submerged sediment is very silty.
Section spawning suitability is poor.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-19

		Upper Transect	Lower Transect
Section	16		
Section Length (feet)	1320		
River Mile	24		
Habitat Type		pool (inundated)	pool (inundated)
Water Surface Width (feet)		162	221
Maximum Water Depth (feet)		7.0	7.4
Water Temperature (°C) @ Time of Day Taken		24.0 @ 1335	24.0 @ 1250
Water Transparency (feet)		>4.0	>4.0
In-Channel Cover (feet)		22	5
In-Channel Vegetative Canopy (feet)		30	15
In-Stream Cover (feet)		5	0
In-Stream Vegetative Canopy (feet)		10	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	N/A
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	0.38

Section Pool Quality

The entire section is pool-like. The flow is very slow (1.0 fps), with *a* maximum depth of 7.0 feet. Some cover and canopy are available on the right edge of the water.

Section Riffle Quality

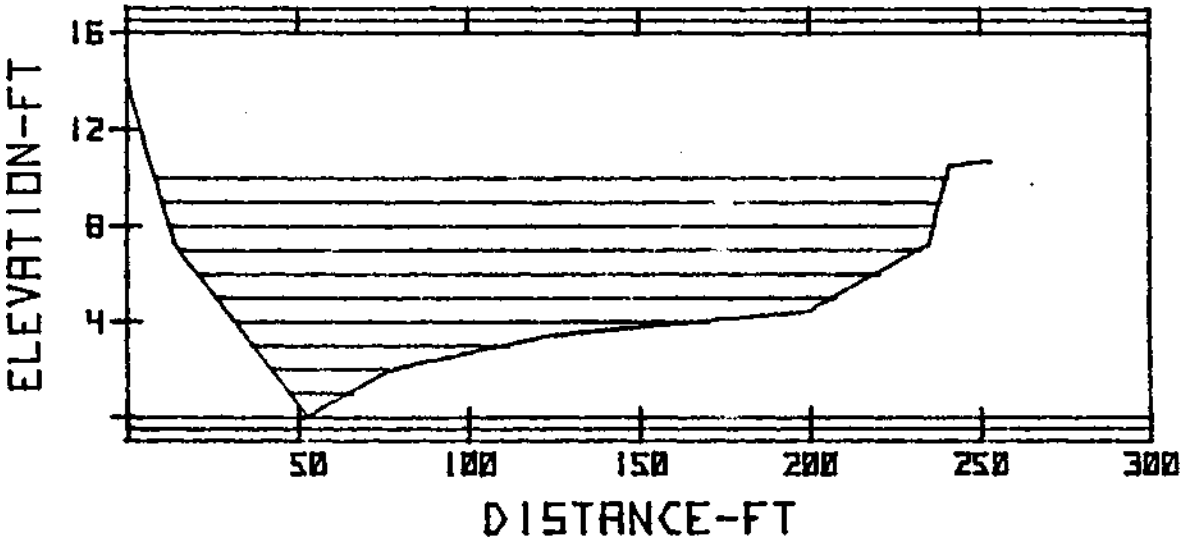
No riffle habitat.

Pool/Riffle Ratio 100% pool

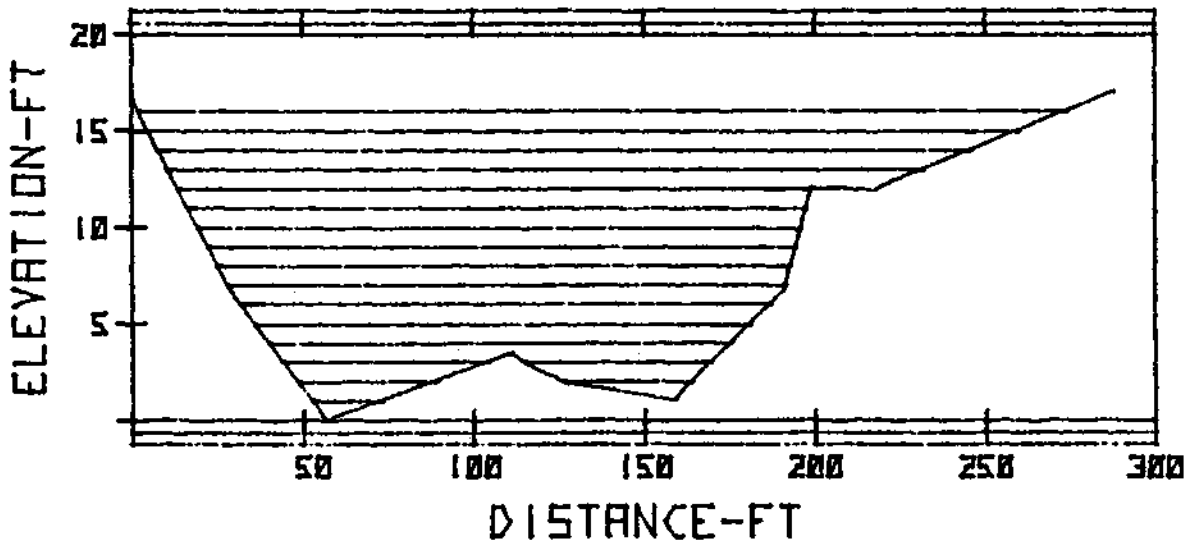
General Section Comments

Wohler Dam inundates this stretch of river.

RUSSIAN RIVER
CROSS SECTION NUMBER 16
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 16
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-21

		Upper Transect	Lower Transect
Section	14		
Section Length (feet)	1320		
River Mile	22		
Habitat Type		pool	riffle
Water Surface Width (feet)		105	68
Water Temperature (°C) @ Time of Day Taken		18.0 @ 1100	18.0 @ 1130
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.00

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 2.1 0.75 1.0 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 3.51 0.75 1.66 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 6.50

Section Habitat

Most of this section is pool-run habitat with the exception of a short stretch of riffle at the lever transect. This is the site of an old dam no longer installed (Mirabel Park Dam).

Pool/Riffle Ratio N/A

Spawning Substrate Observations

Spawning substrate is available near the lower transect Instream and on the right edge of the channel. Instream substrate contains less fine material than the exposed gravel bar on the right edge of the water.

Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-22

		Upper Transect	Lower Transect
Section	13		
Section Length (feet)	1400		
River Mile	19		
Habitat Type		pool	riffle
Water Surface Width (feet)		230	80
Water Temperature (°C) @ Time of Day Taken		18.5 @ 1320	18.5 @ 1400
Water Transparency (feet)		2.5	2.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 05 1.5 0.75 0.7 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 05 0.75 0.75 1.47 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 0.86

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 2.3 0.75 1.0 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 2.54 0.75 3.42 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.33

Section Habitat

The upper two thirds of the section is composed of pool-run habitat. The lower third of the section is composed of riffle-run habitat, with in-channel vegetation present.

Pool/Riffle Ratio 1.8

Spawning Substrate Observations

Spawning substrate of suitable size is available near the lower transect on the right edge of the channel. The content of fine material (sand and silt) is 35% at the lower transect.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-22

		Upper Transect	Lower Transect
Section	13		
Section Length (feet)	1400		
River Mile	19		
Habitat Type		pool	riffle
Water Surface Width (feet)		84	111
Maximum Water Depth (feet)		4.6	4.6
Water Temperature (°C) @ Time of Day Taken		25.0 @ 1435	25.0 @ 1510
Water Transparency (feet)		3.0	3.0
In-Channel Cover (feet)		27	1
In-Channel Vegetative Canopy (feet)		31	9
In-Stream Cover (feet)		4	2
In-Stream Vegetative Canopy (feet)		4	12

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	1.07
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	4.05

Section Pool Quality

Pool habitat composes most of this section. Pools are slow (1.0 fps) with poor transparency (2.5 feet) and silty bottoms. The upper transect is located just below a recreational beach. Good riparian cover and canopy are present on both banks just below the upper transect and extending downstream.

Section Riffle Quality

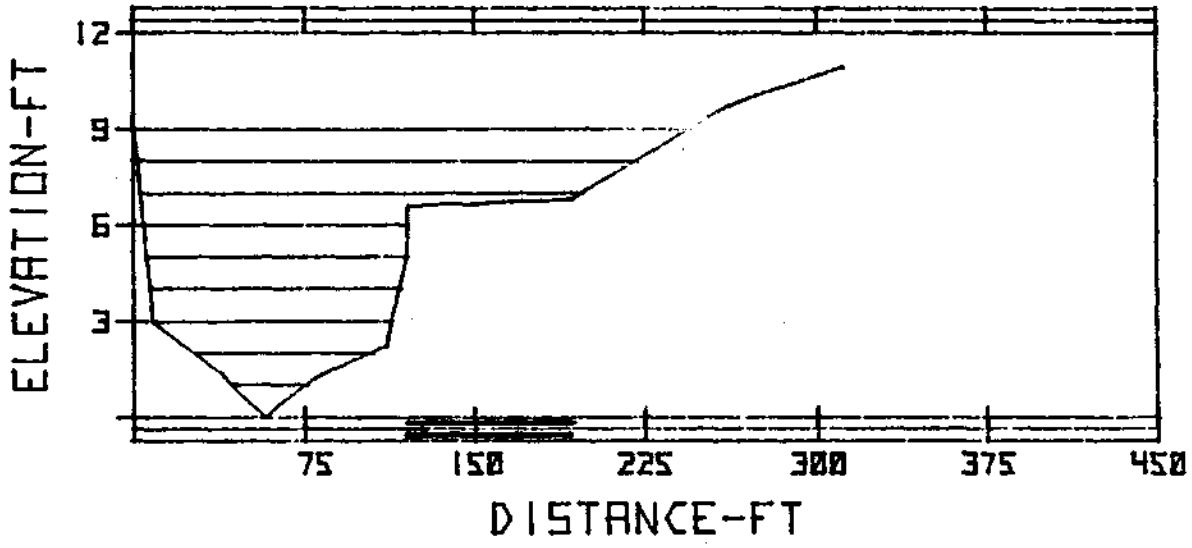
A short riffle stretch exists near the lower transect. The water channel splits through in-channel willow growth, creating the riffle. Cover and canopy are good.

Pool/Riffle Ratio 1.8

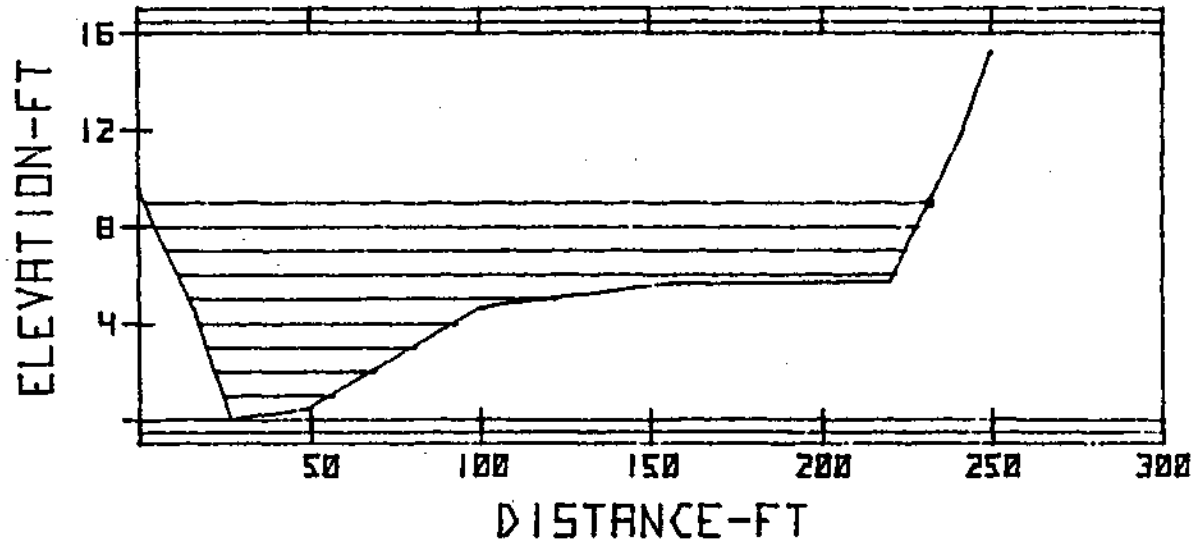
General Section Comments

Personal communication. The lower transect is located at the site of an old gravel extraction operation. The width of the channel is related to a "widening" effect from gravel extraction.

RUSSIAN RIVER
CROSS SECTION NUMBER 13
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 13
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-23

		Upper Transect	Lower Transect
Section	12		
Section Length (feet)	1250		
River Mile	17		
Habitat Type		pool	riffle
Water Surface Width (feet)		300 split channel	lt.-45 rt.-60
Water Temperature (°C) @ Time of Day Taken		19.0 @ 1500	19.0 @ 1505
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 2.9 0.75 2.3 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 0.96 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.29

Lower Transect (Split channel)

Water Depth (Feet) at:
0.25 N/A .05 N/A 0.75 2.2 main channel Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A .05 0.75 3.37 main channel Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.67 main channel

Section Habitat
The upper quarter of the section is pool-like, breaking into a deep riffle-run downstream to the lower transect. The Korbel summer road crossing is constructed between the upper and lower transects in the summer.

Pool/Riffle Ratio N/A

Spawning Substrate Observations
Spawning substrate is generally lacking in the upper quarter of this section. Below this point spawning size substrate becomes more available, especially within the flowing channel. Exposed material in the lower three quarters of the section is usable for spawning.

Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-23

		Upper Transect	Lower Transect
Section	11		
Section Length (feet)	1320		
River Mile	16		
Habitat Type		pool	pool
Water Surface Width (feet)		N/A	118
Water Temperature (°C) @ Time of Day Taken		19.5 @ 1630	19.5 @ 1600
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 3.0 0.5 3.9 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 0.78 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 0.86

Lower Transect

Water Depth (Feet) at:
0.25 1.7 0.5 3.7 0.75 N/A Distance from Left Edge of
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 0.86 0.5 1.47 0. N/A Distance from Left Edge of
Water Velocity (FPS) Measured on the Surface at Midstream 1.47

Section Habitat
The section is composed completely of pool-run habitat.

Pool/Riffle Ratio 100% pool
Spawning Substrate Observations
Considerable spawning size substrate is available throughout this section on the left side of the channel. Sand and silt content exceed 50% within this section.

Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-25

		Upper Transect	Lower Transect
Section	10		
Section Length (feet)	1320		
River Mile	11		
Habitat Type	split:	lt. run rt. riffle	pool
Water Surface Width (feet)		lt. 55 rt. 150	125
Water Temperature (°C) @ Time of Day Taken		18.0 @ 0900	18.0 @ 0950
Water Transparency (feet)		1.5	2.0

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 1.1 riffle 0.75 1.0 riffle Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 2.76 0.75 1.22 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 2.57 (riffle):
2.84 (run)

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 3.9 0.75 2.0 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 0.71 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 0.89

Section Habitat

The section is composed of run and riffle sections with limited pool habitat at the lower transect. The channel is split from the upper transect through approximately half of the section. Riffle areas are located in the right channel.

Pool/Riffle Ratio N/A

Spawning Substrate Observations

Suitable spawning size substrate is distributed in the right channel at the upper transect. Some usable material is available in exposed pockets on the right edge of the water between transects. Construction of Guernewood summer road crossing eliminates the right channel flow.

Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-25

		Upper Transect	Lower Transect
Section	9		
Section Length (feet)	1320		
River Mile	12		
Habitat Type		pool tail	riffle
Water Surface Width (feet)		148	160
Water Temperature (°C) @ Time of Day Taken		18.5 @ 1130	18.0 @ 1100
Water Transparency (feet)		1.5	1.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 3.0 0.75 1.9 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at.
0.25 N/A 0.5 N/A 0.75 1.07 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.14

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 2.9 0.75 1.6 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 3. 05 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 5.89

Section Habitat

The section is composed primarily of run habitat with a section of riffle near the lower transect.

Pool/Riffle Ratio N/A

Spawning Substrate Observations

Potentially usable spawning size substrate is available on the right edge of the water from the upper transect downstream towards the location of the summer structure (Vacation Beach Dam). This gravel is inundated in the summer.

Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-25

		Upper Transect	Lower Transect
Section	7		
Section Length (feet)	1350		
River Mile	10		
Habitat Type		pool	pool-run
Water Surface Width (feet)		215	60
Water Temperature (°C) @ Time of Day Taken		19.0 @ 1245	19.5 @ 1300
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 2.6 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 1.38 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.69

Lower Transect

Water Depth (Feet) at:
0.25 2.4 0.5 2.9 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 1.94 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.26

Section Habitat
Pool habitat is located at the upper transect, followed by a short riffle and then a run to the end of the section.

Pool/Riffle Ratio N/A

Spawning Substrate Observations
The substrate at and just below the upper transect contains greater than 60% sand and silt. Relatively cleaner substrate is available downstream at the lower transect, where sand and silt content is approximately 35%.

Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-25

		Upper Transect	Lower Transect
Section	6		
Section Length (feet)	1900		
River Mile	8		
Habitat Type		pool	pool
Water Surface Width (feet)		220	N/A
Water Temperature (°C)@ Time of Day Taken		19.5 @ 1345	N/A
Water Transparency (feet)		1.5	1.5

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 3.7 0.75 2.4 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 0.38 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream N/A

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream N/A

Section Habitat
This section is composed primarily of pool run habitat.

Pool/Riffle Ratio 100% pool
Spawning Substrate Observations
The substrate is sub-optimal for spawning. An exposed gravel bar at the upper transect contains greater than 50% sand and silt.

Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-26

		Upper Transect	Lower Transect
Section	5		
Section Length (feet)	N/A		
River Mile	6		
Habitat Type		pool	pool
Water Surface Width (feet)		240	255
Water Temperature (°C) @ Time of Day Taken		20.0 @ 1445	20.0 @ 1500
Water Transparency (feet)		2.5	N/A

Upper Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N /A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream N/A

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 3.5 0.75 3.0 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 1.00 0.75 1.31 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.03

Section Habitat

The majority of this section is composed of run habitat. Austin Creek enters at the lower transect. The upper transect is composed of a deep pool with bedrock outcropping on the left edge of water.

Pool/Riffle Ratio N/A

Spawning Substrate Observations

Potentially usable substrate is located at and immediately below Austin Creek mouth. In addition, an exposed gravel bar on the left edge of the channel (opposite Austin Creek) is potentially usable.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-26

Section	5 (Upper transect spot check)	Upper Transect	Lower Transect
Section Length (feet)	N/A		
River Mile	6		
Habitat Type		pool	
Water Surface Width (feet)		N/A	
Maximum Water Depth (feet)		42.0	
Water Temperature (°C) @ Time of Day Taken		see below	
Water Transparency (feet)		N/A	
In-Channel Cover (feet)		N/A	
In-Channel Vegetative Canopy (feet)		0	
In-Stream Cover (feet)		N/A	
In-Stream Vegetative Canopy (feet)		0	

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) <1.0
Water Velocity (FPS) in Midstream at the Surface (Lower Transect) N/A

Section Pool Quality
Upper transect: Consists of very deep pool. Maximum depth recorded – 42 feet. Bedrock outcrops on the left edge of the water; potentially usable cover. No canopy was present at this transect.

Section Riffle Quality
N/A

Pool/Riffle Ratio N/A

General Section Comments
This section was revisited to check the temperature profile and conductivity.

Temperature profile with depth (temperatures recorded at 1400)
Surface = 26.0°C
20 feet deep = 19.0°C
42 feet deep = 17.5°C

Conductivity at 42 feet = 6000µmhos, indicating slightly saline water at the bottom of the pool

Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-26

		Upper Transect	Lower Transect
Section	3		
Section Length (feet)	1320		
River Mile	5		
Habitat Type		run	pool
Water Surface Width (feet)		148	360
Water Temperature (°C) @ Time of Day Taken		20.0 @ 1040	19.5 @ 1020
Water Transparency (feet)		2.0	2.0

Upper Transect

Water Depth (Feet) at:
0.25 2.4 0.5 4.2 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 0.75 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.38

Lower Transect

Water Depth (Feet) at:
0.25 3.9 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 0.64 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 0.68

Section Habitat
This section is composed primarily of pool habitat with faster moving run habitat near the upper transect.

Pool/Riffle Ratio 100% Pool

Spawning Substrate Observations
Pockets of suitable sized substrate are available on the exposed gravel bar on the left side of the channel. The majority of the exposed substrate is too small for spawning.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-26

		Upper Transect	Lower Transect
Section	3		
Section Length (feet)	1320		
River Mile	5		
Habitat Type		pool	pool
Water Surface Width (feet)			
Maximum Water Depth (feet)		N/A	N/A
Water Temperature (°C) @ Time of Day Taken			
Water Transparency (feet)			
In-Channel Cover (feet)			
In-Channel Vegetative Canopy (feet)			
In-Stream Cover (feet)			
In-Stream Vegetative Canopy (feet)			

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) _____
Water Velocity (FPS) in Midstream at the Surface (Lower Transect) _____

Section Pool Quality
River mouth closure creates a pool extending at least up through this section and river mile 5.

Section Riffle Quality

Pool/Riffle Ratio 100% pool
General Section Comments
No data recorded. This section is inundated by river mouth closure.

Fish Habitat Observations
Spawning Habitat
Mainstem

Map Ref. Pg. A-27

		Upper Transect	Lower Transect
Section	2		
Section Length (feet)	1320		
River Mile	3		
Habitat Type		pool	pool
Water Surface Width (feet)		N/A	N/A
Water Temperature (°C) @ Time of Day Taken		19.0 @ 0930	18.0 @ 0915
Water Transparency (feet)		2.0	2.5

Upper Transect

Water Depth (Feet) at:
0.25 3.8 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 0.40 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream <1.0

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of
Water Velocity (FPS) Measured 0.5 ft.
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of
Water Velocity (FPS) Measured on the Surface at Midstream <1.0

Section Habitat
The entire section is pool-like habitat. Velocities are less than 1.0 fps on the surface. No riffle habitat is available.

Pool/Riffle Ratio 100% pool
Spawning Substrate Observations
Very little spawning size substrate is available.
Exposed substrate is generally less than 1 inch in size.

Fish Habitat Observations
Nursery Habitat
Mainstem

Map Ref. Pg. A-27

		Upper Transect	Lower Transect
Section	2		
Section Length (feet)	1320		
River Mile	3		
Habitat Type		pool	pool
Water Surface Width (feet)		533	263
Maximum Water Depth (feet)		13.0	25+
Water Temperature (°C) @ Time of Day Taken		21.0 @ 0930	21.0 @ 0815
Water Transparency (feet)		3.0	3.0
In-Channel Cover (feet)		15	23
In-Channel Vegetative Canopy (feet)		14	15
In-Stream Cover (feet)		6	84
In-Stream Vegetative Canopy (feet)		23	9

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	< 1.0
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	< 1.0

Section Pool Quality

The entire section is wide, slow moving and pool-like. The maximum depth is greater than 25 feet. Water temperature decreases with depth: 21° @ surface, 17.5°C @ 25 feet deep.

Section Riffle Quality

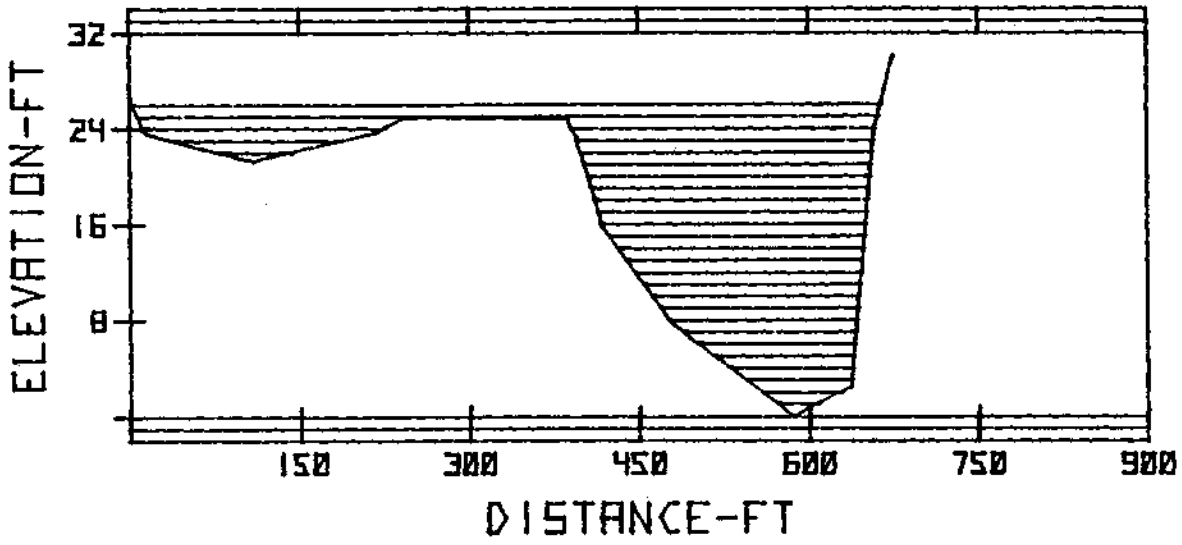
No riffle habitat available in this section.

Pool/Riffle Ratio 100% pool

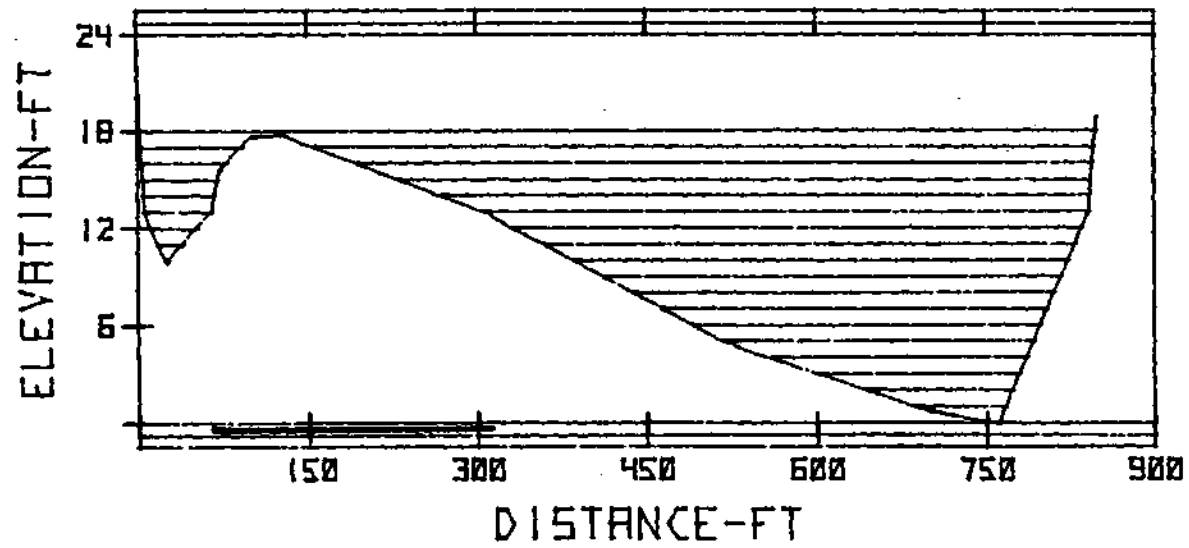
General Section Comments

This section is affected by tidal patterns and general coastal influence.

RUSSIAN RIVER
CROSS SECTION NUMBER 2
LOWER TRANSECT



RUSSIAN RIVER
CROSS SECTION NUMBER 2
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Dry Creek

Map Ref. Pg. A-28

		Upper Transect	Lower Transect
Section	D-1		
Section Length (feet)	1320		
River Mile	13		
Habitat Type		pool	riffle
Water Surface Width (feet)		98	84
Water Temperature (°C) @ Time of Day Taken		13.0 @ 1000	13.0 @ 1035
Water Transparency (feet)		3.0	3.0

Upper Transect

Water Depth (Feet) at:
0.25 2.9 0.5 0.9 0.75 1.4 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 1.47 0.5 1.65 0.75 1.18 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.50

Lower Transect

Water Depth (Feet) at:
0.25 1.1 0.5 1.8 0.75 0.6 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft.
0.25 3.20 0.5 3.02 0.75 0.95 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.66

Section Habitat
Section is composed primarily of riffles and runs. Limited pool habitat is available at the upper transect.

Pool/Riffle Ratio 9 : 1

Spawning Substrate Observations
Instream and exposed substrate it generally smaller than optimal with respect to spawning. Pockets of suitable size material are available.

Fish Habitat Observation
Nursery Habitat
Dry Creek

Map Ref. Pg. A-28

		Upper Transect	Lower Transect
Section	D-1		
Section Length (feet)	1320		
River Mile	13		
Habitat Type		pool	riffle
Water Surface Width (feet)		80	37
Maximum Water Depth (feet)		2.1	0.7
Water Temperature (°C) @ Time of Day Taken		19.0 @ 0835	20.0 @ 0950
Water Transparency (feet)		>3.0	>3.0
In-Channel Cover (feet)		0	20
In-Channel Vegetative Canopy (feet)		30	20
In-Stream Cover (feet)		0	0
In-Stream Vegetative Canopy (feet)		5	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	0.24
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	0.86

Section Pool Quality

With the exception of the pool at the upper transect, this section is without pool habitat. Available pool habitat is shallow and exposed.

Section Riffle Quality

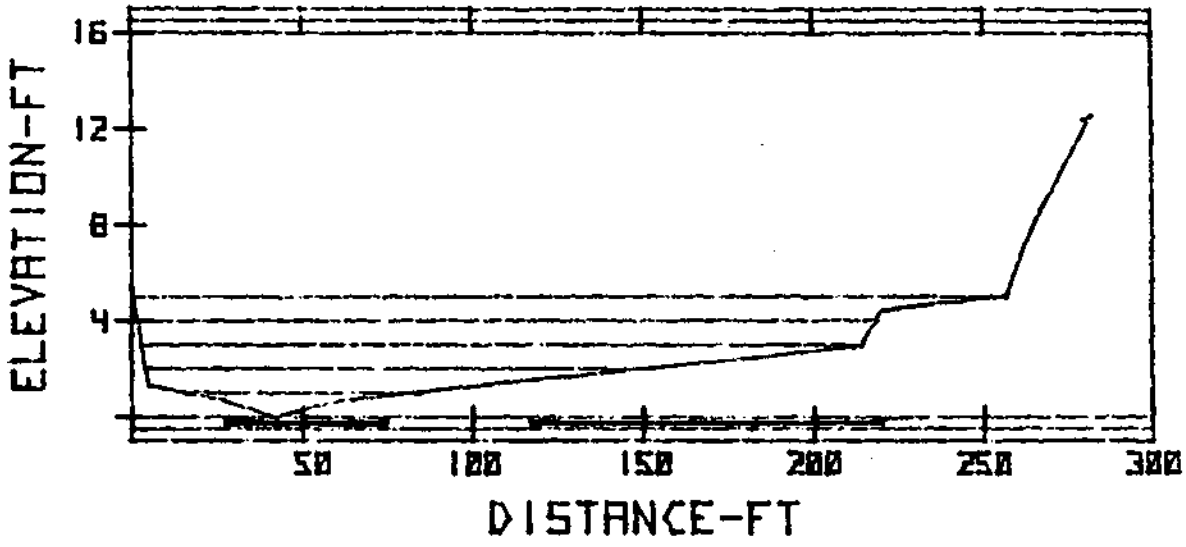
Riffles are very shallow and almost dry (Depths 3 to 4 inches).

Pool/Riffle Ratio 9:1

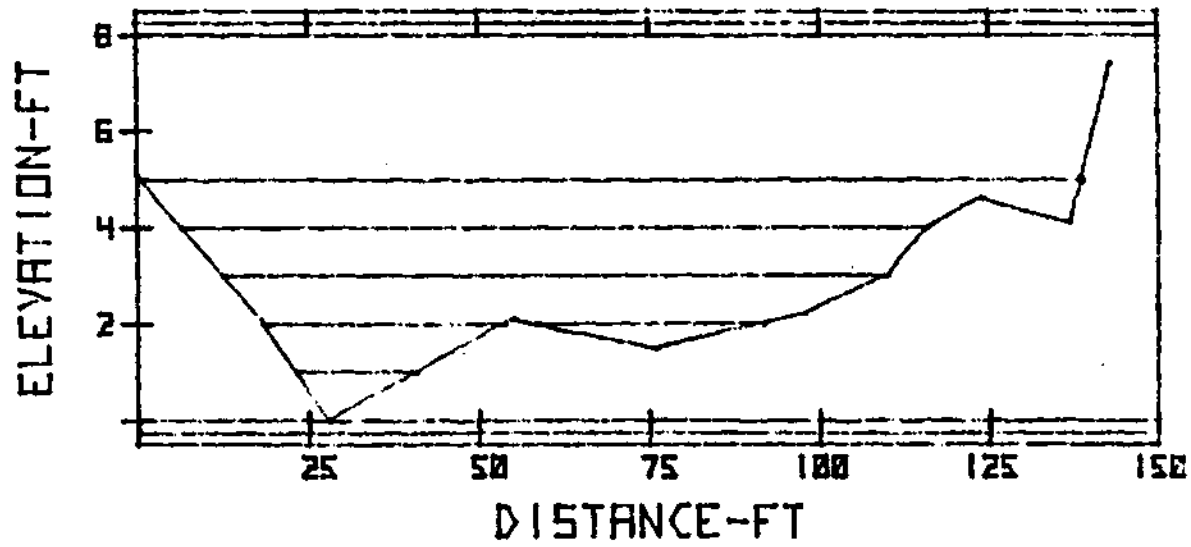
General Section Comments

Section is very shallow and exposed. Filamentous algae is abundant in shallow water areas and benthos is scarce. Juvenile rough fish are abundant.

DRY CREEK
CROSS SECTION NUMBER D 1
LOWER TRANSECT



DRY CREEK
CROSS SECTION NUMBER D 1
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Dry Creek

Map Ref. Pg. A-28

		Upper Transect	Lower Transect
Section	D-2		
Section Length (feet)	1320		
River Mile	11		
Habitat Type		riffle	pool-run
Water Surface Width (feet)		100	55
Water Temperature (°C) @ Time of Day Taken		15.0 @ 1245	15.0 @ 1310
Water Transparency (feet)		>3.0	>3.0

Upper Transect

Water Depth (Feet) at:
0.25 1.0 0.5 1.3 0.75 0.5 Distance from Left Edge of ...
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.65 0.5 3.24 0.75 2.41 Distance from Left Edge of ...
Water Velocity (FPS) Measured on the Surface at Midstream 3.66

Lower Transect

Water Depth (Feet) at:
0.25 1.9 0.5 1.8 0.75 1.9 Distance from Left Edge of ...
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.01 0.5 3.02 0.75 2.15 Distance from Left Edge of ...
Water Velocity (FPS) Measured on the Surface at Midstream 2.87

Section Habitat
This section is narrower than most Dry Creek sections, creating relatively deep, swift water.

Pool/Riffle Ratio 1 : 1

Spawning Substrate Observations
A considerable amount of exposed substrate is available in this stream section. Approximately 40Z of it is potentially usable from a size standpoint. Instream riffle substrate is relatively clean although it consists primarily of the lower range of acceptable spawning substrate.

Fish Habitat Observation
Nursery Habitat
Dry Creek

Map Ref. Pg. A-28

		Upper Transect	Lower Transect
Section	D-2		
Section Length (feet)	1320		
River Mile	11		
Habitat Type		riffle	pool
Water Surface Width (feet)		45	40
Maximum Water Depth (feet)		1.0	1.8
Water Temperature (°C) @ Time of Day Taken		25.0 @ 1545	25.0 @ 1615
Water Transparency (feet)		>3.0	>3.0
In-Channel Cover (feet)		20	30
In-Channel Vegetative Canopy (feet)		35	70
In-Stream Cover (feet)		5	2
In-Stream Vegetative Canopy (feet)		18	15

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 1.15
Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 0.42

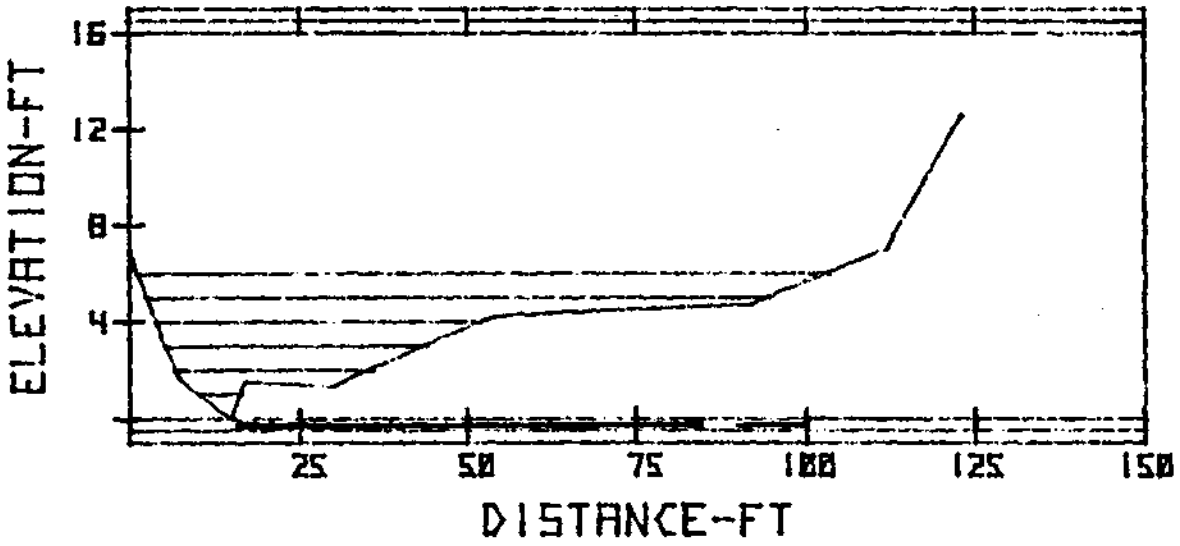
Section Pool Quality
Section contains relatively good pool and run habitat.
Depth and riparian shelter are better than average Dry Creek habitat.

Section Riffle Quality
Riffle quality varies depending primarily on depth and shading. Some relatively deep (1.0 feet) and well shaded habitat is available.

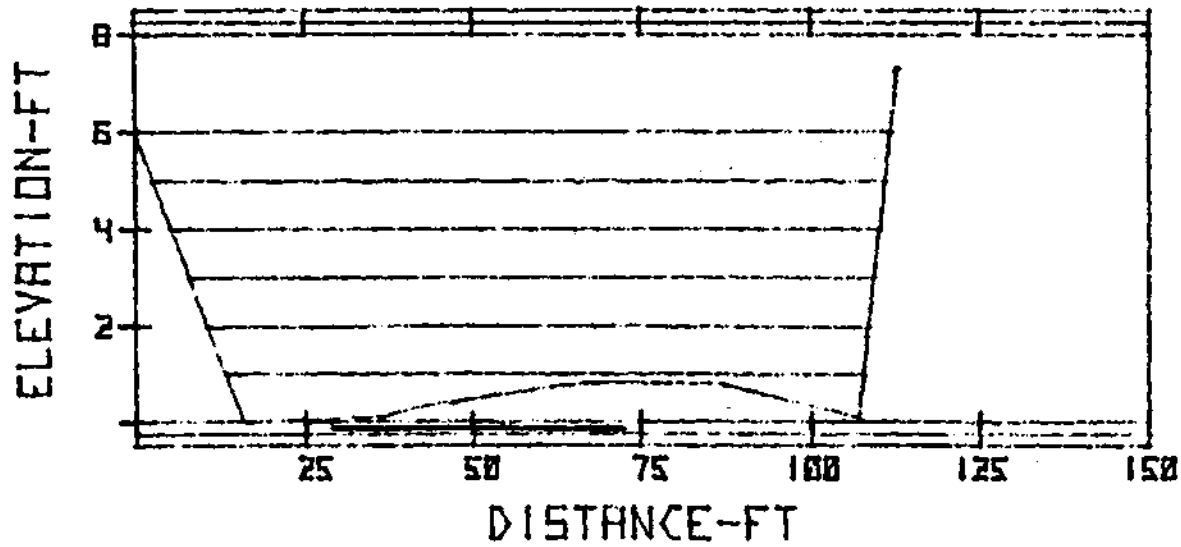
Pool/Riffle Ratio 1:1

General Section Comments
Section water width is relatively narrow, creating better depth and riparian shelter.

DRY CREEK
CROSS SECTION NUMBER D 2
LOWER TRANSECT



DRY CREEK
CROSS SECTION NUMBER D 2
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Dry Creek

Map Ref. Pg. A-29

		Upper Transect	Lower Transect
Section	D-3		
Section Length (feet)	1320		
River Mile	10		
Habitat Type		riffle	riffle
Water Surface Width (feet)		115	51
Water Temperature (°C) @ Time of Day Taken		13.0 @ 1440	13.0 @ 1440
Water Transparency (feet)		>3.0	>3.0

Upper Transect

Water Depth (Feet) at:

0.25 1.3 0.5 1.7 0.75 1.1 Distance from Left Edge of Water

Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:

0.25 2.22 0.5 2.15 0.75 1.35 Distance from Left Edge of Water

Water Velocity (FPS) Measured on the Surface at Midstream 2.41

Lower Transect

Water Depth (Feet) at:

0.25 2.3 0.5 1.3 0.75 0.6 Distance from Left Edge of Water

Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:

0.25 3.47 0.5 3.02 0.75 1.79 Distance from Left Edge of Water

Water Velocity (FPS) Measured on the Surface at Midstream 4.38

Section Habitat

Section is composed primarily of run habitat. Riffles are located at the upper and lower transects and just above the lower transect.

Pool/Riffle Ratio 2:1

Spawning Substrate Observations

Usable size substrate is available primarily on the left edge of water through the upper three fourths of the transect. A good spawning riffle is located just above the lower transect. Most of the exposed substrate contains a relatively high concentration of fines.

Fish Habitat Observation
Nursery Habitat
Dry Creek

Map Ref. Pg. A-29

		Upper Transect	Lower Transect
Section	D-3		
Section Length (feet)	1320		
River Mile	10		
Habitat Type		pool	riffle
Water Surface Width (feet)		75	23
Maximum Water Depth (feet)		0.7	1.2
Water Temperature (°C) @ Time of Day Taken		22.0 @ 1425	22.0 @ 1335
Water Transparency (feet)		>3.0	>3.0
In-Channel Cover (feet)		10	20
In-Channel Vegetative Canopy (feet)		45	30
In-Stream Cover (feet)		5	2
In-Stream Vegetative Canopy (feet)		15	4

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 1.0
Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 1.51

Section Pool Quality

Pool habitat is generally shallow and exposed. Water is very clear and no surface turbulence is available for cover.

Section Riffle Quality

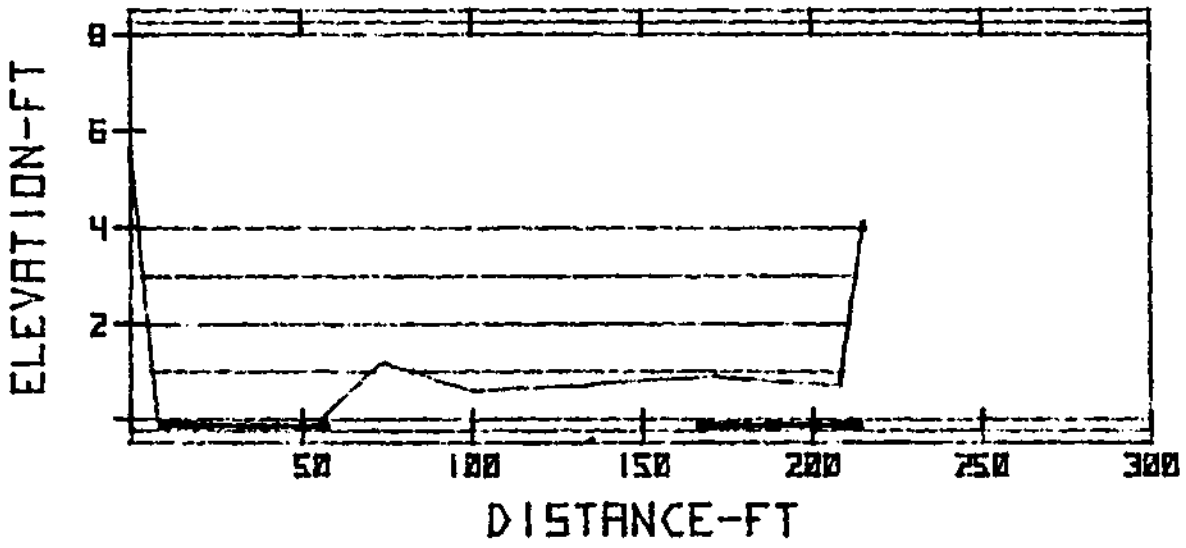
Riffles are very shallow with the exception of the lower transect riffle. Thirty-five invertebrates/ft2 were sampled at the lower transect. Filamentous algae is prevalent in most riffles.

Pool/Riffle Ratio 2:1

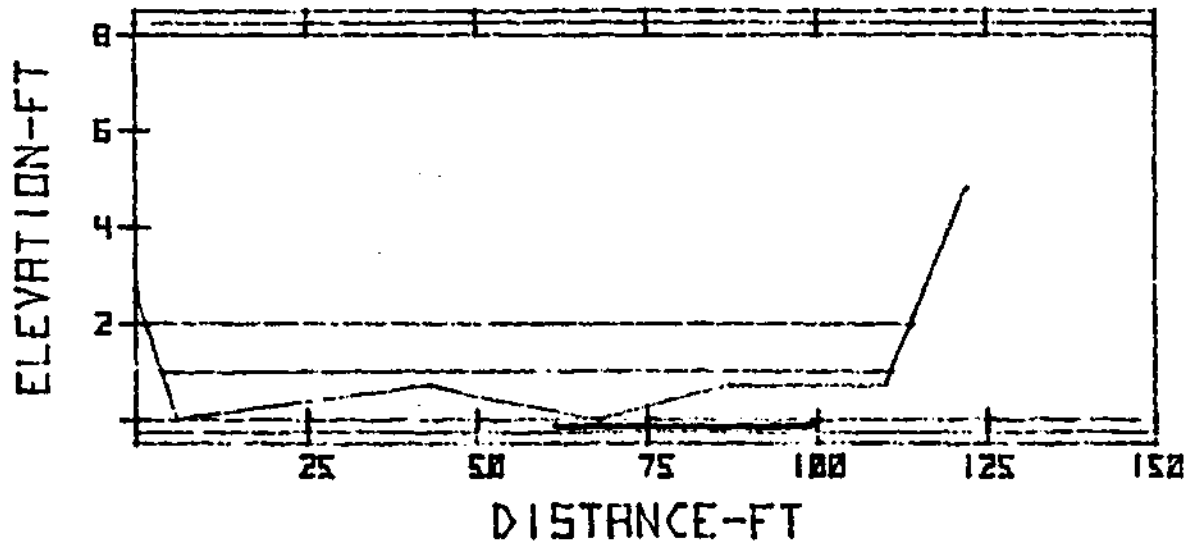
General Section Comments

Juvenile rough fish are numerous. Most of the section is very exposed although shading is available where flows are along the right bank.

DRY CREEK
CROSS SECTION NUMBER D 3
LOWER TRANSECT



DRY CREEK
CROSS SECTION NUMBER D 3
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Dry Creek

Map Ref. Pg. A-29

		Upper Transect	Lower Transect
Section	D-4		
Section Length (feet)	1320		
River Mile	8		
Habitat Type		pool tail	riffle
Water Surface Width (feet)		70	85
Water Temperature (°C) @ Time of Day Taken		16.5 @ 0845	17.0 @ 0915
Water Transparency (feet)		>3.0	>3.0

Upper Transect

Water Depth (Feet) at:
0.25 0.7 0.5 0.8 0.75 0.7 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.04 0.5 2.07 0.75 1.83 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.66

Lower Transect

Water Depth (Feet) at:
0.25 0.6 0.5 N/A 0.75 0.6 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.94 0.5 N/A 0.75 2.11 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.23

Section Habitat
Section is composed of riffle, run and pool habitat. The channel is relatively wide, but good cover and canopy are available on the left edge of the water.

Pool/Riffle Ratio 2:1

Spawning Substrate Observations
A considerable amount of spawning sire substrate is available on the exposed gravel bar on the right side of the channel. Instream riffle substrate is generally less coarse than the exposed material.

Fish Habitat Observation
Nursery Habitat
Dry Creek

Map Ref. Pg. A-29

		Upper Transect	Lower Transect
Section	D-4		
Section Length (feet)	1320		
River Mile	8		
Habitat Type		pool tail	riffle
Water Surface Width (feet)		64	65
Maximum Water Depth (feet)		0.7	0.7
Water Temperature (°C) @ Time of Day Taken		18.5 @ 0828	20.0 @ 0930
Water Transparency (feet)		>3.0	>3.0
In-Channel Cover (feet)		20	35
In-Channel Vegetative Canopy (feet)		50	40
In-Stream Cover (feet)		0	2
In-Stream Vegetative Canopy (feet)		0	11

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	2.57
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	1.75

Section Pool Quality

Section pool quality is relatively poor in the upper third of the section because of a complete lack of riparian vegetation. Where flow is along the left bank, habitat is better because of increased instream cover and canopy.

Section Riffle Quality

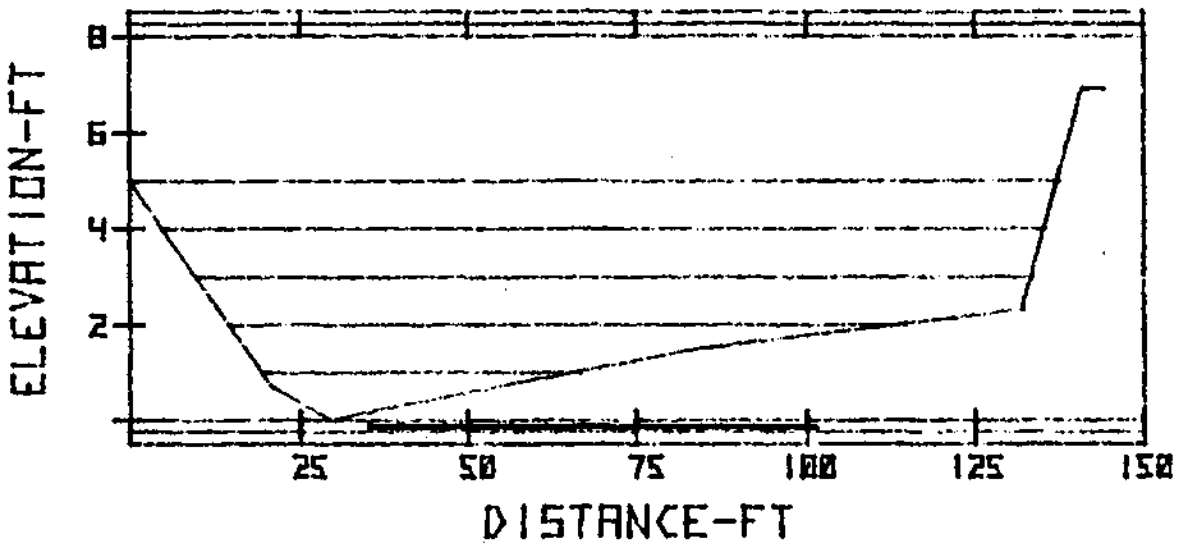
Riffles are, in general, too shallow and composed of smaller than optimal substrate. Seventy invertebrates/ft2 were collected.

Pool/Riffle Ratio 2:1

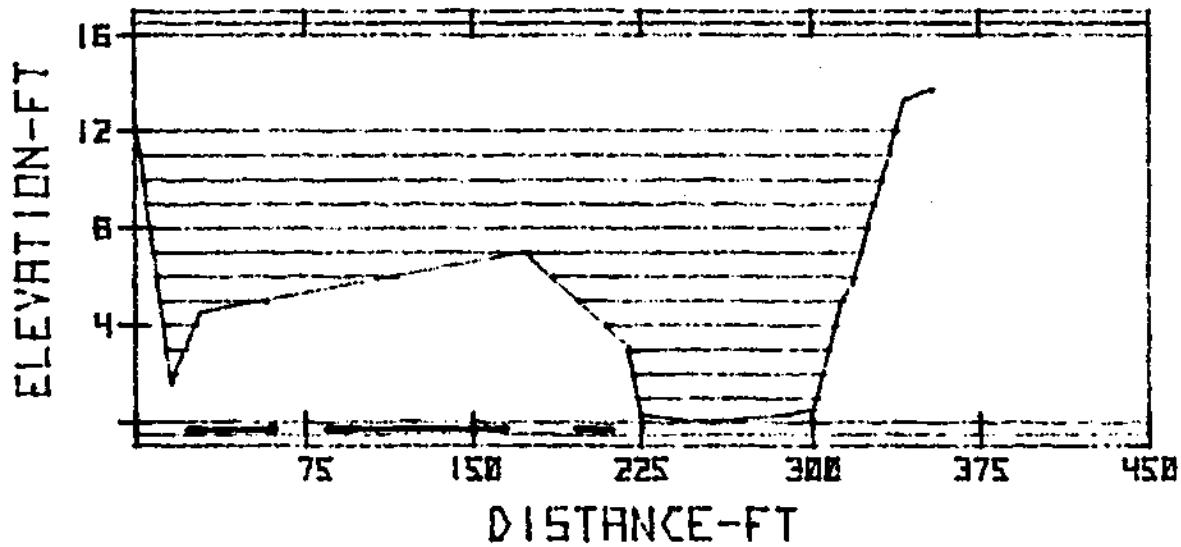
General Section Comments

Most of this stream section contains good riparian-associated stream habitat only on the left edge of water. Exposed portions of this section are shallow and relatively less valuable as nursery habitat.

DRY CREEK
CROSS SECTION NUMBER D 4
LOWER TRANSECT



DRY CREEK
CROSS SECTION NUMBER D 4
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Dry Creek

Map Ref. Pg. A-30

		Upper Transect	Lower Transect
Section	D-5		
Section Length (feet)	1320		
River Mile	6		
Habitat Type		riffle-run	rapids
Water Surface Width (feet)		100	55
Water Temperature (°C) @ Time of Day Taken		15.0 @ 1640	15.0 @ 1705
Water Transparency (feet)		>3.0	>3.0

Upper Transect

Water Depth (Feet) at:
0.25 0.8 0.5 1.1 0.75 1.0 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.15 0.5 2.40 0.75 2.19 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 2.30

Lower Transect

Water Depth (Feet) at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 N/A 0.5 N/A 0.75 N/A Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 4.74

Section Habitat
Good riparian vegetation is available in this section. Riffle habitat is available primarily in the lower third of this section. The upper two thirds of this section is primarily run habitat.

Pool/Riffle Ratio 2.5:1

Spawning Substrate Observations
The main concentration of potentially usable spawning substrate is located above the lower transect on the left edge of water. Isolated patches of usable substrate are located in the riffles.

Fish Habitat Observation
Nursery Habitat
Dry Creek

Map Ref. Pg. A-30

		Upper Transect	Lower Transect
Section	D-5		
Section Length (feet)	1320		
River Mile	6		
Habitat Type		pool	riffle
Water Surface Width (feet)	rt. chnl.	61	
	lt. chnl.	20	47
Maximum Water Depth (feet)		2.1	2.9
Water Temperature (°C) @ Time of Day Taken		21.5 @ 1030	22.0 @ 1110
Water Transparency (feet)		>3.0	>3.0
In-Channel Cover (feet)		20	10
In-Channel Vegetative Canopy (feet)		25	30
In-Stream Cover (feet)		15	0
In-Stream Vegetative Canopy (feet)		20	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	1.47
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	0.53

Section Pool Quality

Pool quality is fair to poor except where flow is shaded along a bank. Depths are generally 6 to 12 inches with an occasional 2 to 3 foot deep pocket.

Section Riffle Quality

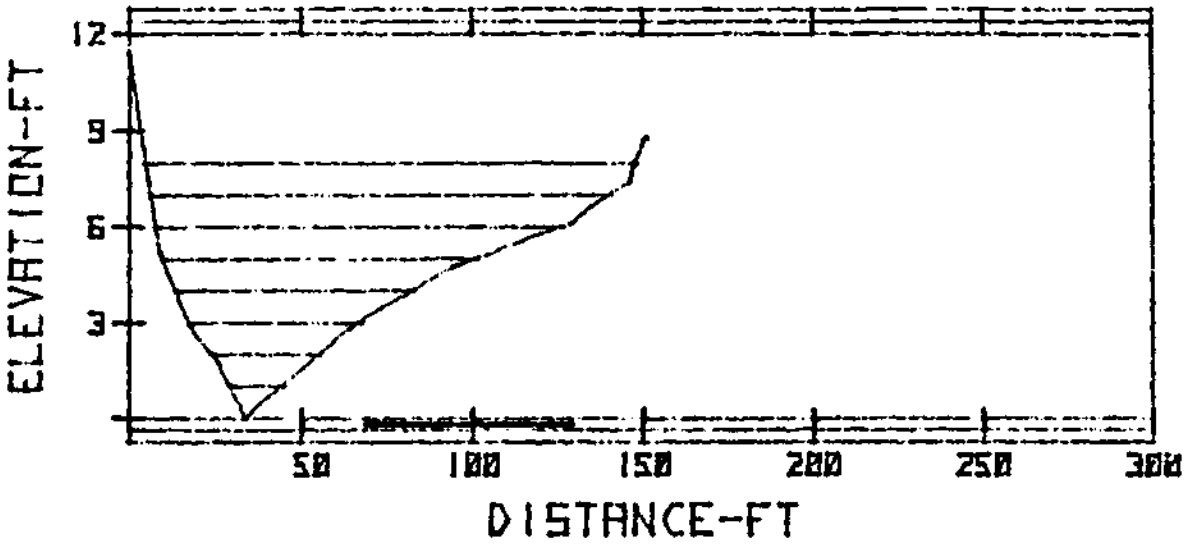
Riffle quality is fair to poor except where depths are greater, e.g. near the lower transect. Sixty-five invertebrates/ft^2 were collected Just above the lower transect.

Pool/Riffle Ratio 2.5:1

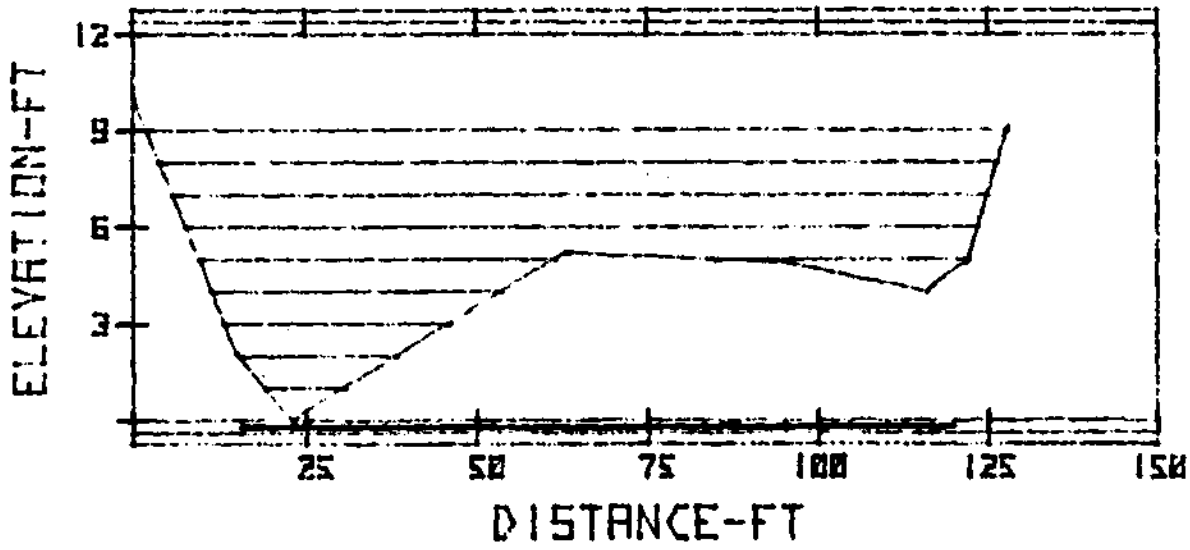
General Section Comments

Riparian vegetation is good to very good except for occasional bare patches. The upper half of this section is relatively narrow, creating more shading.

DRY CREEK
CROSS SECTION NUMBER D 5
LOWER TRANSECT



DRY CREEK
CROSS SECTION NUMBER D 5
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Dry Creek

Map Ref. Pg. A-30

		Upper Transect	Lower Transect
Section	D-6		
Section Length (feet)	1320		
River Mile	6		
Habitat Type		pool-run	run
Water Surface Width (feet)		68	57
Water Temperature (°C) @ Time of Day Taken		17.0 @ 1000	18.0 @ 1025
Water Transparency (feet)		>3.0	>3.0

Upper Transect

Water Depth (Feet) at:
0.25 0.7 0.5 1.3 0.75 1.1 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.2 0.5 2.6 0.75 2.7 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 2.8

Lower Transect

Water Depth (Feet) at:
0.25 1.8 0.5 1.7 0.75 1.6 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 0.96 0.5 1.54 0.75 1.62 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.43

Section Habitat
This section contains good riparian vegetation, but the flow is generally in the exposed center of the channel. Very little bank flow is available.

Pool/Riffle Ratio 3:1

Spawning Substrate Observations
Spawning-size substrate is available in patches on most of the exposed gravel bar sections. Instream substrate is also potentially usable. A general characteristic of most substrate in this section is a relatively high percentage of silt and sand.

Fish Habitat Observation
Nursery Habitat
Dry Creek

Map Ref. Pg. A-30

		Upper Transect	Lower Transect
Section	D-6		
Section Length (feet)	1320		
River Mile	6		
Habitat Type		pool tail	run
Water Surface Width (feet)		55	36
Maximum Water Depth (feet)		0.9	0.5
Water Temperature (°C) @ Time of Day Taken		23.0 @ 1310	24.0 @ 1340
Water Transparency (feet)		> 3.0	>3.0
In-Channel Cover (feet)		20	15
In-Channel Vegetative Canopy (feet)		15	10
In-Stream Cover (feet)		2	0
In-Stream Vegetative Canopy (feet)		0	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	0.46
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	0.86

Section Pool Quality

Pool habitat is fair to poor depending primarily on the amount of shading and cover present. Some relatively deep (2- to 3-foot) pools are available.

Section Riffle Quality

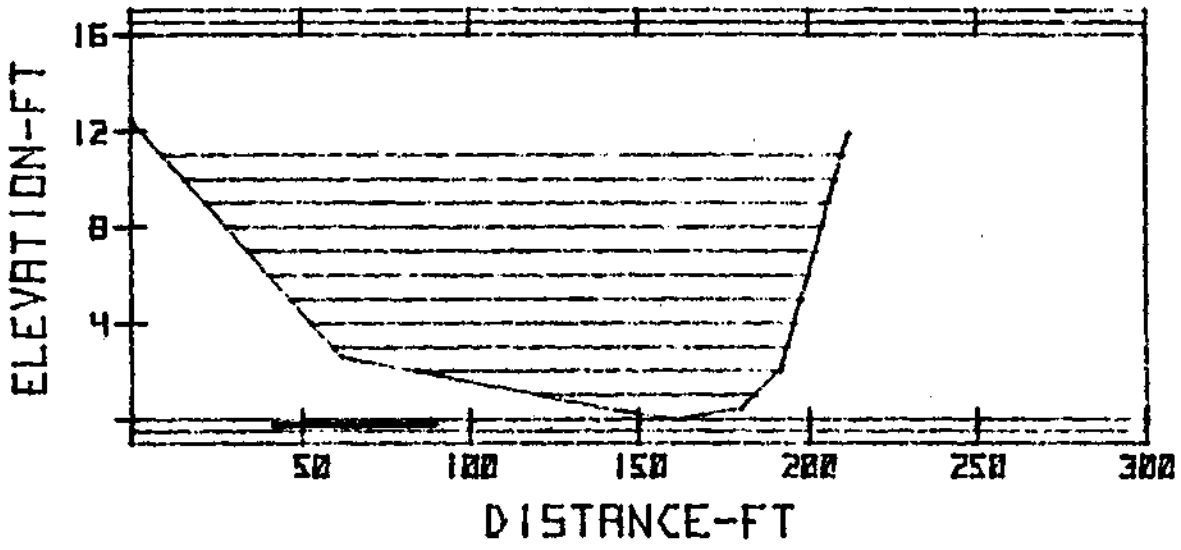
Riffles are generally too shallow and exposed. Filamentous algae is very prevalent. Sixty invertebrates/ft2 were collected.

Pool/Riffle Ratio 3:1

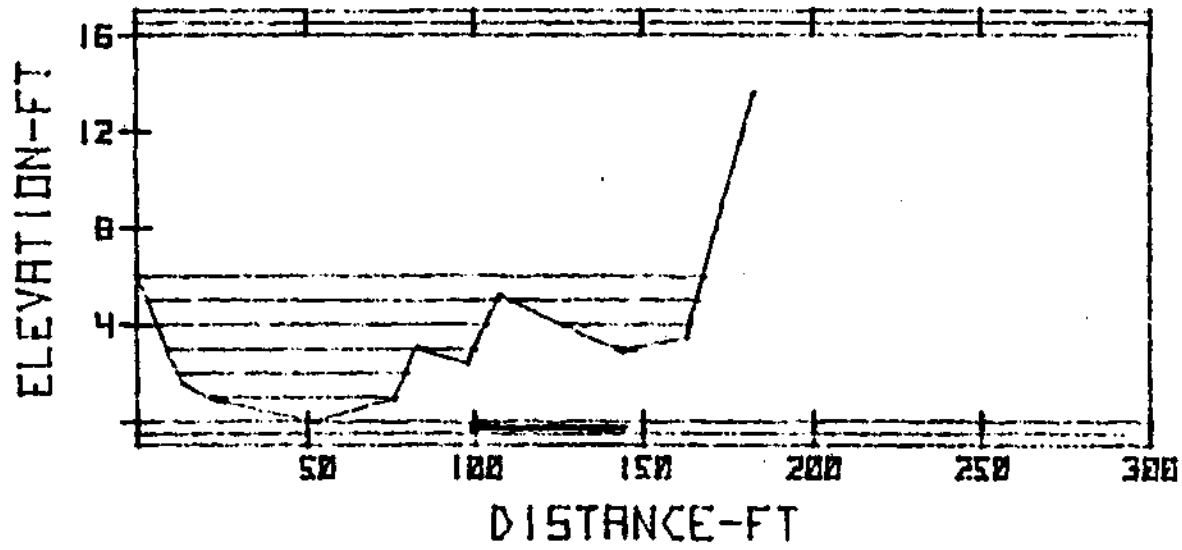
General Section Comments

A greater percentage of this section is exposed (in comparison with upstream Dry Creek sections).

DRY CREEK
CROSS SECTION NUMBER D 6
LOWER TRANSECT



DRY CREEK
CROSS SECTION NUMBER D 6
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Dry Creek

Map Ref. Pg. A-30

		Upper Transect	Lower Transect
Section	D-7		
Section Length (feet)	1320		
River Mile	4		
Habitat Type		riffle-run	riffle
Water Surface Width (feet)		180 (2 channel combined width)	67
Water Temperature (°C) @ Time of Day Taken		19.0 @ 1115	20.0 @ 1140
Water Transparency (feet)		>3.0	> 3.0

Upper Transect

Water Depth (Feet) at:
0.25 0.5 0.5 0.5 0.75 0.4 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 1.11 0.5 1.47 0.75 1.31 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.47

Lower Transect

Water Depth (Feet) at:
0.25 1.6 0.5 0.5 0.75 0.7 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 0.89 0.5 3.23 0.75 2.73 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.23

Section Habitat
In-channel substrate stability is poor in this section. Exposure is considerable and the channel is very vide.

Pool/Riffle Ratio 3:1

Spawning Substrate Observations
Because of the width of this section, there is a considerable amount of exposed substrate on both sides of the flow. Approximately 602 of this material is suitable for spawning from a size standpoint. The concentration of fine material varies.

Fish Habitat Observation
Nursery Habitat
Dry Creek

Map Ref. Pg. A-30

		Upper Transect	Lower Transect
Section	D-7		
Section Length (feet)	1320		
River Mile	4		
Habitat Type		riffle	riffle
Water Surface Width (feet)		56 (3 channel combined width	65
Maximum Water Depth (feet)		1.0	1.5
Water Temperature (°C) @ Time of Day Taken		20.5 @ 0900	20.5 @ 0815
Water Transparency (feet)		>3.0	>3.0
In-Channel Cover (feet)		20	15
In-Channel Vegetative Canopy (feet)		10	20
In-Stream Cover (feet)		0	3
In-Stream Vegetative Canopy (feet)		0	12

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 1.47
Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 1.31

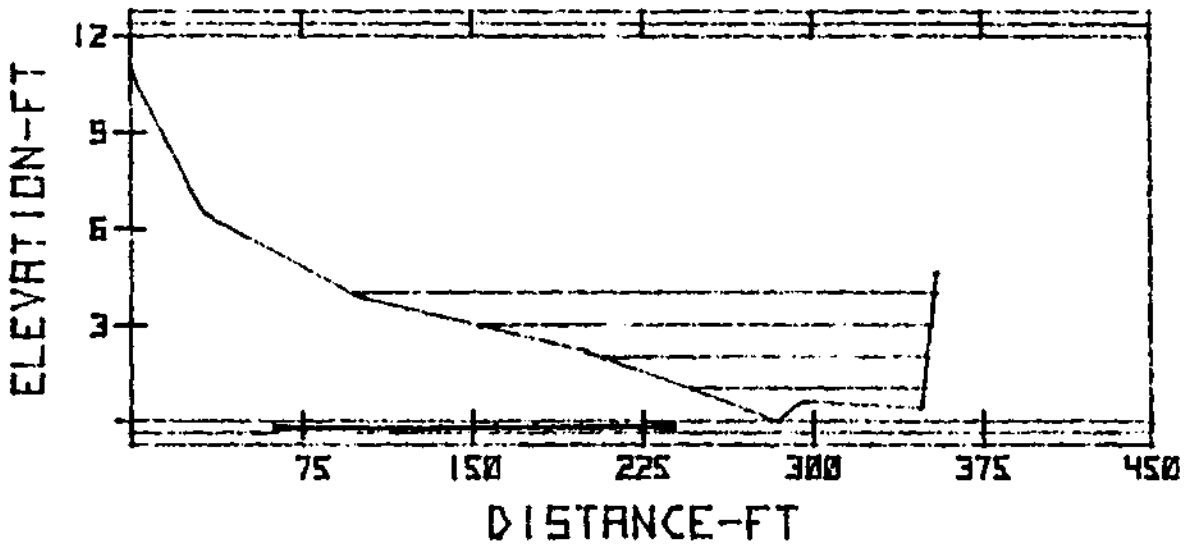
Section Pool Quality
Pool habitat is practically absent in this section. Existing pool pockets are completely exposed and relatively shallow.

Section Riffle Quality
Riffle habitat is typically very shallow and exposed. Eighty-seven invertebrates/ft^2 were collected.

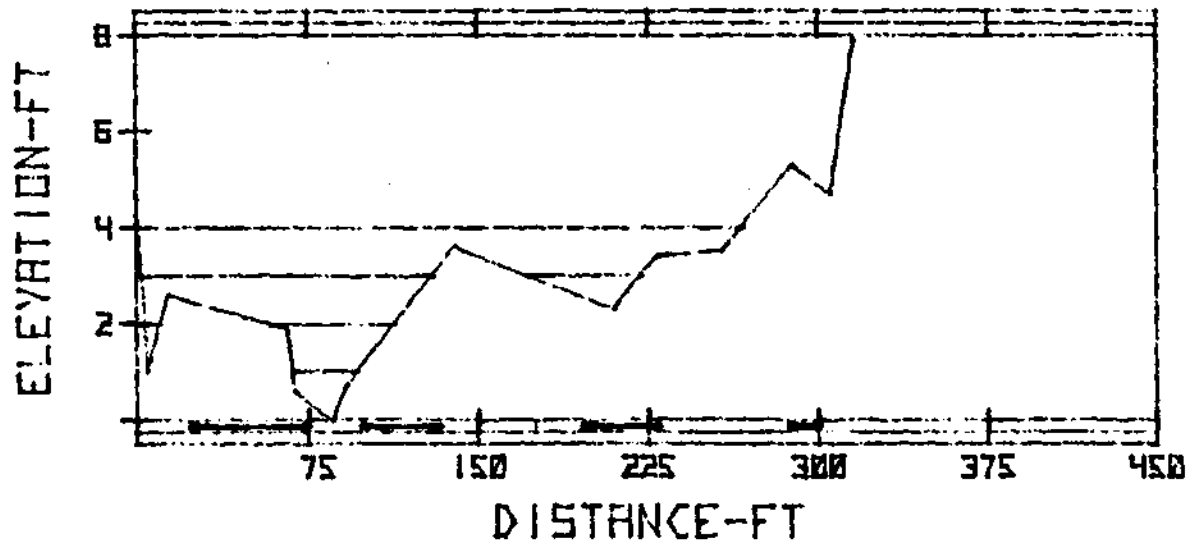
Pool/Riffle Ratio 3 : 1

General Section Comments
This section is very exposed and wide.

DRY CREEK
CROSS SECTION NUMBER D 7
LOWER TRANSECT



DRY CREEK
CROSS SECTION NUMBER D 7
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Dry Creek

Map Ref. Pg. A-31

		Upper Transect	Lower Transect
Section	D-8		
Section Length (feet)	1320		
River Mile	2		
Habitat Type		riffle	riffle
Water Surface Width (feet)		168	48
Water Temperature (°C) @ Time of Day Taken		23.0 @ 1415	24.0 @ 1435
Water Transparency (feet)		> 3.0	>3.0

Upper Transect

Water Depth (Feet) at:
0.25 0.3 0.5 0.3 0.75 1.1 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 0.96 0.5 1.29 0.75 2.83 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.29

Lower Transect

Water Depth (Feet) at:
0.25 1.2 05 1.8 0.75 1.1 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 2.22 05 2.94 0.75 2.71 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 3.26

Section Habitat
This section is wide and flat; flow is shallow and very exposed. A large, operating gravel extraction firm is located adjacent to this section.

Pool/Riffle Ratio 2 : 1

Spawning Substrate Observations
Instream gravel extraction has occurred historically in this stream section. Relatively less coarse material was observed in this section. Isolated patches of suitable size spawning substrate are available.

Fish Habitat Observation
Nursery Habitat
Dry Creek

Map Ref. Pg. A-31

		Upper Transect	Lower Transect
Section	D-8		
Section Length (feet)	1320		
River Mile	2		
Habitat Type		riffle	riffle
Water Surface Width (feet)		67	23
Maximum Water Depth (feet)		0.5	0.7
Water Temperature (°C) @ Time of Day Taken		22.0 @ 1010	23.0 @ 1030
Water Transparency (feet)		>3.0	>3.0
In-Channel Cover (feet)		5	6
In-Channel Vegetative Canopy (feet)		2	25
In-Stream Cover (feet)		0	0
In-Stream Vegetative Canopy (feet)		0	0

Water Velocity (FPS) in Midstream at the Surface (Upper Transect) 1.26
Water Velocity (FPS) in Midstream at the Surface (Lower Transect) 1.15

Section Pool Quality

Pools are typically shallow and very exposed in this stream section. Considerable filamentous algae is present in the shallow, slow flowing stretches of the section.

Section Riffle Quality

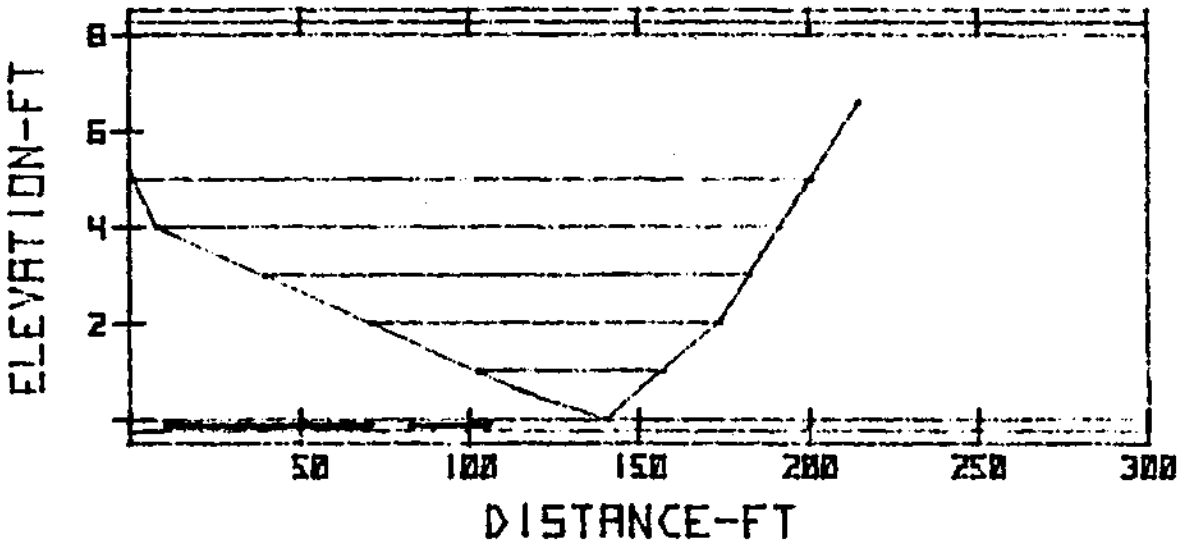
Riffle quality is poor in this section. Exposure is excessive, depths are shallow, and stream substrate is less coarse than in upstream sections. Twenty-five invertebrates/ft^2 were sampled.

Pool/Riffle Ratio 2:1

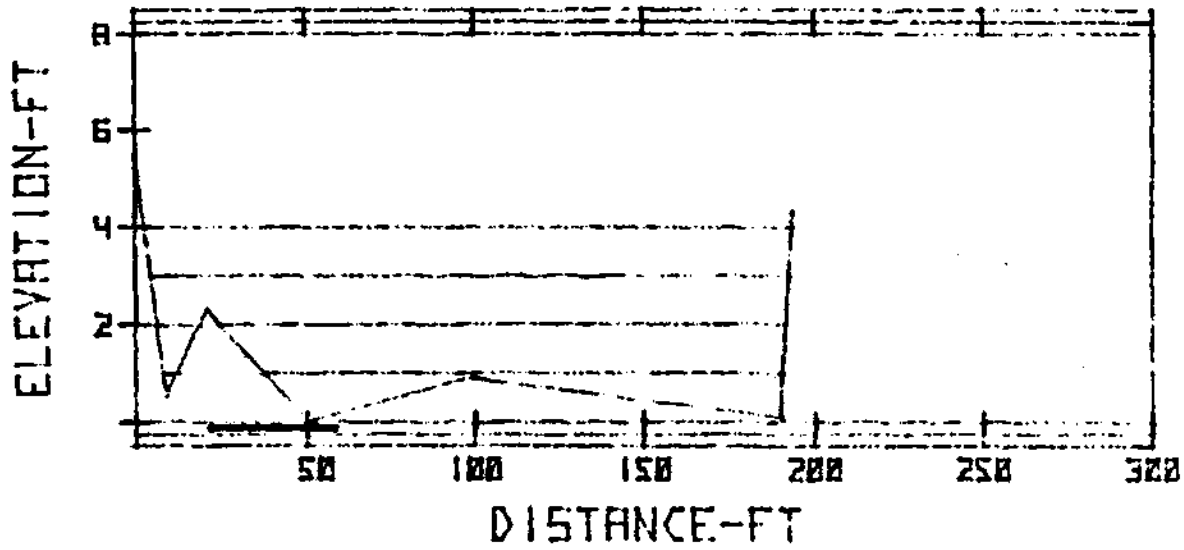
General Section Comments

The section is located opposite a gravel extraction company at West Side Road Bridge.

DRY CREEK
CROSS SECTION NUMBER D 8
LOWER TRANSECT



DRY CREEK
CROSS SECTION NUMBER D 8
UPPER TRANSECT



Fish Habitat Observations
Spawning Habitat
Dry Creek

Map Ref. Pg. A-17

		Upper Transect	Lower Transect
Section	D-9		
Section Length (feet)	1320		
River Mile	0		
Habitat Type		riffle	riffle
Water Surface Width (feet)		125	55
Water Temperature (°C) @ Time of Day Taken		25.5 @ 1615	25.0 @ 1350
Water Transparency (feet)		>3.0	>3.0

Upper Transect

Water Depth (Feet) at:
0.25 0.9 0.5 0.5 0.75 1.4 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
0.25 3.55 0.5 5.03 0.75 1.73 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 5.03

Lower Transect

Water Depth (Feet) at:
0.25 1.6 0.5 1.4 0.75 1.8 Distance from Left Edge of Water
Water Velocity (FPS) Measured 0.5 ft. Above the Substrate at:
025 1.69 0.5 2.04 0.75 1.47 Distance from Left Edge of Water
Water Velocity (FPS) Measured on the Surface at Midstream 1.90

Section Habitat
This section is typically very exposed with a wide channel. Selected deep pools and runs are available.

Pool/Riffle Ratio 1:1

Spawning Substrate Observations
Substrate generally contains too high a concentration of fine material to be considered optimal for spawning.
A considerable amount of potentially usable material exists in this section despite the high concentration of fines.

Fish Habitat Observation
Nursery Habitat
Dry Creek

Map Ref. Pg. A-17

		Upper Transect	Lower Transect
Section	D-9		
Section Length (feet)	1320		
River Mile	0		
Habitat Type		riffle	pool
Water Surface Width (feet)		33	37
Maximum Water Depth (feet)		0.3	1.5
Water Temperature (°C) @ Time of Day Taken		29.0 @ 1545	28.5 @ 1505
Water Transparency (feet)		>3.0	> 3.0
In-Channel Cover (feet)		11	20
In-Channel Vegetative Canopy (feet)		21	20
In-Stream Cover (feet)		0	10
In-Stream Vegetative Canopy (feet)		0	5

Water Velocity (FPS) in Midstream at the Surface (Upper Transect)	0.93
Water Velocity (FPS) in Midstream at the Surface (Lower Transect)	0.75

Section Pool Quality

Isolated, exposed pool habitat is available in this section. The pool habitat of the lower transect is affected if not created, by the summer road crossing Just downstream at the mouth of Dry Creek.

Section Riffle Quality

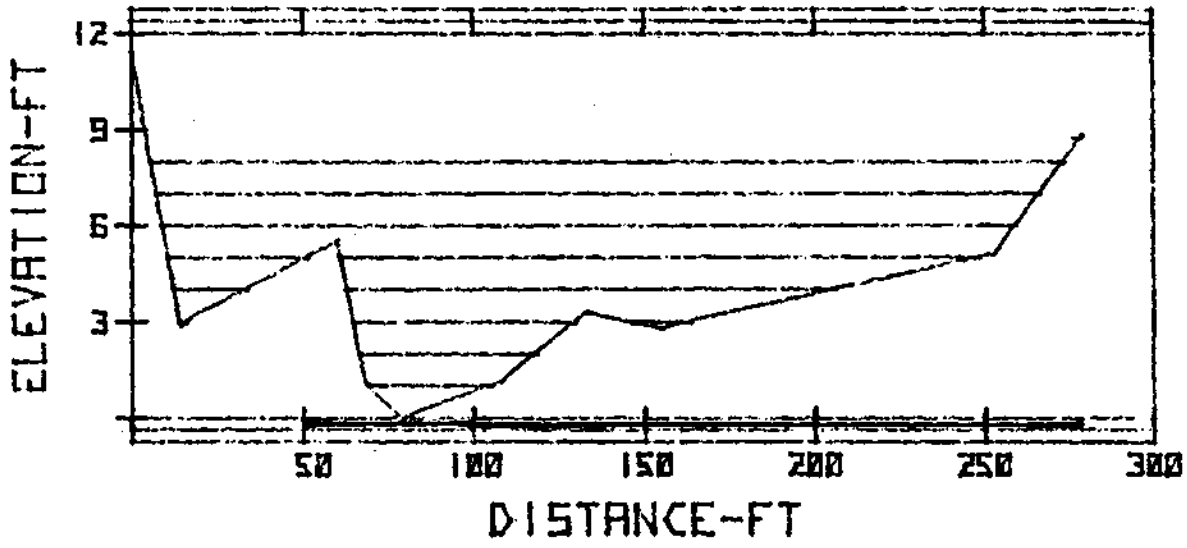
Riffles are very shallow in this section. Very little canopy and cover are available. Twenty-five invertebrates/ft^2 were collected.

Pool/Riffle Ratio 1 : 1

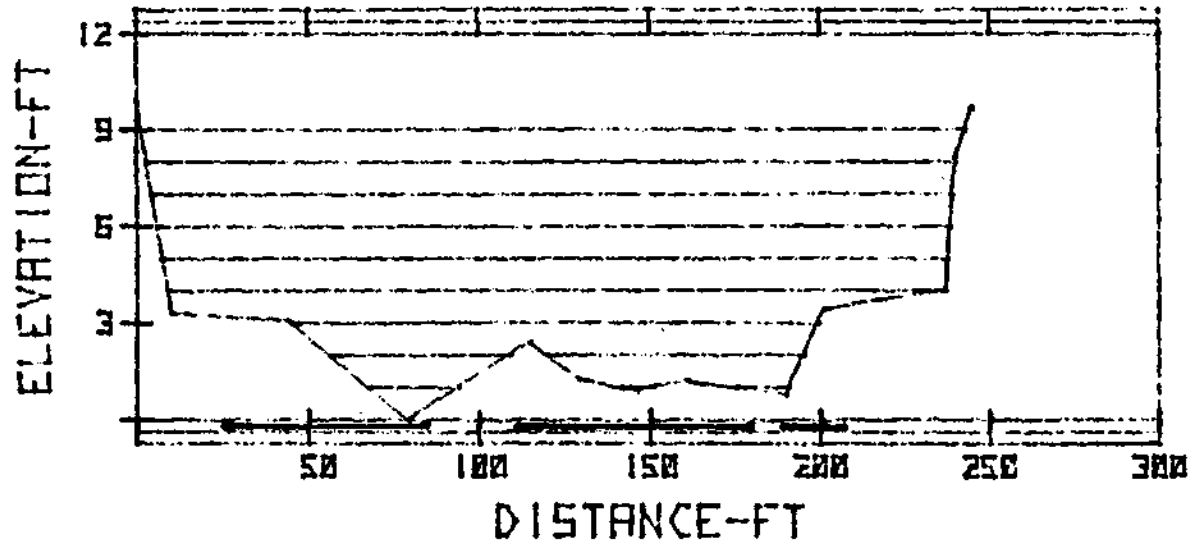
General Section Comments

Many juvenile rough fish were present, even at the observed temperatures. Considerable filamentous algae was present near the mouth of an unnamed creek just below the lower transect.

DRY CREEK
CROSS SECTION NUMBER D 9
LOWER TRANSECT



DRY CREEK
CROSS SECTION NUMBER D 9
UPPER TRANSECT



Appendix D

U.S. Geological Survey

Russian River Drainage Basin Gage Station Locations

RUSSIAN RIVER DRAINAGE BASIN GAGE STATIONS

Station 11461000
RUSSIAN RIVER NEAR UKIAH, CA

PERIOD OF RECORD. — August 1911 to September 1913, October 1952 to current year. Monthly discharge only for some periods, published in WSP 1315-B.

GAGE. -- Water-stage recorder. Altitude of gage is 600 ft (183 m), from topographic map. Prior to October 1952, nonrecording gage at bridge 20 ft (6 m) upstream at different datum. Oct. 1, 1952, to Nov. 8, 1971, water-stage recorder at site 0.6 mi (1.0 km) upstream at different datums.

REMARKS. -- Records good. No regulation. Diversions above station for irrigation of about 1,000 acres (4.05 km^3).

AVERAGE DISCHARGE. -- 26 years, 181 ft^3/s (5.126 m^3/s), 131,100 acre-ft/yr (162 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 18,900 ft^3/s (535 m^3/s) Dec. 21, 1955, gage height, 19.0 ft (5.79 m) site and datum then in use; no flow at times in 1911, 1952-53, 1960-61, 1964-65, 1970-73, 1975-76, 1976-77.

Station 11461500
EAST FORK RUSSIAN RIVER NEAR CALPELLA, CA

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. --October 1941 to current year. Monthly discharge only for some periods, published in WSP 1315-B.

GAGE. -- Water-stage recorder. Datum of gage is 787.87 ft (240.143 m) above mean sea level. Prior to May 28, 1957, at site 1.3 mi (2.1 km) downstream at different datum. May 28, 1957, to Apr. 5, 1966, at site 0.4 mi (0.6 km) downstream at same datum.

REMARKS. -- Records good. Flow greatly affected by diversion from Eel River through Potter Valley powerhouse (station 11471000). Diversion for irrigation of about 8,000 acres (32.4 km^2) above station.

AVERAGE DISCHARGE. -- 35 years, 339 ft^3/s (9.600 m^3/s), 245,600 acre-ft/yr (303 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD. --Maximum discharge, 18,700 ft^3/s (530 m^3/s) Dec. 22, 1964, gage height, 20.21 ft (6.160 m) site then in use; minimum daily, 2.0 ft^3/s (0.058 m^3/s) July 18, 1977.

WATER-QUALITY RECORDS

PERIOD OF RECORD. --Water years 1951-58, 1964 to current year. CHEMICAL ANALYSES: Water years 1951-58, 1973 to current year. WATER TEMPERATURES: Water years 1964 to current year. SEDIMENT RECORDS: Water years 1964, 1967-68. TURBIDITY: Water years 1964-71.

PERIOD OF DAILY RECORD. --WATER TEMPERATURES: March 1964 to current year. SEDIMENT RECORDS: March to September 1964, October 1966 to September 1968.

INSTRUMENTATION. -- Temperature recorder since August 1965.

EXTREMES FOR PERIOD OF DAILY RECORD. --WATER TEMPERATURES: Maximum (water years 1966, 1968-76), 29.0°C Aug. 11, 1971, July 1, 1972; minimum (water years 1966-67, 1969-70, 1972-76), 2.0°C Dec. 12, 1962.

Station 11461800
LAKE MENDOCINO NEAR UKIAH, CA

PERIOD OF RECORD. -- November 1958 to present.

GAGE. -- Water-stage recorder. Datum of gage is at mean sea level (levels by Corps of Engineers).

REMARKS.-- Reservoir is formed by earthfill dam; storage began in November 1958. Capacity, 122,900 acre-ft (152 hm^3) between elevations 637.0 ft (194.16 m), invert of outlet tunnel and 764.8 ft (233.11 m), spillway crest, above mean sea level. Storage affected by diversions from Eel River through Potter Valley powerhouse (station 11471000). Water is released down East Fork Russian River for irrigation and recreation use. Records given herein represent total contents.

EXTREMES FOR PERIOD OF RECORD. -- Maximum contents, 128,700 acre-ft (159.19 hm^3) Dec. *22,* 1964, elevation 768.17 (231.96 m); minimum, 12,081 acre-ft (14.94 hm^3) Nov. 3, 1977, elevation, 687.17 ft (209.5 m).

Station 11462000
EAST FORK RUSSIAN RIVER NEAR UKIAH, CA

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- August 1911 to September 1913, October 1951 to June 1956, October 1957 to current year.

GAGE. -- Water-stage recorder and concrete control. Datum of gage is 614.41 ft (187.272 m) above mean sea level. Prior to October 1951, nonrecording gage at site 0.5 mi (0.8 km) upstream at different datum. October 1951 to June 1956, water-stage recorder at site 1.0 mi (1.6 km) upstream at different datum.

REMARKS. -- Records good. Flow affected by diversion from Eel River through Potter Valley powerhouse (station 11471000) and since November 1958 by storage in Lake Mendocino (station 11461800) 500 ft (152 m) upstream. Diversions above station for irrigation of about 8,000 acres (32.4 km^2).

AVERAGE DISCHARGE (unadjusted). -- 7 years (water years 1912-13, 1952-55, 1958). 356 ft^3/s (10.08 m^3/s), 257,900 acre-ft/yr (318 hm^3/yr); 17 years (water years 1960-76), 354 ft^3/s (10.03 m^3/s), 256,500 acre-ft/yr (316 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD (Prior to regulation by Lake Mendocino). -- Maximum discharge, 13,300 ft^3/s (377 m^3/s) Dec. 21, 1955, gage height, 16.86 ft (5.139 m) site and datum then in use, from rating curve extended above 1,700 ft^3/s (48.1 m^3/s) on basis of maximum flow at station upstream which was defined to 8,600 ft^3/s (244 m^3/s); no flow Aug. 13-15, 1913. 1957 to current year: Maximum discharge, 6,500 ft^3/s (183.9 m^3/s) Jan. 24, 1970, gage height, 10.84 ft (3.304 m); minimum daily, 0.02 ft^3/s (0.001 m^3/s) Apr. 17, 1973.

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1953-55, 1964-68, 1973 to current year.
CHEMICAL ANALYSES: Water years 1953-55, 1973 to current year. WATER TEMPERATURES: Water years 1953-55, 1965-68, 1973 to current year.
SEDIMENT RECORDS: Water years 1953-55, 1964-68.

PERIOD OF DAILY RECORD. --WATER TEMPERATURES: December 1952 to March 1955, October 1964 to September 1968, October 1972 to current year.
SEDIMENT RECORDS: December 1952 to March 1955, January 1964 to September 1968.

INSTRUMENTATION. -- Temperature recorder since October 1972.

EXTREMES FOR PERIOD OF DAILY RECORD. --WATER TEMPERATURES (water years 1973-74, 1976): Maximum, 22.5°C on several days in 1973; minimum, 7.0°C Jan. 14, 1973.

Station 11462500
RUSSIAN RIVER NEAR HOPLAND, CA

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1939 to current year. Monthly discharge only for some periods, published in WSP 1315-B.

GAGE. -- Water-stage recorder. Datum of gage is 497.61 ft (151.672 m) above mean sea level. Prior to Sept. 9, 1943, nonrecording gage at same site and datum.

REMARKS. -- Records good. Diversions for irrigation of about 11,800 acres (47.8 km^2) above station. Flow also affected by diversion into basin (see REMARKS for East Fork Russian River stations) and since November 1958 by storage in Lake Mendocino (station 11461800) 15 mi (24 km) upstream.

AVERAGE DISCHARGE. -- 37 years, 727 ft^3/s (20.59 m^3/s), 526,700 acre-ft/yr (649 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 45,000 ft^3/s (1,270 m^3/s) Dec. 22, 1955, gage height, 27.00 ft (8.230 m); minimum daily, 9.1 ft^3/s (0.26 m^3/s) April 20, 1977.

EXTREMES OUTSIDE PERIOD OF RECORD. -- Flood in December 1937 reached a stage of 30.0 ft (9.14 m), from floodmarks.

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1951 to current year. CHEMICAL ANALYSES: Water years 1951-66. WATER TEMPERATURES: Water years 1965 to current year.

PERIOD OF DAILY RECORD. --WATER TEMPERATURES: September 1965 to current year.

INSTRUMENTATION. -- Temperature recorder since September 1965.

EXTREMES FOR PERIOD OF DAILY RECORD. --WATER TEMPERATURES: Maximum (water years 1966, 1969, 1972-76), 24.0°C on several days in 1969 and 1973; minimum (water years 1966-68, 1970, 1972-76), 5.0°C Feb. 2, Dec. 16, 1972, Jan. 31 to Feb. 2, 1975.

Section 11463000
RUSSIAN RIVER NEAR CLOVERDALE, CA

PERIOD OF RECORD. -- July 1951 to current year.

GAGE. -- Water-stage recorder. Altitude of gage is 350 ft (107 m), from topographic map. Prior to July 30, 1970, at site 0.2 mi (0.3 km) upstream at different datum.

REMARKS. -- Records good. Diversions for irrigation of about 15,300 acres (61.9 km^2) above station. Flow also affected by diversion into basin (see REMARKS for East Fork Russian River stations) and since November 1958 by storage in Lake Mendocino (station 11461800) 28 mi (45 km) upstream.

AVERAGE DISCHARGE. -- 25 years, 305 ft^3/s (8.723 m^3/s), 723,100 acre-ft/yr (892 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 55,200 ft^3/s (1,560 m^3/s) Dec. 22, 1964, gage height, 31.60 ft (9.632 m) site and datum then in use; minimum daily, 12 ft^3/s (0.35 m^3/s) April 22, 1977.

Section 11463900
MAACAMA CREEK NEAR KELLOGG, CA

PERIOD OF RECORD. -- Occasional low-flow measurements and annual maximum, water years 1958-60, December 1960 to current year.

GAGE. -- Water-stage recorder. Datum of gage is 188.91 ft (57.580 m) above mean sea level. Prior to Dec. 20, 1960, crest-stage gage only at site 700 ft (213 m) upstream at different datum.

REMARKS. -- Records good. No regulation or diversion above station.

AVERAGE DISCHARGE. -- 15 years (water years 1962-76), 86.7 ft^3/s (2.455 m^3/s), 62,810 acre-ft/yr (77.4 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 8,920 ft^3/s (253 m^3/s), Dec. 22, 1964, gage height, 17.56 ft (5.352 m); no flow for many days in 1964, 1968, 1976, 1977 (July 4 to Sept. 28).

Station 11464000
RUSSIAN RIVER NEAR HEALDSBURG, CA

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1939 to current year. Monthly discharge only for some periods, published in WSP 1315-B.

GAGE. -- Water-stage recorder. Datum of gage is 77.01 ft (23.473 m) above mean sea level.

REMARKS. -- Records good. Several diversions for irrigation of about 17,800 acres (72.0 km^2) above station. Flow also affected by diversion into basin (see REMARKS for East Fork Russian River stations) and since November 1958 by storage in Lake Mendocino (station 11461800) 63 mi (101 km) upstream.

AVERAGE DISCHARGE. -- 37 years, 1,442 ft^3/s (40.84 m^3/s), 1,045,000 acre-ft/yr (1.29 km^3/yr).

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 71,300 ft^3/s (2,020 m^3/s) Dec. 23, 1964, gage height, 27.00 ft (8.230 m); maximum gage height, 30.0 ft (9.14 m) Feb. 28. 1940; minimum daily discharge, 17 ft^3/s (0.49 m^3/s) April 20, 1977.

EXTREMES OUTSIDE PERIOD OF RECORD. -- Flood of December 1937 reached a stage of 30.8 ft (9.39 m) from floodmarks.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- Water years 1951 to current year. CHEMICAL ANALYSIS: Water years 1951-66. WATER TEMPERATURES: Water years 1966 to current year.

PERIOD OF DAILY RECORD. --WATER TEMPERATURES: October 1965 to current year.

INSTRUMENTATION. -- Temperature recorder since October 1965.

EXTREMES FOR PERIOD OF DAILY RECORD. --WATER TEMPERATURES: Maximum (water years 1966-68, 1970, 1972-76), 28.0°C July 13, 14, 1972; minimum (water years 1966-69, 1972-76), 5.0°C Dec. 10, 11, 1972.

Station 11464400
DRY CREEK NEAR YORKVILLE, CA

PERIOD OF RECORD. -- October 1973 to current year.

GAGE. -- Water-stage recorder and crest-stage gage. Altitude of gage is 500 ft (152 m), from topographic map.

REMARKS. -- Records good except those for period of no gage-height record, which are fair. No regulation or diversion above station.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 15,400 ft^3/s (436 m^3/s) Jan. 16, 1974, gage height, 13.50 ft (4.115 m); minimum daily, no flow (August 5 through August 25, 1977).

Station 11464500
DRY CREEK NEAR CLOVERDALE, CA

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1941 to current year. Monthly discharge only for some periods, published in WSP 1315-B.

GAGE. -- Water-stage recorder. Datum of gage is 304.04 ft (92.671 m) above mean sea level.

REMARKS. -- Records good. No regulation or diversion above station.

AVERAGE DISCHARGE. -- 35 years, 162 ft^3/s (4.588 m^3/s), 117,400 acre-ft/yr (145 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 18,100 ft^3/s (513 m^3/s) Dec. 22, 1964, gage height, 18.09 ft (5.514 m); minimum, 0.08 ft^3/s (0.002 m^3/s) August 18, 1977.

EXTREMES OUTSIDE PERIOD OF RECORD. -- Flood in December 1937 reached a stage of about 18 ft (5.5 m), from floodmarks.

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD. --WATER TEMPERATURES: May 1965 to current year.

INSTRUMENTATION. -- Temperature recorder since May 1965.

EXTREMES FOR PERIOD OF DAILY RECORD. --WATER TEMPERATURES: Maximum (water years 1966, 1968-76), 33.5 C Aug. 6, 7, 1966; minimum (water years 1967-76), 2.0°C Dec. 10, 1972.

Station 11464860
WARM SPRINGS CREEK NEAR ASTI, CA

PERIOD OF RECORD. -- October 1973 to current year.

GAGE. -- Water-stage recorder. Altitude of gage is 625 ft (191 m), from topographic map.

REMARKS. -- Records good. No regulation or diversion above station.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 2,230 ft^3/s (63.2 m^3/s) Jan. 16, 1974, gage height, 9.66 ft (2.944 m); minimum daily, no flow, July 13 to September 6, 1977.

Station 11465200
DRY CREEK NEAR GEYSERVILLE, CA

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1959 to current year.

GAGE. -- Water-stage recorder. Datum of gage is 158.40 ft (48.280 m) above mean sea level. Prior to Oct. 1, 1964, at datum 2.00 ft (0.610 m) higher. Oct. 1, 1964, to Apr. 8, 1976, at datum 1.00 ft (0.305 m) higher.

REMARKS. -- Records good except those for period of no gage-height record, which are fair. No regulation; small diversions above station for orchard irrigation of about 1,200 acres (4.80 km^2) in summer.

AVERAGE DISCHARGE. -- 17 years, 327 ft^3/s (9.261 m^3/s), 236,900 acre-ft/yr (292 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 32,400 ft^3/s (918 m^3/s) Jan. 31, 1963, gage height, 18.50 ft (5.639 m) present datum; minimum daily, no flow at times including October 1 to November 14, 1976 and June 22 to September 30, 1977.

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1964 to current year.
CHEMICAL ANALYSES: Water years 1971 to current year.
WATER TEMPERATURES: Water years 1964 to current year.
SEDIMENT RECORDS: Water years 1964 to current year.
TURBIDITY: Water years 1964 to current year.

PERIOD OF DAILY RECORD. –
WATER TEMPERATURES: March 1964 to current year.
SEDIMENT RECORDS: March 1964 to current year.

INSTRUMENTATION. -- Temperature recorder since November 1964.

REMARKS. -- Where no maximum or minimum is shown, temperature is once-daily reading.

EXTREMES FOR PERIOD OF DAILY RECORD. --WATER TEMPERATURES: Maximum (water years 1965-75), 26.5°C Aug. 11, 1971, Aug. 23, 1974; minimum (water years 1965-66, 1968-76), 3.5°C Jan. 3, 1974.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 15,000 mg/L (estimated) Dec. 22, 1964; minimum daily mean, no flow for many days in 1964, 1966, 1970-76.
SEDIMENT DISCHARGE: Maximum daily, 830,000 tons (753,000 tons), estimated, Dec. 22, 1964; minimum daily, 0 tons (0 tons) on many days in 1964, 1966, 1968-76).

Station 11467000
RUSSIAN RIVER NEAR GUERNEVILLE, CA
(National stream-quality accounting network station)

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1939 to current year. Monthly discharge only for some periods, published in WSP 1315-B. Prior to October 1954, published as "at Guerneville."

GAGE. -- Water-stage recorder. Altitude of gage is 20 ft (6.1 m), from topographic map. Prior to Oct. 1, 1954, nonrecording gage at bridge 5.3 mi (8.5 km) downstream at datum 8.58 ft (2.615 m) lower. Oct. 1, 1954, to Oct. 23, 1974, at site 0.7 mi (1.1 km) downstream at datum 2.75 ft (0.838 m) lower. Supplementary water-stage recorder 2.1 mi (3.4 km) downstream used during periods of low flow 1948-54.

REMARKS. -- Records good. Many diversions above station for irrigation of about 29,000 acres (117 km^2). Flow also affected by diversion into basin (see REMARKS for East Fork Russian River stations), since November 1958 by

storage in Lake Mendocino (station 11461800) 77 mi (124 km^2) upstream and by diversion at Wohler pumping plant beginning in May 1959.

AVERAGE DISCHARGE. -- 37 years, 2,309 ft^3/s (65.39 m^3/s), 1,673,000 acre-ft/yr (2.06 km^3/yr).

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 93,400 ft^3/s (2,650 m^3/s) Dec. 23, 1964, gage height, 49.6 ft (15.12 m) from floodmarks, site and datum then in use; maximum gage height, 49.7 ft (15.15 m) Dec. 23, 1955, from floodmarks, site and datum then in use; minimum daily discharge, 0.75 ft^3/s (0.02 m^3/s) May 6, 1977.

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1951 to current year.
CHEMICAL ANALYSES: Water years 1951 to current year. Published as "at Guerneville" in 1961-65.
SPECIFIC CONDUCTANCE: Water years 1974 to current year.
WATER TEMPERATURES: Water years 1964 to current year.
SEDIMENT RECORDS: Water years 1966 to current year.
TURBIDITY: Water years 1967 to current year.

PERIOD OF DAILY RECORD. –
SPECIFIC CONDUCTANCE: October 1973 to current year.
WATER TEMPERATURES: January 1964 to current year.
SEDIMENT RECORDS: April to September 1967, October 1969 to current year.

INSTRUMENTATION. -- Specific conductance recorder since October 1973, at site 0.7 mi (1.1 km) downstream. Temperature recorder since January 1964.

REMARKS. -- Where no maximum or minimum is shown, temperature is once-daily reading.

EXTREMES FOR PERIOD OF DAILY RECORD. --SPECIFIC CONDUCTANCE: Maximum, 400 micromhos July 8, 9, 1974; minimum, 57 micromhos Nov. 4, 1973. WATER TEMPERATURES: Maximum, 29.5°C June 26, 1973; minimum (water years 1966-71, 1975-76), 4.5°C Dec. 15, 1967, Jan. 12, 1968.

RUSSIAN RIVER DRAINAGE BASIN GAGE STATIONS
(Continued)

SEDIMENT CONCENTRATIONS (water years 1970-76): Maximum daily mean, 2,350 mg/L Jan. 16, 1974; minimum daily mean, 3 mg/L on several days in 1972 and 1973. SEDIMENT DISCHARGE (water years 1970-76): Maximum daily 316,000 tons (287,000 tons) Jan. 16, 1974; minimum daily, 1,3 tons (1.2 tons) Sept. 23, 1972,Aug. 30, 1976.

U.S. GOVERNMENT PRINTING OFFICE: 1980 680 060/1

APPENDIX G

COMMENTS AND RESPONSES

FINAL REPORT NORTHERN CALIFORNIA STREAMS
INVESTIGATION RUSSIAN RIVER BASIN STUDY

APPENDIX G

COMMENTS AND RESPONSES

MARCH 1982

Contents

INTRODUCTION

The comments contained in this appendix were received following public distribution of the draft report on the Northern California Streams Investigation - Russian River Basin Study in December 1980. However, not all comments received are included in this appendix. In general, comments which did not specifically address the draft study report were omitted. This included several items of correspondence and some statements made at the January 8, 1981 Final Public Meeting on the study. These items are included in the transcript of the meeting (Northern California Streams Investigation - Russian River Basin Study Record of Public Meeting; January 8, 1981) published separately by the Corps of Engineers San Francisco District and released in August 1981. All comments received following distribution of the draft report, both written and verbal, were evaluated and considered during the preparation of the Final Report on the Russian River Basin Study.

APPENDIX FORMAT

Each item of correspondence is reproduced in full with major comments and questions of fact indexed by reference number. Each item of correspondence is followed by responses from the Corps of Engineers also indexed by reference number. Near the end of the appendix are comments paraphrased from statements made at the final public meeting on the study, and associated Corps responses. Where a comment resulted in revision of the draft report, the revision is noted and its location in the final report identified.

INDEX TO REVIEW COMMENTS AND CORPS RESPONSES

INDEX TO REVIEW COMMENTS AND CORPS RESPONSES

COMMENT LETTER 1
United States Department of the Interior

FISH AND WILD LIFE SERVICE

Division of Ecological Services
2800 Cottage Way, Room E-2727
Sacramento, California 95825

March 6, 1981

District Engineer San Francisco
District, Corps of Engineers 211 Main
Street San Francisco, California
94105

Dear Sir:

We have reviewed the Northern California Streams Investigation, Draft Interim Report, Russian River Basin Study. He offer the following comments pursuant to the authority, and in accordance with the provisions, of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The Intent of the interim report 1s to fulfill a request by the House Committee on Public Works to examine the subjects of water quality, and environmental protection and enhancement. Six Issues in the Russian River Basin were specifically addressed, as follows:

G-7

1. Gravel mining and sediment Influx. 2. Channel improvements and stabilization. 3. Summer and recreational type dams. 4. Sandbar closure of the mouth of the river. 5. Land use and floodplain management. 6. Operation of existing structures on the river and tributaries.

Our primary concerns center on items 1, 2, and 3 which involve adverse impacts on anadromous fishes. Although we stated many of our concerns in a planning aid letter of May 6, 1980, we believe the significance of the issues justifies additional comment.

II. Problem identification

1-1 Page 33, paragraph 2. The statement is made that recreation areas in the study area have only local drawing power and that public access to the river is limited. For this reason, we believe it is important to consider that improvement of the Russian River fishery and fishing access might provide 1-1 greater local economic benefits than general recreational activities such as swimming and canoeing which require summer dams. We are not certain if this type of Issue can, or should, be resolved at only the local or State level. The anadromous fishes are a highly important resource that contributes to the economy of several States and thus may necessitate Federal involvement.

Page 33, paragraph 4. We would encourage and support Installation of a multiple outlet intake at Coyote Dam if the project is enlarged. This type of Intake would improve the quality of water releases by decreasing turbidity and by possibly providing more suitable temperatures for salmonids in the river below.

1-2 Page 37, paragraphs 2 and 3. The statements here imply the importance of the headwater tributaries to juvenile salmonid production. Exact information is not available, but we suspect that many summer dams on these headwaters pose a serious threat to the fishery. Steps should be taken to provide better regulation of the small summer dams on the tributaries. The success of efforts to improve the basin fishery through minimum flow releases into the mainstem will be severely diminished if the adverse impacts caused by summer dams on the tributaries continues.

1-3 Page 41, paragraph 6. The data collected on the water temperature differences above and below the simmer dams is not adequate to indicate the cumulative temperature effects of the dams. More data is needed to support any statement suggesting that no long-term, adverse water quality impacts occur due to the dams.

III. Formulation of Plans

1-4 Page 73, paragraph 3. We do not agree with the statement that... "removal of riparian vegetation and prevention of its establishment is insignificant." Any activity that disrupts riparian vegetation and results in its absence over the long term is a significant impact. The paucity of riparian vegetation along the river is a factor that has lowered the quality of habitat for the salmonid fishery.

1-5 Page 73, paragraph 6. The passage problems with Willow County water diversion dam and the Basalt summer road crossing should not be deleted from further consideration, as stated. These problems may be of lesser importance at this time, but they nevertheless are an impediment to improving the steelhead fishery up to the base of Coyote Dam. It is well known that a substantial run of adult steelhead reached the base of the dam in years past. The opportunity to reestablish a good run of steelhead to the upper reaches of the East Fork should not be foreclosed by barriers such as Willow County Diversion Dam. This dam and its associated problems should be studied further.

1-6 Page 74, paragraph 4. The recreational use survey, as stated, was based on minimal background data. No real determination has been made of the use attributed only to facilities created by the summer dams. Many of the recreation types such as sunbathing, camping, fishing, picnicking, hunting, horseback riding and hiking could occur without the dams. A more detailed recreational study including a with- and without-dam evaluation should be performed.

1-7 Page 88, paragraph 6. Plan C should also incorporate improvement of the Willow County Diversion Dam by appropriate fish passage facilities. This dam constitutes a barrier to fish passage. There are Important spawning and rearing areas on the mainstem Russian, West Fork Russian and East Fork Russian above the dam. The dam in its present state most likely has adverse Impacts on both adult and juvenile fish during migration periods.

The Basalt summer road crossing should not be deleted from further study because the crossing is likely a barrier to salmonids and surely one for shad. This crossing will Impede establishment of salmon and steelhead runs in connection with the Warm Springs Project, slated for operation in 1982. Water flow regimes will change at that time and Dry Creek will no longer be dry throughout the summer.

V. Study Conclusion

Page 117, paragraph 2. We support the Corps' proposal to study gravel mining and sediment problems in the basin.

Page 117, paragraph 4. There have been several bank stabilization projects at various locations on the Russian River, and there are ongoing bank stabilization demonstration projects in other areas of the State. We believe it 1s appropriate for the Corps to undertake a more detailed

1-8 study to assess bank erosion problems, alternative treatments, means to Improve fish and wildlife habitat, and impacts on fish and wildlife caused by channelization in the basin. We would support any additional studies of bank stabilization and channel improvement in relation to fish and wildlife habitat.

1-9 Page 118. paragraph 2. We do not agree with the statement that there is no Federal interest or responsibility respecting summer dams. The regulatory authority over installation of summer dams under section 10 of the Rivers and Harbors Act of 1899, and Section 404 of Public Law 92-500, should be exercised as necessary by the Corps to insure that environmental impact issues are resolved. The efforts of the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to improve and protect the anadromous fishery should complement the Corps' administration of these regulations.

G8

Page 119, paragraph 5. We would encourage the Sonoma County Water Agency to consider an alternative flow release schedule to provide optimum flows for the salmonid fishery in Dry Creek during the early post-project period (1982-1990) when unallocated water is available. These supplemental interim flows would complement the fishery improvement efforts in Dry Creek and generate valuable data on fishery production relative to instream flow.
We would support any of the studies listed in #1-6 to fill data gaps in knowledge of the basin.

V. Recommendations

1-10 Page 122, paragraphs 1 and 2. We agree with many of the recommendations as stated, but do not believe that the issue of summer dams has been adequately addressed. We agree that alternative C represents a reasonable choice which may resolve some of the adverse Impacts on the fisheries. This will depend on how well State and local agencies can coordinate efforts to prepare a workable management plan. If this effort falls, then the issue will remain a major problem to the basin fisheries.

It would be appropriate for the Corps to retain an Interest 1n the regulation of summer dams in case State and local Interests cannot reach agreement.

We also believe, as stated earlier, that the Corps should undertake a more detailed study on bank stabilization problems.

We hope these comments will be of assistance to you. Please contact Gary Taylor at (916) 484-4731 1f there are questions concerning these comments.

Sincerely,

for James D. Canan

James J. McKevitt
Field Supervisor

cc: Director, CDFG, Sacramento, CA
Reg. Mgr., Region III, Yountville, CA
NMFS, Tiburon, CA

COMMENT LETTER 1. U.S. Department of the Interior - Fish and Wildlife Service

1-1 Issue : Fishery Improvement

It is noted in Sections III and IV of the draft and final reports that improvement of the Russian River fishery could result in significant benefits to the basin's economy. However, the magnitude of these benefits is difficult to estimate due to the scarcity of data on the river's fish populations and their recreational utilization.

The Corps of Engineers presently has no authority to specifically undertake improvement of the Russian River anadromous fishery. However, this does not preclude participation by other Federal agencies in such improvement, or participation by the Corps should special authority be provided by Congress. The emphasis placed in the report on local and State participation in this area is due to on-going involvement by local and State water agencies in managing the natural resources of the Russian River basin. Several of these resources, such as flow releases for instream use, and gravel extraction, are related to the viability of the basin's anadromous fishery.

1-2 Issue: Tributary Fish Populations

The potential adverse impacts on the Russian River anadromous fishery of summer dams on the river's tributaries is noted in Section II.C.3.b. of the Final Report.

1-3 Issue: Water Temperature

The discussion of water quality as related to summer dams in Section II.C.3.b. of the Final Report has been changed to reflect the need for more data. Statements in Sections III.B.4. and IV.A.1. have also been changed to indicate that conclusions regarding the effect of summer dams on water quality are based on existing data.

1-4 Issue: Riparian Vegetation

Section III.A.2.b. of the Final Report has been changed to note possible adverse impacts of removal of riparian vegetation on salmonid habitats in the river system.

1-5 Issue: Willow County Dan and Basalt Crossing

The discussion in Section III.A.2.b. of the Willow County water diversion dam and the Basalt summer road crossing has been rewritten in the Final Report explaining why they were not studied in more detail. The summer dams on the lower Russian River were considered to represent greater fish passage problems than the Willow County dam and the Basalt crossing.

It is noted in the Final Report that these barriers have some adverse impacts on the basin's fishery, particularly the American shad population. These impacts may become more significant once Warm Springs Dam is operational and if a summer steelhead population is established in the basin. There is no reason to delete these barriers from future studies of the Russian River fisheries, though at the present time no funding is available for the Corps to conduct such additional studies.

1-6 Issue: Recreation Survey

While a detailed analysis of recreation use at specific facilities associated with the summer dams was not conducted, an effort was made to assess recreation activity in areas directly impacted by the dams. Section III.A.2.c. has been changed in the Final Report to indicate that certain recreational activities would take place in the basin even without summer dams. Additional detailed Corps recreational studies on the Russian River are not possible at this time due to lack of funding. However this does not preclude future recreational studies of the Russian River by other parties.

1-7 Issue: Willow County Dam and Basalt Crossing

See response to Comment No. 1-5.

1-8 Issue: Bank Stabilization

Section V.B. of the Final Report has been changed to reflect the need for, and public interest in, additional Corps studies of bank stabilization along the Russian River. It is also noted that such studies would require specific authorization and funding from Congress.

1-9 Issue: Corps Regulatory Authority

Section V.C. of the Final Report has been changed to mention the Corps' continuing regulatory authority over summer dams on the Russian River under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act. However, the Congressional resolution authorizing the Russian River Basin Study did not give the Corps specific responsibility for maintaining or improving the Russian River fishery, nor for managing summer dams on the river.

1-10 Issue: Summer Dam Management Plan C

Section III.B.3.c. of the Final Report has been changed to note Fish and Wildlife Service support for Alternative C. The various summer dam management plans are presented for consideration for implementation by local governments. The Corps presently is not authorized to initiate or implement any such plans. The Corps, however, does have continuing regulatory authority over installation and removal of summer dams on the Russian River under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act. A recommendation for additional Corps studies of bank stabilization along the Russian is included in Section V.B. of the Final Report (see Response to Comment No. 1-8).

COMMENT LETTER 2

STATE OF CALIFORNIA—BUSINESS AND TRANSPORTATION AGENCY EDMUND G. BROWN JR., Governor

DEPARTMENT OF TRANSPORTATION
1120 N STREET
SACRAMENTO, CALIFORNIA 95814
(916) 445-6400

February 2, 1981

Paul Bazilwich, Jr.
Colonel, CE
District Engineer
U.S. Corps of Engineers 211
Main Street
San Francisco, CA 94105

Dear Sir:

In reply to your letter of December 5, 1980 requesting comments on your Draft Interim Report on the Russian River Basin Study, Caltrans has the following comment:

2-1 The gravel mining operations in the Russian River have, in some instances, lowered the riverbed to a point where the structural integrity of some State highway bridges is being affected. Caltrans urges that an aggregate resources management plan be adopted to assure adequate regulations that will preclude damage to properties in riverbed environs due to aggregate mining.

Sincerely,

J. T. KASSEL
Chief, Office of Planning and Design

RESPONSE LETTER 2

COMMENT LETTER 2. California Department of Transportation

2-1 Issue: Gravel Mining

A discussion of gravel depletion near several State highway bridges crossing the Russian River and its tributaries has been added to Section II.C.1.b. of the Final Report. Included are cases of streambed degradation near the Highway 101 bridge across the Russian River south of Hopland and the Highway 20 bridge across Cold Creek just above Lake Mendocino.

Sonoma County has proposed an Aggregate Resources Management Plan aimed at assuring future aggregate resources for the county while minimizing environmental impacts and land use conflicts. In addition both Sonoma and Mendocino counties have operated "use" permit systems for gravel mining for many years. These systems were expanded in the 1970's to include environmental impacts as dictated by the California Environmental Quality Act and California Surface Mining and Reclamation Act.

These and other permit programs regulating gravel extraction in the Russian River basin (including Army Corps of Engineers, State Department of Fish and Game, North Coast Regional Water Quality Control Board, and State Division of Water Rights) are discussed in detail in Appendix A to the Final Report. This appendix is essentially unchanged from the Draft Report.

- State of California COMMENT LETTER 3 The Resources Agency

M e m o r a n d u m

To : U.S. Army Engineer District, San Francisco Date: December 19, 1980
Corps of Engineers San Francisco

Telephone: ATSS ( )
( )

From : **Department of Conservation**
Division of Mines and Geology –
San Francisco 94111

Subject: Russian River Basin Study Draft Interim Report December 1980

3-1 The CDMG has reviewed the subject document and wishes to make the following comments:

1) Stream channel degredation downstream from dams, channel improvements and other manmade structures should be addressed. These structures increase the velocity and erosive energy of the stream.

2) With respect to the continuing study of gravel mining-related stream channel erosion, CDMG Special Report 134, "Erosion Along Dry Creek, Sonoma County, California" (Cleveland and Kelley, 1977) might be helpful.

If the CDMG may provide further assistance, please call Charles Armstrong at (415) 557-1420.

Charles F. Armstrong

CHARLES F. ARMSTRONG
Engineering Geologist 976
San Francisco District

APPROVED:

James F. Davis

JAMES F. DAVIS
State Geologist

CFAA/clz

RESPONSE LETTER 3

COMMENT LETTER 3. California Department of Conservation - Division of Mines and Geology

3-1 Issue: Channel Degradation

See response to Comment No. 1-8 regarding additional studies of bank stabilization along the Russian River.
A special study of sediment movement and erosion in the Dry Creek basin was initiated by the Corps in late 1980. The study will include effects of Warn Springs Dan on the aggregate resources of the creek. The study is mentioned in Sections II.C.1.c. and V.A. of both the Draft and Final reports. The Final report was changed to note Congressional authorization of the special study which occurred subsequent to publication of the Draft Report.

COMMENT LETTER 4

OFFICE OF THE SECRETARY
RESOURCES BUILDING
1416 NINTH STREET
95814
(916) 445-5656

Department of Conservation
Department of Fish and Game
Department of Navigation and Ocean Development
Department of Parks and Recreation
Department of Water Resources

EDMUND G. BROWN JR.
GOVERNOR OF
CALIFORNIA

Air Resources Board
Colorado River Board
San Francisco Bay Conservation and Development Commission
Solid Waste Management Board
State Lands Commission
State Reclamation Board
State Water Resources Control Board
Regional Water Quality Control Boards
Energy Resources Conservation and Development Commission

THE RESOURCES AGENCY OF CALIFORNIA
SACRAMENTO, CALIFORNIA

MAR 4 - 1981

Colonel Paul Bazilwich, District Engineer
San Francisco District
U.S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94105

Dear Colonel Bazilwich:

The State of California has reviewed your "Northern California Streams Investigation, Draft Interim Report, Russian River Basin Study", transmitted by Notice of Intent (SCH 81011408) and submitted to the Office of Planning and Research (State Clearinghouse) in the Governor's Office. This review fulfills the requirements under Part II of the U. S. Office of Management and Budget Circular A-95 and the National Environmental Policy Act of 1969.

The State's review has been coordinated with the Departments of Conservation, Fish and Game, Boating and Waterways, Parks and Recreation, Water Resources, and Transportation; the State Water Resources Control Board, and the California Coastal Zone Conservation Commission.

4-1 RECREATION

Section II.C.2., Channel Improvements and Stabilization (page 27)

It is recommended the final draft of the Russian River Basin Study propose for future studies or action the removal of those stabilization works creating a hazard to boaters as noted on page 29.

4-2 Section III.A.2.c., Recreational Analysis, 1) Benefits of Small Dams (page 74)

It is recommended the final report explore further the positive and negative impacts the summer dams have on "downstream float-trip boating". In some cases portage signs and safe and convenient portage trails may be needed at these sites, particularly at the permanent Willow County Water Diversion Dam.

G-13

COMMENT LETTER 4

In addition to summarizing canoeing recreation on pages 21, 22 and 74, perhaps this subject could be further addressed by covering other boating issues affecting the basin which include: future use and demands, access opportunities and problems, and sanitation needs.

4-3 RIVER MANAGEMENT

Gravel Mining and Sediment Influx

We agree that further study is necessary to determine the effects of sediment movement, erosion, gravel mining and channel stabilization on the Russian River. However, the effects of gravel mining on the ground water recharge also should be considered. A report prepared by the Sonoma County Planning Department in February 1980, "Draft EIR, Aggregate Resources Management Study", is referred to on page 26 and should be included in the Bibliography.

Channel Improvements and Stabilization, and Summer and Recreational Type Dams

We agree with the conclusion that the channel improvements and stabilization problems and the management of summer and recreational dams should be the responsibility of the local agencies.

Land Use Related to Floodplain Management

Based on the information contained in the report, we agree that the responsibility of providing the data on floodplain usage and other land applications in the Russian River Basin has been satisfied.

4-4 Operation of Existing Structures on the Russian and Tributaries

We recommend that the Corps remain an active participant in the resolution of the water allocation problems in the Eel and Russian Rivers. With the Warm Springs Dam scheduled to be operational by 1983, the Corps should take an interest in the conjunctive operation of Lake Mendocino and Lake Sonoma. Such operation may be necessary to reduce the deficiencies expected to occur beyond the year 2000 as described in the "Water Action Plan for the Russian River Service Area" by our Department.

COMMENT LETTER 1

Colonel Paul Bazilwich, District Engineer
Page 3

Use of Study Data and Future Data Requirements

He agree with the conclusion that more data are needed to resolve the resources problems in the Russian River Basin and that a coordinated data-gathering effort by local, State and Federal agencies would reduce the deficiency.

4-5 WATER RIGHTS

The report should note that the State Water Resources Control Board also exercises a role in the regulations of the diversion and use of water in the Russian River and Lakes Mendocino and Sonoma. Any diversion or use of water that does not conform to the terms and conditions of existing permits or license, or which constitutes a new diversion or use of water, is subject to the Board's review and approval.

WILDLIFE

4-6 We find that the report is a good summary of presently available Information on the resources, problems, and some possible solutions to the problems of the mainstem Russian River and Dry Creek.

As a basin study, however, the report is deficient in that superficial treatment is given to the resources and problems of the hundreds of miles of tributary streams; streams which are the source of the resource value in the mainstem. As a regional planning document, the report is of value as a compilation of various general data on resources and problems, but its potential use will be restricted to general planning due to the lack of hard data on specific problems and specific solution options for those problems.

The report concludes that further study is needed on the topics of gravel mining, channel stabilization, and impacts on fish of summer recreational dams which is beyond the scope of the basin study authorization. We agree that all three of these topics deserve further field study. Specific comments on the report follow:

4-7 Page 11, Environmental Setting

This section should contain a statement to the effect that water originating in the Eel River and entering Lake Mendocino via the Pacific Gas and Electric Company's transbasin diversion contains a heavy suspended sediment load. Throughout much of the winter and spring this sediment: discolors the stored water and depresses the biological productivity of Lake Mendocino; and upon release of

COMMENT LETTER 4

Colonel Paul Bazilwich, District Engineer
Page 4

thin water into the Russian River maintains a condition of high turbidity which depresses the salmon and steelhead fishery.

Page 16, paragraph A

4-8 Chinook salmon are native to the Russian River.

Page 23, Gravel Mining

4-9 Although the gravel mining associated problems on the Russian River may be the most severe in Sonoma County, there are serious problems on the mainstem and Forsythe Creek in Mendocino County.

Page 27, Channel Improvements

4-10 This section needs to include a discussion of the various channel stabilization devices which have been used on the Russian River and the successes and/or failures associated with each device.

Page 3A, Fisheries Resource

4-11 Summer steelhead have been introduced into the Russian River duo to the significant difference between the life cycles of winter and summer steelhead, the summer steelhead race should be discussed separately. As various impacts on fish populations are developed later in the report, each should be evaluated for its Impact on summer steelhead as well as winter steelhead, coho and chinook salmon and American shad.

Page 37, paragraph 3

4-12 American shad currently ascend the river only as far as the Healdsburg Dan; prior to the construction of the dam, the shad were able to reach the Ukiah area in some years.

Page 39, paragraph 4

4-13 Although the tributary streams provide many more miles of habitat than does the mainstem, the value of the mainstem to the production of anadromous fishes cannot be understated. The mainstem provides the migration route, some spawning area (of particular value in dry years when the fish may not be able to ascend the tributary streams), and nursery area for salmon and steelhead. The mainstem also provides virtually all the spawning area for the American shad.

Colonel Paul Bazilwich, District Engineer
Page 5

Page 42, paragraph 2

4-14 Winter passage problems exist at the Healdsburg Dam due to the degradation of the streambed below the dam's foundation. At low flow, passage may be prevented altogether; at higher flows passage may only be delayed as the fish attempt to Jump the barrier. Summer steelhead introduced into the Russian River in the spring of 1980 may also be affected by the summer dams. In contrast to the winter steelhead, these fish are expected to enter the river between April and early July, hold over through the summer in deep, cool pools of the upper river, then spawn in the winter. The lack of fishways at Healdsburg and Del Rio Woods may stop the upstream migration of these fish and prevent their establishment.

Page 45, paragraph 4; and page 47, paragraph 7

4-15 The Healdsburg summer dam may also affect the Immigration of summer steelhead.

Page 54, paragraphs 3 and 5

4-16 The development of a salmon/steelhead fishery in Dry Creek below Warm Springs Dam is questionable at this time. Stream conditions will be enhanced and fish will probably be abundant; however, opposition has been expressed to the opening of Dry Creek to fishing.

Page 55, Problems and Opportunities

4-17 Once a year, during periods of low flow, the discharge from Lake Mendocino is totally cut off for several hours to permit an inspection of the outlet tunnel and valve. The Impact of this flow interruption has never been evaluated but may have a significant detrimental impact on fish populations in the east branch and upper mainstem Russian River. An assessment of the impacts of this flow cutoff should be made.

Page 60, paragraph 5

4-18 The second sentence should be changed to "Optimum nursery resting habitat was found..." The fourth sentence should be changed to "This streamflow appears..."

Page 72, Fisheries Resources Effects

4-19 Include a discussion of the effects on summer steelhead.

Colonel Paul Bazilwich, District Engineer
Page *6*

Page 76, Fishery Benefits

4-20 The Introduction or Sumner steelhead may greatly increase the fishery recreational use of the Russian River.

Page 83, ASSESSMENT AND EVALUATION OF DETAILED PLANS

4-21 Throughout this section the pressure of summer steelhead in the Russian River should be considered in the evaluation of the alternative plans for handling the summer dams. It should also bc pointed out that recently Salmon Unlimited, the Mendocino County Board of Supervisors, and others have expressed concern over the lack or, and need for, a fishery at Healdsburg.

Page 86, paragraph A

4-22 How were the percent increases to the salmon/steelhead and shad fisheries derived? Even if the benefit to the salmon/steelhead fishery is only 1 percent, the benefit to the fish populations is very likely to be considerably greater as a result of reducing the delays in passage caused by Healdsburg Dam.

Page 100, paragraph 2

4-23 The comment that 60°F is the upper tolerance level for salmonid fishes is incorrect. Paul Kubicek, Pacific Gas and Electric

Page 114, ENVIRONMENTAL ASSESSMENT

4-24 Again, summer steelhead should be included.

Appendix A, GRAVEL MINING

4-25 This section discusses the permit processes of Sonoma County, the Department of Fish and Game, the Regional Water Quality Control Board, and the Corps. of Engineers. The gravel mining permit process of Mendocino County should also be discussed.

Page B-1, Steelhead

4-26 Summer steelhead were introduced to the Russian River in 1980; a second plant will be made in the spring of 1981. The summer differ from the winter steelhead in that they will migrate

into the river during April through early July to hold over in deep, cool pools through the summer months. The spawning or both races will occur in the late winter and early spring.

Page B-3, paragraph 5

4-27 At one time shad were able to migrate up the Russian River as far as Ukiah.

Page C-11

Change the reference to "Philip Baker, Warden" to "Philip Baker, Associate Fishery Biologist".

Appendix F, page 67, paragraph 6

4-28 This statement on the lack of silver salmon and steelhead in Dry Creek should Include supporting material on the year of the survey, drought conditions existing or recently experienced, and the extent of the observation efforts. These data are essential to the interpretation of the report.

Page 83, Healdsburg Dam

4-29 It should be added that even under the best conditions the passage of salmonid fishes may be delayed for some time due to the difficulty of Jumping the dam sill. It should also be pointed out that at the time of construction the sill of the Healdsburg Dam was at grade; in the years since, the streambed below the dam has degraded by up to 18 feet, it may still be degrading causing the passage problems to become worse.

Appendix F, page 93, Nursery Habitat

4-30 This section is very misleading. It is stated and shown graphically that nursery habitat peaks at 20 cfs. Then, almost as an afterthought, adds that the 20 cfs habitat peaking applies only to resting areas and that total nursery habitat would probably be increased by increasing the flow above the present level due to reduced temperatures.

Department of Fish and Game personnel are available to discuss our concerns in more detail. To arrange a meeting, the project sponsor or applicant should contact Mr. Bill Cox, Fishery Biologist,

8699 Mill Station Road, Sebastopol, California 95472, telephone (707) 823-1001; or Mr. Wendy Jones, Fishery Biologist, 540 Zinfandel Street, Ukiah, California 95482, telephone (707) 468-1104.

Thank you for the opportunity to review and comment.

Sincerely,

James W. Burns
Assistant Secretary
for Resources

cc: Director of Management Systems
State Clearinghouse
Office of Planning and Research
1400 Tenth Street Sacramento,
CA 95814
SCH 81011408

COMMENT LETTER 4. The Resources Agency of California

4-1 Issue: Boating Hazards

The maintenance of Corps bank stabilization works along the Russian River is a local responsibility under agreements reached with Sonoma and Mendocino counties prior to construction of these facilities. However, this does not preclude assessment of this problem in any future studies of recreation or bank works along the Russian River. In this regard, Section V.B. of the Final Report has been changed to reflect the need for, and public interest in, additional Corps studies of bank stabilization along the Russian (see Response to Comment Ho. 1-8).

4-2 Issue: Recreational Boating

Additional Corps studies of boating or other recreational activities on the Russian River are not possible at this time due to lack of funding. However this does not preclude future recreational studies of the Russian by other parties.

4-3 Issue: Gravel Mining

A special study of sediment movement and erosion in the Dry Creek basin was initiated by the Corps in late 1980. Sediment movement, erosion, gravel mining, groundwater recharge and channel stabilization were some of the issues raised by basin residents at a public workshop held on the study in early 1981. This study is attempting to address these concerns using currently available data on the basin and its land and water resources (see Response to Comment No. 3-1).
Section V.B. of the Final Report has been changed to reflect the need for, and public interest in, additional Corps studies of bank stabilization structures along the Russian River (see Response to Comment No. 1-8). The bibliography in the Final Report has been changed to include Sonoma County's February 1980 "Draft EIR, Aggregate Resources Management Study."

4-4 Issue: Inter-Basin Water Allocation

The Corps of Engineers is an active participant in the Eel-Russian River Commission which is studying water allocation between the Eel and Russian River basins. The Commission was primarily established to address this issue because of the pending Relicensing of the Potter Valley powerhouse by the Federal Energy Regulatory Commission. Operation of the powerhouse depends on diversions from the Eel River to the Russian River basin.

The Corps is actively involved in the operation of Lake Mendocino as it will be in the operation of Lake Sonoma once the project is complete. However, this involvement extends only to preserving the projects' flood control and recreation capabilities. The operation of these reservoirs for water supply purposes is strictly the responsibility of local governments by virtue of their sharing in the construction costs of the projects.

A joint use study of Lakes Sonoma, Mendocino and Pillsbury is being conducted by the California Department of Water Resources, Central District. A similar study of Lakes Sonoma and Mendocino was done by the Sonoma County Water Agency. The state study is examining opportunities for optimizing operation of the three reservoirs to meet projected year 2000 water demands in both the Russian and Eel River basins. This study was not mentioned in the Draft Report but is mentioned in Section II.C.6.a. of the Final Report.

4-5 Issue: Water Diversion Rights

Section II.C.6.a of the Final Report has been changed to include discussion of the role of the State Water Resources Control Board in regulating water use in the Russian River basin.

4-6 Issue: Russian River Tributaries

The importance of Russian River tributary streams as fish habitat is recognized in Section II.C.3. and III.B.6. of the Final Report. The State of California expressed concern early in the study that summer dams on the river may inhibit migration of fish to and from spawning and nursery habitats in these tributaries. In keeping with these concerns and study funding limitations, investigation of fishery resources during the basin study was limited to the Russian River mainstem and Dry Creek.

Section V.G. of the Draft and Final reports discusses the use of data developed during the study. It is also noted in this section that analysis of specific basin resource problems. These deficiencies are identified and ways in which they can be eliminated are briefly discussed.

RESPONSE LETTER 1

4-7 Issue: Eel River Diversions

A discussion of this subject is included in Section III.C.1. of the Final Report. A similar discussion was included in the Draft Report.

4-8 Issue: Chinook Salmon

The statement in Section II.B.1.f. of the Draft Report that chinook salmon were introduced to the Russian River has been stricken from the Final Report.

4-9 Issue: Mendocino County Gravel Mining

A discussion of streambank and channel erosion problem in the Mendocino County portion of the Russian River basin has been added to Section II.C.1.b. of the Final Report.

4-10 Issue: Channel Stabilization

The discussion of channel stabilization Matures in this Section (II.C.2.) is deemed adequate. This section of the Final Report has not been changed from the Draft version.

4-11 Issue: Summer Steelhead

Discussion of the summer steelhead strain recently planted in the Russian River has been added to Sections II, III, IV and Appendix B of the Final Report. The impacts on this strain of the various summer dam management measures presented in the Final Report are evaluated qualitatively in Sections III and IV. Quantitative assessment of impacts on this strain was not presented because a viable population has not yet become established in the basin.

4-12 Issue: American Shad

A statement to this effect has been added to Section II.C.3.b. of the Final Report.

4-13 Issue: Russian River Mainstem Fishery Value

Section II.C.3. of the Draft Report discussed the value of the Russian River mainstem as a migration route and spawning and nursery habitat for anadromous fish. This discussion has been retained in the Final Report.

RESPONSE LETTER 4

4-14 Issue: Healdsburg Dam

The fish passage problems at Healdsburg Dam are discussed in Section II.C.3.b. of the Draft and Final reports. A discussion of the summer steelhead introduced to the Russian River has been added to this section of the Final Report.

4-15 Issue: Summer Steelhead

Mention of the potential impact of the dam on summer steelhead migration has been added to Section II.C.3. of the Final Report.

4-16 Issue: Dry Creek Fishery

Section II.C.6.a. of the Final Report has been changed to incorporate a discussion of possible development of a salmon/steelhead fishery in Dry Creek following completion of Harm Springs Dam. Also added is a discussion of the issue of public access to Dry Creek for fishing and other activities.

4-17 Issue: Lake Mendocino Inspection

The Corps annually notifies the California Department of Fish and Game and the Sonoma County Hater Agency of the date of the Coyote Dam outlet works inspection. Such coordination has been conducted each year since the dam became operational in 19S9. Representatives of the Department of Fish and Game have been present during several of these inspections to observe changes in the streambed of the east branch and upper mainstem at the Russian River. However, no formal report has been produced on the impact of the annual inspection on fish populations in the Russian River.

4-18 Issue: Sentence Structure

These changes have been made in Section II.C.6.b. of the Final Report.

4-19 Issue: Summer Steelhead

This discussion has been added to Section III.A.2.b. of the Final Report.

4-20 Issue: Summer Steelhead

A statement to this effect has been added to Section II.A.2.c. of the Final Report.

4-21 Issue: Summer Steelhead

Section III.B. of the Final Report has been amended to include qualitative assessment of impacts of the various summer dam management measures discussed therein on summer steelhead in the Russian River. This section in the Final Report also mentions the support expressed by Salmon Unlimited and the Mendocino County Board of Supervisors for provision of fish passage facilities at Healdsburg Dam.

4-22 Issue: Fishery Benefits

The predicted increases in anadromous fish populations in the Russian River basin due to addition of fish passage structures at Healdsburg and Del Rio Woods dams were based on information contained in the literature and opinions of fisheries specialists familiar with the Russian River. Because of the subjective nature of this analysis it was assumed that increases in anadromous fish populations would cause corresponding (in terms of magnitude) increases in fishing success in the basin.

4-23 Issue: Salmonid Temperature Tolerance

Section III.C.2. and the Bibliography of the Final Report have been changed to include the reference by Kubicek and Price (1976).

4-24 Issue: Summer Steelhead

See response to Comment No. 4-11.

4-25 Issue: Mendocino County Mining Permits

Appendix A to the Final Report has been changed to incorporate mention of Mendocino County's gravel mining permit system and the "Surface Mining and Reclamation Ordinance" adopted by the county in 1979.

4-26 Issue: Summer Steelhead

This information on summer steelhead in the Russian River has been added to Appendix B to the Final Report.

4-27 Issue: American Shad

A statement to this effect has been added to Appendix B to the Final Report.

RESPONSE LETTER 4

4-28 Issue: Dry Creek Fish Populations

Information on the period and extent of the anadromous fish nursery habitat observations conducted is presented in Sections III and IV.B. of Appendix F. Data on hydrologic conditions in Dry Creek during these observations is presented in these same sections as well as Section V.A. of Appendix F.

4-29 Issue: Healdsburg Dm

This information on Healdsburg Dam has been added to Section I.E. of the Final Report.

4-30 Issue: Salmonid Nursery Habitat

The relationship between optimum flows for salmonid nursery habitat in terms of resting space, and optimum flows for nursery habitat in terms of water temperature, is discussed in more detail in Section III.C.2.d. of the Final Report.

COMMENT LETTER 5

TELEPHONE:
(707) 468-4221

COUNTY OF MENDOCINO BOARD
OF SUPERVISORS COURTHOUSE
UKIAH, CALIFORNIA 96482

February 2, 1981

Colonel Paul Bazilwich, Jr.
U.S. Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105

Re: Russian River Basin Study Draft Report

Dear Colonel Bazilwich:

G-20

5-1 The Mendocino County Board of Supervisors, along with its staff and consultant, have reviewed the December draft report of the Russian River Basin Study. We would like the following comments to be addressed in the final report you are preparing.

1. Coyote Dam: Effects and Mitigation

The impacts of the construction of Coyote Dam on the anadromous fish losses of the East Fork of the Russian River are inadequately discussed. Those local residents familiar with the pre-project conditions believe that more than 35 miles of salmonid habitat were lost. No permanent measures have yet been taken by the Corps for mitigating this loss, despite the mandate of Section 95 of PL 93-252 of March 1974.

The County does not believe the Warm Springs fish hatchery on Dry Creek is going to fully mitigate the fishery loss to the Upper Russian River basin. Possible solutions which the Corps should seriously evaluate are an egg-taking station and rearing ponds below Coyote Dam. It is the Corps' responsibility, with assistance from the Calif. Dept. of Fish and Game, to develop and implement adequate fishery compensation for Coyote Dam.

5-2 2. Bank Stabilization

Improvement in stabilizing eroding banks along the Upper Russian River below Coyote Dam is a major county concern. The original bank stabilization structures constructed by the Corps were built in 1958-1972 and are now quite old. The County does not believe that total responsibility for bank protection should lie with the County (p. 28). The Corps should continue to provide technical and financial assistance as part of the mitigation for the effects of Coyote Dam.

THE BOARD OF SUPERVISORS

Thomas Crofoot	Dan Hamburg	JAMES EDDIE	JOHN CIMOLINO	NORMAN de VALL
FIRST DISTRICT	SECOND DISTRICT	THIRD DISTRICT	FOURTH DISTRICT	FIFTH DISTRICT

COMMENT LETTER 5

Colonel Paul Bazilwich, Jr.
U.S. Army Corps of Engineers, San Francisco District
February 2, 1981
Page Two

3. Optimum Flow Releases for Fisheries

5-3 It is not clear how the "optimum salmonid spawning flows" of Table 13 were calculated (p. 109) for the mainstem of the Russian River. What is the basis for the 200 cfs optimum flow for the Russian River at Hopland? Contrary to the statement on page 108, these "optimum spawning flows" are greater than the SCWA and CDFG agreement for minimum releases.

4. County Population

5-4 The population figures in Table 1 are out-of-date and available data was not incorporated. The 1975 estimated population (DOF. E-150) was 57,417. The 1980 preliminary Census for Mendocino County is 66,751 while the General Plan Draft estimated the 1960 population to be 69,493 based on housing unit data. The Planning Department estimates 31,031 people in the Russian River Basin portion in 1980.

5. Sediment Influx and Gravel Mining

The study did not adequately address sediment influx and transport or gravel mining in the flood plain, as the 1972 U.S. House of Representatives resolution directed. The study's results pertain primarily to Sonoma County with little useful information for Mendocino County. While the Corps did offer the County the use of its HEC-6 computer model, the statements in the text (p. 27 and 117) do not accurately describe the situation.

5-5 The County was given only two weeks to respond to the Corps' offer. While staff was trying to find out what the computer model could do for us, the deadline expired and the County was told the offer no longer held. A more cooperative approach to helping the County in its information needs would have been desirable. Assistance other than a computer model requiring large quantities of unavailable data should have been offered. The County has instead contracted with the Calif. Dept. of Water Resources for an Upper Russian River Gravel and Erosion Study to provide us with the data we need.

Enclosed is an up-to-date map of the gravel operations in the Upper Russian River drainage, based on County permit records for 1973-80. Please correct your maps (Plates 3 and 4). The Planning Department would like to have the gravel mining and sediment Influx data gathered by the Corps, as offered on page 120.

6. Land Use and Flood Plain Maps
The Planning Department would also like to obtain the land use data developed in the study: the original land use quads from which Tables 14-24 were reproduced; and statistical tables and printouts for each sub-basin and quadrangle in Mendocino County.
Thank you for this opportunity to comment on your draft report.

Sincerely,

James Eddie
Chairman

JE/SS/aa Enclosure

COMMENT LETTER 5. County of Mendocino

5-1 Issue: Coyote Dam Fish Mitigation
Both the Draft and Final reports mention, in Sections II.C.3.a. and II.C.6.a., that approximately 35 miles of anadromous salmonid spawning and nursery habitat were eliminated by the construction of Coyote Dam and Lake Mendocino. However, the exact magnitude of the impacts of the project on the Russian River fisheries is not known.

The Corps of Engineers is authorized to compensate for damage to these fisheries attributable to the dam and reservoir by Section 95 of Public Law 93-251 dated March 7, 1974 (Water Resources Development Act of 1974). The Corps has indicated it will respond to this authority once the California Department of Fish and Came and/or the U.S. Fish and Wildlife Service provide information on the extent of fish losses attributable to the dam project, and possible mitigative measures. The Fish and Wildlife Service provided some input on this topic in January 1982. This input is presently being evaluated by the Corps.

5-2 Issue: Bank Stabilization

The 1936 Flood Control Act mandated that maintenance of Corps of Engineers bank stabilization measures be the responsibility of the projects' local non-Federal sponsors. The Corps constructed bank stabilization measures along the Russian River from 1962 to 1972 as part of the Coyote Dam/Lake Mendocino project. These measures generally succeeded in preventing or reducing bank erosion associated with regulation of flows on the Russian River by Coyote Dam. However, certain of these structures have been damaged or destroyed since 1972 and renewed bank erosion has occurred in some areas. A discussion to this effect is included in Section II.C.2. of the Draft and Final reports.
Repair of some of these Corps works was evaluated since 1972 under the provisions of Public Law 84-99(PL 99). This statute created an annual fund for flood fighting and repair of flood control works threatened or destroyed by flood. This authority is predicated on the proposed repair work being economically feasible. Several PL 99 projects were constructed along the Russian between 1962 and 1972. However, damaged bank works evaluated since 1972 did not show this feasibility and thus could not be repaired under this statute. This was mentioned in Section II.C.2. of the Draft and Final reports.

The Corps has studied other bank erosion problems along the Russian under Section 14 of the Flood Control Act of 1946 and Section 205 of the Flood Control Act of 1948. Section 14 authorizes emergency bank protection works to prevent flood damage to public facilities. Section 205 authorizes construction of small flood control projects without specific authorization by Congress. Both these authorities allow construction only if shown to be economically feasible. Up to now the projects evaluated along the Russian River under these authorities did not show this feasibility.

Russian River under the authorities mentioned above. In addition, Mendocino and Sonoma County, as well as the U.S. Fish and Wildlife Service and the Resources Agency of California, have expressed the desire for expanded Federal involvement in evaluating bank erosion problems along the Russian. The Corps recognizes this position and the Final Report on the Basin Study concludes that such additional involvement is warranted. However, no funds remain for any such investigation under the present Russian River Basin Study authorization. Thus additional Corps studies of bank erosion and stabilization along the Russian River would require specific authority and funding from Congress. These conclusions are noted in Sections II.C.2.c. and V.B. of the Final Report.

The Corps of Engineers, under Public Law 93-251, Section 55, can also provide technical and engineering assistance to non-Federal public interests in developing structural and non-structural methods of preventing damages attributable to shore and streambank erosion. A discussion of this assistance is contained in Section V.G. of the Final Report.

5-3 Issue: Optimum Salmonid Flows
"Optimum salmonid spawning flows" were determined during the in-depth investigation of fish habitat and barriers to fish migration conducted during the Basin Study. This is noted in Section III.C.2.d. of both the Draft and Final reports. This investigation is documented in Appendix F of the report. Essentially these flows were based on documented environmental requirements for spawning during the months of salmonid reproduction in the Russian River. The "optimum spawning flows" are greater than the values in the 1959 Sonoma County Water Agency/California Department of Fish and Came agreement for minimum flow releases from Coyote Dam. However, the statement in the Draft Report referred to in this comment read that the minimum releases are greater than "optimum nursery flows." This statement has been retained in the Final Report.

5-4 Issue: Population

Table 1 in the Final Report has been modified to incorporate these data.

5-5 Issue: Sediment Movement and Gravel Mining

The Russian River Basin Study Phase I Report released by the Corps in December, 1976 proposed interagency involvement in defining the nature of sediment influx, transport and turbidity in the Russian River. The U.S. Geological Survey would have provided major input to this investigation.

Unfortunately, soon after release of the Phase I Report, the Corps and other agencies participating in the study underwent significant internal re-organization and re-ordering of priorities. Because of this the proposed interagency study of sediment and turbidity in the Russian River was never initiated.

This issue was addressed to some degree by the Pacific Gas and Electric Company in its "Application for Certificate of Conformance with Water Quality Standards, Potter Valley Project", filed in September 1978. The California Department of Hater Resources, Central District also discussed the turbidity problem in the Russian in its "Water Action Plan for the Russian River Service Area" published in May 1960. The involvement of these parties in the Russian River turbidity issue is mentioned in Sections II.C.3.a. and III.C.1. of the Final Report.

The primary direction of Corps investigation of gravel mining during the Basin Study was toward assisting Sonoma County in the development of its Aggregate Resources Management Plan. The Corps offered similar assistance to Mendocino County during the course of the study. A presentation to this effect was made before the Mendocino County Board of Supervisors in October 1978. A formal letter regarding this assistance was sent to the Board in January 1979, followed by a phone call in March and another letter in April. The County was granted an extension to May 1979 for response to these inquiries. When no response was received by this time the offer was considered expired. However, this does not mean Mendocino County cannot become involved in any future Corps studies of sedimentation in the Russian River basin. Sections II.C.2.a. and V.A. of the Final Report have been amended to note the County's involvement with the California Department of Water Resources.

Plate 3 of the Final Report has been changed to incorporate Mendocino County's recent information on gravel operations in the upper Russian River basin.

Monte Rio Recreation and Park District
19578 Redwood Drive
MONTE RIO, CALIFORNIA
TELEPHONE 707 865-1176
95462

January 8, 1981

U.S. Army Corps of Engineers, San Francisco District
ATTN: SPNED-PW (Russian River)
Gentlemen:

Our interest in The Russian River Basin Study lies in the area of temporary summer dams. On March 1, 1978 we made application for such a dam, composed of gravel and a fish-way, which was given the No. 11563-44. This application was withdrawn on June 18, 1980, on the advice of Mr. Paul Portch, of your office, because of the time it was taking for the Calif. Dept. of Fish and Game to give it's final approval. We made a similar application to the Calif. Dept. of Fish and Game and signed an Agreement for Streambed Alteration on January 30, 1979 which contained a condition that a "comprehensive, independent study... is completed and the results show that the project will not have any significant detrimental impacts. The DFG agreed to prepare the parameters of the study. The project was given the number Notification III-223-78. On March 7, 1979 DFG advised that there would be a delay in the preparation of the study plan. The location of the dam is about 300 feet downstream from the confluence with Austin Creek.

6-1

We have reviewed the document Evaluation of Fish Habitat and Barriers to Fish Migration and some other inputs. We cannot find anything that could be considered "detrimental" to the gravel dam we propose.

We therefore request that a summation be prepared as a part of the Final Report which addresses the impact of our proposed project. DFG's main interest is in effect on American Shad.

For your information our District operates a boat launching ramp at Monte Rio. The total investment for all facilities connected with the ramp is about $200,000.00. Unfortunately use of the ramp in the summer time is restricted because of low water in the River. If we could raise the water level close to what it is when the sand-bar at Jenner closes the River we would satisfy all requirements for use of the River from River Mile 6.3 to 12.8.

The people in the area and the thousands of summer visitors, including fishermen, stand to benefit from the dam. In fact, we have testimonials from fishermen who used the River in the years when the dam was in place that the fishing was greatly improved.

Request your assistance in providing information which will eliminate DFG fears about American Shad.

Sincerely,

Lyle C. Maritzen
Director

COMMENT LETTER 6. Monte Rio Recreation and Park District

6-1 Issue: Summer Dam Impacts

Within the scope of funds available for the remainder of the Russian River Basin Study, it is not possible for the Corps *to* initiate investigation of the Park District's proposal for a new summer dam on the river. Such investigation would require specific authorization and funding from Congress.
The information developed during the Basin Study regarding summer dams on the Russian River is available for use by the Park District. However, for specific information on design, installation and removal of such dams the District should contact either the California Department of Fish and Game or the U.S. Fish and Wildlife Service.

SONOMA COUNTY WATER AGENCY
Chapter 694 of the Statutes of 1949 as Amended
2425 CLEVELAND AVENUE
P.O. BOX 11505
SANTA ROSA, CA 95406
(707) 526-5370

January 30, 1981

FILE: 49-0-1 RR Basin Study

U. S. Army Corps of Engineers
San Francisco District
Attention: SPNED-PW (Russian River)
211 Main Street
San Francisco, CA 94105

The following comments are made on your Russian River Basin Study in response to your announcement of public meeting dated December 8, 1980. An initial comment it should be noted that the report generally does not cite the sources of its information. This makes it very difficult for the reader to judge the accuracy of the Information presented or to determine the assumptions made or the age of the data. Regardless of the weakness of the data, once it is published, it will be considered credible by many readers.

Specific comments are as follows:

	Page	Paragraph	Comment
7-1	11	4	Coyote Dam storage is given as 120,000 acre feet. This should be 122,500. Lake Mendocino surface area is given as 2,000 acres (presumably for recreation purposes)—this would require 137,000 A.F. of storage! Approximate surface areas are 1810 acres with encroachment into the flood pool to 90,000 A.F., 1733 acres at top of conservation pool (72,300 A.F.), and 1498 acres at 50,000 A.F. (still considered desirable for recreation).
	15	3	Listing of major drought years - should 1944 have been 1934, which appears to be drier.
7-1			
7-2	18	4	Page A-3 of the report states that "The Santa Rosa-Rohnert Park-Sebastopol urban area is within the basin.", yet Rohnert Park is not included in the listing of principal communities, nor is it shown on Figure 1 (page 12) although the much smaller community of Cotati is.

COMMENT LETTER 7

	Page	Paragraph	Comment
7-2	19	Table 1	Again, Rohnert Park with a population of about 23,000 is not included in the listing. In addition, since the 1980 census has now been taken, it would seem the table should he updated to include that information, e.g., Sonoma County has about 40,000 more people than shown. If the report is to be used as a planning tool, it should present the most up-to-date information possible.
	19	Last	ABAG has updated their population projections for Sonoma County in a report, published as "Projections 79". Although this should probably be included in the tabulation on page 20, the projections are close to the DOF E-150 estimates used and would not significantly change the report.
	28	2	The Sonoma County Water Agency maintains about 4 miles of low flow drainage channel from a point midway between River Road and Guemeville Road through Occidental Road. It is incorrect to say we conduct a program of sediment and debris removal.
7-3			The Central Sonoma Watershed Project includes flood control channel improvements on tributaries of Santa Rosa Creek such as Piner Creek, Paulin Creek, Brush Creek and tributaries, Spring Creek and Matanzas Creek. It further includes flood detention reservoirs on Paulin Creek, Brush Creek, Matanzas Creek and one off-stream reservoir for Santa Rosa Creek and Spring Creek. It is incorrect to say CSWP reaches from the Laguna to the Santa Rosa Civic Center Complex as there is channel work beyond that point as well as the detention reservoirs.
	29	1	The statements in the last sentence as to Dry Creek erosion and future channel improvements do not appear to agree with the last sentence of the first full paragraph on page 28.
7-4			
	30	2,4 & 5	Comments regarding the lack of inspection and maintenance by the Sonoma County Water Agency are totally Inaccurate. The Agency annually Inspects the entire reach of river along which the Corps has Installed stabilization works. The poor design of bank protection devices, i.e., jacklines, imposed upon the Agency by the Corps, against our recommendations, on a "jacks or nothing" basis resulted in maintenance deficiencies in excess of our financial ability to rectify. The failure of the design should have been obvious to the Corps early in the stabilization program as many of the jacklines had to be replaced, some twice, in the
7-5			

	Page	Paragraph	Comment
	30	2,4 & 5 (Cont.)	first few years. The jack failures not only leave the area unprotected which they were intended to protect, but often swing out into the channel and force the river into the opposite bank causing erosion where none would have otherwise occurred. House Document 585 (letter from the Secretary of the Army, letter from the Chief of Engineers, Corps of Engineers, and a survey of Russian River) estimated maintenance costs for the proposed project between river miles 32 and 63 at approximately $6,000 per year. The actual average maintenance costs since that time is approximately $60,000 with costs some years exceeding $120,000. By Board resolution DR 30220 dated July 21, 1970, and again by letter dated May 4, 1978, the Agency requested the Corns to reevaluate the effectiveness of the Russian River bank stabilization project between river mile 42 and 62. Since rock riprap is the only bank protective measure which we have found effective, we have attempted to replace jacklines as they fail with rock. Since limited budgets do not insure restoration of all failures each year we prioritize and repair those areas most in need. By letter dated January 31, 1978, the Agency requested assistance from the Corps for extensive damage to seven sites containing flood control works along the river resulting from the floods of early January. In August of that year the Corps responded that four of the sites were not eligible for assistance but that three of the sites were being considered. The Corps responded in February 1979 that the damage was so extensive that none of the sites had an acceptable cost-benefit ratio. In cooperation with the owners, the Agency provided some rock stabilization at two of the three sites. The erosion just above Geyserville bridge which the Corps estimated would cost in excess of $1,000,000 to repair is beyond Agency budget capability.
	31 27	2 6	Sentence regarding funding and initiation in late 1980 of Corns' special study on erosion and gravel mining should be updated in final report, since it is already 1981.
7-6	117 &118 122	3 & 1 2	
7-7	34	4	Estimates of steelhead and salmon runs are evidently (see FERC pg. 2-50) based on 1972 reports of K.R. Anderson --

	Page	Paragraph	Comment
	34	4 (Cont.)	Check of '72 report indicates figures were taken from a 1969 F&G report; further check indicates 1969 figures may have been based on a 1966 report of a 1965 F&G survey.' Are these figures still valid? Shouldn't this report reflect current studies underway? Even the original 1966 report stated *"The estimates* (of steelhead and salmon population) *are preliminary and are intended to serve primarily as a basis for further studies."* The 1969 report reiterated this by *saying "an inventory is needed on both the salmon and steelhead resources as we do not know how many of these anadromous fishes use this drainage system.....reasonable estimates have been made, but more detailed knowledge is needed in order to manage this resource effectively."* If the statistical information 1; this outdated, can the needs of the fishery be established until current studies are completed?
7-8	39	4	If the inventory figures have not changed (see above), on what basis has it been determined that extensive losses of habitat have occurred due to summer dams, etc.?
7-9	47	7	Implies that Fish & Game paid for the fish ladders at Vacation and Johnson Beaches. According to Phil Guidotti (of the Russian River Recreation & Park District), F&G designed the fish ladders (one required revision only two years later), but only paid for one-half the cost of the Vacation Beach installation. The other half, and the entire cost of the Johnson's Beach facility, was paid for by the Russian River District. He stated they do not have a copy of the report — the Corps should solicit comments from these recreation districts since they are so vitally concerned with the summer dam issue.
	51	4	States there are "several" homes and resorts along the Russian River. Page 15 in a nearly identical sentence says a "significant number" which is certainly more than "several".
7-10	53	4	In this instance, as well as in others in the report, reference is made to our Wohler intake— this should probably be augmented to read Wohler "and Mirabel" intakes to reflect both diversion points. This sentence also emphasizes our diversion and implies that we use the greater portion of Coyote releases--our diversions vs. agricultural and instream uses should be put in perspective.

	Page	Paragraph	Comment
7-11	56& 57	Fig.3&4	Hydrologic analyses, on which these figures are based, include the period from 1915 to 1964. Since the drought of 1976/77 affects previous estimates of dry year yield, shouldn't this analysis also be updated to include the recent drought years?
	58 104 106	4 5 1	Minimum release required from Coyote is 25 cfs, not 30 as stated.
	59	1	"Water Permit" should more accurately read "Appropriative Water Right Permit".
7-12	59 106	3 1	The statement "According to this agreement" implies that the 150 cfs minimum in the river through the confluence with Dry Creek" is contained in our original 1959 FAG agreement. This does not reflect the actual wording of the 1959 agreement.
7-13	76ft 77	6& Table 7	As stated in the report, the steelhead catch and angler-day figures are based on data estimated from a 1971/72 creel census. Comparison from 1965 figures (reported on page 78) is as follows:

	1965	1971/72
Steelhead catch	12.000	5,062
Angler-Days	60,000	53,151
Angler-Days/Fish	5.0	10.5

With the significant changes apparent above in only 6 years, it seems further studies are required to assess any change in the last 10 years before dollar values are assigned and operational plans devised.

7-14	78 79	4 Table 10	The data given in Table 10 is based on 1965 estimates with no change. Again, updated studies should be done to assess changes in the past 16 years.
	80& 81		American shad and warmwater fishery data, again, are based on estimates made in 1969 and 1970.....
7-15	80	4	(Line 4) states estimates are "based on data that are generally at least 5 years old." This was true 1n 1976 when the Phase 1 report was published, but should probably now read "at least 10 years old."
	80		(Last sentence) Wohler Dam was constructed in 1975 rather than 1976.
7-16	82	3	The Agency and the Department of Fish and Game both agreed that their design would cost $100,000 to build.

	Page	Paragraph	Comment
7-17	82	5	Healdsburg Dam in its down position presently offers a barrier separating the spawning areas of the salmonoids and the American shad. Since the shad are free spawners and arc able to utilize the river below Healdsburg Dam as they have successfully been doing for the last 20 years and since a fish passage structure which would pass them above Healdsburg Dam would permit them to compete with the salmonoids for the available habitat, such a structure would be of dubious value. Should a Denil fishway be constructed to assist the salmonoids in negotiating Healdsburg Dam in its down position, consideration should be given to constructing it on a slope sufficient to discourane American shad migration, i.e., 6:1.
7-18	83& 87	2,3 & 6	Estimates of annual installation, removal and maintenance costs are far too low on Healdsburg Dam. For example, there would be 132 feet of ladder to install and remove each year for the up position of the dam if constructed on an 8:1 slope. The permanent ladder section for the down position could be expected to receive considerable damage during winter floods.
7-19	93 43	6 3	Implies that costs of installing a fish ladder at Healdsburg Dam are the responsibility of the Agency -- this is not the cast.
7-20	94		(Last two sentences) ..... If, as the report states, summer dams have insignificant impact on water quality, etc., and the only significant detriment is as a harrier to fish, then these two sentences do not quite add up. If it is not clear that the interferences with the movement of anadromous fish ... associated with .... summer dams...are the limiting factor in the fishery" then how can it be said their removal would have the greatest benefit?
7-21	95	2	Proposed removal of the Agency's rubber dam at Wohler! This dam should not be considered in the category of "sunnier recreational dams" -- it is for water supply, has a fish ladder, and can be raised and lowered to meet practically any streamflow condition. We question the $1,500,000 cost for substitute facilities without proof that such facilities could accomplish the same purpose. Nor is any mention made of the $1,500,000 the Agency has already spent to build the dam.
7-22	101	1 & 2	Recommends that "flow releases...from Coyote or Warm Springs... should consider the magnitude of flows necessary to reduce temperatures to acceptable levels" (for salmonoid nursery habitat). If, as stated, "lowering of the temperature...is rather modest and...not sufficient to convert the river into a salmonoid habitat area" then assessment of adverse impacts on recreation and water supply should be carefully balanced against any releases for temperature-lowering purposes.

	Page	Paragraph	Comment
	101	1 & 2 (Cont.)	We could not seem to "match up" the discharge and temperature data given 1n Table 12, page 102, with USGS records, but since this is a "generalized" analysis, it probably doesn't matter.
	103	4	(Line 2) Statement "April to October" should read "April through October".
7-23	117	2	The County has not decided to use the computer model for gravel mining management. The Board of Supervisors rejected the proposal.
	121		...lists the data deficiencies which exist and recommends further studies which should be made. He agree with the need for undated studies (particularly on the fishery) and further question the validity of some conclusions reached in this report without those further studies.

Thank you for the opportunity to comment on this report.

ROBERT F. BEACH
General Manager

RFB/ph

G-27

COMMENT LETTER 7

SONOMA COUNTY WATER AGENCY

M E M O R A N D U M

RUSSIAN RIVER BASIN STUDY - DRAFT INTERIM REPORT

TYPOGRAPHICAL ERRORS NOTED:

Page	Paragraph	
11	3	Big "Sulfur" Creek should read Big "Sulphur".
17	4	"wiers" should be "weirs".
18	4	"Sebastapol" should be "Sebastopol".
19	Table 1	"
55	4	"Agnecy" should be "Agency".
86	Last	7th line .- "nd" should he "and".
99	1	3rd line - "pools" should be "pool".
104	3	"scarse" should be "scarce"
A-6	5	"riparion" should be "riparian"
A-7	1	" " " "

COMMENT LETTER 7. Sonoma County Water Agency

7-1 Issue: Lake Mendocino Specifications

These corrections are included in Section II.B.1. of the Final Report.

7-2 Issue: Rohnert Park

Rohnert Park has been added to Figure 1 and Table 1 of the Final Report. Table 1 has also been amended to include preliminary data from the 1980 Census.

7-3 Issue: Sonoma County Flood Control

Section II.C.2. of the Final Report has been changed to include these corrections.

7-4 Issue: Inconsistency

The statements in Section II.C.2.a. of the Draft Report regarding channel improvement structures along Dry Creek have been changed in the Final Report. The channel works presently being constructed are addressing existing channel and bank erosion problems. Continuing monitoring of the Creek channel is aimed at detecting future problems should they develop.

7-5 Issue: Maintenance of Bank Stabilization Measures

Section II.C.2.b. of the Final Report has been rewritten removing misinformation regarding Sonoma County's maintenance of Corps-constructed bank protection measures along the Russian River. However, some clarification is called for regarding the selection of these measures.

The use of jacklines by the Corps for bank stabilization along the Russian was dictated by several factors. These works were installed between 1962 and 1972 as part of the Coyote Dam/Lake Mendocino project. The bank measures were not originally an authorized component of the project and their construction was funded from the project's operation and maintenance budget. As such, funds for these works were limited. Among the several bank stabilization measures evaluated, jacklines provided the greatest benefit to cost ratio.

Sonoma County's early concerns regarding the success of these jacklines in stabilizing the banks of the Russian River were addressed by the Corps during the early 1970's. Several jacklines were removed and others modified. At one bank protection site near Asti rip-rap was added to supplement the jacklines.

With regard to bank erosion just upstream of Geyserville Bridge, the Corps evaluated this problem under the provisions of Section 14 of the Flood Control Act of 1946. Section 14 authorizes emergency bank protection works to prevent flood damage to public facilities, if economically feasible. This feasibility could not be shown for the Geyserville Bridge site. This is stated in Section II.C.1.b. of both the Draft and Final reports. It should be noted that the integrity of Geyserville Bridge and associated State Highway 128 is to some degree a responsibility of the California Department of Transportation.

Along with Sonoma County, Mendocino County, the U.S. Fish and Wildlife Service and the Resources Agency of California have expressed the desire for expanded Federal involvement in evaluating bank erosion problems along the Russian River. For a discussion of this potential future involvement see the response to Comment No. 5-2.

7-6 Issue: Dry Creek Sedimentation Study

These references have been changed to reflect initiation in late 1980 of a special Corps study of sedimentation in the Dry Creek basin.

7-7 Issue: Salmonid Population Estimates

The estimates of anadromous fish populations included in the Basin Study Report are based on the best data available. The California Department of Fish and Game and the U.S. Fish and Wildlife Service, both of which reviewed the Draft Study Report, have indicated agreement with this statement. It is noted in Section III.A.2.c. of both the Draft and Final Reports that these data are about 10 years old and often incomplete.

Most parties concerned with the Russian River fisheries, both public and private, acknowledge that additional fisheries surveys and data are needed to determine the status of salmon and steelhead populations in the Russian River basin. This is noted in the Draft and Final Reports, Section V.G.

Current studies of fisheries resources in the Russian River basin were not advanced enough to warrant detailed discussion in the Final Report. The U.S. Fish and Wildlife Service in January 1982 provided some information on fisheries losses in the basin attributable to the construction of Coyote Dam, but no new data collection was involved in this effort. Sonoma County recently conducted an appraisal of what studies are needed to assess fish populations in the basin, but decided not to enter into any such studies.

7-8 Issue: Salmonid Habitat Losses

It has not been irrefutably determined that extensive losses of fish habitat have occurred in the Russian River due to summer dams. Section II.C.3.a. of the Draft and Final reports states that "... indications are that extensive losses of habitat, particularly steelhead habitat, occurred (in the basin) subsequent to 1962." The reports further state that the establishment of summer dams in the Russian River basin is only one of the factors contributing to these losses.

7-9 Issue: Vacation and Johnson Beach Fish Ladders

Section II.C.3.c. of the Final Report has been corrected to incorporate this information on the Johnson Beach and Vacation Beach fish ladders.

7-10 Issue: Sonoma County Water Supply Diversions

Section II.C.6. and other instances in the Final Report where Sonoma County's water supply diversions are mentioned have been corrected to include the Mirabel intake. Section II.C.6. has also been amended to include a discussion of municipal and agricultural water diversions as well as in-stream uses.

7-11 Issue: Warm Springs Dam Impacts

The purpose of these figures is to illustrate in general the effect of the Warm Springs project on flows in Dry Creek and the Russian River, not to present specific impacts of the project on these flows. The 1915 to 1964 period of record is sufficient for this purpose.

7-12 Issue: Coyote Dam Flow Release Agreement

Section II.C.6.b. of the Final Report has been changed to include the correct wording of the 1959 agreement.

7-13 Issue: Salmonid Population Estimates

It is agreed that additional fisheries surveys and data are needed to determine the status of salmonid populations in the Russian River basin. This is noted in the Draft and Final reports, Section V.G. However, it was felt the Russian River Basin Study Report would be incomplete without some recommendations for alternative ways to manage summer dams on the Russian. It was further felt these recommendations should consider, as much as possible, the economic impacts of the alternatives. An integral part of these impacts is the effect on commercial and recreational fishing.

RESPONSE LETTER 7

The estimates of anadromous fish populations included in the Basin Study Report are based on the best data currently available. For a discussion of possible future fisheries studies in the Russian River basin, see the response to Comment No. 7-7.

7-14 Issue: Salmonid Population Estimates

See response to Comment No. 7-13.

7-15 Issue: Salmonid Population Estimates

See response to Comment No. 7-13.

7-16 Issue: Healdsburg Dam Fish Ladder

This correction has been made to Section III.A.3. of the Final Report.

7-17 Issue: Healdsburg Dam Fish Ladder

As illustrated in Appendix B (Anadromous Fish Life History Data) to the Draft and Final reports, the chronological life stage activities and other environmental parameters for shad are significantly different from those for steelhead and king and silver salmon. Thus there would be minimal competition between the species for common resources in the Russian River basin.

The U.S. Fish and Wildlife Service and the California Department of Fish and Game have indicated that significant fishery benefits could be realized from the re-establishment of a viable American shad population throughout the Russian River basin. American shad constitute a valuable and highly utilized fishery in many eastern U.S. rivers. Prior to construction of Healdsburg Dam shad were known to migrate a* far up-river as Ukiah.

7-18 Issue: Healdsburg Dan Fish Ladder

After conversations with the Sonoma County Water Agency these estimates were updated in Section II.B.2.b. of the Final Report.

7-19 Issue: Healdsburg Dam Fish Ladder

See response to Comment No. 7-20.

7-20 Issue: Summer Dam Impacts

These references have been clarified in the Final Report.

7-21 Issue: Wohler Dam

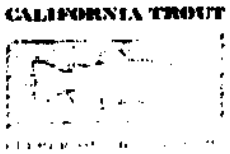
Consideration of removal of Wohler Dam has been deleted from the Final Report.

7-22 Issue: Coyote and Warm Springs Dams Releases

Section III.C.1. of the Final Report has been changed to indicate the need to balance benefits against the costs to recreation, water supplies, etc. of increased releases from the Coyote or Warm Springs project for temperature control for salmonid production.

7-23 Issue: Sediment Transport Modeling

This correction has been made in Section V.A. of the Final Report.



January 22, 1981 Colonel Paul Bazilwich, Jr. CE
District Engineer, U.S. Corps of Engineers
211 Main Street
San Francisco, CA 94105

Dear Colonel:

California Trout has reviewed the 1980 Draft Interim Report (DIR) of the Russian River Basin Study with some disappointment. The document is vague, replete with generalities we already know, and describes few specific problems or recommended solutions. Nevertheless we offer the following comments:

While the DIR covers many of the fishery habitat parameters and problems of the mainstem Russian River and Lower Dry Creek, the report fails to address adequately a proclaimed major "refined planning objective" (b, pg. 9) "To provide data on the environmental, economic and social impacts of small summer recreational dams established annually on the Russian River mainstem and tributaries, for use in future programs for managing these dams."
We wish to emphasize the word TRIBUTARIES here. On pg. 39 the DIR states, "California Department of Fish and Game data (table 6.) indicate that 84% of the basin's habitat is in the tributaries Thus, it appears that the largest contribution to anadromous fish production in the Russian River basin comes from the tributary system." For example, (pg. 31), ".... the majority of the small tributary dams are not (documented)" and the bulk of the 200 small dams are on these very tributaries.
In discussing the impact of small dams the DIR docs not acknowledge the fact that the vast majority of juvenile steelhead remain in the streams for two years O_1 'or sometimes three) before smolting and thus are subject to many more hazards than salmon which remain for much shorter periods. Appendix B (B-l) is vague on this point.

8-1

By focusing on the mainstem Russian and Lower Dry Creek the DIR missed the primary objective target by failing to adequately inventory spawning and rearing on habitat in actual use by anadromous salmonids. Fish population inventories of both juvenile and adult salmonids are glaringly absent, and it is noteworthy (pg. 37) that during summer months juvenile salmonids, mostly steelhead, are found in the headwaters of tributary streams.

8-2

Section 404 permit authority encompasses the entire Russian River, Austin, Mill g? Mark West, Maacama, Big Sulpher and Forsythe Creeks and the East Fork Russian. Serious questions arise, for example, concerning the impact of the 32

8-3

summer dams on Austin Creek (Appendix F, Table II-2), a major salmonid spawning and rearing tributary. Juvenile salmonids here are trapped between dams and are extremely vulnerable to angling, yet angling is permitted by regulation. In our judgment, to optimize smolt production from depressed populations, these and similar dams on tributaries, and angling therein for summer "trout" (baby steelhead) should be stringently regulated if not prohibited. Attempts to negotiate this with local residents has met with varying result, and the California DF&G currently is studying the problem. We all need the result of that study.

Further detailed assessment of damage to habitat and fish from isothermal opora- lions, especially on Big Sulpher Creek is needed. Likewise, we have serious reservations concerning the fishery impacts from channelization. In some instances meanders may be highly desirable for fish and for anglers.

Angling is not considered in the DIR except briefly in relation to turbidity, yet a "fishery" by definition consists for fish, habitat, and fishermen. Among other problems, heavy increases in angling pressure can be expected if and when Warm Springs Dam Hatchery is successfully operated (which remains to be seen). Should this occur, native fish populations will be severely impacted and further decimated from their already precarious state. These native, naturally produced fish are our primary concern in these comments. The hatchery must be supplemental, not harmful.

8-5

Naturally produced, wild winter-run steelhead comprise the bulk of anadromous fish in the Russian River drainage. They are prized sport fish of highest quality and are eagerly sought by anglers despite obvious, tragic reduction in the runs. Prior to construction of Coyote Dam the Russian was, indeed, one of America's blue ribbon steelhead streams, world famous. Experienced anglers fully agree that the runs today are but a fraction of their former size. By comparison, silver salmon constitute a relatively minor resource while king salmon are completely foreign, a non-native species poorly adapted to this river system. Another non-native species, American Shad, became plentiful at one time but are today a mere remnant of their former abundance.

8-6

We believe the estimate of 57,000 spawning steelhead in the Russian River drainage (pg. 34) is a gross over-estimate. There also is no documentable basis for the estimate of 6,000 steelhead using Dry Creek. No scientific, acceptable fish population inventories, using modern techniques, have been done on either the mainstem or Dry Creek. There are no hard data to support these estimates. It is generally agreed that all North Coast steelhead and salmon populations have declined drastically over the past 20 years, but there are no firm figures, past or present, for the Russian River. Population figures for silver salmon (5500) and shad (11,000 to 22,000) also are highly questionable and have no reliable documentation. For estimates of silver salmon populations there were no carcass counts.

8-7

King salmon are not native to the Russian River (except for "strays") and all attempts by DF&G to introduce them have failed. California Trout opposes the plan to devote extensive Warm Springs Hatchery facilities to rear 1,000,000 king salmon. The 101. 5 miles of stream channel "used" by king salmon (Table 6.) is totally false, "Enhancing" the fishery by injecting this volume of hatchery fish into the system may have deleterious effects on naturally produced fish which, among other problems this

8-8

will create, will not be able to withstand the impact of intensified angling.
California Trout's major goal is the protection and restoration of wild salmonids and their natural habitat. Efforts toward this by various agencies should not be diverted by the operation of Warm Springs Hatchery. The basic importance of the tributary system in fish production, including the remains of Dry Creek, must always bc remembered and this habitat protected and restored by a program of long-range planning with adequate funding. Meanwhile, the success and ultimate impacts of the hatchery cannot be assessed for some years. Hatcheries never must be allowed to supplant or interfere with natural production potential.

8-9 Although "suitable" for spawning and rearing (pg. 40) are the 19 miles of river between Hopland and Coyote Dam actually used today by steelhead for spawning and rearing?

Shad runs may never be restored until all barriers are removed. With few exceptions (e.g., the mere 11 shad in two months observed at Vacation beach Dam in 1973) the studies presented on
8-10 fish passage are based on estimates and established criteria rather than actual observations about the ability of downstream migrating juvenile shad and salmonids to pass some of the barriers, e.g., Wohler Dam fishway. There is a dirth of hard data.

8-11 A problem entirely omitted from the DIR is the multiple, non-registered, non-metered water diversions from both the mainstem and tributaries. Neither the State Water Resources Control Board nor DWR have complete inventories of all
impact of these diversions on salmonids may he disastrous, but all agencies avoid this problem because of the possible social, economic and political implications. The Basin Study will be incomplete without investigation and measurement of all water diversions in the system.

Even though "the turbidity problems. . . .due to the inflow of highly turbid Eel River water....will not be addressed in this report," a timely reminder is appropriate: millions of taxpayers' dollars are being spent to study, mitigate and enhance a fishery in which angling has been impossible during much of
8-12 the winter steelhead season due to this turbidity. The major source of this unmitigated pollution is a poorly constructed USFS road along Corbin Creek in the Eel River drainage. Corbin Creek's watershed must be rehabilitated forthwith.

A value of $10.40 per angler-day for steelhead (Table 9) is extremely low. Today the average Russian River steelhead angler, driving from the Bay Area, would spend more than this on
8-13 gasoline alone. A modest motel room is not available for this amount. We also question the accuracy of the 5,062 steelhead catch which would be extraordinarily high today.

Dollar values of anadromous fishery habitat should be estimated in the Russian River Basin. Figures for this recently have been calculated and reported by USFS for several North Coast
8-14 watersheds. Total dollar value of the entire fishery would be much higher than those presented in the DIR if values of both fish and habitat are included.

Much detail is presented in Appendix F on habitat, habitat requirements and parameters; however there is a singular paucity of data on actual use of the habitat by salmonids. Fish population inventories are lacking, and the most crucial question of actual smolt production and escape is not addressed or quantified. For example, instream structures are listed and described but their impact on fish production and passage is not discussed or documented. No redd counts have been done in the mainstem or tributaries. Though Tables III-1.2, and 3
8-15 describe spawning habitat in the mainstem, no evidence is presented showing that spawning occurs here. "Potential" habitat in the mainstem and Lower Dry Creek is described whereas the most productive habitat, in the tributaries, is not addressed as to existing, observable, documented smolt production.

In summary, the DIR and Appendix F fail to adequately assess factual impacts facing natural production of anadromous salmonids and shad, the most important source of this valuable resource in the Russian River Basin.

Sincerely,

Richard H. May
President

cc: RR Flyfishers, Inc.
DFG R3

COMMENT LETTER 8. California Trout

8-1 Issue: Juvenile Steelhead

Section II.C.3.b. of the Final Report has been amended to include this information.

8-2 Issue: Fish Population Inventories

The estimates of anadromous fish populations included in the Basin Study Report are based on the beat data currently available. For a discussion of possible future fisheries studies in the Russian River basin, see the response to Comment No. 7-7.

For a discussion of why fish habitat in the Russian River tributaries was not studied in more detail during the Basin Study, see the response to Comment No. 4-6. Section V.C. of the Draft and Final reports notes that further studies of the resources of the Russian River basin should include assessment of fish populations and habitat in the tributary streams.

8-3 Issue: Summer Dams on Tributaries

Section II.C.3.b. of the Final Report has been amended to mention the possible impact on juvenile salmonids of numerous summer dams on the Russian River tributaries.

8-4 Issue: Geothermal Fish Impacts

It is agreed that further study of fish populations and habitat in the tributaries of the Russian River, including Big Sulphur Creek, is needed. This is noted in Section V.C. of the Draft and Final reports.

Regarding further studies of bank and channel stabilization along the Russian River, refer to the response to Comment No. 5-2. Any such new Corps study or studies would include assessment of fisheries impacts.

8-5 Issue: Native Fisheries

One goal of the Warm Springs fish hatchery is to provide mitigation for fish habitat losses attributable to the construction of Warm Springs Dam and Lake Sonoma. The hatchery will Also provide enhancement of the Russian River steelhead, king salmon and silver salmon populations. In no way is the hatchery intended to adversely affect the basin's native fish populations.

8-6 Issue: Native Fisheries

California Department of Fish and Game personnel have indicated that, according to conversations with long-time residents of the Russian River basin, king salmon were seen as far up-river as Coyote Valley in the 1920's and 30's. There are also indications that similar native king salmon populations exist or existed at one time in other northern California coastal streams such as the Garcia River and Ten-Mile River.

8-7 Issue: Fish Population Estimates

See responses to Comments Nos. 5-1, 7-7 and 7-13.

8-8 Issue: King Salmon

With regard to the history of king salmon in the Russian River basin, refer to the response to Comment No. 8-6. The figures on king salmon use of stream channel in the Russian River drainage were presented by the Department of Fish and Game in a 1972 report to the Federal Power Commission on the re-licensing of the Potter Valley powerhouse (see Table 6, Draft and Final Russian River Basin Study reports). For a discussion of the purposes of the Warm Springs fish hatchery, see the response to Comment No. 8-5.

8-9 Issue: Steelhead Habitat
It is not known how much of this area is presently used by steelhead for spawning and rearing.

8-10 Issue: American Shad

It is agreed that available data on fish passage at small dams on the Russian River is inadequate for in-depth assessment of the effectiveness of the fish passage structures. This is noted in the Draft and Final Reports, Section V.G.

8-11 Issue: Unregistered Water Diversions

A discussion of the problem of unmetered and unregistered water diversions in the Russian River basin has been added to Section II.C.6.a. of the Final Report. However, a survey and documentation of these diversions is beyond the scope of funds remaining for the Russian River Basin Study.

8-12 Issue: Eel River Diversions

Section III.C.1. of the Final Report has been changed to include a discussion of land use practices above Lake Pillsbury.

8-13 Issue: Steelhead Fishery Value

The value of $10.40 per angler-day used in the Basin Study report for steelhead sport fishing My not include all associated peripheral costs. This is noted in Section III.A.2.c. of the Final Report.

The Unit Day Value Method for evaluating recreation costs and benefits My not be as accurate as other methods noted in the Water Resources Council's Principles, Standards and Procedures for Planning Water and Related Land Resources ("Principles and Standards") in effect during the final stages of the Basin Study. The other methods noted in the Principles and Standards were the Travel Cost Method and the Contingent Valuation (Survey) Method. However, the Unit Day method still provides a basis for comparison of alternative resource management plans in the Russian River basin.

The estimated steelhead sport fishery catch noted in Table 9 of the Draft and Final reports is the best estimate currently available. For further discussion of this point see the response to Comment No. 7-7.

8-14 Issue: Fish Habitat Values

Analysis of the value of fish habitat in the Russian River basin may be a beneficial exercise. However, such values cannot be included with the unit day values used throughout the basin study to assess the basin's fishery recreation benefits. This would violate the guidelines of the Water Resources Council's Principles and Standards in effect during the final stages of the study. Re-computation of fishery benefits using habitat values is beyond the scope of funds remaining for the Russian River Basin Study.

8-15 Issue: Fish Habitat Inventories

A comprehensive inventory of current fish populations in the Russian River mainstem and its tributaries is the major requirement for accurate assessment of the basin's fishery resources. This data deficiency is noted in Section V.C. of both the Draft and Final reports. For discussion of possible future studies of the Russian River fisheries refer to the response to Comment No. 7-7.

The response to Comment No. 4-6 discusses the extent to which fish habitat in the Russian River tributary streams was addressed during the Basin Study. Section V.C. of the Draft and Final reports notes that any further studies of the resources of the Russian River basin should include assessment of fish populations and habitat in the tributary streams.

COMMENT LETTER 9

PACIFIC GAS AND ELECTRIC COMPANY
77 BEALE Street • SAN FRANCISCO. CALIFORNIA 94106 • (415) (sic) • TWX 910 (sic)

March 5, 1981

U.S. Army Corps of Engineers
San Francisco District
211 Main Street
San Francisco, CA 94105

Attention SPNED-PW (Russian River)

Gentlemen:

Subject: Russian River Basin Study Draft Report

Thank you for the opportunity to review your draft report. Our comments, listed below, are limited to those aspects of the report that relate to the Potter Valley Project.

9-1 Page 33, Paragraph 4; Page 99, Paragraph 5; Page 100, Paragraph 1:

The turbidity problem in the Russian River is not being studied as part of the Potter Valley Fisheries Study. Although, to our knowledge, there are no parties currently studying this problem, previous studies have been conducted. Two sources of turbidity information for the Russian River are: "Turbidity and Suspended Sediment Transport in the Russian River Basin, California," J.R. Ritter and W.M. Brown, USGS, 1971, and "Application for Certificate of Conformance with Water Quality Standards, Potter Valley Project" by P G and E, filed with the California Regional Water Quality Control Board, North Coast Region, in September, 1978. Should you wish to review these studies and are unable to obtain copies, please contact us.

Page 37, Paragraph 6; Page 39, Paragraph 1-3; Page 4, Paragraph 4:

Operation of the Potter Valley Project has increased flows in the Russian River since 1907. No mention is made concerning the beneficial effects that these flows have had on fisheries habitat in the Russian River.

9-2

Page 39, Paragraph 5:

9-3 Data from our Potter Valley Fisheries Study does not "suggest that up to 80 percent of the spawning salmon used tributary streams as opposed to the mainstem." In fact, our data indicate that the mainstem is probably used more heavily than tributary streams.

COMMENT LETTER 9

If you have any questions regarding these comments, please, call Polly Boissevain, of my staff, at 781-4211, Extension 3077.

Sincerely,

COMMENT LETTER 9. Pacific Gas and r

9-1 Issue: Turbidity In the Russian River

The Misunderstanding regarding investigation of turbidity in the Russian River during the Potter Valley Fisheries Study has been corrected in the Final Report (Sections II.C.3.a. and III.C.1.).

9-2 Issue: Eel River Diversions

Section II.C.3.a. of the Final Report has been changed to mention the likelihood that the Eel River diversions made more spawning and nursery habitat available in the east fork of the Russian River and the mainstem downstream of the confluence.

9-3 Issue: Potter Valley Fisheries Study

Section II.C.3.a. of the Final Report has been changed to correct this error.

COMMENT LETTER 10

DUNCAN MILLS CALIFORNIA
February 6, 1981

Paul Bazilwich, Jr., Colonel
U.S. Army Corps of Engineers
San Francisco District
ATTN: SPNED-PW (Russian River)
211 Main Street
San Francisco, CA 94105

Dear Sir:

10-1 Concerning your Draft Report of the Russian River Area Basin Study... generally, it is well done. Our compliments!

However, we question your conclusion concerning the mouth of the River. On page 118 of the draft report it reads:

"Construction or structural improvements providing year around safe passage through the mouth of the Russian River has not been proven to be in the Federal interest. Improving fish passage through the preservation of an open channel entrance would have little or no effect on the Russian River Fishery. Therefore, no further studies of maintaining year around free passage through the mouth of the river are necessary at the Federal level at this time."

Agreed, there are many determining factors involved with fish migration. But to conclude that a closed river mouth has "little or no effect" on fishery we believe requires more study!

We, the Russian River Sportsmen's Club, Inc., ask that a new study of the river mouth be initiated for the 1981 fiscal year.

Sincerely,

Darrell E. Sukovitzen
President, Russian River Sportsmen's Club, Inc.

Executive Committee: Margaret Porter, Jay Ryan, Dorothy Watson, Bill Porter

Board of Directors: Russ Watson, David Waterman, Linda Pallari, Donnie Fecteau, Russ Zechiedrich, Jay Dry, Paul Fecteau

Representing all the members of the R.R.S.C., Inc.

RESPONSE LETTFR 10

COMMENT LETTER 10. Russian River

10-1 Issue: Mouth of the Russian River

The mouth of the Russian River may not always provide adequate fish passage. However, the Corps is of the opinion that addressing this issue would be inadvisable at the present time because of serious economic and environmental considerations. Given the rising costs of materials and labor, it is highly unlikely construction and maintenance of a year-around open channel at the mouth would be economically feasible. Keeping the mouth open would also raise major environmental questions, considering the nature of the off-shore structures that would be required and their potential impacts on the Russian River estuary.

COMMENT LETTER 11

Sonoma County TOMORROW

p. o. box 3121 ♦ santa rosa ♦ california 95402

February 7, 1981

Col. Paul Bazilwich, Jr., District Engineer Corps of Engineers 211 Main Street San Francisco, CA 94105

Dear Col. Bazilwich

The Russian River Basin Study serves a valuable purpose by furnishing background data and focusing attention on unresolved problems in the Russian River area.

The most serious problem pointed out in the study is degredation of the fishery from the construction of summer dams. Most of these dams are on the tributaries, where fish habitat is located. Which of these dams should be eliminated and alternative operations of those allowed to remain should receive immediate attention by the Sonoma County Water Agency Board of Directors/Board of Supervisors, with public hearings. Also the operation of snail dams on the win river, such as Healdsburg Dam and Wohler.

A serious problem not discussed in the report on the Corps' study is the completely unregulated and unregistered water diversions from both the Russian River main stem and its tributaries. These 11-1 diversions (some or many without a permit?) are reducing the habitat for fish and could cause water shortages in the event of a drought, or early triggering of Warm Springs Dam water. The diversions need to be measured and regulated. This matter also should receive attention from the SCWA/Bd. of Supervisors.

Although the Corps postpones correction of turbidity in the Russian River from diversions from the Eel until the enlargement of Coyote Dam is studied, the source of this turbidity should be recognized and action started to correct the problem — poorly constructed roads along Corbin Creek in the Eel River drainage for timbering.

Coordination of releases from Coyote Dam and Warm Springs Dam to ensure adequate water in the middle reaches of the Russian River seems to be progressing satisfactorily between SCWA and Fish and Game. However, we believe there should be public review of any proposed agreement (or alternatives) before a contract is signed.

A large interested public is concerned about the management of the Russian River resources and full public involvement is warranted in correcting the past problems. Sonoma County Tomorrow is one of these groups long Involved in water resource issues. We appreciate the opportunity to comment on the Corps' Basin Study and hope the Board of Directors of the Water Agency and Corps will follow up to correct present problems, with interested groups and persons Informed and given the opportunity to participate.

Sincerely, Iva Warner

Iva Warner, Executive Director

copies to: SCWA and *FK*

RESPONSE LETTER 11

COMMENT LETTER 11. Sonoma County Tomorrow

11-1 Issue: Unregistered and Eel River Diversions

A discussion of the problem of unmetered unregistered water diversions in the Russian River basin has been added to Section II.C.6.a. of the Final Report. Section III.C.1. of the Final Report has been changed to include a discussion of land use practices above Lake Pillsbury.

COMMENT LETTER 12

Final Public Meeting Attendees

The following comments were paraphrased from statements made at the final public meeting on the Northern California Streams Investigation - Russian River Basin Study. The meeting was held on January 8, 1981 in Santa Rosa, California. The complete transcript of these statements is included in the Northern California Streams Investigation - Russian River Basin Study Record of Public Meeting: January 8, 1981. This document was published separately by the Corps of Engineers San Francisco District and released in August 1981.

The purpose of this meeting was to discuss the draft final report on the study and to receive public comments. The attendees to the meeting raised several questions regarding the study. Some of these were answered at the meeting while others are included in the correspondence discussed elsewhere in this appendix. The following comments were not specifically addressed at the meeting and did not appear in written statements reproduced in this appendix.

William Johnson, Citizens for Community Improvement

12-1 The Russian River Basin Study did not adequately address the issue of bank stabilization problems along the Russian River, including areas [illegible] bank works have degraded.

12-2 Sedimentation at the mouth of the Russian River... meandering and bank erosion along the Russian River estuary. Therefore the channel through the mouth is not always adequate in terms of flow capacity.

Lyle Maritzen, Monte Rio Recreation and Park District

12-3 The Final Report on the Russian River Basin Study should include a discussion of the optimal design of a summer dam and an associated fish passage device.

Iva Warner, Sonoma County Tomorrow

12-4 The final report should include discussion of turbidity problems in the Russian River due to the design of Coyote Dam and diversions of turbid Eel River water into the east fork of the Russian River. The final report should also assess the fishery in the tributaries of the Russian River.

COMMENTS: Final Public Meeting Attendees

12-1 Issue: Bank Stabilization

See response to Comment No. 5-2.

12-2 Issue: Mouth of the Russian River

The mouth of the Russian River may not always provide a channel adequate to prevent flooding, meandering and bank erosion along the Russian River estuary. However, the Corps is of the opinion that addressing this issue is inadvisable at the present time (see the response to Comment No. 10-1).

12-3 Issue: Summer Dam Design

Information on the design of these structures would best be obtained from the appropriate State and Federal agencies with expertise in fish and wildlife management in the Russian River basin. These include the California Department of Fish and Game and the U.S. Fish and Wildlife Service.

12-4 Issue: Russian River Turbidity and Tributary Fish Habitat

[illegible] noted in Sections II.C.3.a. and III.C.1. of the Draft and Final reports. It is noted in Sections II.C.3.a. and III.C.1. that should any studies be done on expanding Lake Mendocino, consideration will be given to installing a multiple outlet structure at Coyote Dam to reduce turbid water discharges. Section III.C.1. of the final report has also been amended to include a discussion of land use practices above Lake Pillsbury.

The importance of fish habitat in the tributaries to the Russian River is recognized in Sections II.C.3.a., II.C.4.a. and III.B.6. of the Draft and Final reports. For a discussion of why fish habitat in the Russian River tributaries was not studied in more detail during the Basin Study, see the response to Comment No. 4-6.

Streams Investigation

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street,
Room 1216, San Francisco, California 94111 21 April 1982

TO: CDR USACE (DAEN-CWP) WASH DC 20314

I concur in the conclusions and recommendations of the District Commander.

HOMER JOHNSTONE
Brigadier General, USA
Commanding

Mendocino County Water Agency
Courthouse
Ukiah CA 95482
(707)463-4589