

Appendix B

Reach Specific Habitat Inventories

Shasta Dam Fish Passage Evaluation



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Table B-1. Aerial Videography Coverage and Quality for Aquatic Habitat in the Sacramento and McCloud Rivers and their Tributaries Above Shasta Lake Collected for the Shasta Fish Passage Evaluation during November 2013

Date	Stream	Video File Segment	Video Quality Rating	Comments
11/23/2013	Sacramento	Dog Creek to Slate Creek (RM 1.0-4.5)	Fair-Good	Can readily identify substrate composition and habitat types. Stream banks and channel features clear with limited shadows.
11/23/2013	Sacramento	Slate Creek to North Salt Creek (RM 4.5-7.2)	Good	Can readily identify substrate composition and habitat types. Stream banks and channel features clear with limited shadows or vegetative cover.
11/23/2013	Sacramento	North Salt Creek to Shotgun Creek (RM 7.2-13.3)	Good	Can readily identify substrate composition and habitat types. Stream banks and channel features clear with limited shadows or vegetative cover. Some loss of habitat detail, particularly around tight bends for portions of channel not visible.
11/23/2013	Sacramento	Shotgun Creek to Hazel Creek (RM 13.3-14.5)	Good	Can readily identify substrate composition and habitat types. Stream banks and channel features clear with limited shadows or vegetative cover. Some loss of habitat detail, particularly around tight bends for portions of channel not visible.
11/23/2013	Sacramento	Hazel Creek to Castle Creek (RM 14.5-22.2)	Good	Complete video coverage of the river channel and both stream banks becomes increasingly intermittent in this segment due to increasing shadows and vegetative cover. Decreased ability to distinguish substrates, but able to readily discern habitat types (rearing/holding habitats) and most key habitat features.
11/23/2013	Sacramento	Castle Creek to Soda Creek (RM 22.2-24.5)	Good-Fair	Complete video coverage of the river channel and both stream banks becomes increasingly intermittent in this segment due to increasing shadows, vegetative cover and channel sinuosity. Decreased ability to distinguish substrates, but able to readily discern habitat types (rearing/holding habitats) and most key habitat features.
11/23/2013	Sacramento	Soda Creek to Mossbrae Falls (RM 24.5-34.0)	Fair	Video coverage of the river channel and both stream banks generally intermittent in this segment due to increasing shadows and vegetative

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Date	Stream	Video File Segment	Video Quality Rating	Comments
				cover. Decreased ability to distinguish some key habitat features particularly where canopy cover increases along with shadows to limit clear views of the channel.

Table B-1. Aerial Videography Coverage and Quality for Aquatic Habitat in the Sacramento and McCloud Rivers and their Tributaries Above Shasta Lake Collected for the Shasta Fish Passage Evaluation during November 2013 (contd.)

Date	Stream	Video File Segment	Video Quality Rating	Comments
11/23/2013	Sacramento	Mossbrae Falls to Box Canyon Dam (RM 34.0-37.0)	Fair-Poor	Video coverage of the river channel and both stream banks generally intermittent in this segment due to increasing shadows and vegetative cover. Decreased ability to distinguish some key habitat features particularly where canopy cover increases along with shadows to limit clear views of the channel. Increased elevation and air speed also contribute to difficulty in seeing more specific habitat features in this reach.
11/23/2013	Slate Creek	Slate Creek DS	Fair	Video coverage from diversion structure to Sacramento River confluence is fair. Aircraft elevation above ground and speed coupled with moderate canopy cover provide moderate coverage of habitat. Sufficient quality to identify most key habitat features along most of the section flown.
11/23/2013	Hazel Creek	Hazel Creek	Poor	Visibility of stream channel highly limited by shadows and vegetation and is of insufficient quality to assess habitat features.
11/24/2014	McCloud	Nawtawacket Creek to above Chatterdown Creek (RM 0.0-3.7)	Good	Can readily identify substrate composition and habitat types. Stream banks and channel features clear with limited shadows or vegetative cover. Some loss of habitat detail, particularly around tight bends for portions of channel not visible.
11/24/2014	McCloud	Above Chatterdown Creek to Squaw Valley Creek (RM 3.7-9.5)	Good	Can readily identify substrate composition and habitat types. Stream banks and channel features clear with limited shadows or vegetative cover. Some loss of habitat detail, particularly around

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Date	Stream	Video File Segment	Video Quality Rating	Comments
				tight bends for portions of channel not visible.
11/24/2014	McCloud	Squaw Valley Creek to Claiborne Creek (RM 9.5-11.5)	Good-Fair	Complete video coverage of the river channel and both stream banks becomes increasingly intermittent in this segment due to increasing shadows and vegetative cover. Decreased ability to distinguish substrates, but able to readily discern habitat types (rearing/holding habitats) and most key habitat features. Smaller habitat features and detail less distinguishable due to shadows. Difficult to see size and extents of alluvial deposits (e.g. downstream of Claiborne). Some difficulty in evaluating depth-complexity of pocket/flatwater habitats.

Table B-1. Aerial Videography Coverage and Quality for Aquatic Habitat in the Sacramento and McCloud Rivers and their Tributaries Above Shasta Lake Collected for the Shasta Fish Passage Evaluation during November 2013 (contd.)

Date	Stream	Video File Segment	Video Quality Rating	Comments
11/24/2014	McCloud	Claiborne Creek to Ah Di Na campground (RM 11.5-19.8)	Fair	Increasingly intermittent channel and bank coverage in this segment due to increasing shadows and vegetative cover. Decreased ability to distinguish substrates, but able to readily discern habitat types (rearing/holding habitats) and most key habitat features. Smaller habitat features and detail less distinguishable due to shadows. Difficult to see size and extents of alluvial deposits. Some difficulty in evaluating depth-complexity of pocket/flatwater habitats.
11/24/2014	McCloud	Ah-Di-Na campground to McCloud Dam (RM 19.8-23.2)	Fair	Aircraft elevation above ground and speed coupled with moderate canopy cover provide moderate coverage of habitat. Decreased ability to distinguish substrates, but able to readily discern most habitat types (rearing/holding habitats) and most key habitat features. Smaller habitat features and detail less distinguishable due to shadows. Difficult to see size and extents of alluvial deposits. Some difficulty in

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Date	Stream	Video File Segment	Video Quality Rating	Comments
				evaluating depth-complexity of pocket/flatwater habitats.
11/24/2014	McCloud	McCloud Reservoir to Big Springs (RM 29.0-34.0)	Good-Fair	Video is sufficient quality to identify most habitat units, but key features difficult to identify along much of the reach due to narrower channel and more extensive canopy cover. Wider and straighter reaches have the best coverage.
11/24/2014	McCloud	Big Springs to Lower Falls (RM 34.0-36.0)	Fair	Video is sufficient quality to identify most habitat units, but key features difficult to identify along much of the reach due to narrower channel and more extensive canopy cover.
11/24/2014	Squaw Valley Creek	Lower few miles Squaw Valley Creek	Fair	Much of channel occluded by large trees, but habitat composition is generally discernable in more open areas, particularly closer to the McCloud confluence. Insufficient quality to pick out finer habitat attributes.
11/24/2014	Claiborne Creek	Claiborne Creek	Poor	Dense vegetation and shadows preclude a clear view of much of the channel – little habitat data can be identified from the video.

Table B-2. Aquatic Habitat Inventory of Channel Morphometry Parameters, by Study Reach, Derived from Representative Ground Survey Sites in the Upper Sacramento River between Shasta Lake and Box Canyon Dam

Study Reach	% of entire reach length covered by ground survey sites	Habitat Type				Channel Widths			Channel Depths			Gradient (%) (mean $\pm$ s.e.)
		Habitat type	Number of units	Aggregate total length (m)	Percent of total habitat surveyed	Baseflow wetted width (m) (mean $\pm$ s.e.)	OHWM width (m) (mean $\pm$ s.e.)	Bankfull width (m) (mean $\pm$ s.e.)	Baseflow depth (m) (mean $\pm$ s.e.)	OHWM depth (m) (mean $\pm$ s.e.)	Baseflow max depth (m) (mean $\pm$ s.e.)	
Box Canyon (RM 37.0-34.0)	27%	RIF	3	602.6	47%	14.3 $\pm$ 2.1	24.7 $\pm$ 14.3	36.6 $\pm$ 5.0	0.4 $\pm$ 0.1	0.9 $\pm$ 0.2	1.7 $\pm$ 0.4	2.5 $\pm$ 0.1
		CAS	2	89.6	7%	14.6 $\pm$ 0.0	20.9 $\pm$ 14.8	25.0 $\pm$ 4.3	0.8 $\pm$ 0.1	1.1 $\pm$ 0.1	1.9 $\pm$ 0.1	3.5 $\pm$ 0.3
		POW	2	246.0	19%	19.1 $\pm$ 0.2	23.3 $\pm$ 16.5	31.5 $\pm$ 3.2	0.6 $\pm$ 0.1	1.1 $\pm$ 0.1	1.7 $\pm$ 0.2	1.5 $\pm$ 0.2
		RUN	1	137.2	11%	14.6 $\pm$ 0.0	22.9 $\pm$ 0.0	26.2 $\pm$ 0.0	0.8 $\pm$ 0.0	0.8 $\pm$ 0.0	1.4 $\pm$ 0.0	0.3 $\pm$ 0.0
		GLI	0	-	-	-	-	-	-	-	-	-
		LSP	5	208.2	16%	14.6 $\pm$ 1.8	22.4 $\pm$ 10.0	30.2 $\pm$ 4.4	1.2 $\pm$ 0.1	2.0 $\pm$ 0.2	2.7 $\pm$ 0.2	0.4 $\pm$ 0.0
		MCP	0	0.0	0%	-	-	-	-	-	-	-
		TOTAL	13	1,283.5	100%	15.2$\pm$0.9	22.9$\pm$6.3	30.8$\pm$2.2	0.8$\pm$0.1	1.4$\pm$0.2	2.1$\pm$0.2	0.5$\pm$0.1
Mossbrae (RM 34.0-30.0)	14%	RIF	4	663.9	63%	16.3 $\pm$ 4.6	28.6 $\pm$ 14.3	31.5 $\pm$ 3.0	0.5 $\pm$ 0.0	0.7 $\pm$ 0.0	1.5 $\pm$ 0.1	0.8 $\pm$ 0.1
		CAS	0	0.0	0%	-	-	-	-	-	-	-
		POW	4	123.4	24%	16.1 $\pm$ 1.7	23.5 $\pm$ 11.8	29.5 $\pm$ 0.6	0.6 $\pm$ 0.0	0.9 $\pm$ 0.0	1.6 $\pm$ 0.1	0.2 $\pm$ 0.0
		RUN	0	-	-	-	-	-	-	-	-	-
		GLI	1	120.7	11%	21.0 $\pm$ 0.0	31.1 $\pm$ 0.0	37.5 $\pm$ 0.0	0.6 $\pm$ 0.0	1.0 $\pm$ 0.0	1.7 $\pm$ 0.0	0.6 $\pm$ 0.0
		LSP	0	-	-	-	-	-	-	-	-	-
		MCP	1	18.3	2%	17.7 $\pm$ 0.0	30.5 $\pm$ 0.0	33.2 $\pm$ 0.0	0.7 $\pm$ 0.0	1.2 $\pm$ 0.0	1.5 $\pm$ 0.0	0.1 $\pm$ 0.0
		TOTAL	10	926.3	100%	16.8$\pm$1.9	27.0$\pm$8.5	31.5$\pm$1.5	0.6$\pm$0.0	0.9$\pm$0.1	1.6$\pm$0.1	0.5$\pm$0.1

Table B-2. Aquatic Habitat Inventory of Channel Morphometry Parameters, by Study Reach, Derived from Representative Ground Survey Sites in the Upper Sacramento River between Shasta Lake and Box Canyon Dam (contd.)

Study Reach	% of entire reach length covered by ground survey sites	Habitat Type				Channel Widths			Channel Depths			Gradient (%) (mean $\pm$ s.e.)
		Habitat type	Number of units	Aggregate total length (m)	Percent of total habitat surveyed	Baseflow wetted width (m) (mean $\pm$ s.e.)	OHW width (m) (mean $\pm$ s.e.)	Bankfull width (m) (mean $\pm$ s.e.)	Baseflow depth (m) (mean $\pm$ s.e.)	OHW depth (m) (mean $\pm$ s.e.)	Baseflow max depth (m) (mean $\pm$ s.e.)	
Dunsmuir (RM 30.0-24.5)	16%	RIF	4	772.7	54%	16.5 $\pm$ 1.6	18.9 $\pm$ 9.4	22.4 $\pm$ 1.9	0.5 $\pm$ 0.0	0.7 $\pm$ 0.0	1.4 $\pm$ 0.1	0.5 $\pm$ 0.1
		CAS	1	38.4	3%	13.7 $\pm$ 0.0	18.3 $\pm$ 0.0	21.3 $\pm$ 0.0	0.6 $\pm$ 0.0	1.2 $\pm$ 0.0	2.0 $\pm$ 0.0	1.5 $\pm$ 0.0
		POW	0	-	-	-	-	-	-	-	-	-
		RUN	3	434.9	30%	16.5 $\pm$ 0.7	20.2 $\pm$ 11.7	23.5 $\pm$ 3.0	0.7 $\pm$ 0.0	0.9 $\pm$ 0.1	1.6 $\pm$ 0.2	0.2 $\pm$ 0.0
		GLI	0	-	-	-	-	-	-	-	-	-
		LSP	2	117.3	8%	17.8 $\pm$ 1.4	19.8 $\pm$ 14.0	26.4 $\pm$ 2.0	1.0 $\pm$ 0.4	1.7 $\pm$ 0.4	2.4 $\pm$ 0.5	0.1 $\pm$ 0.0
		MCP	1	68.3	5%	15.5 $\pm$ 0.0	17.4 $\pm$ 0.0	18.3 $\pm$ 0.0	1.2 $\pm$ 0.0	1.7 $\pm$ 0.0	2.5 $\pm$ 0.0	0.1 $\pm$ 0.0
		TOTAL	11	1,431.6	100%	16.4$\pm$0.7	19.1$\pm$5.8	22.9$\pm$1.1	0.7$\pm$0.1	1.1$\pm$0.1	1.8$\pm$0.2	0.4$\pm$0.1
Canyon (RM 24.5-15.5)	17%	RIF	11	1,659.3	68%	21.7 $\pm$ 1.8	32.5 $\pm$ 9.8	38.2 $\pm$ 1.8	0.4 $\pm$ 0	0.8 $\pm$ 0.1	1.6 $\pm$ 0.2	0.7 $\pm$ 0.1
		CAS	0	-	-	-	-	-	-	-	-	-
		POW	6	421.2	17%	21.2 $\pm$ 1.0	28.8 $\pm$ 11.8	41.7 $\pm$ 1.0	0.6 $\pm$ 0.1	1.2 $\pm$ 0.1	1.9 $\pm$ 0.1	0.5 $\pm$ 0.0
		RUN	0	-	-	-	-	-	-	-	-	-
		GLI	0	-	-	-	-	-	-	-	-	-
		LSP	5	353.3	15%	20.1 $\pm$ 2.6	29.4 $\pm$ 13.2	39.7 $\pm$ 4.1	0.9 $\pm$ 0.1	1.9 $\pm$ 0.1	2.4 $\pm$ 0.3	0.1 $\pm$ 0.0
		MCP	0	-	-	-	-	-	-	-	-	-
		TOTAL	22	2,433.8	100%	21.5$\pm$1.1	30.9$\pm$6.6	38.8$\pm$1.5	0.6$\pm$0.0	1.2$\pm$0.1	1.8$\pm$0.1	0.5$\pm$0.1

Table B-2. Aquatic Habitat Inventory of Channel Morphometry Parameters, by Study Reach, Derived from Representative Ground Survey Sites in the Upper Sacramento River between Shasta Lake and Box Canyon Dam (contd.)

Study Reach	% of entire reach length covered by ground survey sites	Habitat Type				Channel Widths			Channel Depths			Gradient (%) (mean $\pm$ s.e.)
		Habitat type	Number of units	Aggregate total length (m)	Percent of total habitat surveyed	Baseflow wetted width (m) (mean $\pm$ s.e.)	OHWL width (m) (mean $\pm$ s.e.)	Bankfull width (m) (mean $\pm$ s.e.)	Baseflow depth (m) (mean $\pm$ s.e.)	OHWL depth (m) (mean $\pm$ s.e.)	Baseflow max depth (m) (mean $\pm$ s.e.)	
Shotgun (RM 15.5-7.2)	14%	RIF	5	742.2	45%	19.4 $\pm$ 3.3	35.7 $\pm$ 16.0	46.0 $\pm$ 4.2	0.6 $\pm$ 0.0	0.9 $\pm$ 0.1	1.9 $\pm$ 0.2	0.6 $\pm$ 0.1
		CAS	0	-	-	-	-	-	-	-	-	-
		POW	5	742.2	45%	19.4 $\pm$ 1.0	35.7 $\pm$ 15.9	46.0 $\pm$ 4.1	0.6 $\pm$ 0.1	0.9 $\pm$ 0.2	1.9 $\pm$ 0.4	0.6 $\pm$ 0.0
		RUN	2	300.5	18%	25.6 $\pm$ 1.8	41.6 $\pm$ 29.4	50.3 $\pm$ 2.1	0.9 $\pm$ 0.2	1.4 $\pm$ 0.7	2.7 $\pm$ 0.4	0.1 $\pm$ 0.0
		GLI	0	-	-	-	-	-	-	-	-	-
		LSP	2	131.7	8%	28.3 $\pm$ 8.2	40.2 $\pm$ 28.4	53.2 $\pm$ 9.0	1.2 $\pm$ 0.3	3.1 $\pm$ 1.5	3.7 $\pm$ 1.8	0.1 $\pm$ 0.0
		MCP	0	-	-	-	-	-	-	-	-	-
		TOTAL	14	1,916.6	100%	21.7$\pm$1.7	37.2$\pm$9.9	48.2$\pm$2.5	0.8$\pm$0.1	1.4$\pm$0.3	2.4$\pm$0.3	0.4$\pm$0.1
North Salt (RM 7.2-0.2)	18%	RIF	5	500.2	25%	30.4 $\pm$ 3.7	44.7 $\pm$ 20.0	51.9 $\pm$ 6.3	0.6 $\pm$ 0.1	1.0 $\pm$ 0.1	1.9 $\pm$ 0.2	0.7 $\pm$ 0.1
		CAS	0	-	-	-	-	-	-	-	-	-
		POW	6	969.9	49%	25.4 $\pm$ 2.7	36.1 $\pm$ 14.7	47.3 $\pm$ 5.2	1.0 $\pm$ 0.1	1.5 $\pm$ 0.1	2.4 $\pm$ 0.1	0.2 $\pm$ 0.0
		RUN	1	99.7	5%	35.7 $\pm$ 0.0	44.8 $\pm$ 0.0	48.8 $\pm$ 0.0	2.0 $\pm$ 0.0	4.1 $\pm$ 0.0	5.1 $\pm$ 0.0	0.1 $\pm$ 0.0
		GLI	0	-	-	-	-	-	-	-	-	-
		LSP	1	64.9	3%	24.7 $\pm$ 0.0	27.7 $\pm$ 0.0	30.5 $\pm$ 0.0	1.5 $\pm$ 0.0	3.2 $\pm$ 0.0	4.0 $\pm$ 0.0	0.1 $\pm$ 0.0
		MCP	3	363.9	18%	25.9 $\pm$ 5.0	28.9 $\pm$ 16.7	33.5 $\pm$ 5.8	2.4 $\pm$ 0.4	3.3 $\pm$ 0.2	4.4 $\pm$ 0.2	0.1 $\pm$ 0.0
		TOTAL	16	1,998.6	100%	27.7$\pm$1.8	37.5$\pm$9.4	45.2$\pm$3.3	1.3$\pm$0.2	1.9$\pm$0.3	2.8$\pm$0.3	0.3$\pm$0.1

Key:
 % = percent
 "-" = no data available
 CAS = cascade
 GLI = glide
 LSP = lateral scour pool
 m = meter

MCP = main channel pool
 OHWL = ordinary high water stage
 POW = pocketwater
 RIF = riffle
 RM = river mile
 RUN = run
 s.e. = standard error of the mean

Table B-3. Aquatic Habitat Inventory of Channel Morphometry Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper Sacramento River between Shasta Lake and Box Canyon Dam

Study reach	Habitat Type				Channel Widths			Count of Mean Channel Depths at Baseflow				Count of Maximum Channel Depths at Baseflow				Gradient (%) ^a
	Habitat type	Number of units	Aggregate total length (m)	Percent of total reach	Baseflow wetted width (m) (mean $\pm$ s.e.)	OHWM width (m) (mean $\pm$ s.e.)	Bankfull width (m) (mean $\pm$ s.e.)	0.5 – 1.0 m	1.0 – 2.0 m	2.0 – 3.0 m	> 3.0 m	0.5 – 1.0 m	1.0 – 2.0 m	2.0 – 3.0 m	> 3.0 m	
Box Canyon (RM 37.0-34.0)	RIF	15	1,167.4	27%	15.9 $\pm$ 1.0	25.2 $\pm$ 4.7	32.5 $\pm$ 4.3	15	0	0	0	15	0	0	0	1.71
	CAS	3	226.5	5%	14.4 $\pm$ 2.0	20.3 $\pm$ 1.3	23.7 $\pm$ 1.8	3	0	0	0	3	0	0	0	1.71
	POW	9	807.4	18%	16.4 $\pm$ 0.5	22.5 $\pm$ 2.2	28.2 $\pm$ 2.6	9	0	0	0	9	0	0	0	1.71
	RUN	1	146.3	3%	18.6 $\pm$ 0.0	24.1 $\pm$ 0.0	29.0 $\pm$ 0.0	1	0	0	0	0	1	0	0	1.71
	GLI	5	859.5	20%	15.2 $\pm$ 1.0	19.6 $\pm$ 1.2	24.7 $\pm$ 3.4	5	0	0	0	5	0	0	0	1.71
	LSP	9	713.5	16%	15.6 $\pm$ 1.4	23.5 $\pm$ 2.4	29.3 $\pm$ 3.9	0	8	1	0	0	4	3	2	1.71
	MCP	5	461.5	11%	16.0 $\pm$ 1.2	20.4 $\pm$ 1.5	25.4 $\pm$ 3.1	0	5	0	0	0	3	2	0	1.71
	TOTAL	47	4,382.1	100%	15.8$\pm$0.5	22.9$\pm$3.4	28.8$\pm$3.7	33	13	1	0	32	8	5	2	1.71
Mossbrae (RM 34.0-30.0)	RIF	25	3,614.3	53%	20.0 $\pm$ 0.8	24.5 $\pm$ 2.3	29.7 $\pm$ 2.8	25	0	0	0	24	1	0	0	1.15
	CAS	1	91.4	1%	14.9 $\pm$ 0.0	21.0 $\pm$ 0.0	24.4 $\pm$ 0.0	1	0	0	0	1	0	0	0	1.15
	POW	9	1,353.6	19%	18.9 $\pm$ 0.4	22.7 $\pm$ 1.6	25.7 $\pm$ 1.6	9	0	0	0	8	1	0	0	1.15
	RUN	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GLI	4	565.1	8%	19.4 $\pm$ 1.5	22.5 $\pm$ 1.7	24.8 $\pm$ 2.0	4	0	0	0	3	1	0	0	1.15
	LSP	9	913.5	13%	16.0 $\pm$ 1.2	20.6 $\pm$ 2.2	26.6 $\pm$ 3.4	0	9	0	0	0	6	3	0	1.15
	MCP	5	434.9	6%	16.0 $\pm$ 0.4	19.3 $\pm$ 0.7	23.0 $\pm$ 1.9	0	5	0	0		3	2	0	1.15
	TOTAL	53	6,972.8	100%	18.6$\pm$0.5	22.8$\pm$2.2	27.4$\pm$2.8	39	14	0	0	36	12	5	0	1.15
Dunsmuir (RM 30.0-24.5)	RIF	32	3,913.0	42%	17.0 $\pm$ 0.6	23.3 $\pm$ 4.8	30.5 $\pm$ 3.8	32	0	0	0	32	0	0	0	1.15
	CAS	1	75.0	1%	13.1 $\pm$ 0.0	18.0 $\pm$ 0.0	20.4 $\pm$ 0.0	1	0	0	0	0	1	0	0	1.15
	POW	25	4,094.7	44%	16.5 $\pm$ 0.8	28.4 $\pm$ 7.5	34.9 $\pm$ 5.1	25	0	0	0	25	0	0	0	1.15
	RUN	1	123.4	1%	25.6 $\pm$ 0.0	29.3 $\pm$ 0.0	36.3 $\pm$ 0.0	1	0	0	0	0	1	0	0	1.15
	GLI	1	67.1	1%	18.9 $\pm$ 0.0	22.3 $\pm$ 0.0	27.4 $\pm$ 0.0	1	0	0	0	1	0	0	0	1.15
	LSP	12	959.8	9%	16.8 $\pm$ 1.0	21.4 $\pm$ 2.2	27.9 $\pm$ 3.2	0	12	0	0	0	6	6	0	1.15
	MCP	2	177.7	2%	16.5 $\pm$ 2.4	33.2 $\pm$ 11.8	42.4 $\pm$ 6.5	0	2	0	0	0	1	1	0	1.15
	TOTAL	74	9,410.7	100%	17.0$\pm$0.4	25.3$\pm$5.8	32.3$\pm$4.5	60	14	0	0	58	9	7	0	1.15

Table B-3. Aquatic Habitat Inventory of Channel Morphometry Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper Sacramento River between Shasta Lake and Box Canyon Dam (contd.)

Study reach	Habitat Type				Channel Widths			Count of Mean Channel Depths at Baseflow				Count of Maximum Channel Depths at Baseflow				Gradient (%) ^a
	Habitat type	Number of units	Aggregate total length (m)	Percent of total reach	Baseflow wetted width (m) (mean $\pm$ s.e.)	OHWM width (m) (mean $\pm$ s.e.)	Bankfull width (m) (mean $\pm$ s.e.)	0.5 – 1.0 m	1.0 – 2.0 m	2.0 – 3.0 m	> 3.0 m	0.5 – 1.0 m	1.0 – 2.0 m	2.0 – 3.0 m	> 3.0 m	
Canyon (RM 24.5-15.5)	RIF	46	6,193.5	43%	19.5 $\pm$ 0.9	27.4 $\pm$ 3.4	37.6 $\pm$ 4.7	46	0	0	0	43	3	0	0	0.85
	CAS	1	114.3	1%	8.2 $\pm$ 0.0	14.9 $\pm$ 0.0	25.3 $\pm$ 0.0	0	1	0	0	0	0	1	0	0.85
	POW	23	3,883.2	27%	19.7 $\pm$ 0.6	24.0 $\pm$ 2.3	30.9 $\pm$ 3.4	23	0	0	0	16	7	0	0	0.85
	RUN	1	132.6	1%	20.4 $\pm$ 0.0	28.7 $\pm$ 0.0	43.6 $\pm$ 0.0	0	1	0	0	0	1	0	0	0.85
	GLI	1	210.3	1%	23.5 $\pm$ 0.0	27.7 $\pm$ 0.0	33.5 $\pm$ 0.0	1	0	0	0	0	1	0	0	0.85
	LSP	22	2,361.6	16%	19.2 $\pm$ 1.1	26.3 $\pm$ 2.4	37.4 $\pm$ 5.5	0	22	0	0	0	7	15	0	0.85
	MCP	9	1,611.8	11%	18.5 $\pm$ 1.5	24.5 $\pm$ 2.0	33.0 $\pm$ 3.1	0	9	0	0	0	2	7	0	0.85
	TOTAL	103	14,507.3	100%	19.2$\pm$0.6	26.1$\pm$3.1	35.7$\pm$4.7	70	33	0	0	59	21	23	0	0.85
Shotgun (RM 15.5-7.2)	RIF	42	5,211.8	39%	20.5 $\pm$ 0.8	35.5 $\pm$ 4.1	50.6 $\pm$ 4.4	42	0	0	0	39	3	0	0	0.85
	CAS	3	254.5	2%	16.2 $\pm$ 7.1	33.2 $\pm$ 2.5	51.4 $\pm$ 2.3	1	2	0	0	0	3	0	0	0.85
	POW	11	1,718.2	12%	25.9 $\pm$ 1.7	36.5 $\pm$ 2.5	49.5 $\pm$ 4.2	11	0	0	0	10	1	0	0	0.85
	RUN	5	574.5	4%	26.0 $\pm$ 3.7	36.2 $\pm$ 2.6	51.4 $\pm$ 5.2	3	2	0	0	1	4	0	0	0.85
	GLI	3	613.9	4%	20.2 $\pm$ 6.7	38.3 $\pm$ 1.1	49.9 $\pm$ 1.3	3	0	0	0	1	2	0	0	0.85
	LSP	25	2,761.2	20%	21.9 $\pm$ 1.2	33.6 $\pm$ 3.1	49.0 $\pm$ 5.3	0	18	7	0	0	2	14	9	0.85
	MCP	12	2,620.7	19%	20.7 $\pm$ 1.4	29.5 $\pm$ 2.4	40.6 $\pm$ 3.1	0	8	4	0	0	0	6	6	0.85
	TOTAL	101	13,754.8	100%	21.6$\pm$0.6	34.5$\pm$3.2	48.9$\pm$4.5	60	30	11	0	51	15	20	15	0.85

Table B-3. Aquatic Habitat Inventory of Channel Morphometry Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper Sacramento River between Shasta Lake and Box Canyon Dam (contd.)

Study reach	Habitat Type				Channel Widths			Count of Mean Channel Depths at Baseflow				Count of Maximum Channel Depths at Baseflow				Gradient (%) ^a
	Habitat type	Number of units	Aggregate total length (m)	Percent of total reach	Baseflow wetted width (m) (mean ±s.e.)	OHWM width (m) (mean ±s.e.)	Bankfull width (m) (mean ±s.e.)	0.5 – 1.0 m	1.0 – 2.0 m	2.0 – 3.0 m	> 3.0 m	0.5 – 1.0 m	1.0 – 2.0 m	2.0 – 3.0 m	> 3.0 m	
North Salt (RM 7.2-0.2)	RIF	35	4,167.3	38%	23.0±1.7	41.4±5.9	53.3±4.7	34	0	0	0	27	7	0	0	0.61
	CAS	0	-	-	-	-	-	-	-	-	-	-	-	-	-	0.61
	POW	7	1,314.3	12%	29.1±3.7	37.5±3.1	48.0±4.4	7	0	0	0	2	5	0	0	0.61
	RUN	8	1,252.1	11%	23.5±1.7	40.2±10.2	49.7±4.7	7	1	0	0	2	6	0	0	0.61
	GLI	0	-	-	-	-	-	-	-	-	-	-	-	-	-	0.61
	LSP	21	2,995.6	28%	23.9±1.4	40.2±4.2	51.1±3.5	1	18	2	0	0	4	17	0	0.61
	MCP	7	1,210.4	11%	25.6±1.8	33.7±4.1	46.1±4.8	0	6	1	0	0	1	6	0	0.61
	TOTAL	78	10,939.7	100%	24.1±0.9	39.9±5.5	51.2±4.3	49	25	3	0	31	23	23	0	0.61

Note:

^a Channel gradient for aerial videographic interpretation was derived from the longitudinal channel profile by reach from a digital elevation model in ArcGIS.

Key:

% = percent

“-“ = no data available

CAS = cascade

GLI = glide

LSP = lateral scour pool

m = meter

MCP = main channel pool

OHWM = ordinary high water stage

POW = pocketwater

RIF = riffle

RM = river mile

RUN = run

s.e. = standard error of the mean

Table B-4. Aquatic Habitat Inventory of Aquatic Habitat Cover Parameters, by Survey Reach, Derived from Representative Ground Survey Sites in the Upper Sacramento River Between Shasta Lake and Box Canyon Dam

Study Reach	% of entire reach length covered by ground survey sites	Habitat		Shelter Value Frequency				Cover Composition (mean % unit area ± s.e.)										Large wood (pieces/100m)
		Type	Number of units	none	minimal	moderate	high	Undercut bank	Small wood	Large wood	Root mass	Terrestrial vegetation	Aquatic vegetation	Bubble curtain	Boulders	Bedrock ledges		
Box Canyon (RM 37.0-34.0)	27%	RIF	3	0	0	3	0	2±2	5±0	0±0	0±0	24±9	2±2	35±3	32±12	0±0	0.0	
		CAS	2	0	0	1	1	5±5	3±3	5±0	0±0	3±3	0±0	33±3	40±5	13±8	0.2	
		POW	2	0	0	2	0	3±3	5±0	3±3	3±3	23±8	0±0	18±3	48±13	0±0	0.3	
		RUN	1	0	1	0	0	5±0	0±0	5±0	0±0	70±0	0±0	5±0	10±0	5±0	0.2	
		GLI	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		LSP	5	0	5	0	0	8±1	1±1	0±0	0±0	8±3	0±0	1±1	26±12	56±12	0.0	
		MCP	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		TOTAL	13	0	6	6	1	5±1	3±1	2±1	1±0	18±5	1±0	17±5	32±6	24±9	0.7	
Mossbrae (RM 34.0-30.0)	14%	RIF	4	0	0	2	2	0±0	3±1	3±1	1±0	20±6	8±6	29±2	39±6	0±0	0.5	
		CAS	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		POW	4	0	3	1	0	0±0	4±1	1±1	1±1	23±2	1±1	19±4	51±4	0±0	0.2	
		RUN	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		GLI	1	0	0	0	1	5±0	5±0	5±0	0±0	30±0.0	5±0	20±0	30±0	0±0	0	
		LSP	1	0	0	1	0	5±0	5±0	10±0	0±0	25±0.0	0±0	10±0	45±0	0±0	0.5	
		MCP	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		TOTAL	10	0	3	4	3	1±1	4±1	3±1	1±1	23±3	4±2	22±4	44±5	0±0	1.2	

Table B-4. Aquatic Habitat Inventory of Aquatic Habitat Cover Parameters, by Survey Reach, Derived from Representative Ground Survey Sites in the Upper Sacramento River Between Shasta Lake and Box Canyon Dam (contd.)

Study Reach	% of entire reach length covered by ground survey sites	Habitat		Shelter Value Frequency				Cover Composition (mean % unit area ± s.e.)										Large wood (pieces/100m)
		Type	Number of units	none	minimal	moderate	high	Undercut bank	Small wood	Large wood	Root mass	Terrestrial vegetation	Aquatic vegetation	Bubble curtain	Boulders	Bedrock ledges		
Dunsmuir (RM 30.0-24.5)	16%	RIF	4	0	1	3	0	0±0	5±2	4±2	0±0	25±7	0±0	23±6	44±7	0±0	0.5	
		CAS	1	0	0	1	0	5±0	5±0	0±0	5±0	15±0	0±0	30±0	40±0	0±0	0.0	
		POW	3	0	2	1	0	35±25	5±0	0±0	0±0	14±14	0±0	13±4	34±14	0±0	0.0	
		RUN	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		GLI	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		LSP	2	0	2	0	0	0±0	3±3	0±0	3±3	48±28	0±0	0±0	38±38	10±10	0.0	
		MCP	1	0	1	0	0	5±0	5±0	0±0	0±0	15±0	0±0	0±0	75±0	0±0	0	
		TOTAL	11	0	6	5	0	10±6	5±1	1±1	1±1	25±6	0±0	15±4	42±7	2±2	0.5	
Canyon (RM 24.5-15.5)	17%	RIF	11	0	3	7	1	2±1	7±1	2±1	2±1	24±4	0±0.0	25±5	35±6	3±2	1.3	
		CAS	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		POW	6	0	3	3	0	3±2	7±2	2±1	3±3	26±6	0±0	11±3	42±10	6±4	0.1	
		RUN	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		GLI	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		LSP	5	0	4	1	0	5±3	3±1	2±2	1±1	12±6	1±1	1±1	34±17	41±16	0.2	
		MCP	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		TOTAL	22	0	10	11	1	3±1	6±1	2±1	3±1	22±4	1±0	15±4	36±5	12±5	1.7	
Shotgun (RM 15.5-7.2)	14%	RIF	5	0	1	2	2	0±0	4±1	1±1	3±1	40±8	0±0	18±5	34±3	0±0	0.0	
		CAS	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		POW	5	0	2	3	0	0±0	3±1	0±0	0±0	40±4	1±1	5±1	50±5	0±0	0.0	
		RUN	2	0	1	1		3±3	5±0	0±0	2±3	54±5	0±0	2±3	34±10	0±0	0.0	
		GLI	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		LSP	2	0	2	0	0	3±3	5±0	20±20	0±0	24±5	0±0	8±8	34±5	8±8	0.0	
		MCP	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Study Reach	% of entire reach length covered by ground survey sites	Habitat		Shelter Value Frequency				Cover Composition (mean % unit area ± s.e.)								Large wood (pieces/100m)	
		Type	Number of units	none	minimal	moderate	high	Undercut bank	Small wood	Large wood	Root mass	Terrestrial vegetation	Aquatic vegetation	Bubble curtain	Boulders		Bedrock ledges
		TOTAL	14	0	6	6	2	1±1	4±1	3±3	1±1	41±4	1±0	9±3	39±3		1±1

Table B-4. Aquatic Habitat Inventory of Aquatic Habitat Cover Parameters, by Survey Reach, Derived from Representative Ground Survey Sites in the Upper Sacramento River Between Shasta Lake and Box Canyon Dam (contd.)

Study Reach	% of entire reach length covered by ground survey sites	Habitat		Shelter Value Frequency				Cover Composition (mean % unit area ± s.e.)										Large wood (pieces/100m)
		Type	Number of units	none	minimal	moderate	high	Undercut bank	Small wood	Large wood	Root mass	Terrestrial vegetation	Aquatic vegetation	Bubble curtain	Boulders	Bedrock ledges		
North Salt (RM 7.2-0.2)	18%	RIF	5	0	1	3	1	0±0	4±1	1±1	0±0	25±3	0±0	29±5	39±4	2±2	0.2	
		CAS	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		POW	6	0	2	4	0	8±3	4±1	1±1	1±1	18±5	0±0	4±1	45±7	20±8	0.6	
		RUN	1	0	1	0	0	50±0	0±0	0±0	0±0	5±0	0±0	0±0.0	15±0	30±0	0.0	
		GLI	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		LSP	1	0	1	0	0	0±0	0±0	0±0	0±0	5±0	0±0	0±0	0±0	95±0	0.0	
		MCP	3	0	3	0	0	10±0	0±0	3±2	0±0	7±2	0±0	0±0	20±6	60±6	0.2	
		TOTAL	16	0	8	7	1	8±3	3±1	1±1	1±0	16±3	0±0	11±4	34±5	27±8	1.0	

Key:

% = percent

- = no data available

Study Reach	% of entire reach length covered by ground survey sites	Habitat		Shelter Value Frequency				Cover Composition (mean % unit area ± s.e.)								Large wood (pieces/100m)
		Type	Number of units	none	minimal	moderate	high	Undercut bank	Small wood	Large wood	Root mass	Terrestrial vegetation	Aquatic vegetation	Bubble curtain	Boulders	

CAS = cascade
GLI = glide
LSP = lateral scour pool
m = meter
MCP = main channel pool
POW = pocketwater
RIF = riffle
RM = river mile
RUN = run
s.e. = standard error of the mean

Table B-5. Aquatic Habitat Inventory of Cover Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper Sacramento River Between Shasta Lake and Box Canyon Dam

Study Reach	Habitat		Shelter Value Frequency				Cover Composition (mean %)										Large wood (pieces/100m)
	Type	Number of units	none	minimal	moderate	high	Undercut bank	Small wood	Large wood	Root mass	Terrestrial vegetation	Aquatic vegetation	Bubble curtain	Boulders	Bedrock ledges		
Box Canyon (RM 37.0-34.0)	RIF	15	0	0	3	0	2	5	0	0	24	2	35	32	0	1.3	
	CAS	3	0	0	1	1	5	3	5	0	3	0	33	40	13	1.3	
	POW	9	0	0	2	0	3	5	3	3	23	0	18	48	0	1.1	
	RUN	1	0	1	0	0	5	0	5	0	70	0	5	10	5	0.7	
	GLI	5	0	1	0	0	5	0	5	0	70	0	5	10	5	0.6	
	LSP	9	0	5	0	0	8	1	0	0	8	0	1	26	56	1.3	
	MCP	5	0	5	0	0	8	1	0	0	8	0	1	26	56	1.1	
	TOTAL	47	0	12	6	1	5	2	3	0	29	0	14	27	19	1.1	
Mossbrae (RM 34.0-30.0)	RIF	25	0	0	2	2	0	3	3	0	20	8	29	39	0	0.7	
	CAS	1	0	0	2	2	0	3	3	0	20	8	29	39	0	1.1	
	POW	9	0	3	1	0	0	4	1	1	23	1	19	51	0	0.7	
	RUN	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	GLI	4	0	0	0	1	5	5	5	0	30	5	20	30	0	0.7	
	LSP	9	0	0	1	0	5	5	10	0	25	0	10	45	0	1.0	
	MCP	5	0	0	1	0	5	5	10	0	25	0	10	45	0	0.9	
	TOTAL	53	0	3	7	5	3	4	5	0	24	4	20	42	0	0.7	
Dunsmuir (RM 30.0-24.5)	RIF	32	0	1	3	0	0	5	4	0	25	0	23	44	0	0.8	
	CAS	1	0	0	1	0	5	5	0	5	15	0	30	40	0	1.3	
	POW	25	0	2	1	0	35	5	0	0	14	0	13	34	0	0.6	
	RUN	1	0	2	1	0	35	5	0	0	14	0	13	34	0	0.8	
	GLI	1	0	2	1	0	35	5	0	0	14	0	13	34	0	1.5	
	LSP	12	0	2	0	0	0	3	0	3	48	0	0	38	10	1.3	
	MCP	2	0	1	0	0	5	5	0	0	15	0	0	75	0	1.1	
	TOTAL	74	0	10	7	0	16	5	1	1	21	0	13	43	1	0.8	

Table B-5. Aquatic Habitat Inventory of Cover Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper Sacramento River Between Shasta Lake and Box Canyon Dam (contd.)

Study Reach	Habitat		Shelter Value Frequency				Cover Composition (mean %)										Large wood (pieces/100m)
	Type	Number of units	none	minimal	moderate	high	Undercut bank	Small wood	Large wood	Root mass	Terrestrial vegetation	Aquatic vegetation	Bubble curtain	Boulders	Bedrock ledges		
Canyon (RM 24.5-15.5)	RIF	46	0	3	7	1	2	7	2	2	24	0	25	35	3	0.7	
	CAS	1	0	3	7	1	2	7	2	2	24	0	25	35	3	0.9	
	POW	23	0	3	3	0	3	7	2	3	26	0	11	42	6	0.6	
	RUN	1	0	3	3	0	3	7	2	3	26	0	11	42	6	0.8	
	GLI	1	0	3	3	0	3	7	2	3	26	0	11	42	6	0.5	
	LSP	22	0	4	1	0	5	3	2	1	12	1	1	34	41	0.9	
	MCP	9	0	4	1	0	5	3	2	1	12	1	1	34	41	0.6	
	TOTAL	103	0	21	25	2	3	6	2	2	21	0	12	38	15	0.7	
Shotgun (RM 15.5-7.2)	RIF	42	0	1	2	2	0	4	1	3	40	0	18	34	0	0.7	
	CAS	3	0	1	2	2	0	4	1	3	40	0	18	34	0	1.2	
	POW	11	0	2	3	0	0	3	0	0	40	1	5	50	0	0.6	
	RUN	5	0	1	1	0	3	5	0	2	54	0	2	34	0	0.9	
	GLI	3	0	1	1	0	3	5	0	2	54	0	2	34	0	0.5	
	LSP	25	0	2	0	0	2	5	20	0	24	0	8	34	7	0.8	
	MCP	12	0	2	0	0	2	5	20	0	24	0	8	34	7	0.5	
	TOTAL	101	0	10	9	4	1	4	6	1	39	0	9	36	2	0.7	

Table B-5. Aquatic Habitat Inventory of Cover Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper Sacramento River Between Shasta Lake and Box Canyon Dam (contd.)

Study Reach	Habitat		Shelter Value Frequency				Cover Composition (mean %)										Large wood (pieces/100m)
	Type	Number of units	none	minimal	moderate	high	Undercut bank	Small wood	Large wood	Root mass	Terrestrial vegetation	Aquatic vegetation	Bubble curtain	Boulders	Bedrock ledges		
North Salt (RM 7.2-0.2)	RIF	35	0	1	3	1	0	4	1	0	25	0	29	39	2	0.8	
	CAS	0	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	
	POW	7	0	2	4	0	8	4	1	1	18	0	4	45	20	0.6	
	RUN	8	0	1	0	0	50	0	0	0	5	0	0	15	30	0.6	
	GLI	0	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	
	LSP	21	0	1	0	0	0	0	0	0	5	0	0	0	95	0.7	
	MCP	7	0	3	0	0	10	0	3	0	7	0	0	20	60	0.6	
	TOTAL	78	0	8	7	1	8	3	1	0	16	0	11	34	27	0.7	

Note:

Aerial Video was insufficient to accurately and efficiently measure shelter value and cover composition, therefore, data provided here are reach-based values derived from ground survey sites. Shelter value and cover composition from the similar functional habitat types were used where values were not available for certain habitat types from ground surveys and are noted in italics.

Key:

% = percent

"-" = no data available

CAS = cascade

GLI = glide

LSP = lateral scour pool

m = meter

MCP = main channel pool

POW = pocketwater

RIF = riffle

RM = river mile

RUN = run

Table B-6. Aquatic Habitat Substrate Parameters, by Study Reach, Derived from Representative Ground Survey Sites in the Upper Sacramento River Between Shasta Lake and Box Canyon Dam

Study Reach	% of entire reach length covered by ground survey sites	Habitat		Total Suitable Spawning Gravel Area (m ²)		Substrate Composition (frequency of class occurring as dominant/subdominant)							Average pool tail/ riffle embeddedness range (%)
		Type	Number of units	Baseflow stage	OHW stage	Silt/Clay <0.062 mm	Sand 0.06 – 2 mm	Gravel 2 – 64 mm	Small cobble 64 – 90 mm	Large cobble 90 – 256 mm	Boulder >256 mm	Bedrock	
Box Canyon (RM 37.0-34.0)	27%	RIF	3	13	13	0	0	2	3	1	0	0	25-50
		CAS	2	0	0	0	0	0	0	1	2	1	-
		POW	2	0	0	0	0	0	0	1	2	1	-
		RUN	1	0	0	0	0	1	0	1	0	0	-
		GLI	0	-	-	-	-	-	-	-	-	-	-
		LSP	5	113	189	0	1	1	2	1	2	3	25-50
		MCP	0	-	-	-	-	-	-	-	-	-	-
		TOTAL	13	126	202	0	1	4	5	5	6	5	25-50
Mossbrae (RM 34.0-30.0)	14%	RIF	4	0	0	4	4	0	0	0	0	0	25-50
		CAS	0	-	-	-	-	-	-	-	-	-	-
		POW	4	0	0	0	1	0	3	3	1	0	-
		RUN	0	-	-	-	-	-	-	-	-	-	-
		GLI	1	0	0	0	0	0	1	1	0	0	-
		LSP	0	-	-	-	-	-	-	-	-	-	-
		MCP	1	28	28	0	0	1	1	0	0	0	5-25
		TOTAL	10	28	28	0	0	6	6	4	3	1	25-50
Dunsmuir (RM 30.0-24.5)	16%	RIF	4	45	45	0	0	4	3	1	0	0	25-50
		CAS	1	0	0	0	0	0	0	1	1	0	-
		POW	3	0	0	0	0	0	0	2	3	1	-
		RUN	0	-	-	-	-	-	-	-	-	-	-
		GLI	0	-	-	-	-	-	-	-	-	-	-
		LSP	2	195	200	0	0	2	2	0	0	0	5-25
		MCP	1	46	51	0	0	1	1	0	0	0	5-25
		TOTAL	11	286	296	0	0	7	8	5	2	0	5-25

Table B-6. Aquatic Habitat Substrate Parameters, by Study Reach, Derived from Representative Ground Survey Sites in the Upper Sacramento River Between Shasta Lake and Box Canyon Dam (contd.)

Study Reach	% of entire reach length covered by ground survey sites	Habitat		Total Suitable Spawning Gravel Area (m ²)		Substrate Composition (frequency of class occurring as dominant/ subdominant)							Average pool tail/ riffle embeddedness range (%)
		Type	Number of units	Baseflow stage	OHW stage	Silt/Clay <0.062 mm	Sand 0.06 – 2 mm	Gravel 2 – 64 mm	Small cobble 64 – 90 mm	Large cobble 90 – 256 mm	Boulder >256 mm	Bedrock	
Canyon (RM 24.5-15.5)	17%	RIF	11	32	32	0	0	11	10	1	0	0	25-50
		CAS	0	-	-	-	-	-	-	-	-	-	-
		POW	6	75	75	0	0	3	3	2	3	1	-
		RUN	0	-	-	-	-	-	-	-	-	-	-
		GLI	0	-	-	-	-	-	-	-	-	-	-
		LSP	5	235	347	0	0	0	4	3	2	1	25-50
		MCP	0	-	-	-	-	-	-	-	-	-	-
		TOTAL	22	342	454	0	0	14	17	6	5	2	25-50
Shotgun (RM 15.5-7.2)	14%	RIF	5	0	0	0	0	4	5	1	0	0	5-25
		CAS	0	-	-	-	-	-	-	-	-	-	-
		POW	5	125	125	0	0	0	0	2	5	3	-
		RUN	2	0	0	0	0	0	2	0	0	2	-
		GLI	0	-	-	-	-	-	-	-	-	-	-
		LSP	2	47	65	0	0	1	2	1	0	0	25-50
		MCP	0	-	-	-	-	-	-	-	-	-	-
		TOTAL	14	172	190	0	0	5	11	7	3	2	5-25

Table B-6. Aquatic Habitat Substrate Parameters, by Study Reach, Derived from Representative Ground Survey Sites in the Upper Sacramento River Between Shasta Lake and Box Canyon Dam (contd.)

Study Reach	% of entire reach length covered by ground survey sites	Habitat		Total Suitable Spawning Gravel Area (m ²)		Substrate Composition (frequency of class occurring as dominant/subdominant)							Average pool tail/ riffle embeddedness range (%)
		Type	Number of units	Baseflow stage	OHW stage	Silt/Clay <0.062 mm	Sand 0.06 – 2 mm	Gravel 2 – 64 mm	Small cobble 64 – 90 mm	Large cobble 90 – 256 mm	Boulder >256 mm	Bedrock	
North Salt (RM 7.2-0.2)	18%	RIF	5	0	0	0	0	5	2	1	2	0	25-50
		CAS	0	-	-	-	-	-	-	-	-	-	-
		POW	6	0	0	0	0	1	0	4	4	3	-
		RUN	1	0	0	0	1	0	0	0	0	1	-
		GLI	0	-	-	-	-	-	-	-	-	-	-
		LSP	1	48	77	0	0	0	0	1	1	0	25-50
		MCP	3	93	93	0	2	1	0	1	0	2	25-50
		TOTAL	16	141	170	0	3	7	3	7	6	6	25-50

Key:
 % = percent
 “-” = no data available
 CAS = cascade
 GLI = glide
 LSP = lateral scour pool
 m² = square meters
 MCP = main channel pool
 mm = millimeter
 OHW = ordinary high water
 POW = pocketwater
 RIF = riffle
 RM = river mile
 RUN = run

Table B-7. Aquatic Habitat Substrate Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper Sacramento River Between Shasta Lake and Box Canyon Dam

Study Reach	Habitat		Total Suitable Spawning Gravel Area (m ²)		Substrate Composition (frequency of class occurring as dominant/ subdominant)							Average pool tail/ riffle embeddedness range (%)
	Type	Num ber of units	Baseflow stage	OHW stage	Silt/Clay <0.062 mm	Sand 0.06 – 2 mm	Gravel 2 – 64 mm	Small cobble 64 – 90 mm	Large cobble 90 – 256 mm	Boulder >256 mm	Bedrock	
Box Canyon (RM 37.0-34.0)	RIF	15	27	27	0	0	1	12	14	3	0	25-50
	CAS	3	0	0	0	0	0	0	1	3	2	-
	POW	9	0	0	0	0	1	8	8	1	0	-
	RUN	1	102	130	0	0	0	1	1	0	0	-
	GLI	5	0	0	0	0	0	2	5	3	0	-
	LSP	9	70	70	0	0	1	5	4	2	6	25-50
	MCP	5	0	0	0	0	0	0	1	5	4	-
	TOTAL	47	199	227	0	0	3	28	34	17	12	25-50
Mossbrae (RM 34.0-30.0)	RIF	25	14	14	0	0	5	23	20	2	0	25-50
	CAS	1	0	0	0	0	0	0	1	1	0	-
	POW	9	46	46	0	0	1	7	8	2	0	-
	RUN	0	-	-	-	-	-	-	-	-	-	-
	GLI	4	0	0	0	0	0	2	4	2	0	-
	LSP	9	265	272	0	0	1	8	6	0	3	-
	MCP	5	0	0	0	0	0	2	3	2	3	5-25
	TOTAL	53	325	332	0	0	7	42	42	9	6	25-50
Dunsmuir (RM 30.0-24.5)	RIF	32	37	37	0	0	10	32	22	0	0	25-50
	CAS	1	0	0	0	0	0	0	1	1		-
	POW	25	0	0	0	0	8	26	16	0	0	-
	RUN	1	127	167	0	0	1	1	0	0	0	-
	GLI	1	0	0	0	0	0	1	1	0	0	-
	LSP	12	591	639	0	0	6	10	4	3	1	5-25
	MCP	2	0	0	0	0	0	2	2	0	0	5-25
	TOTAL	74	755	843	0	0	25	72	46	4	1	5-25

Table B-7. Aquatic Habitat Substrate Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper Sacramento River Between Shasta Lake and Box Canyon Dam (contd.)

Study Reach	Habitat		Total Suitable Spawning Gravel Area (m ²)		Substrate Composition (frequency of class occurring as dominant/ subdominant)							Average pool tail/ riffle embededness range (%)
	Type	Num ber of units	Baseflow stage	OHW stage	Silt/Clay <0.062 mm	Sand 0.06 – 2 mm	Gravel 2 – 64 mm	Small cobble 64 – 90 mm	Large cobble 90 – 256 mm	Boulder >256 mm	Bedrock	
Canyon (RM 24.5-15.5)	RIF	46	64	64	0	0	3	36	41	10	2	25-50
	CAS	1	0	0	0	0	0	0	0	1	1	-
	POW	23	90	90	0	0	2	22	21	1	0	-
	RUN	1	0	0	0	0	0	1	1	0	0	-
	GLI	1	0	0	0	0	0	0	1	1	0	-
	LSP	22	827	1,015	0	0	4	14	6	5	15	25-50
	MCP	9	361	437	0	0	2	6	5	2	3	-
	TOTAL	103	1,343	1,606	0	0	11	79	75	20	21	25-50
Shotgun (RM 15.5-7.2)	RIF	42	25	25	0	0	0	17	34	24	10	5-25
	CAS	3	0	0	0	0	0	0	2	3	1	-
	POW	11	0	0	0	0	0	5	9	5	3	-
	RUN	5	37	111	0	0	0	3	4	2	1	-
	GLI	3	0	0	0	0	0	1	1	2	2	-
	LSP	25	916	1,324	0	0	0	8	12	9	21	25-50
	MCP	12	279	444	0	0	0	3	4	6	10	-
	TOTAL	101	1,257	1,904	0	0	0	37	66	51	48	5-25

Table B-7. Aquatic Habitat Substrate Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper Sacramento River Between Shasta Lake and Box Canyon Dam (contd.)

Study Reach	Habitat		Total Suitable Spawning Gravel Area (m ²)		Substrate Composition (frequency of class occurring as dominant/ subdominant)							Average pool tail/ riffle embeddedness range (%)
	Type	Num ber of units	Baseflow stage	OHW stage	Silt/Clay <0.062 mm	Sand 0.06 – 2 mm	Gravel 2 – 64 mm	Small cobble 64 – 90 mm	Large cobble 90 – 256 mm	Boulder >256 mm	Bedrock	
North Salt (RM 7.2-0.2)	RIF	35	98	195	0	0	4	14	24	21	7	25-50
	CAS	0	-	-	-	-	-	-	-	-	-	-
	POW	7	0	0	0	0	0	2	5	4	2	-
	RUN	8	31	46	1	0	0	1	3	7	4	-
	GLI	0	-	-	-	-	-	-	-	-	-	-
	LSP	21	1,745	1,960	0	0	1	8	13	5	16	25-50
	MCP	7	265	283	0	0	0	1	1	5	7	25-50
	TOTAL	78	2,138	2,485	1	0	5	26	46	42	36	25-50

Note:

Embeddedness could not be assessed from video; values reported here and used in analysis are the average of field-derived values for each reach

Key:

% = percent

"-" = no data available

CAS = cascade

GLI = glide

LSP = lateral scour pool

m² = square meters

MCP = main channel pool

mm = millimeter

OHW = ordinary high water stage

POW = pocketwater

RIF = riffle

RM = river mile

RUN = run

Table B-8. Aquatic Habitat Inventory of Channel Morphometry Parameters, by Study Reach, Derived from Representative Ground Survey Sites in the Upper McCloud River Between Squaw Valley Creek and McCloud Dam

Study Reach	% of entire reach length covered by ground survey sites	Habitat				Channel Widths			Channel Depths			Gradient (%) (mean $\pm$ s.e.)
		Habitat type	Number of units	Aggregate total length (m)	Percent of total habitat surveyed	Baseflow wetted width (m) (mean $\pm$ s.e.)	OHWM width (m) (mean $\pm$ s.e.)	Bankfull width (m) (mean $\pm$ s.e.)	Baseflow depth (m) (mean $\pm$ s.e.)	OHWM depth (m) (mean $\pm$ s.e.)	Baseflow max depth (m) (mean $\pm$ s.e.)	
Upper (RM 19.8-23.2)	38%	RIF	3	194.8	9%	24.1 $\pm$ 1.3	35.1 $\pm$ 3.1	38.7 $\pm$ 2.0	0.5 $\pm$ 0.0	2.2 $\pm$ 0.4	0.9 $\pm$ 0.1	2.5 $\pm$ 0.8
		CAS	7	411.5	20%	24.6 $\pm$ 3.2	35.4 $\pm$ 3.6	39.1 $\pm$ 2.9	0.7 $\pm$ 0.0	2.4 $\pm$ 0.2	1.3 $\pm$ 0.1	6.3 $\pm$ 0.5
		POW	1	73.2	3%	20.1 $\pm$ 0.0	34.7 $\pm$ 0.0	41.1 $\pm$ 0.0	0.5 $\pm$ 0.0	1.8 $\pm$ 0.0	0.8 $\pm$ 0.0	1.0 $\pm$ 0.0
		RUN	0	0.0	0%	-	-	-	-	-	-	-
		GLI	7	735.5	35%	26.8 $\pm$ 3.3	37.0 $\pm$ 4.0	39.2 $\pm$ 2.6	0.6 $\pm$ 0.0	2.2 $\pm$ 0.1	1.6 $\pm$ 0.1	1.9 $\pm$ 0.1
		LSP	7	451.7	22%	21.9 $\pm$ 1.7	34.4 $\pm$ 3.0	36.0 $\pm$ 3.4	1.5 $\pm$ 0.1	3.7 $\pm$ 0.3	3.8 $\pm$ 0.2	0.2 $\pm$ 0.1
		MCP	2	231.3	11%	18.9 $\pm$ 0.3	31.5 $\pm$ 0.5	37.5 $\pm$ 0.9	1.8 $\pm$ 0.2	4.3 $\pm$ 0.9	4.0 $\pm$ 0.9	0.3 $\pm$ 0.3
		TOTAL	27	2,097.9	100%	23.8$\pm$1.3	35.2$\pm$1.6	38.2$\pm$1.3	0.9$\pm$0.1	2.8$\pm$0.2	4.0$\pm$0.2	2.5$\pm$0.5
Middle (RM 9.5-19.8)	7%	RIF	3	344.4	30%	30.5 $\pm$ 3.0	45.4 $\pm$ 3.0	53.9 $\pm$ 0.5	0.5 $\pm$ 0.1	1.9 $\pm$ 0.2	1.0 $\pm$ 0.1	2.2 $\pm$ 0.6
		CAS	1	91.4	8%	15.5 $\pm$ 0.0	32.9 $\pm$ 0.0	44.8 $\pm$ 0.0	0.6 $\pm$ 0.0	2.2 $\pm$ 0.0	1.0 $\pm$ 0.0	4.0 $\pm$ 0.0
		POW	3	355.7	31%	25.6 $\pm$ 8.2	22.1 $\pm$ 10.1	46.6 $\pm$ 2.8	0.5 $\pm$ 0.1	1.9 $\pm$ 0.3	1.3 $\pm$ 0.2	1.0 $\pm$ 0.0
		RUN	2	149.4	13%	17.8 $\pm$ 5.9	35.2 $\pm$ 0.5	45.7 $\pm$ 0.9	0.6 $\pm$ 0.0	2.0 $\pm$ 0.1	1.1 $\pm$ 0.1	0.8 $\pm$ 0.3
		GLI	1	83.2	7%	25.6 $\pm$ 0.0	38.4 $\pm$ 0.0	43.0 $\pm$ 0.0	0.8 $\pm$ 0.0	2.2 $\pm$ 0.0	1.2 $\pm$ 0.0	0.5 $\pm$ 0.0
		LSP	0	0.0	0%	-	-	-	-	-	-	-
		MCP	1	132.6	11%	25.6 $\pm$ 0.0	34.7 $\pm$ 0.0	41.1 $\pm$ 0.0	1.5 $\pm$ 0.0	3.3 $\pm$ 0.0	2.2 $\pm$ 0.0	0.5 $\pm$ 0.0
		TOTAL	11	1,156.7	100%	24.6$\pm$0.0	34.5$\pm$0.0	47.5$\pm$0.0	0.6$\pm$0.0	2.1$\pm$0.0	2.2$\pm$0.0	1.5$\pm$0.0

Note: No Ground Surveys were conducted in the Lower Reach or the Headwaters Reach and are Not Listed in this Table.

Key:

% = percent

"-" = no data available

CAS = cascade

GLI = glide

LSP = lateral scour pool

m = meter

MCP = main channel pool

OHWM = ordinary high water stage

POW = pocketwater

RIF = riffle

RM = river mile

RUN = run

s.e. = standard error of the mean

Table B-9. Aquatic Habitat Inventory of Channel Morphometry Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper McCloud River Between Shasta Lake and McCloud Dam

Study Reach	Habitat Type				Channel Widths			Channel Depths			Gradient (%) ^a
	Habitat type	Number of units	Aggregate total length (m)	Percent of total habitat surveyed	Baseflow wetted width (m) (mean $\pm$ s.e.)	OHW width (m) (mean $\pm$ s.e.)	Bankfull width (m) (mean $\pm$ s.e.)	Baseflow depth (m) (mean $\pm$ s.e.)	OHW depth (m) (mean $\pm$ s.e.)	Baseflow max depth (m) (mean $\pm$ s.e.)	
Upper (RM 19.8-23.2)	RIF	18	1,687.1	33%	20.9 $\pm$ 1.3	28.9 $\pm$ 1.6	34.7 $\pm$ 1.6	18	0	0	1.87
	CAS	12	918.4	18%	17.3 $\pm$ 1.2	22.9 $\pm$ 1.1	27.8 $\pm$ 1.0	12	0	0	1.87
	POW	2	138.7	3%	17.2 $\pm$ 0.5	25.3 $\pm$ 1.5	31.7 $\pm$ 3.7	2	0	0	1.87
	RUN	1	56.4	1%	17.1 $\pm$ 0.0	21.3 $\pm$ 0.0	25.9 $\pm$ 0.0	1	0	0	1.87
	GLI	4	760.5	15%	22.9 $\pm$ 3.3	29.3 $\pm$ 3.7	35.7 $\pm$ 3.4	4	0	0	1.87
	LSP	11	697.4	14%	17.7 $\pm$ 0.9	24.6 $\pm$ 1.1	31.2 $\pm$ 1.4	0	7	4	1.87
	MCP	12	880.3	17%	16.8 $\pm$ 0.9	22.0 $\pm$ 0.9	26.8 $\pm$ 1.3	0	6	6	1.87
	TOTAL	60	5,138.6	100%	18.7$\pm$0.6	25.3$\pm$0.7	30.9$\pm$0.8	37	13	10	1.87
Middle (RM 9.5-19.8)	RIF	64	6,447.1	36%	21.9 $\pm$ 0.8	31.0 $\pm$ 0.9	38.3 $\pm$ 1.0	64	0	0	1.11
	CAS	6	314.9	2%	16.1 $\pm$ 2.0	23.9 $\pm$ 2.3	29.5 $\pm$ 2.8	6	0	0	1.11
	POW	18	2,599.0	14%	21.5 $\pm$ 1.0	28.2 $\pm$ 1.3	37.1 $\pm$ 2.3	18	0	0	1.11
	RUN	2	125.0	1%	15.7 $\pm$ 2.3	21.0 $\pm$ 0.6	27.0 $\pm$ 0.5	2	0	0	1.11
	GLI	12	2,386.0	13%	23.4 $\pm$ 1.0	32.1 $\pm$ 2.7	44.9 $\pm$ 7.0	12	0	0	1.11
	LSP	42	3,999.9	22%	18.9 $\pm$ 0.6	26.5 $\pm$ 0.9	33.4 $\pm$ 1.0	0	27	15	1.11
	MCP	20	2,108.9	12%	19.7 $\pm$ 0.8	25.5 $\pm$ 0.9	30.4 $\pm$ 1.1	0	16	4	1.11
	TOTAL	164	17,980.7	100%	20.5$\pm$0.4	28.3$\pm$0.6	35.5$\pm$0.8	102	43	19	1.11

Table B-9. Aquatic Habitat Inventory of Channel Morphometry Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper McCloud River Between Shasta Lake and McCloud Dam (contd.)

Study Reach	Habitat Type				Channel Widths			Channel Depths			Gradient (%) ^a
	Habitat type	Number of units	Aggregate total length (m)	Percent of total habitat surveyed	Baseflow wetted width (m) (mean ±s.e.)	OHWM width (m) (mean ±s.e.)	Bankfull width (m) (mean ±s.e.)	Baseflow depth (m) (mean ±s.e.)	OHWM depth (m) (mean ±s.e.)	Baseflow max depth (m) (mean ±s.e.)	
Lower (RM 0.0-9.5)	RIF	32	3,774.3	24%	22.2±1.1	32.1±1.1	49.6±3.8	32	0	0	0.79
	CAS	15	1,125.9	7%	16.9±1.2	24.3±1.4	36.3±2.6	15	0	0	0.79
	POW	8	1,464.0	9%	21.7±1.5	30.2±1.2	42.8±4.9	8	0	0	0.79
	RUN	2	270.4	2%	24.1±2.4	31.4±1.2	41.3±1.7	1	1	0	0.79
	GLI	2	519.7	3%	21.0±0.6	31.9±0.8	38.3±4.4	2	0	0	0.79
	LSP	32	4,865.8	31%	23.3±0.8	29.6±1.0	38.2±1.4	0	16	16	0.79
	MCP	18	3,691.7	23%	21.0±0.8	27.7±1.0	36.5±1.5	0	10	8	0.79
	TOTAL	109	11,937.5	100%	21.6±0.5	29.4±0.6	41.4±1.4	57	27	24	0.79

Note:

^a Channel gradient for aerial videographic interpretation was derived from the longitudinal channel profile by reach from a digital elevation model in ArcGIS.

Key: % = percent

“-“ = no data available

CAS = cascade

GLI = glide

Key:

LSP = lateral scour pool

m = meter

MCP = main channel pool

OHWM = ordinary high water stage

POW = pocketwater

RIF = riffle

RM = river mile

RUN = run

s.e.= standard error of the mean

Table B-10. Aquatic Habitat Inventory of Cover Parameters, by Study Reach, Derived from Representative Ground Survey Sites of the Upper McCloud River Between Squaw Valley Creek and McCloud Dam

Study Reach	% of entire reach length covered by ground survey sites	Habitat		Shelter Value Frequency				Cover Composition (mean % unit area $\pm$ s.e.)									Large wood (pieces/100m)
		Type	Number of units	none	minimal	moderate	high	Undercut bank	Small wood	Large wood	Root mass	Terrestrial vegetation	Aquatic vegetation	Bubble curtain	Boulders	Bedrock ledges	
Upper (RM 19.8-23.2)	38%	RIF	3	0	0	2	1	3 $\pm$ 2	8 $\pm$ 2	2 $\pm$ 2	0 $\pm$ 0	30 $\pm$ 3	0 $\pm$ 0	23 $\pm$ 4	33 $\pm$ 2	0 $\pm$ 0	2.6
		CAS	7	0	2	5	0	0 $\pm$ 0	2 $\pm$ 1	1 $\pm$ 1	0 $\pm$ 0	9 $\pm$ 3	0 $\pm$ 0	46 $\pm$ 5	42 $\pm$ 3	0 $\pm$ 0	3.6
		POW	1	0	0	1	0	0 $\pm$ 0	5 $\pm$ 0	0 $\pm$ 0	0 $\pm$ 0	40 $\pm$ 0	0 $\pm$ 0	15 $\pm$ 0	40 $\pm$ 0	0 $\pm$ 0	0.0
		RUN	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		GLI	7	0	0	6	1	2 $\pm$ 1	8 $\pm$ 1	0 $\pm$ 0	0 $\pm$ 0	23 $\pm$ 2	0 $\pm$ 0	20 $\pm$ 3	47 $\pm$ 4	0 $\pm$ 0	6.7
		LSP	7	0	6	1	0	1 $\pm$ 1	6 $\pm$ 1	1 $\pm$ 1	0 $\pm$ 0	21 $\pm$ 5	0 $\pm$ 0	25 $\pm$ 5	45 $\pm$ 6	0 $\pm$ 0	2.1
		MCP	2	0	1	1	0	0 $\pm$ 0	20 $\pm$ 15	3 $\pm$ 3	0 $\pm$ 0	28 $\pm$ 3	0 $\pm$ 0	5 $\pm$ 5	38 $\pm$ 13	8 $\pm$ 8	3.6
		TOTAL	27	0	9	16	2	1$\pm$0	7$\pm$1	1$\pm$0	0$\pm$0	21$\pm$2	0$\pm$0	27$\pm$3	43$\pm$2	1$\pm$1	1.7
Middle (RM 9.5-19.8)	7%	RIF	3	0	1	1	1	0 $\pm$ 0	7 $\pm$ 7	0 $\pm$ 0	0 $\pm$ 0	20 $\pm$ 5	0 $\pm$ 0	45 $\pm$ 3	28 $\pm$ 12	0 $\pm$ 0	0.6
		CAS	1	0	0	1	0	5 $\pm$ 0	10 $\pm$ 0	5 $\pm$ 0	0 $\pm$ 0	10 $\pm$ 0	0 $\pm$ 0	30 $\pm$ 0	40 $\pm$ 0	0 $\pm$ 0	2.6
		POW	2	0	1	1	0	0 $\pm$ 0	12 $\pm$ 8	0 $\pm$ 0	2 $\pm$ 3	47 $\pm$ 3	0 $\pm$ 0	12 $\pm$ 8	25 $\pm$ 5	2 $\pm$ 3	1.5
		RUN	1	0	1	0	0	5 $\pm$ 0	10 $\pm$ 0	0 $\pm$ 0	0 $\pm$ 0	60 $\pm$ 0	0 $\pm$ 0	0 $\pm$ 0	25 $\pm$ 0	0 $\pm$ 0	0.9
		GLI	3	0	0	2	1	2 $\pm$ 2	12 $\pm$ 3	0 $\pm$ 0	0 $\pm$ 0	37 $\pm$ 9	0 $\pm$ 0	21 $\pm$ 8	28 $\pm$ 7	0 $\pm$ 0	2.3
		LSP	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		MCP	1	0	1	0	0	0 $\pm$ 0	4 $\pm$ 0	0 $\pm$ 0	0 $\pm$ 0	33 $\pm$ 0	0 $\pm$ 0	14 $\pm$ 0	49 $\pm$ 0	0 $\pm$ 0	0.0
		TOTAL	11	0	4	5	2	1$\pm$1	9$\pm$2	0$\pm$0	0$\pm$0	33$\pm$5	0$\pm$0	24$\pm$5	30$\pm$4	0$\pm$0	2.3

Note: No Ground Surveys were Conducted in the Lower Reach or the Headwaters reach and are Not Listed in this Table.

Key:

% = percent

"-" = no data available

CAS = cascade

GLI = glide

LSP = lateral scour pool

m = meter

MCP = main channel pool

OHWL = ordinary high water stage

POW = pocketwater

RIF = riffle

RM = river mile

RUN = run

s.e. = standard error of the mean

Table B-11. Aquatic Habitat Inventory of Cover Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper McCloud River Between Shasta Lake and McCloud Dam

Study Reach	Habitat		Shelter Value Frequency				Cover Composition (mean %)										Large wood
	Type	Number of units	none	minimal	moderate	high	Undercut bank	Small wood	Large wood	Root mass	Terrestrial vegetation	Aquatic vegetation	Bubble curtain	Boulders	Bedrock ledges		
Upper (RM 19.8-23.2)	RIF	18	0	0	2	1	3.3	8.3	1.7	0.0	30.0	0.0	23.3	33.3	0.0	0.4	
	CAS	12	0	2	5	0	0.0	2.1	1.4	0.0	8.6	0.0	45.7	42.1	0.0	0.7	
	POW	2	0	0	1	0	0.0	5.0	0.0	0.0	40.0	0.0	15.0	40.0	0.0	0.0	
	RUN	1	0	0	1	0	0.0	5.0	0.0	0.0	40.0	0.0	15.0	40.0	0.0	0.0	
	GLI	4	0	0	6	1	2.2	8.0	0.0	0.0	22.9	0.0	20.3	46.6	0.0	0.7	
	LSP	11	0	6	1	0	0.7	6.4	1.4	0.0	21.4	0.0	25.0	45.0	0.0	0.6	
	MCP	12	0	1	1	0	0.0	20.0	2.5	0.0	27.5	0.0	5.0	37.5	7.5	0.6	
	TOTAL	60	0	9	17	2	1.1	6.9	1.1	0.0	20.7	0.0	27.1	42.6	0.6	0.5	
Middle (RM 9.5-19.8)	RIF	64	0	1	1	1	0.0	6.7	0.0	0.0	20.0	0.0	45.0	28.3	0.0	0.9	
	CAS	6	0	0	1	0	5.0	10.0	5.0	0.0	10.0	0.0	30.0	40.0	0.0	0.6	
	POW	18	0	1	1	0	0.0	12.1	0.0	2.0	47.1	0.0	12.1	24.7	2.0	0.4	
	RUN	2	0	1	0	0	5.0	10.0	0.0	0.0	60.0	0.0	0.0	25.0	0.0	0.0	
	GLI	12	0	0	2	1	1.7	12.0	0.0	0.0	37.0	0.0	21.0	28.3	0.0	0.8	
	LSP	42	0	1	0	0	0.0	4.0	0.0	0.0	33.0	0.0	14.0	49.0	0.0	1.1	
	MCP	20	0	1	0	0	0.0	4.0	0.0	0.0	33.0	0.0	14.0	49.0	0.0	0.8	
	TOTAL	164	0	5	5	2	1.4	9.4	0.5	0.5	33.4	0.0	24.1	30.3	0.5	0.8	

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Note:

Aerial Video was Insufficient to Accurately and Efficiently Measure Shelter Value and Cover Composition, therefore, Data Provided Here are Reach Based Values Derived from Ground Survey Sites. Shelter Value and Cover Composition from the Similar Functional Habitat Types were used where Values were not Available for Certain Habitat Types from Ground Surveys and are Noted in Italics

Key:

% = percent

"-" = no data available

CAS = cascade

GLI = glide

LSP = lateral scour pool

m = meter

MCP = main channel pool

OHWM = ordinary high water stage

POW = pocketwater

RIF = riffle

RM = river mile

RUN = run

s.e. = standard error of the mean.

Table B-12. Aquatic Habitat Substrate Parameters, by Study Reach, Derived from Representative Ground Survey Sites of the Upper McCloud River Between Squaw Valley Creek and McCloud Dam

Study Reach	Habitat		Total Suitable Spawning Gravel Area (m ²)		Substrate Composition (frequency of class occurring as dominant/ subdominant)							Average pool tail/ riffle embeddedness range (%)
	Type	Number of units	Baseflow stage	OHW stage	Silt/Clay <0.062 mm	Sand 0.06 – 2 mm	Gravel 2 – 64 mm	Small cobble 64 – 90 mm	Large cobble 90 – 256 mm	Boulder >256 mm	Bedrock	
Upper (RM 19.8-23.2)	RIF	3	15	15	0	0	1	2	2	1	0	25-50
	CAS	7	7	7	0	0	0	0	5	7	2	-
	POW	1	16	16	0	0	0	1	1	0	0	-
	RUN	0	-	-	-	-	-	-	-	-	-	-
	GLI	7	380	380	0	0	3	3	5	2	1	5-25
	LSP	7	230	280	0	1	2	1	2	2	6	5-25
	MCP	2	218	218	0	0	0	0	2	0	2	5-25
	TOTAL	27	867	917	0	1	6	7	17	12	11	5-25
Middle (RM 9.5-19.8)	RIF	3	900	900	0	0	1	3	2	0	0	25-50
	CAS	1	6	6	0	0	0	1	1	0	0	-
	POW	2	169	169	0	0	2	2	2	0	0	5-25
	RUN	1	177	177	0	0	1	0	0	1	0	5-25
	GLI	3	155	155	0	0	1	3	0	0	0	-
	LSP	0	-	-	-	-	-	-	-	-	-	-
	MCP	1	167	167	0	0	1	0	0	1	0	5-25
	TOTAL	11	1,573	1,573	0	0	6	9	5	2	0	5-25

Note:

No Ground Surveys were Conducted in the Lower Reach or the Headwaters reach and are Not Listed in this Table.

Key:

% = percent

"-" = no data available

CAS = cascade

GLI = glide

LSP = lateral scour pool

m = meter

m² = square meters

MCP = main channel pool

mm = millimeter

OHWM = ordinary high water stage

POW = pocketwater

RIF = riffle

RM = river mile

RUN = run

s.e. = standard error of the mean

Table B-13. Aquatic Habitat Substrate Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper McCloud River Between Shasta Lake and McCloud Dam

Study Reach	Habitat		Total Suitable Spawning Gravel Area (m ²)		Substrate Composition (frequency of class occurring as dominant/ subdominant)							Average pool tail/ riffle embeddedness range (%)
	Type	Number of units	Baseflow stage	OHW stage	Silt/Clay <0.062 mm	Sand 0.06 – 2 mm	Gravel 2 – 64 mm	Small cobble 64 – 90 mm	Large cobble 90 – 256 mm	Boulder >256 mm	Bedrock	
Upper (RM 19.8-23.2)	RIF	18	0.0	0.0	0	0	0	13	18	5	0	25-50
	CAS	12	0.0	0.0	0	0	0	2	11	10	2	-
	POW	2	0.0	0.0	0	0	0	1	2	1	0	-
	RUN	1	0.0	0.0	0	0	0	0	1	0	1	-
	GLI	4	0.0	0.0	0	0	0	3	4	1	0	5-25
	LSP	11	53.4	143.1	0	0	0	1	9	2	9	5-25
	MCP	12	0.0	0.0	0	0	0	0	6	6	12	5-25
	TOTAL	60	53.4	143.1	0	0	0	20	51	25	24	5-25
Middle (RM 9.5-19.8)	RIF	64	74.3	185.8	0	0	0	55	64	9	0	25-50
	CAS	6	0.0	0.0	0	0	0	0	6	6	0	-
	POW	18	0.0	0.0	0	1	3	14	14	2	2	5-25
	RUN	2	0.0	0.0	0	0	0	2	1	0	1	5-25
	GLI	12	27.9	27.9	0	0	0	8	12	4	0	-
	LSP	42	1,336.4	1,618.8	0	2	2	20	12	9	39	-
	MCP	20	649.4	714.0	2	1	3	5	3	7	19	5-25
	TOTAL	164	2,088.0	2,546.5	2	4	8	104	112	37	61	5-25

Table B-13. Aquatic Habitat Substrate Parameters, by Study Reach, Derived from Aerial Video Surveys of the Upper McCloud River Between Shasta Lake and McCloud Dam (contd.)

Study Reach	Habitat		Total Suitable Spawning Gravel Area (m ²)		Substrate Composition (frequency of class occurring as dominant/ subdominant)							Average pool tail/ riffle embeddedness range (%)
	Type	Number of units	Baseflow stage	OHW stage	Silt/Clay <0.062 mm	Sand 0.06 – 2 mm	Gravel 2 – 64 mm	Small cobble 64 – 90 mm	Large cobble 90 – 256 mm	Boulder >256 mm	Bedrock	
Lower (RM 0.0-9.5)	RIF	32	83.6	83.6	0	0	1	13	28	18	4	-
	CAS	15	0.0	0.0	0	0	0	1	9	14	6	-
	POW	8	0.0	0.0	0	0	0	3	6	5	2	-
	RUN	2	0.0	0.0	0	0	0	1	1	1	1	-
	GLI	2	511.0	511.0	0	0	0	0	2	2	0	-
	LSP	32	221.1	292.6	0	1	2	6	6	19	30	-
	MCP	18	392.5	501.7	0	0	0	5	4	10	17	-
	TOTAL	109	1,208.2	1,388.9	0	1	3	29	56	69	60	-

Note:

No Ground Surveys were Conducted in the Lower Reach or the Headwaters Reach and are Not Listed in this Table.

Key:

% = percent

"-" = no data available

CAS = cascade

GLI = glide

LSP = lateral scour pool

m = meter

m² = square meters

MCP = main channel pool

mm = millimeter

OHWM = ordinary high water stage

POW = pocketwater

RIF = riffle

RM = river mile

RUN = run

s.e. = standard error of the mean

Table B-14. Minimum, Maximum and Mean Average Daily Flows, in Cubic Feet per Second, for the Sacramento River at Delta (USGS Gage No. 11341500) by Month for Water Years 2003 through 2012

Month	2003			2004			2005			2006			2007			2008			2009			2010			2011			2012		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
October	203	216	209	242	253	248	208	1,480	371	263	460	287	259	289	269	204	835	259	172	475	222	191	1,450	331	224	1,540	368	248	640	300
November	213	958	296	250	1,690	497	270	451	318	350	2,550	579	267	718	407	217	269	225	250	2,120	493	245	651	304	337	1,050	555	261	980	401
December	231	23,800	3,490	707	6,600	1,885	262	5,490	1,181	465	14,300	3,498	313	3,250	1,065	217	1,800	492	232	501	273	248	2,040	561	419	5,740	2,569	248	383	278
January	1,880	10,300	3,670	991	3,580	1,704	830	6,370	1,936	1,640	10,900	3,593	407	1,120	576	303	4,950	1,114	325	458	386	660	13,400	2,990	915	1,920	1,293	237	1,090	460
February	1,010	3,020	1,545	921	26,900	4,407	1,060	4,830	1,863	1,140	7,150	2,381	393	6,850	2,022	684	4,330	1,436	305	12,500	1,782	1,640	8,470	3,218	776	5,410	1,472	480	1,020	648
March	732	11,900	2,054	1,770	3,850	2,503	1,370	5,380	2,705	1,880	7,240	3,631	923	1,850	1,383	925	2,090	1,245	1,570	22,100	3,898	1,490	5,040	2,151	1,070	7,580	3,871	477	9,030	1,953
April	1,240	8,380	2,959	1,240	2,530	1,765	1,480	2,600	1,911	3,730	12,300	5,606	643	1,070	819	802	1,840	1,157	1,080	2,380	1,582	1,680	4,920	2,724	2,230	5,270	3,160	1,670	13,600	3,434
May	2,110	4,840	2,905	867	2,200	1,348	2,090	9,100	3,695	2,370	7,720	4,618	331	993	537	1,030	2,600	1,607	733	6,160	2,045	1,700	3,470	2,494	1,640	3,310	2,283	752	2,430	1,561
June	546	2,460	1,275	347	837	545	1,030	5,580	1,694	745	3,220	1,739	226	332	276	293	943	497	350	828	562	1,510	5,460	2,758	1,670	2,880	2,296	373	1,130	570
July	314	531	402	252	351	284	394	979	598	373	696	489	207	274	226	216	285	239	233	344	277	371	1,380	671	449	1,620	816	246	371	293
August	272	419	311	231	256	240	297	390	333	302	370	332	193	208	202	194	215	205	199	264	216	262	356	299	292	445	356	210	243	221
September	249	286	262	210	228	216	265	299	284	268	300	284	192	209	198	189	198	192	184	215	194	236	341	259	244	290	264	189	207	199

Source: USGS (2013)

Table B-15. Minimum, Maximum and Mean Average Daily Flows, in Cubic Feet per Second, for the McCloud River above Shasta Lake (USGS Gage No. 1136800) by Month for Water Years 2003 through 2012

Month	2003			2004			2005			2006			2007			2008			2009			2010			2011			2012		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
October	283	297	292	311	320	315	301	692	375	348	400	358	300	316	309	-	-	-	784	1,060	855	299	4,040	584	329	851	392	332	539	364
November	294	675	342	315	683	396	329	446	345	347	1,440	480	307	464	357	-	-	-	293	1,390	473	371	623	417	388	731	470	323	589	369
December	303	13,900	2,262	455	3,680	1,102	330	3,020	698	382	10,800	2,479	317	1,740	670	-	-	-	250	411	321	363	1,530	616	487	3,340	1,564	273	348	308
January	1,200	5,340	2,082	621	2,040	1,013	570	3,420	1,118	963	9,650	2,334	317	671	423	-	-	-	281	363	312	547	7,180	1,965	578	1,060	733	269	639	366
February	590	1,160	791	644	16,500	3,276	639	1,830	987	674	5,470	1,303	306	5,010	1,185	-	-	-	270	9,700	1,361	1,060	5,250	2,109	486	3,970	972	360	594	451
March	485	4,800	1,038	789	2,300	1,185	629	3,000	1,292	1,420	5,160	2,482	446	864	636	-	-	-	966	10,100	2,376	751	2,730	1,220	1,270	4,340	2,413	380	7,660	1,761
April	671	3,580	1,177	572	1,270	742	601	1,200	854	2,900	8,610	4,497	370	483	404	-	-	-	598	1,480	865	967	2,030	1,264	1,220	2,670	1,638	984	4,700	1,599
May	552	2,570	969	446	651	507	575	3,990	1,501	1,300	3,530	2,354	293	410	332	-	-	-	542	3,450	1,089	767	1,130	884	1,010	1,740	1,255	468	928	628
June	430	544	475	386	442	408	493	890	626	514	1,220	812	255	313	273	-	-	-	384	556	461	533	1,360	749	569	1,060	839	358	525	418
July	346	428	389	323	390	350	378	483	423	379	523	436	237	286	249	-	-	-	304	384	337	393	519	458	446	553	496	305	368	332
August	321	388	342	297	321	309	326	374	347	325	376	346	230	243	235	-	-	-	285	314	297	357	389	375	352	435	391	279	304	290

September	320	346	326	295	317	305	354	376	365	305	330	317	239	261	248	-	-	-	293	328	308	334	378	357	348	368	358	273	281	277
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Source: USGS (2013)
Key:
“-” = no data available.

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Table B-16. Minimum, Maximum and Mean Average Daily Flows, in Cubic Feet per Second, for the McCloud River at Ah-Di-Na (USGS Gage No. 11367800) by Month for Water Years 2003 through 2012

Month	2003			2004			2005			2006			2007			2008			2009			2010			2011			2012		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
October	228	230	230	228	230	228	222	279	231	242	251	248	219	225	222	189	223	193	663	794	720	228	761	271	230	280	237	241	270	248
November	225	271	231	229	273	244	225	340	236	236	399	249	221	240	226	189	198	191	228	955	339	237	277	243	233	268	241	233	269	242
December	228	2,040	439	206	581	285	197	399	232	207	3,000	733	194	408	243	181	232	195	180	326	235	221	366	259	195	459	314	196	242	217
January	325	843	455	188	266	205	191	479	247	197	3,580	492	177	211	188	170	330	193	178	196	183	190	688	298	184	284	205	194	223	203
February	180	361	233	192	3,890	812	195	364	247	195	1,310	276	177	625	275	179	399	217	177	1,180	307	187	592	327	189	673	260	204	237	213
March	185	772	243	227	335	268	204	419	279	483	1,860	847	179	263	205	201	283	233	260	1,540	504	189	418	241	261	760	370	204	1,310	388
April	187	419	231	224	332	247	203	253	221	1,430	3,030	1,944	180	203	184	185	220	200	234	374	284	200	395	253	270	785	439	290	713	374
May	198	357	235	196	243	217	212	1,510	536	848	2,390	1,732	169	191	177	195	1,210	494	233	685	335	218	373	277	390	1,040	626	226	296	246
June	208	228	220	218	224	221	219	287	252	234	780	457	168	178	171	248	617	330	210	233	220	234	356	261	242	676	401	223	234	230
July	222	226	223	215	230	223	199	219	209	216	235	219	168	180	173	249	459	261	206	215	210	227	238	231	229	242	233	231	243	238
August	222	227	225	226	231	229	215	221	218	216	222	219	172	189	178	249	254	251	206	227	209	225	239	234	228	242	232	230	236	232
September	222	230	227	227	236	235	248	254	251	222	225	223	186	192	190	253	717	340	228	231	229	228	248	238	245	256	248	230	233	232

Source: USGS (2013)

Table B-17. Minimum, Maximum and Mean Average Daily Flows, in Cubic Feet per Second, for the McCloud River at McCloud Dam (USGS Gage No. 11367760) by Month for Water Years 2003 through 2012

Month	2003			2004			2005			2006			2007			2008			2009			2010			2011			2012		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
October	181	182	182	192	193	192	185	190	188	201	211	209	187	190	188	156	165	159	-	-	-	227	239	229	220	228	224	246	250	249
November	156	183	178	189	202	195	184	186	184	156	201	191	181	188	185	156	161	158	-	-	-	225	228	227	226	247	233	233	259	244
December	181	214	195	85	203	144	64	185	146	85	192	170	147	187	165	124	159	149	173	197	179	182	230	213	98	244	167	184	246	213
January	191	217	200	58	112	88	114	138	127	64	193	91	141	146	142	114	143	128	163	172	167	49	185	117	88	132	106	186	194	188
February	95	191	123	81	143	113	62	114	86	63	134	91	131	154	138	132	137	134	166	202	169	63	88	77	108	153	132	185	187	186
March	58	128	90	65	85	69	61	92	73	-	-	-	59	131	97	121	135	122	162	182	168	73	80	75	85	138	100	168	202	183
April	57	101	74	77	133	119	59	98	75	-	-	-	123	145	136	87	115	104	159	162	160	76	83	78	88	100	92	164	187	169
May	62	138	90	112	169	143	99	201	130	-	-	-	138	149	142	92	178	138	161	213	195	80	265	144	-	-	-	171	185	175
June	141	178	164	170	180	175	146	183	163	183	213	195	143	147	144	176	208	184	192	204	196	126	237	163	193	287	243	189	219	206

July	178	184	182	179	183	181	149	175	159	175	187	178	146	153	150	188	207	190	207	210	208	182	198	192	182	213	207	216	238	235
August	184	187	186	175	185	181	175	181	178	175	185	179	150	164	155	190	192	191	206	219	210	197	214	208	214	240	222	233	239	236
September	187	192	190	177	185	183	209	214	211	185	189	187	163	166	165	194	207	199	-	-	-	214	224	220	246	251	248	232	237	236

Source: USGS (2013)

Key:

“-“ = no data available.

Table B-18. Minimum, Maximum and Mean Average Daily Water Temperature, in degrees Fahrenheit, for the McCloud River above Shasta Lake (USGS Gage No. 1136800) by Month for Water Years 2003 through 2012

Month	2003			2004			2005			2006			2007			2008			2009			2010			2011			2012		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
October	44.4	52.0	48.6	47.1	51.0	49.2	47.1	52.2	49.2	45.9	53.8	49.8	45.4	54.2	50.9	45.8	53.7	50.1	46.9	55.6	52.2	45.9	53.8	49.8	45.4	54.2	50.9	45.8	53.7	50.1
November	39.9	50.3	45.4	39.9	49.5	45.2	43.4	49.3	46.1	41.7	49.9	44.7	39.1	50.3	44.7	42.4	46.8	44.0	44.0	50.5	47.2	41.7	49.9	44.7	39.1	50.3	44.7	42.4	46.8	44.0
December	39.2	48.6	42.4	38.2	44.7	41.1	36.2	44.5	39.9	35.2	45.4	41.0	41.7	48.0	45.2	37.1	44.0	39.9	36.7	50.6	44.0	35.2	45.4	41.0	41.7	48.0	45.2	37.1	44.0	39.9
January	36.0	43.5	39.3	37.8	43.8	41.2	37.3	43.6	39.9	43.8	48.1	45.5	39.1	45.4	42.8	35.9	41.6	39.2	37.2	43.6	40.4	43.8	48.1	45.5	39.1	45.4	42.8	35.9	41.6	39.2
February	38.5	46.8	44.0	40.2	45.9	42.7	37.3	45.5	41.7	42.1	46.7	45.4	40.7	44.8	42.5	39.6	44.5	41.8	40.8	43.0	42.0	42.1	46.7	45.4	40.7	44.8	42.5	39.6	44.5	41.8
March	43.9	50.2	47.4	43.4	47.0	44.8	42.8	48.0	45.5	43.5	47.7	46.1	43.1	47.2	45.6	40.4	46.9	44.2	43.1	48.8	45.9	43.5	47.7	46.1	43.1	47.2	45.6	40.4	46.9	44.2
April	46.2	52.5	49.4	43.2	52.8	47.7	45.4	53.3	49.2	43.0	50.2	46.9	44.4	48.4	46.9	44.4	52.3	47.9	46.2	55.2	49.9	43.0	50.2	46.9	44.4	48.4	46.9	44.4	52.3	47.9
May	58.4	61.7	59.8	47.9	58.7	53.4	48.7	59.2	53.3	46.8	53.4	49.9	46.4	52.6	49.5	49.1	56.8	53.2	52.4	58.8	55.5	46.8	53.4	49.9	46.4	52.6	49.5	49.1	56.8	53.2
June	54.8	62.9	60.3	54.8	60.6	57.6	53.2	62.0	58.1	52.1	59.8	55.5	47.9	57.8	54.3	52.8	60.7	57.1	55.8	64.6	60.5	52.1	59.8	55.5	47.9	57.8	54.3	52.8	60.7	57.1
July	60.6	65.7	63.4	58.9	62.3	60.7	58.7	64.5	61.6	57.5	63.0	60.8	55.6	61.1	59.1	58.5	62.0	60.3	61.4	66.3	64.0	57.5	63.0	60.8	55.6	61.1	59.1	58.5	62.0	60.3
August	59.4	64.3	61.2	58.1	61.8	60.0	56.8	63.5	59.9	56.0	61.4	59.6	57.9	60.8	59.0	56.4	62.1	60.1	56.8	64.0	60.1	56.0	61.4	59.6	57.9	60.8	59.0	56.4	62.1	60.1
September	49.1	61.0	55.3	52.5	57.1	54.7	51.0	57.9	55.7	53.3	58.5	55.2	53.3	58.3	55.8	54.0	57.4	55.3	52.9	58.1	55.9	53.3	58.5	55.2	53.3	58.3	55.8	54.0	57.4	55.3
Annual	36.0	65.7	51.4	37.8	62.3	49.9	36.2	64.5	50.0	35.2	63.0	50.0	39.1	61.1	49.7	35.9	62.1	49.4	36.7	66.3	51.5	35.2	63.0	50.0	39.1	61.1	49.7	35.9	62.1	49.4

Source: USGS (2013)

Table B-19. Minimum, Maximum and Mean Average Daily Water Temperature, in degrees Fahrenheit, for the Sacramento River at Delta (USGS Gage No. 11341500) by Month for Water Years 2003 to 2012

Month	2003			2004			2005			2006			2007			2008			2009			2010			2011			2012		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
October	43.3	59.3	53.2	48.1	60.7	55.3	47.6	59.8	54.1	48.5	56.4	53.2	45.3	56.4	51.5	50.0	55.5	52.6	48.4	60.1	53.7	47.5	56.6	53.2	47.6	59.6	54.7	48.2	58.5	53.9
November	42.6	49.3	46.0	40.8	49.5	46.0	40.4	50.9	46.7	39.6	51.1	46.8	40.0	53.6	47.4	40.2	52.3	47.4	44.7	53.2	48.3	41.7	51.5	45.4	38.9	53.3	46.5	43.8	50.2	45.9
December	40.4	47.9	44.3	36.2	48.6	44.7	37.3	47.3	42.9	37.7	48.0	43.2	40.2	48.1	42.7	37.4	45.2	41.1	35.6	46.4	40.4	33.0	45.4	40.4	42.0	48.1	45.2	37.5	44.3	40.0
January	43.4	47.1	45.5	39.8	44.8	43.0	42.1	45.0	43.9	43.0	46.3	44.6	35.1	43.6	39.5	37.5	43.6	41.0	37.9	44.8	40.8	-	46.9	38.1	39.0	45.5	42.8	34.0	42.2	39.4
February	39.8	46.7	43.8	41.1	45.9	43.8	42.7	47.1	45.0	40.2	46.9	43.8	38.7	46.2	42.7	38.7	45.6	42.9	37.4	44.7	41.9	41.9	46.7	45.3	40.4	45.1	42.4	39.9	45.2	42.2
March	44.3	51.0	47.1	44.8	49.2	47.3	45.2	48.9	47.1	41.2	45.5	44.0	42.1	49.9	47.0	44.2	47.8	45.6	42.4	48.3	45.1	43.7	47.3	45.8	42.5	46.6	45.1	39.5	46.3	43.9
April	38.6	50.7	46.0	45.7	53.2	49.4	46.3	51.2	49.5	44.8	49.5	47.3	46.9	57.1	50.7	44.2	51.9	48.0	44.9	52.1	48.3	42.2	49.4	46.3	44.6	48.3	46.7	44.1	50.4	47.1
May	54.1	55.1	54.5	51.2	57.6	54.0	48.1	55.8	51.5	46.4	51.1	49.2	49.8	64.9	58.3	47.9	55.2	52.0	48.5	62.1	54.1	46.0	51.6	48.7	46.0	52.2	49.0	47.7	57.3	52.5
June	56.0	65.1	60.4	56.8	68.2	62.9	50.3	61.8	56.0	50.9	64.1	57.1	58.3	68.3	65.1	55.5	68.5	61.2	55.3	68.1	61.7	48.6	58.4	53.0	47.4	56.7	52.9	53.7	65.3	59.9
July	62.7	73.0	67.9	66.6	71.2	69.1	62.5	69.5	66.2	60.8	69.4	65.0	66.1	72.8	69.4	66.2	71.7	69.0	64.8	72.3	68.6	57.3	67.3	63.7	0.0	66.9	48.2	63.0	69.9	66.6
August	64.4	67.7	65.7	63.6	69.9	67.3	62.8	69.1	66.5	61.4	66.7	64.2	59.9	71.0	66.9	65.5	71.5	68.5	62.8	72.1	66.8	59.6	67.1	64.7	63.6	66.7	64.8	63.0	70.1	67.6
September	58.4	67.5	61.7	56.3	66.2	61.5	54.9	63.9	59.3	55.0	63.1	59.0	53.0	69.8	61.4	57.7	65.9	61.6	58.7	65.6	63.0	57.8	64.2	59.8	58.2	64.9	61.5	60.0	64.1	61.9

Annual	38.6	73.0	53.0	36.2	71.2	53.7	37.3	69.5	52.4	37.7	69.4	51.5	35.1	72.8	53.6	37.4	71.7	52.6	35.6	72.3	52.7	33.0	67.3	50.4	38.9	66.9	50.0	34.0	70.1	51.7
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Source: USGS (2013)
Key:
"-" = no data available.

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Table B-20. Minimum, Maximum and Mean Average Daily Water Temperature, in degrees Fahrenheit, for Nine Thermographs in the Sacramento River between Approximately River Mile 9 and River Mile 35 During Water Year 2012

Month	Thermograph Name (approximate river mile)																										
	Box Canyon (RM 36)			Cantara (RM 35)			Mossbrae Upper (RM 32)			Mossbrae Lower (RM 31)			Soda (RM 24)			Riverside (RM 23)			Conant (RM 19)			Sims (RM 15)			Gibson (RM 9)		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
October	-	-	-	49.5	51.7	50.5	48.2	51.3	49.9	46.5	49.6	48.0	45.3	49.6	47.5	45.0	49.2	47.2	44.9	48.9	47.3	45.3	49.0	47.4	46.7	49.3	48.0
November	48.0	49.0	48.6	43.3	45.4	44.2	45.6	46.6	46.2	45.1	46.2	45.8	43.3	45.6	44.9	42.7	45.4	44.4	42.2	45.0	43.8	42.2	44.8	43.7	43.0	44.4	43.8
December	42.6	43.5	42.9	40.7	42.6	41.4	40.0	42.0	41.1	40.5	42.3	41.5	38.6	41.1	39.9	38.0	40.9	39.4	37.1	40.2	38.7	36.9	39.8	38.2	37.0	38.4	37.7
January	39.5	40.6	40.1	37.7	39.8	39.1	37.5	40.3	39.1	38.6	41.1	40.1	35.4	38.6	37.3	35.1	37.9	36.7	34.2	36.4	35.4	33.5	35.7	34.8	33.3	35.1	34.4
February	39.7	41.0	40.3	37.3	40.8	39.7	37.4	41.5	40.1	38.8	42.2	40.9	38.2	41.1	40.0	38.5	41.0	39.8	38.0	40.9	39.3	38.1	41.5	39.4	38.5	41.0	39.6
March	39.7	41.2	40.7	39.8	40.7	40.4	36.4	41.4	40.1	37.6	42.0	40.7	36.5	42.1	39.7	36.2	42.0	39.2	36.2	41.8	38.8	36.4	41.4	38.6	37.1	40.5	38.7
April	41.0	41.4	41.3	40.5	42.4	41.5	40.6	42.2	41.4	40.9	42.7	41.7	40.6	42.9	42.3	40.7	43.3	42.6	40.4	43.5	42.5	40.5	43.9	42.8	40.9	44.4	43.6
May	44.2	45.8	44.8	45.7	48.5	47.5	44.7	45.8	45.2	44.7	45.9	45.4	44.7	46.3	46.0	44.8	46.5	46.2	44.2	46.6	46.1	44.2	46.7	46.2	44.7	47.5	46.8
June	45.7	48.3	47.8	46.2	49.2	48.6	45.9	50.7	49.1	45.9	50.4	48.9	47.0	53.5	50.8	47.3	54.1	51.1	47.8	54.2	51.4	48.2	54.1	51.5	49.2	54.6	52.1
July	46.9	50.5	48.3	47.6	52.5	50.0	47.6	53.4	51.0	47.6	52.2	50.4	50.0	55.9	54.1	50.8	57.2	55.1	52.9	60.3	57.1	54.3	62.0	58.3	57.6	63.0	60.3
August	48.5	54.0	50.7	49.3	56.3	52.1	48.8	55.9	52.3	48.3	54.3	51.1	50.2	57.2	54.1	50.8	58.0	54.8	52.9	59.8	56.7	54.6	61.2	58.1	58.2	62.5	60.5
September	49.8	54.4	51.6	50.0	56.6	52.8	48.9	55.5	52.0	48.1	53.8	50.8	49.7	56.3	53.3	50.1	56.6	53.7	51.6	57.5	55.1	53.1	58.7	56.1	56.1	59.9	58.1
Annual	39.5	54.4	45.2	37.3	56.6	45.7	36.4	55.9	45.6	37.6	54.3	45.4	35.4	57.2	45.8	35.1	58.0	45.9	34.2	60.3	46.0	33.5	62.0	46.3	33.3	63.0	47.0

Source: Reclamation, unpublished data.

Key:

"-" = no data available

RM = river mile.

Table B-21. Distribution of Bed Substrate Particle Sizes and Wentworth Sediment Particle Classes Derived from Wolman Pebble Counts on Riffles at Ground-level Survey Sites on the Sacramento River Between Box Canyon Dam and Shasta Lake during January 2014

Particle Size/Class	Study Reach	Box Canyon	Mossbrae	Dunsmuir		Canyon			Shotgun		North Salt	
	Study Site	Cantara	Mossbrae	Dunsmuir2	Dunsmuir1	Canyon3	Canyon2	Canyon1	Shotgun2	Shotgun1	NSalt2	NSalt1
Number of Counts	Number	3	4	1	3	4	3	4	3	3	2	3
Particle size (mm)	D ₁₆	29	12	32	29	33	23	20	26	42	26	30
	D ₃₅	68	51	59	52	50	47	56	52	77	57	64
	D ₅₀	97	75	84	72	67	67	93	69	100	99	96
	D ₆₅	120	99	120	94	84	99	140	90	130	150	150
	D ₈₄	190	170	200	170	120	170	260	160	250	250	310
	D ₉₅	310	290	320	280	180	300	540	310	480	490	490
Percent substrate by class	silt/clay	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	sand	2%	5%	2%	0%	0%	3%	4%	5%	4%	3%	3%
	gravel	29%	33%	36%	41%	46%	44%	35%	41%	22%	34%	32%
	cobble	56%	49%	51%	51%	51%	45%	45%	47%	58%	43%	41%
	boulder	8%	6%	11%	6%	2%	7%	16%	7%	16%	15%	24%
	bedrock	5%	7%	0%	2%	1%	1%	0%	0%	0%	4%	0%

Key:

% = percent

D₁₆ = particle size for which 16 percent of the bed material is finer

D₃₅ = particle size for which 35 percent of the bed material is finer

D₅₀ = median particle size

D₆₅ = particle size for which 65 percent of the bed material is finer

D₈₄ = particle size for which 84 percent of the bed material is finer

D₉₅ = particle size for which 95 percent of the bed material is finer

mm = millimeter

Table B-22. Distribution of Bed Substrate Particle Sizes and Wentworth Sediment Particle Classes Derived from Wolman Pebble Counts on Pool-tails at Ground-level Survey Sites on the Sacramento River Between Box Canyon Dam and Shasta Lake during January 2014

Particle Size/Class	Study Reach	Box Canyon	Mossbrae	Dunsmuir		Canyon			Shotgun		North Salt	
	Study Site	Cantara	Mossbrae	Dunsmuir2	Dunsmuir1	Canyon3	Canyon2	Canyon1	Shotgun2	Shotgun1	NSalt2	NSalt1
Number of Counts	Number	4	1	0	3	1	1	2	0	1	2	1
Particle size (mm)	D ₁₆	22	32	-	17	18	5.4	14	-	13	20	15
	D ₃₅	36	52	-	36	33	19	30	-	32	49	41
	D ₅₀	53	73	-	51	39	54	45	-	48	69	72
	D ₆₅	79	100	-	72	47	85	61	-	66	97	110
	D ₈₄	180	250	-	110	71	140	100	-	94	180	210
	D ₉₅	310	480	-	160	120	280	170	-	200	360	310
Percent substrate by class	silt/clay	0%	0%	-	0%	0%	0%	0%	-	0%	2%	0%
	sand	4%	6%	-	1%	1%	8%	7%	-	5%	5%	8%
	gravel	47%	38%	-	58%	80%	47%	61%	-	58%	37%	38%
	cobble	29%	41%	-	40%	19%	40%	31%	-	34%	41%	44%
	boulder	8%	16%	-	1%	0%	6%	2%	-	3%	8%	10%
	bedrock	12%	0%	-	1%	0%	0%	0%	-	0%	8%	0%

Key:

% = percent

D₁₆ = particle size for which 16 percent of the bed material is finer

D₃₅ = particle size for which 35 percent of the bed material is finer

D₅₀ = median particle size

D₆₅ = particle size for which 65 percent of the bed material is finer

D₈₄ = particle size for which 84 percent of the bed material is finer

D₉₅ = particle size for which 95 percent of the bed material is finer

mm = millimeter

Table B-23. Distribution of Bed Substrate Particle Sizes and Wentworth Sediment Particle Classes Derived from Wolman Pebble Counts on Isolated Sediment Deposits at Ground-level Survey Sites on the Sacramento River Between Box Canyon Dam and Shasta Lake during January 2014

Particle Size/Class	Study Reach	Box Canyon	Mossbrae	Dunsmuir		Canyon			Shotgun		North Salt	
	Study Site	Cantara	Mossbrae	Dunsmuir2	Dunsmuir1	Canyon3	Canyon2	Canyon1	Shotgun2	Shotgun1	NSalt2	NSalt1
Number of Counts	Number	1	0	1	0	0	2	2	0	0	0	0
Particle size (mm)	D ₁₆	12	-	8	-	-	9.2	19	-	-	-	-
	D ₃₅	24	-	28	-	-	21	27	-	-	-	-
	D ₅₀	33	-	40	-	-	35	34	-	-	-	-
	D ₆₅	40	-	55	-	-	47	41	-	-	-	-
	D ₈₄	62	-	83	-	-	90	59	-	-	-	-
	D ₉₅	110	-	140	-	-	170	81	-	-	-	-
Percent substrate by class	silt/clay	0%	-	0%	-	-	0%	0%	-	-	-	-
	sand	1%	-	13%	-	-	5%	2%	-	-	-	-
	gravel	82%	-	59%	-	-	73%	86%	-	-	-	-
	cobble	14%	-	26%	-	-	21%	13%	-	-	-	-
	boulder	1%	-	2%	-	-	2%	0%	-	-	-	-
	bedrock	2%	-	0%	-	-	0%	0%	-	-	-	-

Key:

% = percent

D₁₆ = particle size for which 16 percent of the bed material is finer

D₃₅ = particle size for which 35 percent of the bed material is finer

D₅₀ = median particle size

D₆₅ = particle size for which 65 percent of the bed material is finer

D₈₄ = particle size for which 84 percent of the bed material is finer

D₉₅ = particle size for which 95 percent of the bed material is finer

mm = millimeter

Table B-24. Distribution of Bed Substrate Particle Sizes and Wentworth Sediment Particle Classes Derived from Wolman Pebble Counts on Riffles at Ground-level Survey Sites on the McCloud River Between Shasta Lake and McCloud Dam during January 2014

Particle Size/Class	Study Reach	Upper		Middle
	Study Site	Hawkins	Ah-Di-Na	Ladybug
Number of Counts	Number	1	0	1
Particle size (mm)	D ₁₆	12	-	8.7
	D ₃₅	17	-	14
	D ₅₀	29	-	18
	D ₆₅	65	-	23
	D ₈₄	110	-	37
	D ₉₅	250	-	61
Percent substrate by class	silt/clay	1%	-	0%
	sand	4%	-	0%
	gravel	59%	-	96%
	cobble	30%	-	4%
	boulder	5%	-	0%
	bedrock	1%	-	0%

Key:

% = percent

D₁₆ = particle size for which 16 percent of the bed material is finer

D₃₅ = particle size for which 35 percent of the bed material is finer

D₅₀ = median particle size

D₆₅ = particle size for which 65 percent of the bed material is finer

D₈₄ = particle size for which 84 percent of the bed material is finer

D₉₅ = particle size for which 95 percent of the bed material is finer

mm = millimeter

Table B-25. Distribution of Bed Substrate Particle Sizes and Wentworth Sediment Particle Classes Derived from Wolman Pebble Counts on Pool-tails at Ground-level Survey Sites on the McCloud River Between Shasta Lake and McCloud Dam During January 2014

Particle Size/Class	Study Reach	Upper		Middle
	Study Site	Hawkins	Ah-Di-Na	Ladybug
Number of Counts	Number	0	3	2
Particle size (mm)	D ₁₆	-	12	8.5
	D ₃₅	-	16	12
	D ₅₀	-	19	17
	D ₆₅	-	24	26
	D ₈₄	-	35	46
	D ₉₅	-	47	120
Percent substrate by class	silt/clay	-	0%	0%
	sand	-	0%	4%
	gravel	-	99%	85%
	cobble	-	1%	9%
	boulder	-	12	8.5
	bedrock	-	16	12

Key:

% = percent

D₁₆ = particle size for which 16 percent of the bed material is finer

D₃₅ = particle size for which 35 percent of the bed material is finer

D₅₀ = median particle size

D₆₅ = particle size for which 65 percent of the bed material is finer

D₈₄ = particle size for which 84 percent of the bed material is finer

D₉₅ = particle size for which 95 percent of the bed material is finer

mm = millimeter

Table B-26. Distribution of Bed Substrate Particle Sizes and Wentworth Sediment Particle Classes Derived from Wolman Pebble Counts on Isolated Sediment Deposits at Ground-level Survey Sites on the McCloud River Between Shasta Lake and McCloud Dam During January 2014

Particle Size/Class	Study Reach	Upper		Middle
	Study Site	Hawkins	Ah-Di-Na	Ladybug
Number of Counts	Number	6	2	2
Particle size (mm)	D ₁₆	7.7	12	7.1
	D ₃₅	12	16	10
	D ₅₀	15	19	13
	D ₆₅	20	24	18
	D ₈₄	31	35	29
	D ₉₅	56	47	45
Percent substrate by class	silt/clay	0%	0%	0%
	sand	0%	0%	2%
	gravel	96%	99%	96%
	cobble	4%	1%	1%
	boulder	0%	0%	0%
	bedrock	0%	0%	0%

Key:

% = percent

D₁₆ = particle size for which 16 percent of the bed material is finer

D₃₅ = particle size for which 35 percent of the bed material is finer

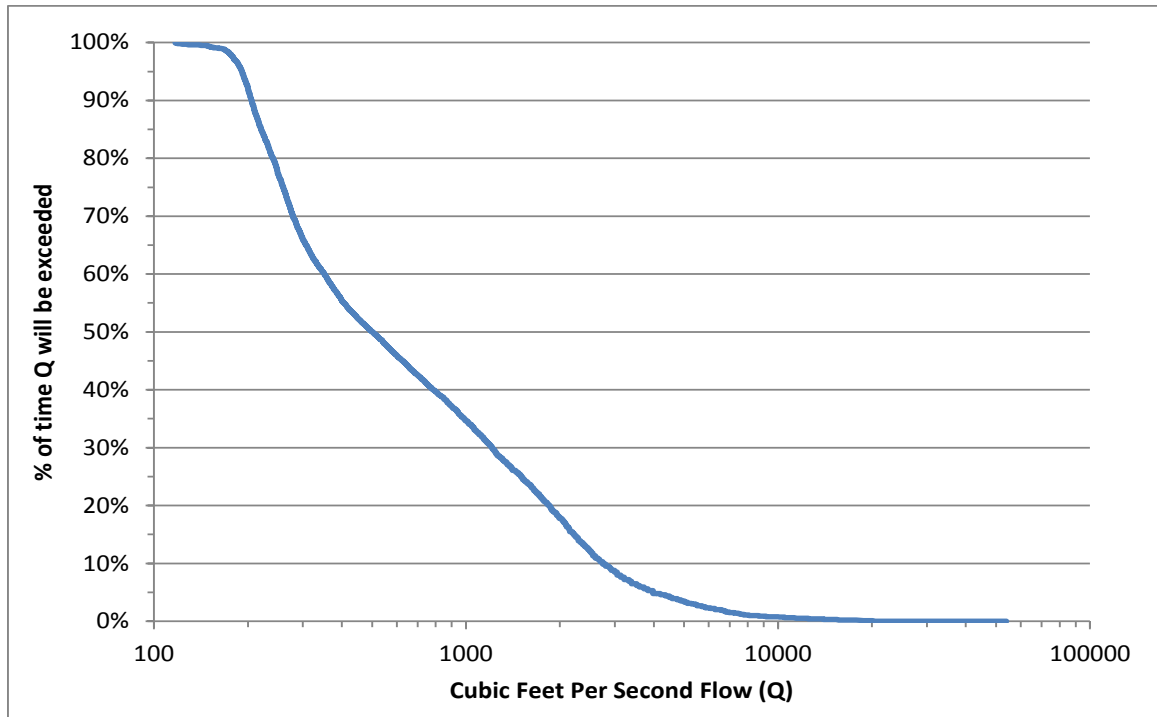
D₅₀ = median particle size

D₆₅ = particle size for which 65 percent of the bed material is finer

D₈₄ = particle size for which 84 percent of the bed material is finer

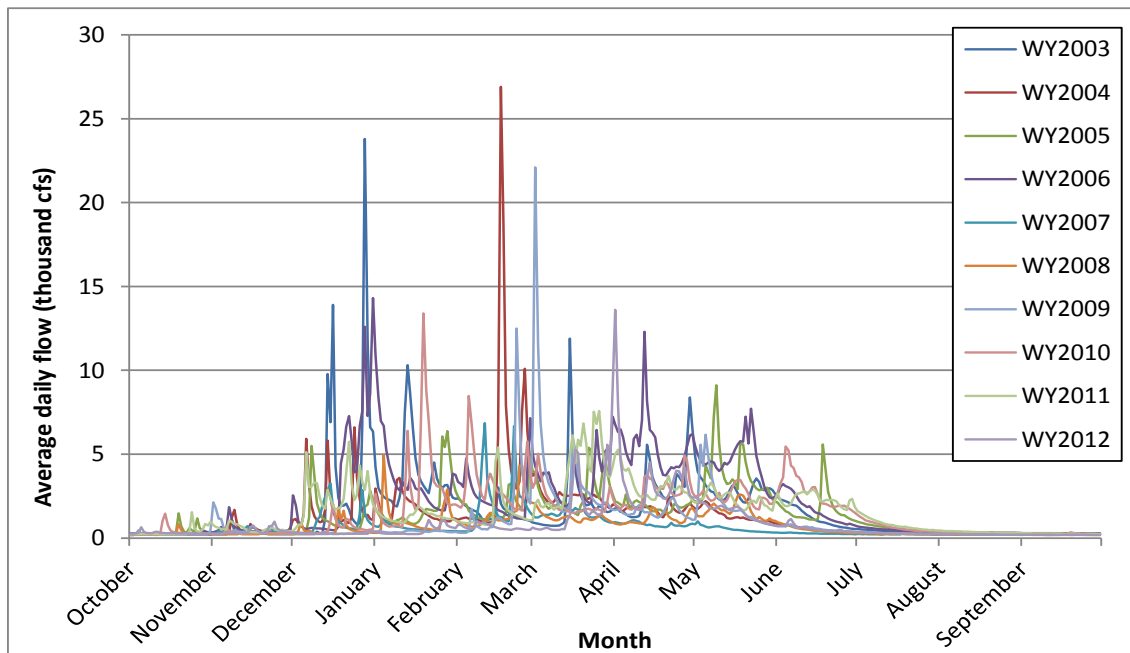
D₉₅ = particle size for which 95 percent of the bed material is finer

mm = millimeter



Source: USGS (2013)

Figure B-1. Flow Duration Curve for the Sacramento River at Delta (USGS Gage No. 11341500) for Water Years 1971 through 2012

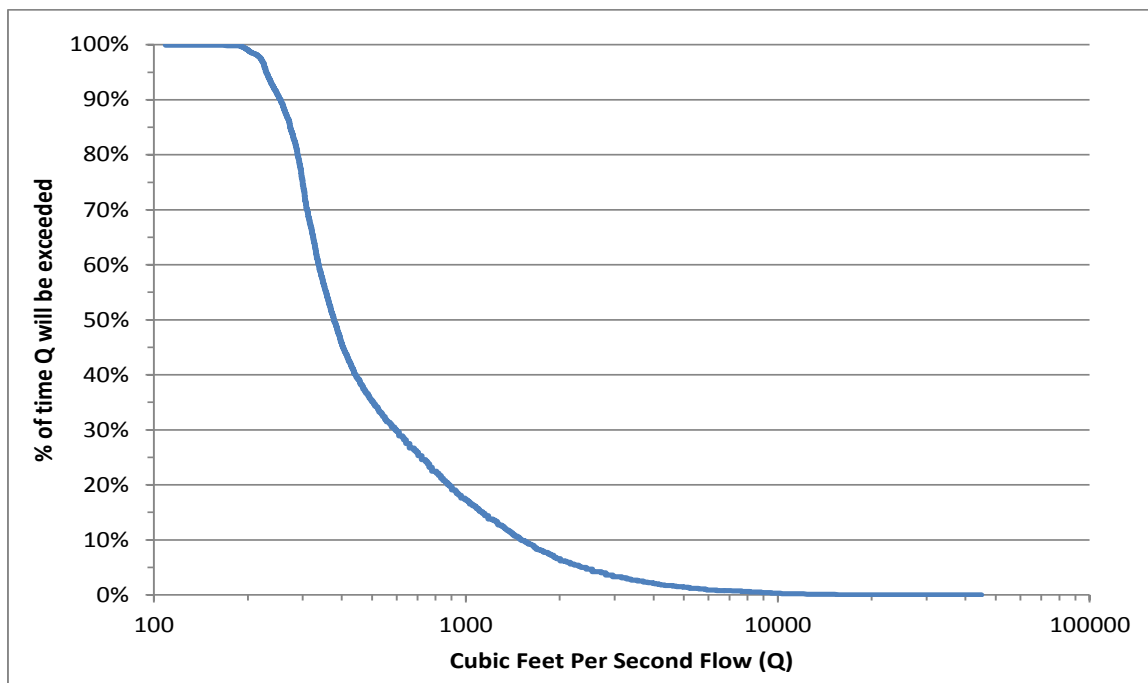


Source: USGS (2013)

Key: cfs = cubic feet per second; WY = water year

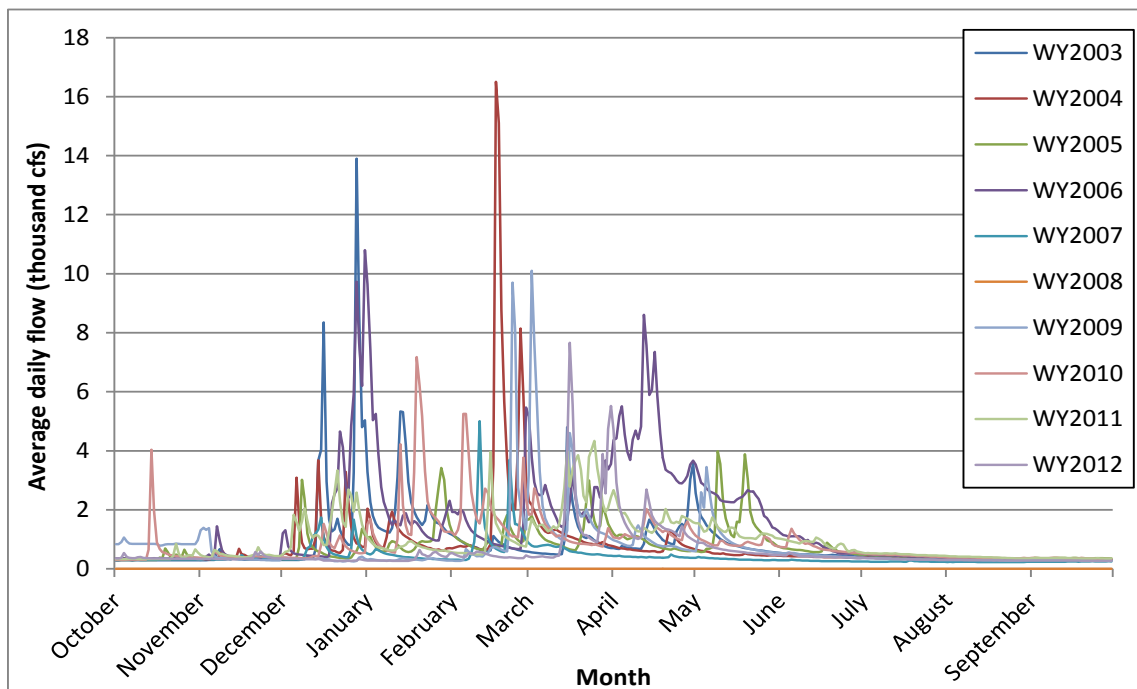
Figure B-2. Seasonal Flow Patterns in the Sacramento River at Delta (USGS Gage No. 11341500) for Water Years 2003 through 2012

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Source: USGS (2013)

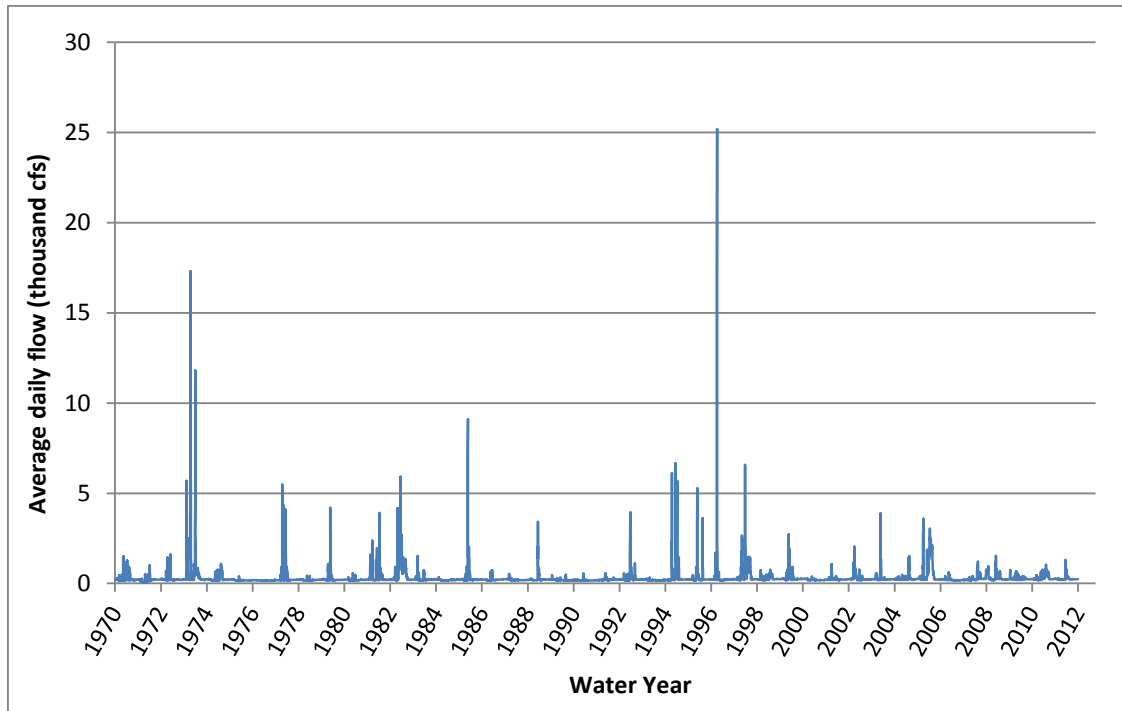
Figure B-3. Flow Duration Curve for the McCloud River above Shasta (USGS Gage No. 1136800) for Water Years 1971 through 2012



Source: USGS (2013)

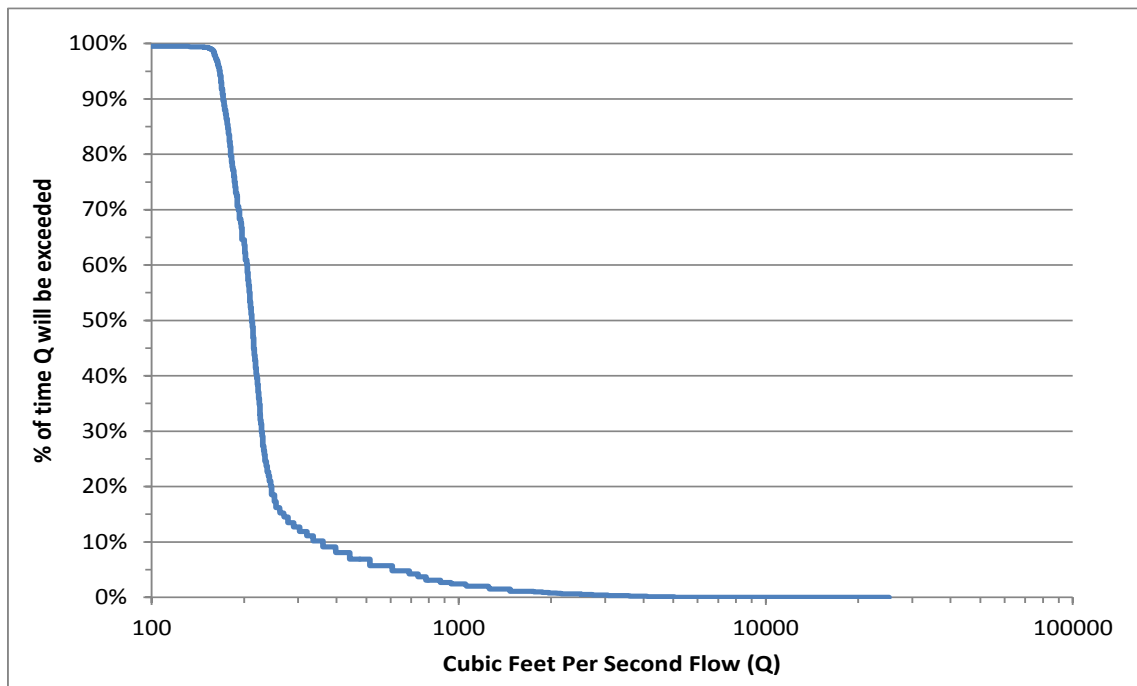
Key: cfs = cubic feet per second; WY = water year

Figure B-4. Seasonal Flow Patterns in the McCloud River above Shasta (USGS Gage No. 1136800) for Water Years 1971 through 2012



Key: cfs = cubic feet per second

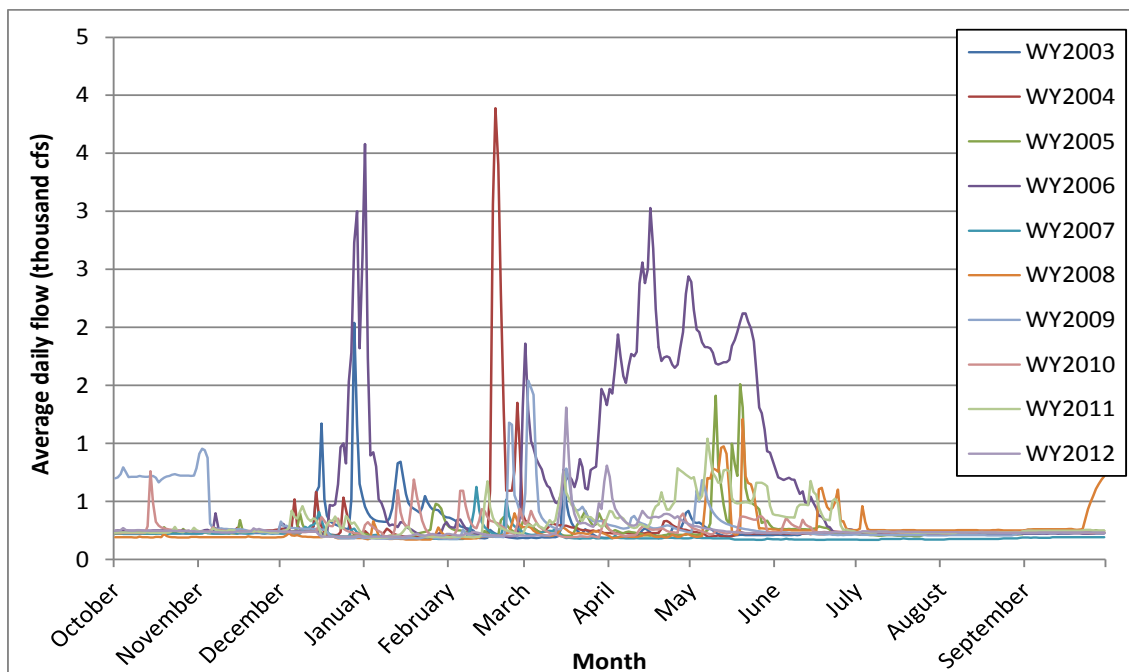
Figure B-5. Average Daily Flow for the McCloud River at Ah-Di-Na (USGS Gage No. 11367800) for Water Years 1971 through 2012



Source: USGS (2013)

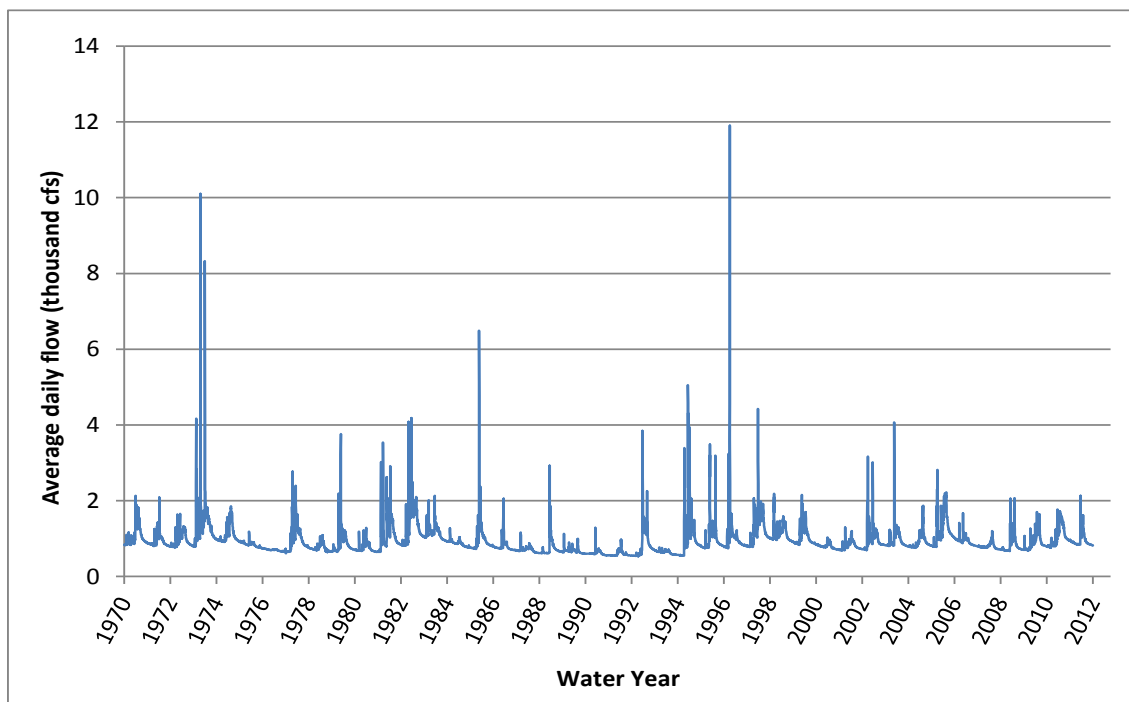
Figure B-6. Flow Duration Curve for the McCloud River near Ah-Di-Na (USGS Gage No. 11367800) for Water Years 1971 through 2012

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Source: USGS (2013)
Key: cfs = cubic feet per second; WY = water year

Figure B-7. Seasonal Flow Patterns in the McCloud River near Ah-Di-Na (USGS Gage No. 11367800) for Water Years 1971 through 2012



Key: cfs = cubic feet per second

Figure B-8. Average Daily Flow for the McCloud River at McCloud (USGS Gage No. 11367500) for Water Years 1971 through 2012

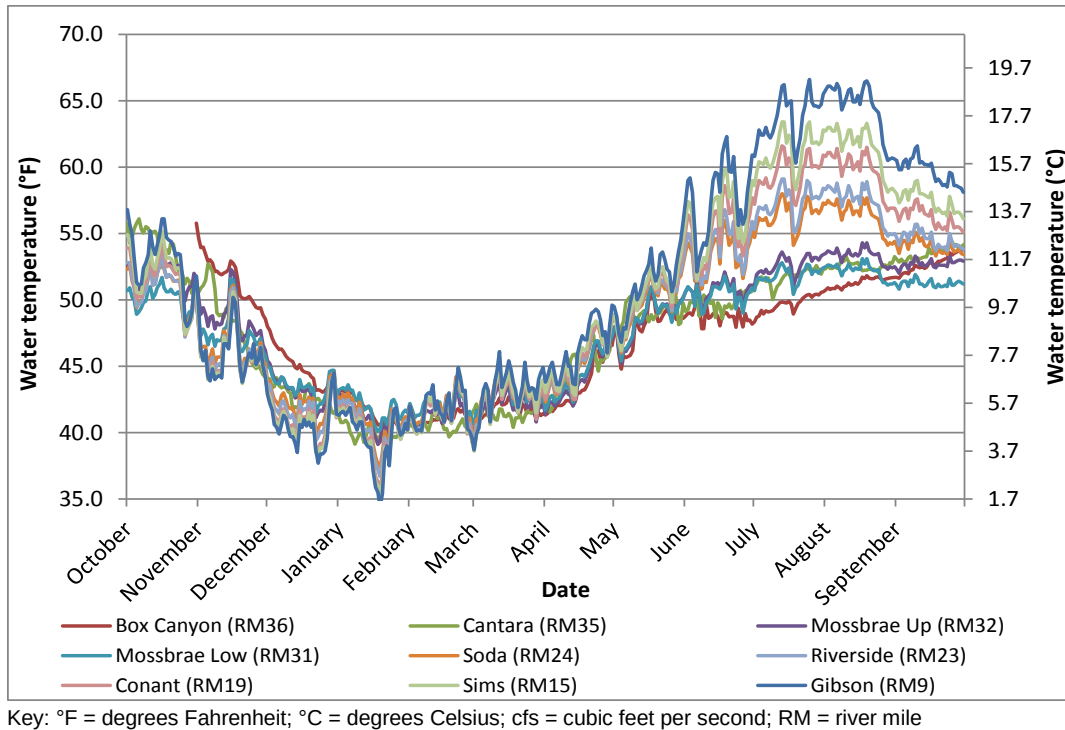


Figure B-9. Daily Average Water Temperature during Water Year 2012 at Nine Locations on the Sacramento River between Box Canyon Dam and Gibson Road

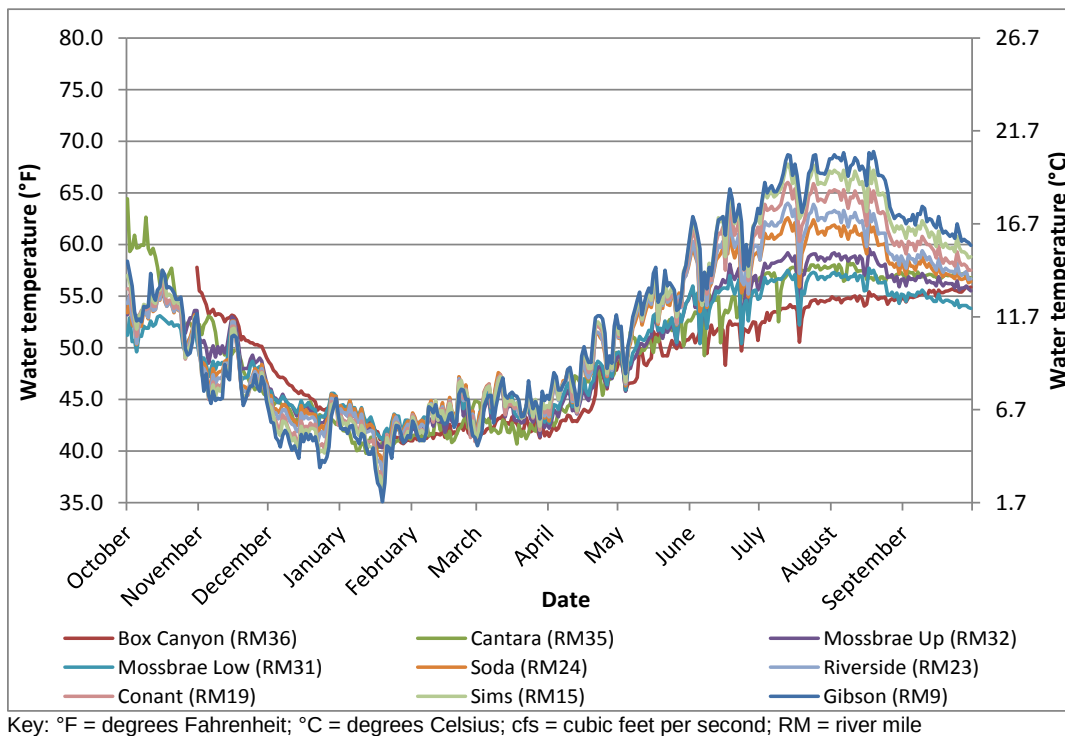
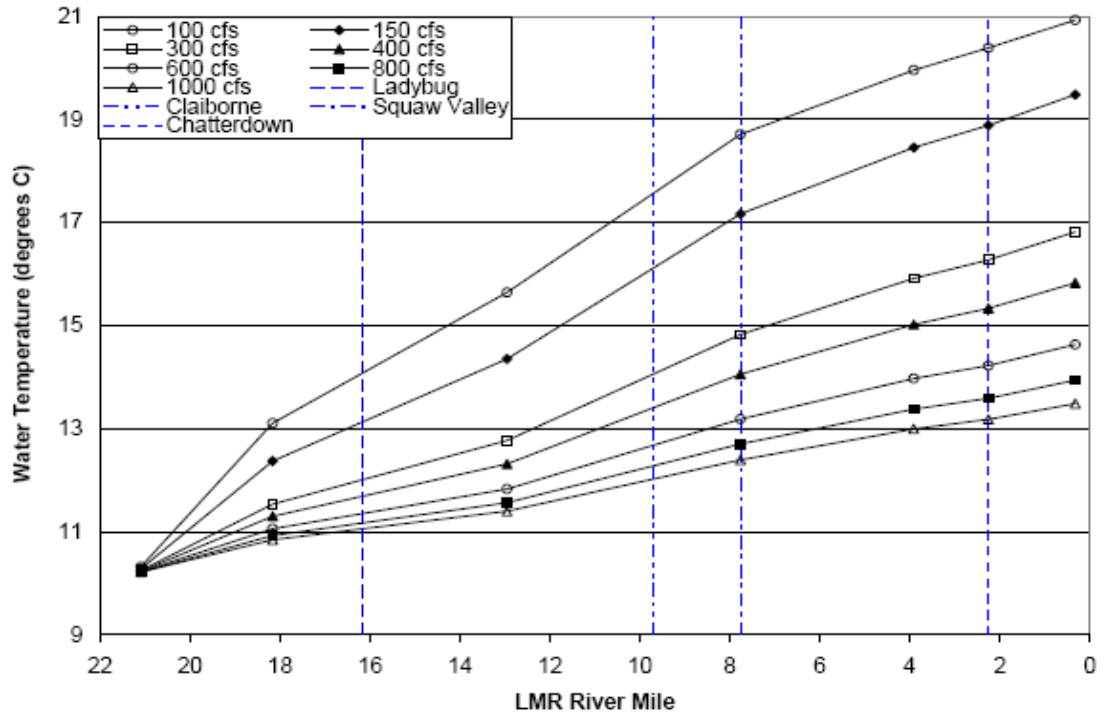
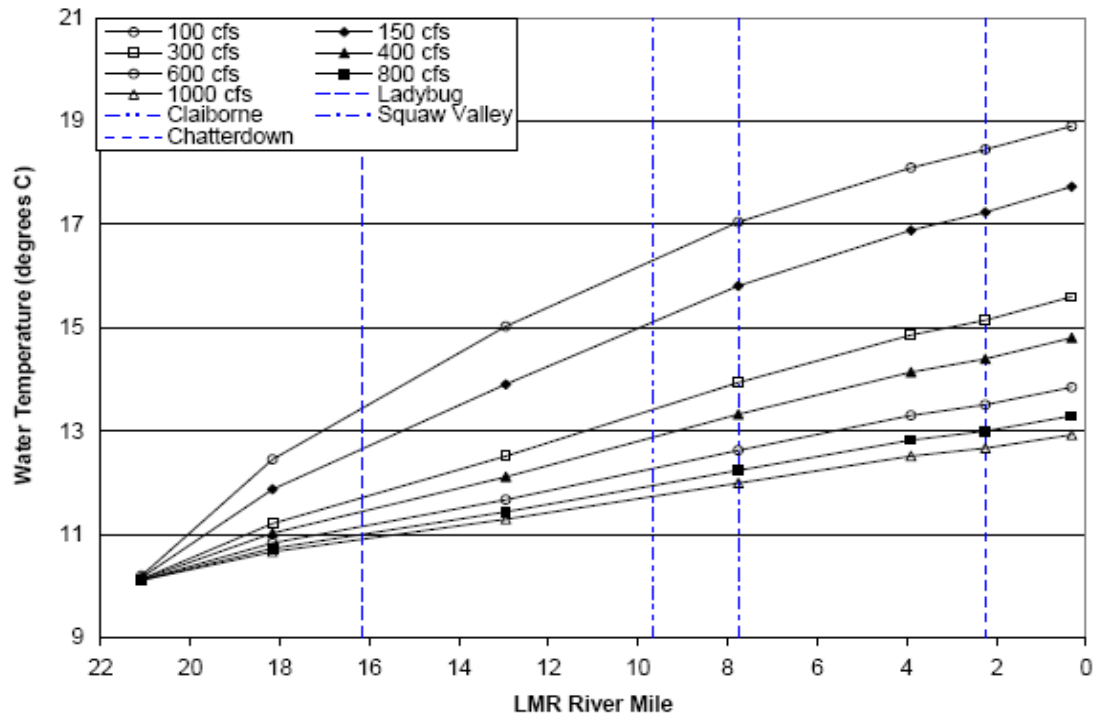


Figure B-10. Daily Maximum Water Temperature during Water Year 2012 at Nine Locations on the Sacramento River between Box Canyon Dam and Gibson Road

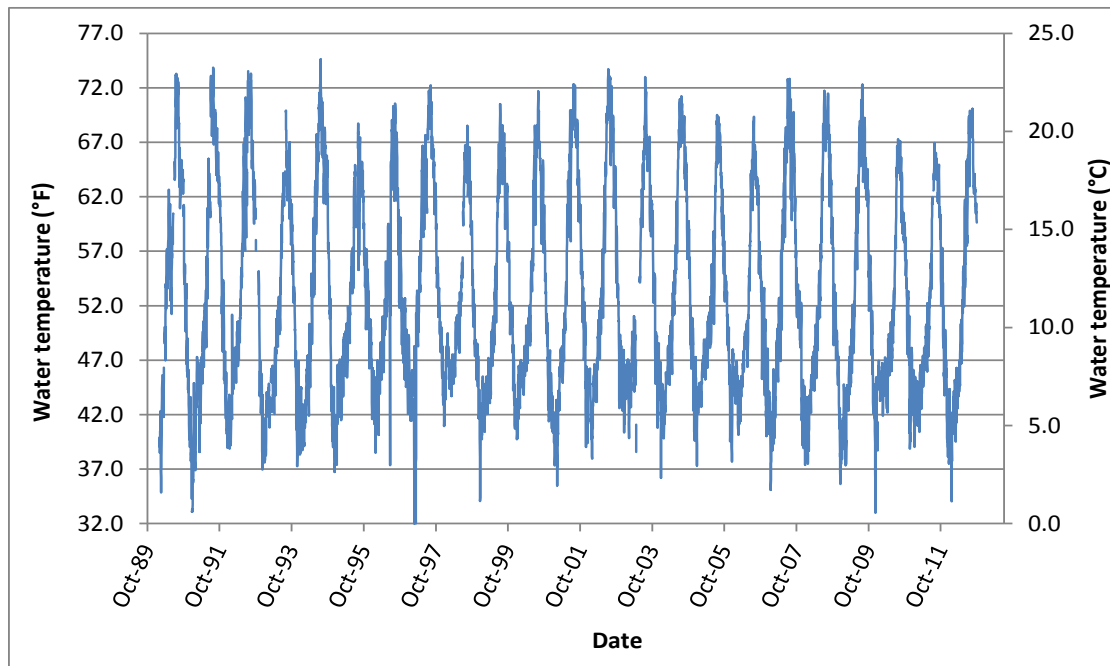




Source: PG&E 2009

Key: C = Celsius; cfs = cubic feet per second; LMR = lower McCloud River

Figure B-11. Lower McCloud River Water Temperature Simulations for July (top panel) and August (bottom panel) with Critically Dry Hydrology and Hot Meteorology

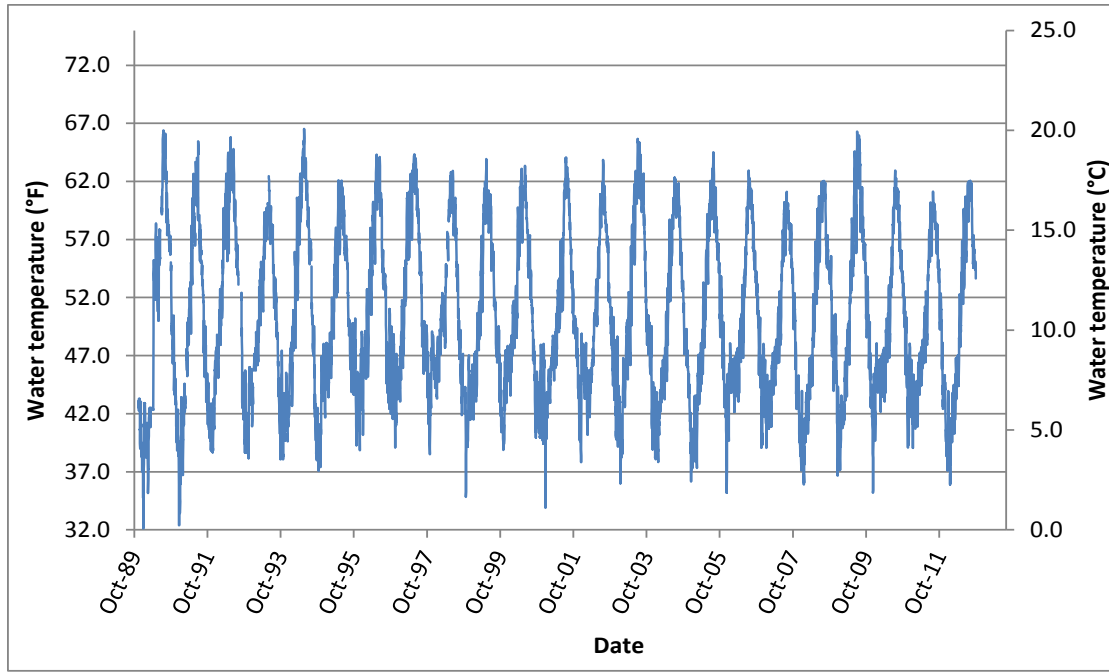


Source: USGS (2013)

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Appendix B: Reach Specific Habitat Inventories

Key: °F = degrees Fahrenheit; °C = degrees Celsius; cfs = cubic feet per second

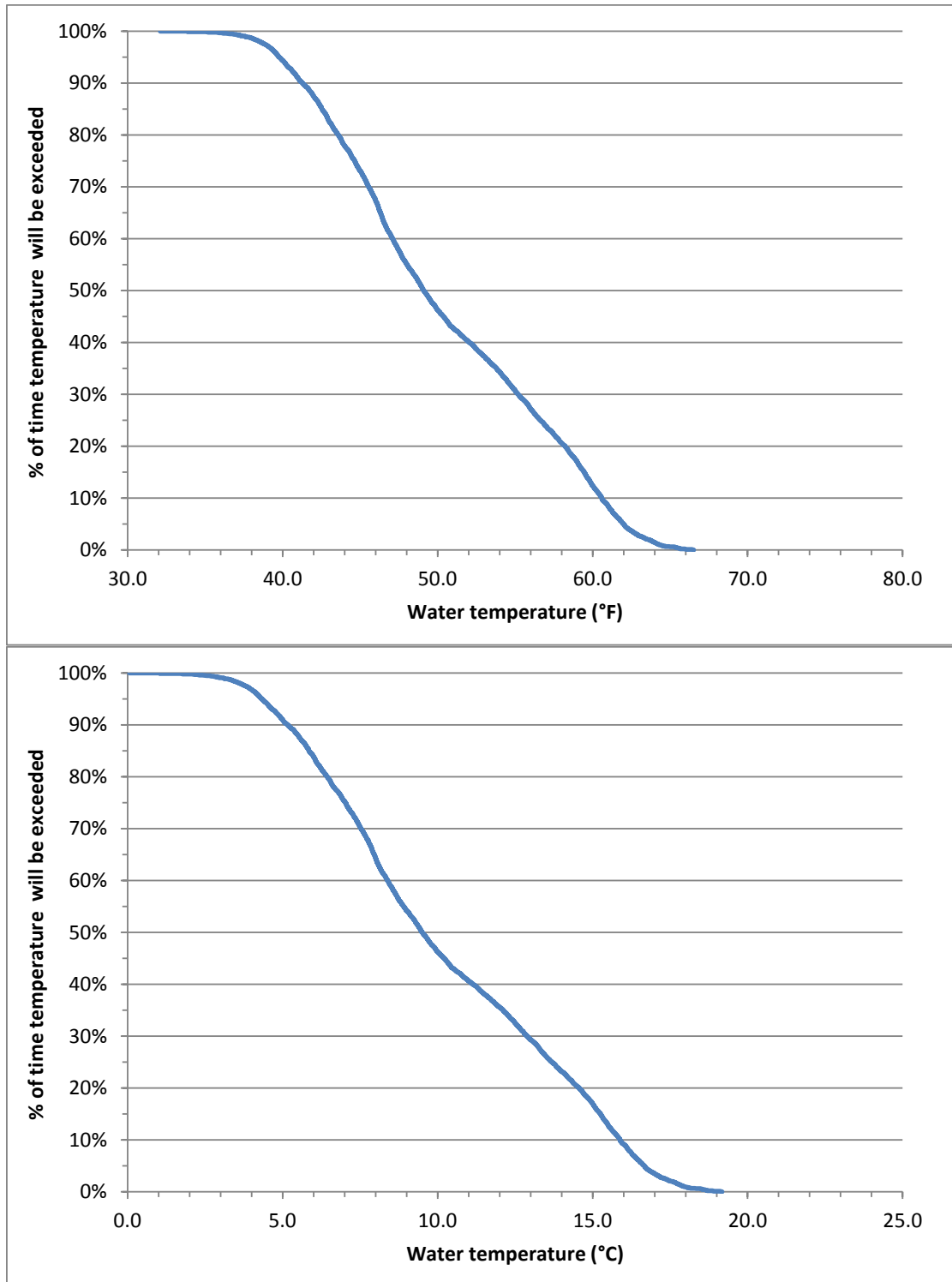
Figure B-12. Daily Average Water Temperature in the Sacramento River at Delta (USGS Gage No. 11341500) for Water Years 1990–2012



Source: USGS (2013)

Key: °F = degrees Fahrenheit; °C = degrees Celsius; cfs = cubic feet per second

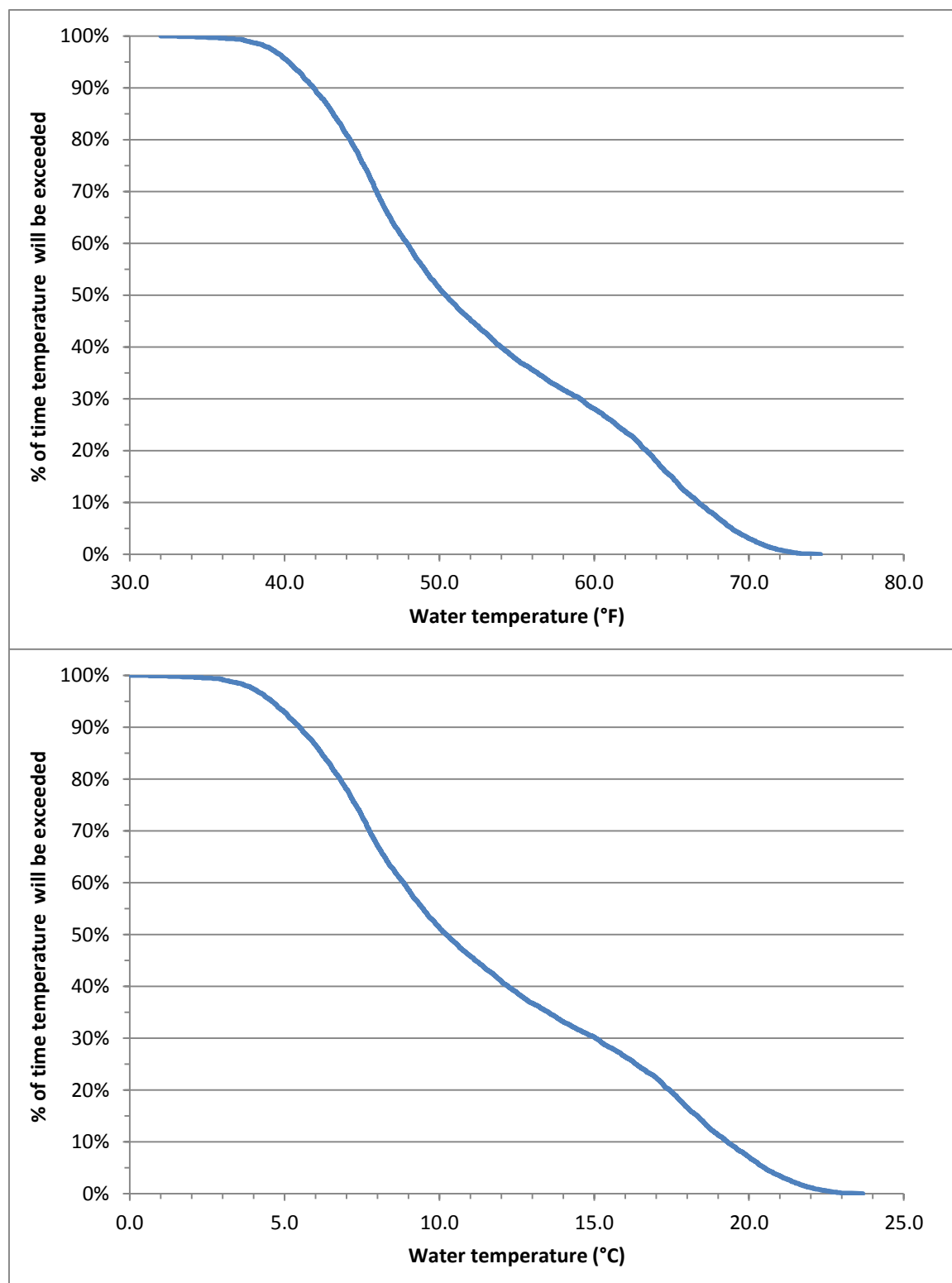
Figure B-13. Daily Average Water Temperature in the McCloud River above Shasta (USGS Gage No. 11367500) for Water Years 1990–2012



Source: USGS (2013)

Key: % = percent; °C = degrees Celsius; °F = degrees Fahrenheit

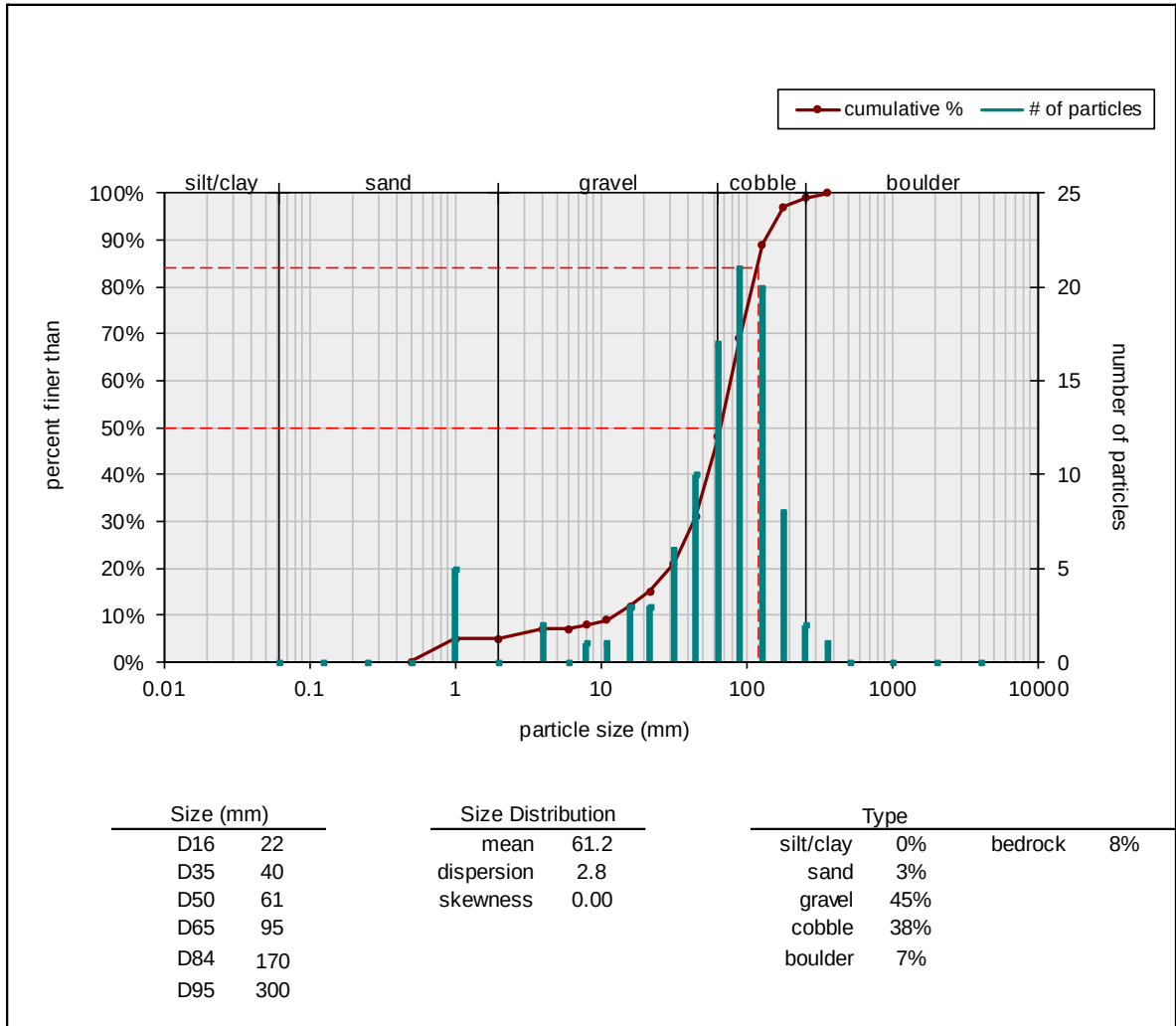
Figure B-14. Temperature Duration Curve for Mean Daily Water Temperature (degrees Fahrenheit and Celsius) in the McCloud River above Shasta (USGS Gage No. 1136800) for Water Years 1971 Through 2012



Source: USGS (2013).

Key: % = percent; °C = degrees Celsius; °F = degrees Fahrenheit

Figure B-15. Temperature Duration Curve for Mean Daily Water Temperature in the Sacramento River at Delta (USGS Gage No. 11341500) for Water Years 1971 Through 2012



Key:

% = percent

D₁₆ = particle size for which 16 percent of the bed material is finer

D₃₅ = particle size for which 35 percent of the bed material is finer

D₅₀ = median particle size

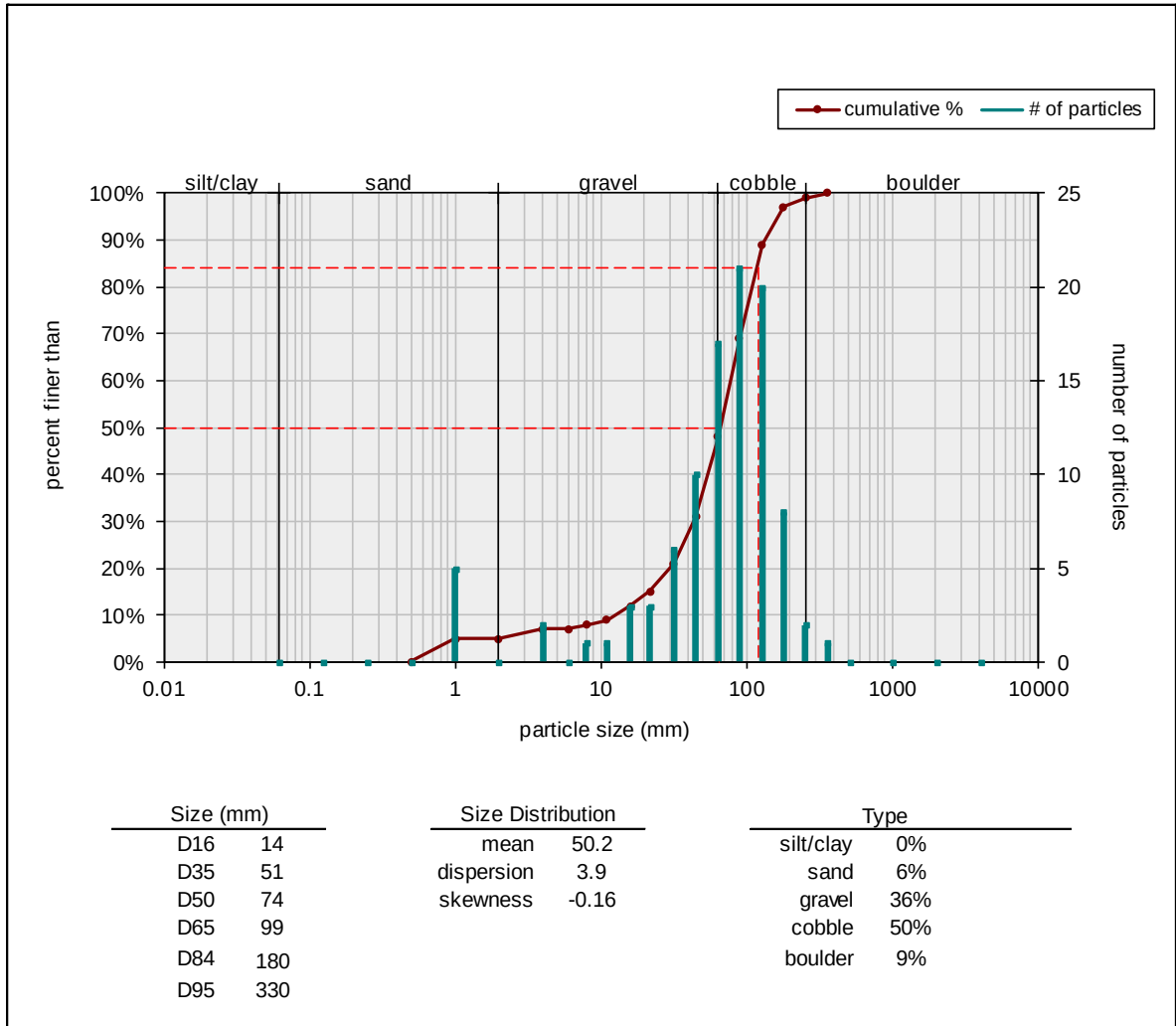
D₆₅ = particle size for which 65 percent of the bed material is finer

D₈₄ = particle size for which 84 percent of the bed material is finer

D₉₅ = particle size for which 95 percent of the bed material is finer

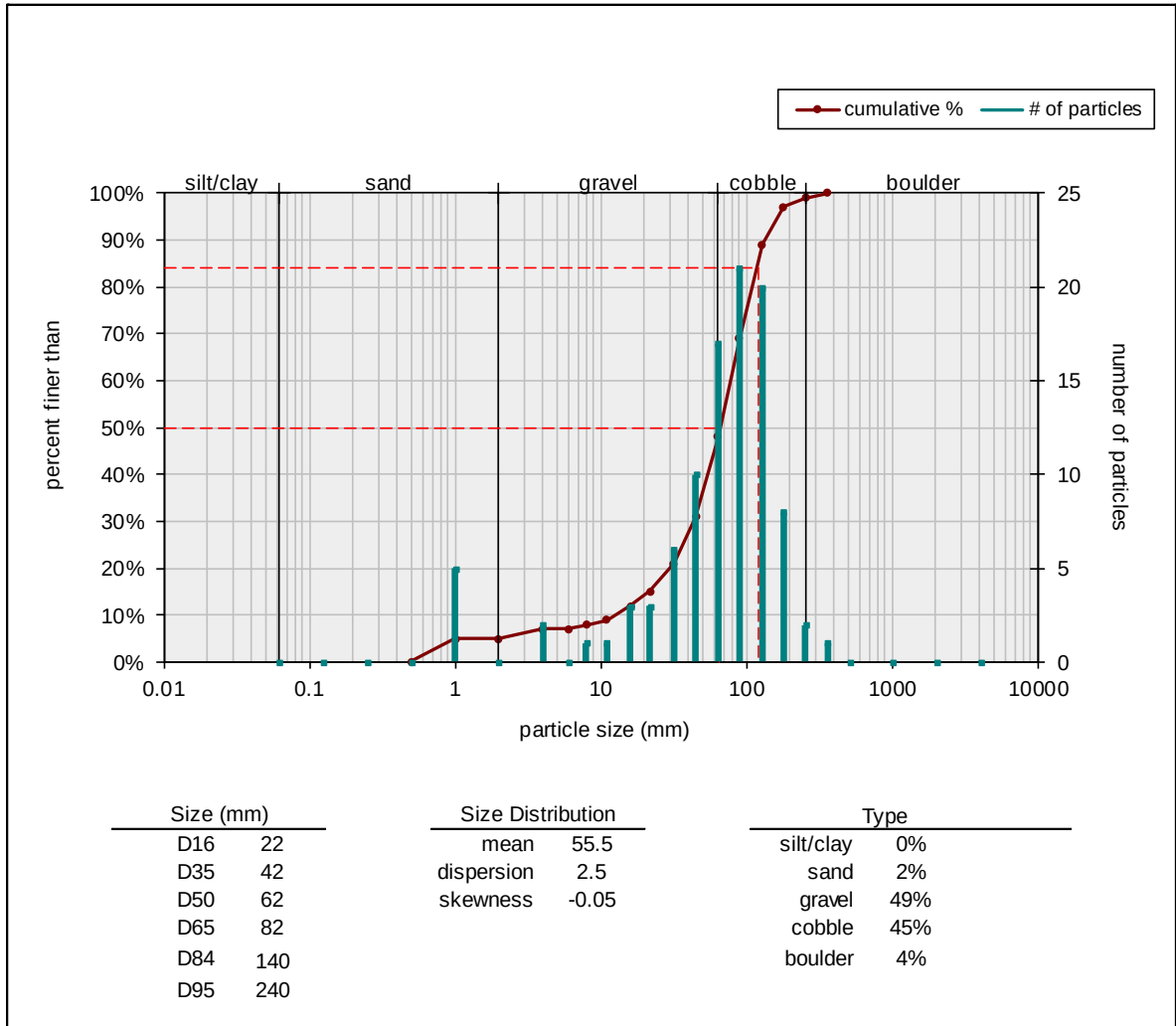
mm = millimeter

Figure B-16. Distribution of Bed Sediment Particle Sizes (and Wentworth Particle Classes) Derived from Wolman Pebble Counts on Spawning Habitat Features (Pooltails, Riffles and Isolated Sediment Deposits behind Flow Defects) in the Box Canyon Study Reach of the Sacramento River in January 2014



Key:
% = percent
D₁₆ = particle size for which 16 percent of the bed material is finer
D₃₅ = particle size for which 35 percent of the bed material is finer
D₅₀ = median particle size
D₆₅ = particle size for which 65 percent of the bed material is finer
D₈₄ = particle size for which 84 percent of the bed material is finer
D₉₅ = particle size for which 95 percent of the bed material is finer
mm = millimeter

Figure B-17. Distribution of Bed Sediment Particle Sizes (and Wentworth Particle Classes) Derived from Wolman Pebble Counts on Spawning Habitat Features (Pooltails, Riffles and Isolated Sediment Deposits behind Flow Defects) in the Mossbrae Study Reach of the Sacramento River in January 2014



Key:

% = percent

D₁₆ = particle size for which 16 percent of the bed material is finer

D₃₅ = particle size for which 35 percent of the bed material is finer

D₅₀ = median particle size

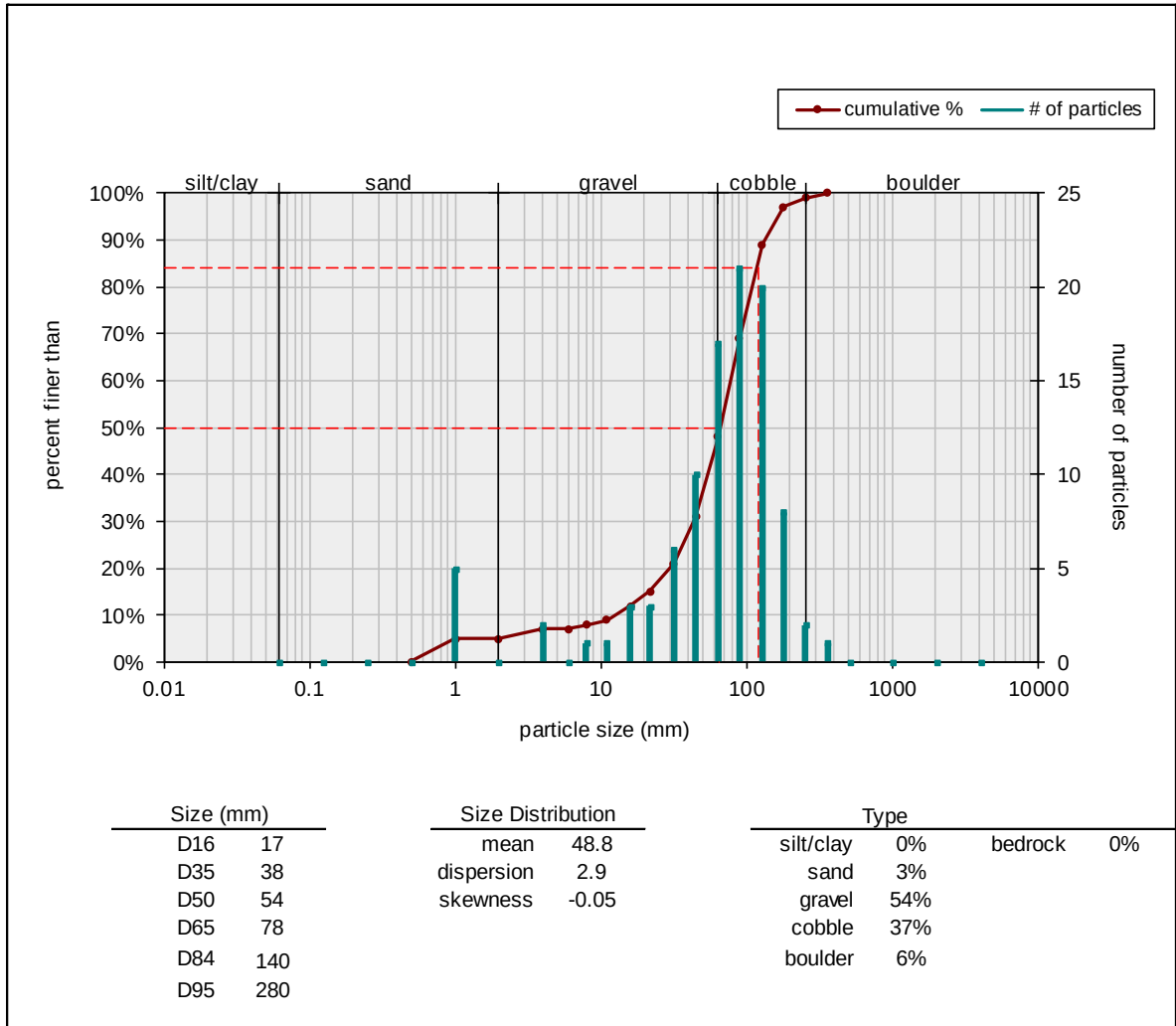
D₆₅ = particle size for which 65 percent of the bed material is finer

D₈₄ = particle size for which 84 percent of the bed material is finer

D₉₅ = particle size for which 95 percent of the bed material is finer

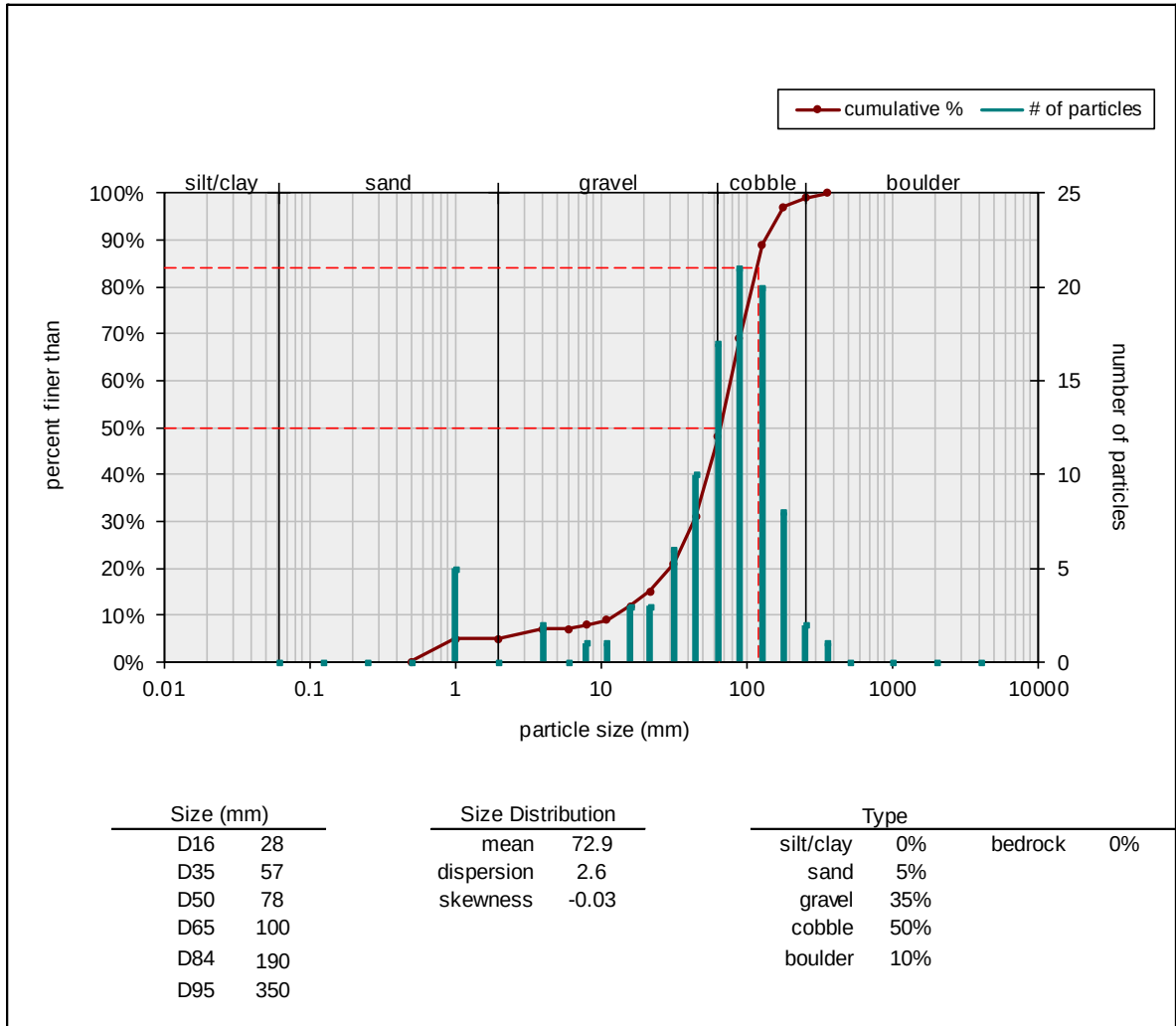
mm = millimeter

Figure B-18. Distribution of Bed Sediment Particle Sizes (and Wentworth Particle Classes) Derived from Wolman Pebble Counts on Spawning Habitat Features (Pooltails, Riffles and Isolated Sediment Deposits behind Flow Defects) in the Dunsmuir Study Reach of the Sacramento River in January 2014



Key:
% = percent
D₁₆ = particle size for which 16 percent of the bed material is finer
D₃₅ = particle size for which 35 percent of the bed material is finer
D₅₀ = median particle size
D₆₅ = particle size for which 65 percent of the bed material is finer
D₈₄ = particle size for which 84 percent of the bed material is finer
D₉₅ = particle size for which 95 percent of the bed material is finer
mm = millimeter

Figure B-19. Distribution of Bed Sediment Particle Sizes (and Wentworth Particle Classes) Derived from Wolman Pebble Counts on Spawning Habitat Features (Pooltails, Riffles and Isolated Sediment Deposits behind Flow Defects) in the Canyon Study Reach of the Sacramento River in January 2014



Key:

% = percent

D₁₆ = particle size for which 16 percent of the bed material is finer

D₃₅ = particle size for which 35 percent of the bed material is finer

D₅₀ = median particle size

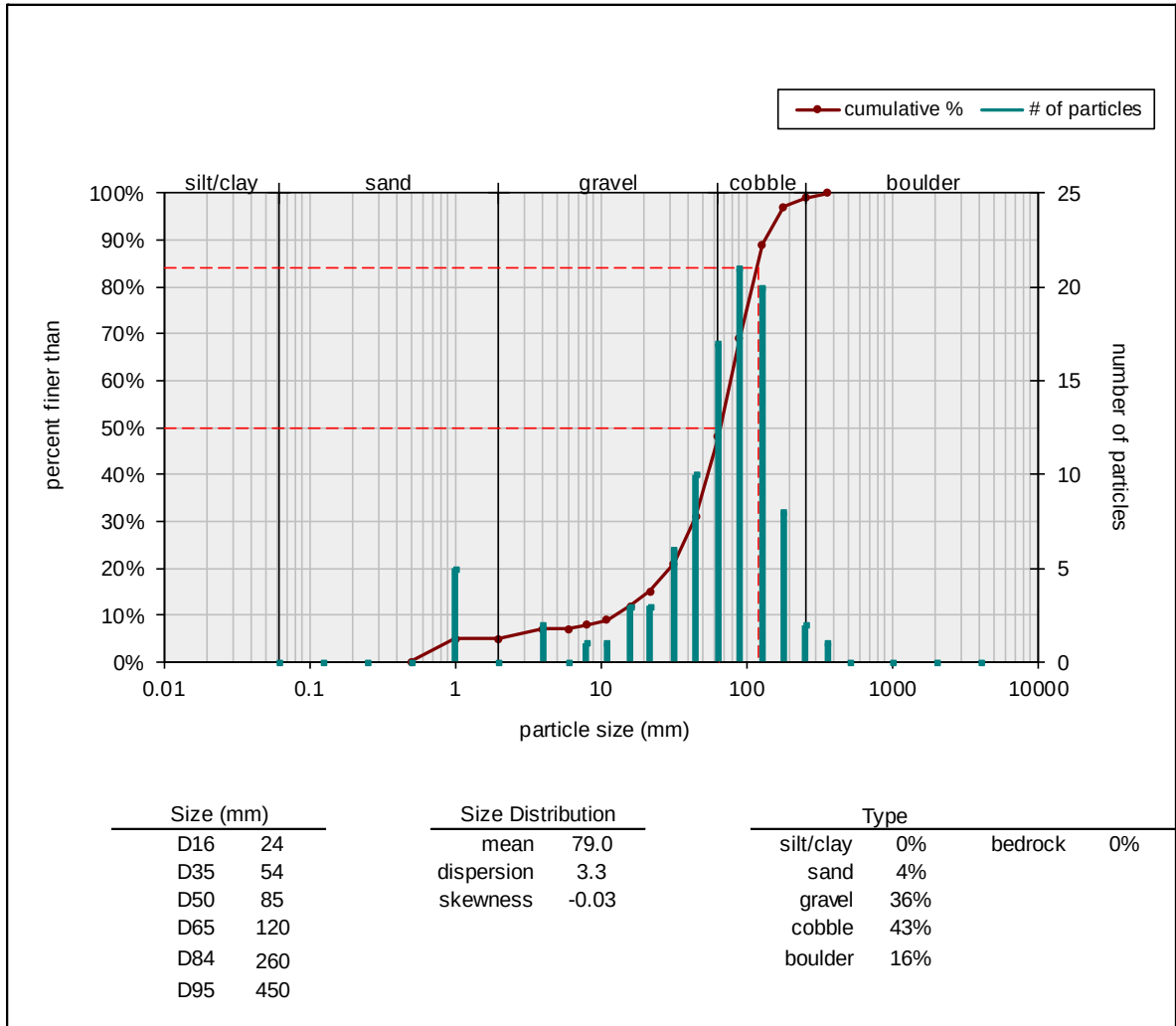
D₆₅ = particle size for which 65 percent of the bed material is finer

D₈₄ = particle size for which 84 percent of the bed material is finer

D₉₅ = particle size for which 95 percent of the bed material is finer

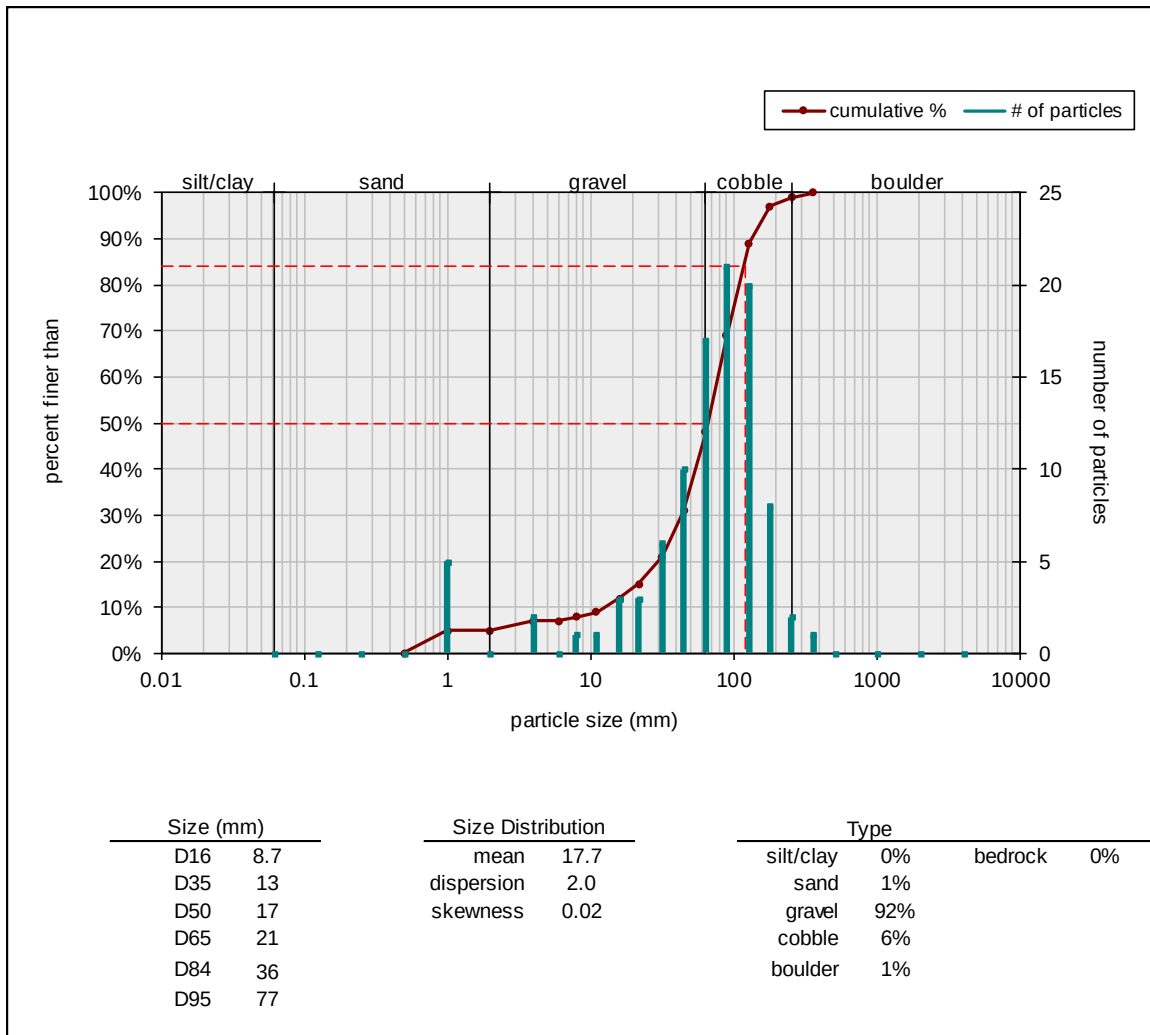
mm = millimeter

Figure B-20. Distribution of Bed Sediment Particle Sizes (and Wentworth Particle Classes) Derived from Wolman Pebble Counts on Spawning Habitat Features (Pooltails, Riffles and Isolated Sediment Deposits behind Flow Defects) in the Shotgun Study Reach of the Sacramento River in January 2014



Key:
% = percent
D₁₆ = particle size for which 16 percent of the bed material is finer
D₃₅ = particle size for which 35 percent of the bed material is finer
D₅₀ = median particle size
D₆₅ = particle size for which 65 percent of the bed material is finer
D₈₄ = particle size for which 84 percent of the bed material is finer
D₉₅ = particle size for which 95 percent of the bed material is finer
mm = millimeter

Figure B-21. Distribution of Bed Sediment Particle Sizes (and Wentworth Particle Classes) Derived from Wolman Pebble Counts on Spawning Habitat Features (Pooltails, Riffles and Isolated Sediment Deposits behind Flow Defects) in the North Salt Study Reach of the Sacramento River in January 2014



Key:

% = percent

D₁₆ = particle size for which 16 percent of the bed material is finer

D₃₅ = particle size for which 35 percent of the bed material is finer

D₅₀ = median particle size

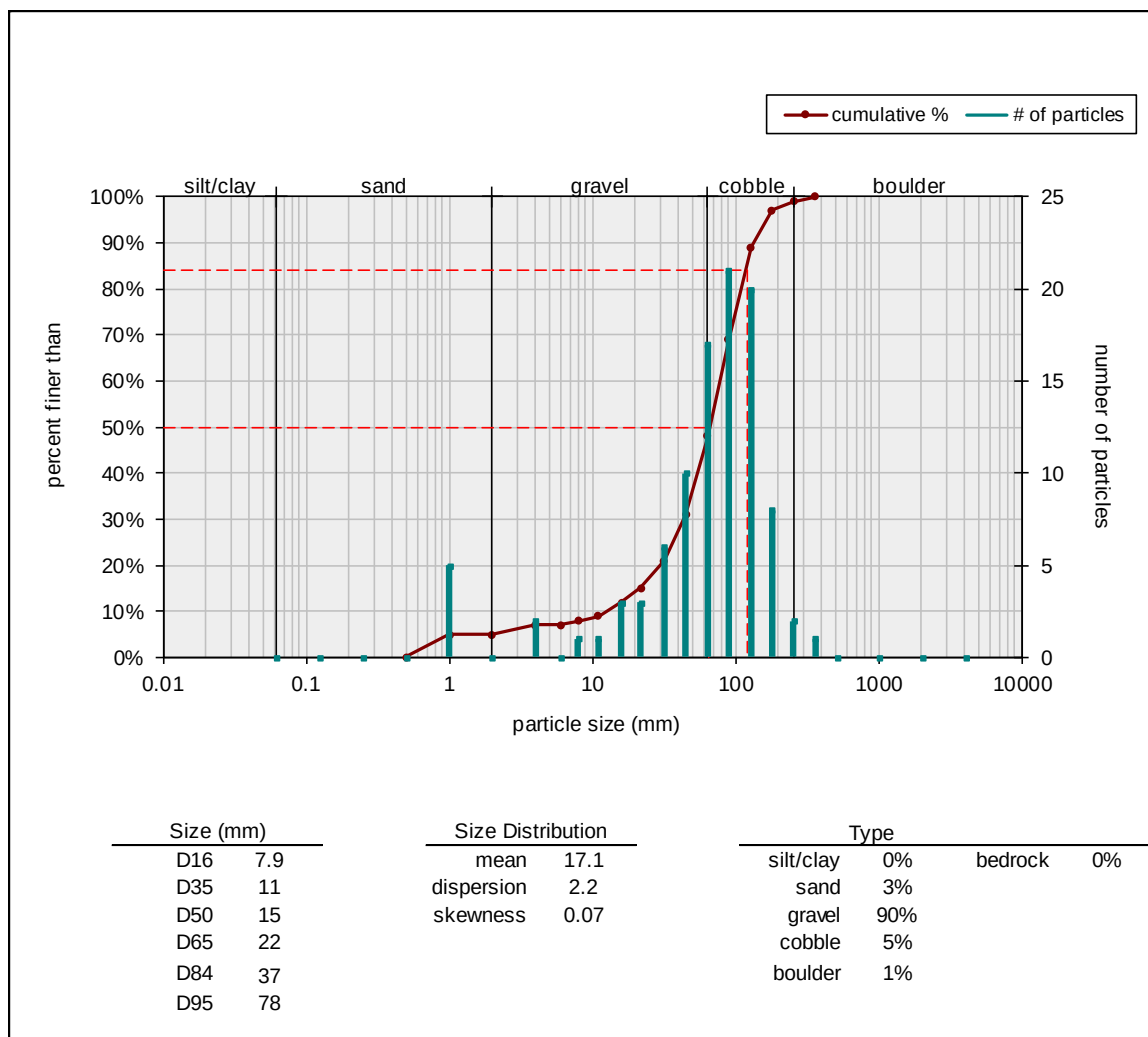
D₆₅ = particle size for which 65 percent of the bed material is finer

D₈₄ = particle size for which 84 percent of the bed material is finer

D₉₅ = particle size for which 95 percent of the bed material is finer

mm = millimeter

Figure B-22. Distribution of Bed Sediment Particle Sizes (and Wentworth Particle Classes) Derived from Wolman Pebble Counts on Spawning Habitat Features (Pooltails, Riffles and Isolated Sediment Deposits behind Flow Defects) in the Upper Study Reach of the McCloud River in January 2014



Key:
% = percent
D₁₆ = particle size for which 16 percent of the bed material is finer
D₃₅ = particle size for which 35 percent of the bed material is finer
D₅₀ = median particle size
D₆₅ = particle size for which 65 percent of the bed material is finer
D₈₄ = particle size for which 84 percent of the bed material is finer
D₉₅ = particle size for which 95 percent of the bed material is finer
mm = millimeter

Figure B-23. Distribution of Bed Sediment Particle Sizes (and Wentworth Particle Classes) Derived from Wolman Pebble Counts on Spawning Habitat Features (Pooltails, Riffles and Isolated Sediment Deposits behind Flow Defects) in the Middle Study Reach of the McCloud River in January 2014

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