Table 3.1 Summary of Reach Characteristics

Reach	**Length (mi)**	**Stationing**	**Water Surface Slope**[1] (ft/mi)		**Channel Width**[1] (ft)		**Flow Depth**[1] (ft)		**Comments**
			2 Yr	100 Yr	2 Yr	100 Yr	2 Yr	100 Yr	
Capay	2.1	1500+00 - 1390+00	10.8	10.8	328	1759	11.4	19.7	steep, confined and incised with bedrock controls
Hungry Hollow	2.8	1390+00 - 1240+00	11.3	11.3	1159	1548	5.9	11.5	channel widens; braided plan form; active gravel mining; depositional reach; avulsion potential
Madison	2.5	1240+00 - 1110+00	12.4	12.4	489	692	9.3	19.3	downstream portion of reach narrows and not actively mined
Guesisosi	2.3	1110+00 - 990+00	6.2	6.2	490	614	9.1	18.6	channel initially confined by levee, reasonably straight but meanders further downstream; some in-channel levees
Dunnigan Hills	2.8	990+00 - 840+00	9.9	9.9	690	879	7.4	16.1	well-developed low-flow meanders; significant riparian vegetation; site of former Moore diversion dam; bedrock controls along Dunnigan Hills; some in-channel levees; West Adams Canal drain and Goodnow Slough enter upstream from road 94B
Hoppin	3.3	840+00 - 665+00	7.4	7.4	672	1584	18.4	32.6	some meander development; bedrock controls upstream from Stevens Bridge; extensive gravel mining; dense vegetation downstream from Stevens Bridge; some in-channel levees
Rio Jesus Maria	7.5	665+00 - 590+00	7	7	210	384	27.6	41.6	upper 1.4 mi included in study area; channel considerably narrower and constricted with steep banks; some riparian vegetation; contains COE flood control levees; four bridge crossings near station 60000, at Yolo

[1] Reach-averaged values.

Table 3.2 Cache Creek, Capay Subreach, February 1996

Subreach 8, Capay, Station 1500+00 to 1390+00									
Return Period	Reach Average Hydraulic Characteristics						Sediment	Channel Form	Vegetation Condition
	Discharge (cfs)	Width (ft)	Depth (ft)	Velocity (ft/sec)	Energy Slope	Bed Slope	Bed Mat'l d_{50} (mm)		
2 yrs	14500	328	11.44	6.32	.0022	.00205	30	Relatively straight, steep, swift, low alternating bars, some bedrock controls, some cut banks, cobble and gravel bed materials,	Narrow & limited riparian vegetation primarily on high banks; variable density vegetation on alternating bars; due to channel incision reach may contain insufficient substrate for native riparian tree or shrub species
10 yrs	37000	1434	16.54	7.99	.0023	.00205	30	same as above	same as above
100 yrs	63500	1759	19.65	8.81	.0021	.00205	30	During high flows significant portions of the high terrace south of the main channel is inundated	During high flows substantial erosion and loss of vegetation occurs; during the 1995 event significant losses of trees and shrubs occurred

Bed Stability	Bank Stability	Controlling Influences and Location	Process resulting in Instability
Bed stability is controlled by the amount and size of in flowing load from upstream, local velocities, bed material size (armoring), local flow obstructions and the location of bedrock outcrops.	The NRCS and PG&E have recently installed bank protection works that may affect local bed and bank stability. Additional home made revetment works exist along the south bank downstream from the dam.	Controlling influences include: 1. in flowing sediment load and size, 2. location of bedrock and/or man-made stabilization works 3. location and extent of gravel bars and vegetation density on the gravel bars 4. Seasonal water diversions at the Capay Dam 5. Capay bridge 6. Seasonal rate and magnitude of in-channel gravel extraction downstream 7. Cumulative extraction volume removed downstream from reach 8	Periodic instability results from channel narrowing and deepening due to sediment starvation and lateral confinement (narrowing) of the active channel. Local instabilities occur due to the growth and stabilization of large - heavily vegetated gravel bars capable of redirecting flows at the banks. Prolonged removal of gravel downstream from the Capay Bridge has resulted in the upward migration of a significant nick point resulting in channel bed lowering and bank attack.

Table 3.3a Cache Creek, Upper Hungry Hollow Subreach, February 1996

Subreach 7, Upper Hungry Hollow, Station 1390+00 to 1300+00									
Return Period	Reach Average Hydraulic Characteristics						Sediment	Channel Form	Vegetation Condition
	Discharge (cfs)	Width (ft)	Depth (ft)	Velocity (ft/sec)	Energy Slope	Bed Slope	Bed Mat'l d_{50} (mm)		
2 yrs	14500	865	6.87	4.57	.0028	.0022	25	Multiple low relief low flow channels at end of runoff season; following mining season there is no readily definable low flow channel; the reach between Capay and Esparto Bridges is wide with a relatively flat bottom; some cut banks and cobble and gravel bed materials. Channel form is artificially maintained by annual mining .	This reach is actively mined and characterized by large gravel and cobble substrate. Lack of adequate fines and water make this reach essentially devoid of vegetation
10 yrs	37000	1038	10.25	6.01	.0029	.0022	25	same as above	Without spring and summer flows, re-establishment of a stable low flow channel and riparian vegetation cannot occur
100 yrs	63500	1247	12.94	6.96	.0028	.0022	25	Same as above. Because of extensive excavation of materials from this reach, there is significantly greater in-channel flow capacity than the channel had historically, therefore, hydraulic energies are greater today	During high flows the channel bottom is resculpted to a new configuration; erosion and loss of vegetation occurs

Bed Stability	Bank Stability	Controlling Influences and Location	Process resulting in Instability
Bed stability is controlled by the amount and size of in flowing load from upstream, local velocities, bed material size, armoring, gravel extraction activities, the location and characteristics of local obstructions such as bars, haul roads, debris, vegetation and	Bank stability is influenced by aggregate extraction activities, construction of berms and jetties, placement of localized revetments, size and location of haul roads, existing bridges and the size and amount of bed load delivered to the reach during a large event.	Controlling influences include: 1. in flowing sediment load and size, 2. location of bedrock and/or man-made stabilization works 3. location and extent of gravel bars and vegetation	Annual gravel removal within subreach 7 and upstream water diversions affect channel stability. The present system is artificially controlled in a state of disequilibrium through annual skimming. If annual extraction and regrading were to stop abruptly, it is difficult to predict where primary problems related

bridges		density on the gravel bars 4. Seasonal water diversions at the Capay Dam 5. Capay and Esparto Bridges 6. Seasonal rate and magnitude of in-channel gravel extraction upstream and downstream 7. Cumulative extraction volume removed upstream and downstream from reach 7.	to channel instability would occur. Abrupt changes in channel dimensions resulting in abrupt changes in hydraulic conditions.

Table 3.3b Cache Creek, Lower Hungry Hollow Subreach, February 1996

Subreach 7, Lower Hungry Hollow, Station 1300+00 to 1240+00									
Return Period	Reach Average Hydraulic Characteristics						Sediment	Channel Form	Vegetation Condition
	Discharge (cfs)	Width (ft)	Depth (ft)	Velocity (ft/sec)	Energy Slope	Bed Slope	Bed Mat'l d_{50} (mm)		
2 yrs	14500	1455	4.98	4.01	.0030	.0022	23	Multiple low relief low flow channels at end of runoff season; following mining season there is no readily definable low flow channel; the reach downstream from the Esparto Bridge is wide with a relatively flat bottom; some cut banks and cobble and gravel bed materials. Channel form is artificially maintained by annual mining	This reach is actively mined and characterized by large gravel and cobble substrate. Lack of adequate fines and water make this reach essentially devoid of vegetation.
10 yrs	37000	1558	7.61	5.13	.0028	.0022	23	same as above	Without spring and summer flows, re-establishment of a stable low flow channel and riparian vegetation cannot occur
100 yrs	63500	1860	10.09	5.71	.0022	.0022	23	Same as above. Because of extensive excavation of materials from this reach, there is significantly greater in-channel flow capacity than the channel had historically, therefore, hydraulic energies are greater today.	During high flows the channel bottom is resculpted to a new configuration; erosion and loss of vegetation occurs;

Bed Stability	Bank Stability	Controlling Influences and Location	Process resulting in Instability
Bed stability is controlled by the amount and size of in flowing load from upstream, local velocities, bed material size, armoring, gravel extraction activities, the location and characteristics of local obstructions such as bars, haul roads, debris, vegetation and bridges	Bank stability is influenced by aggregate extraction activities, construction of berms and jetties, placement of localized revetments, size and location of haul roads, existing bridges and the size and amount of bed load delivered to the reach during a large event.	Controlling influences include: 1. in flowing sediment load and size, 2. location of haul roads and/or man-made stabilization works 3. location and extent of gravel bars and vegetation density on the gravel bars	Annual gravel removal within subreach 7 and upstream water diversions affect channel stability. The present system is artificially controlled in a state of disequilibrium through aggregate extraction and annual skimming. If annual extraction and regrading were to stop abruptly, it is difficult to predict where primary problems related to channel instability would

		4. Seasonal water diversions at the Capay Dam 5. Esparto Bridge 6. Seasonal rate and magnitude of in-channel gravel extraction upstream and downstream 7. Cumulative extraction volume removed upstream and downstream from reach 7.	occur. Abrupt changes in channel dimensions result in abrupt changes in hydraulic conditions between the bridges.

Table 3.4 Cache Creek, Madison Subreach, February 1996

Subreach 6, Madison, Station 1240+00 to 1110+00									
Return Period	Reach Average Hydraulic Characteristics						Sediment	Channel Form	Vegetation Condition
	Discharge (cfs)	Width (ft)	Depth (ft)	Velocity (ft/sec)	Energy Slope	Bed Slope	Bed Mat'l d_{50} (mm)		
2 yrs	14500	489	9.25	5.74	.0015	.00235	23	Same as reach 7, except the channel width is significantly reduced in the downstream direction. The upstream most portion of the reach is influenced by active gravel mining, however the downstream end is not actively mined	The creek plan form and vegetation vary throughout this reach. The upstream half of the reach has a poorly defined channel that is actively mined. The lower portion of the reach is not mined; vegetation occurs in patches along the banks and on small islands bars
10 yrs	37000	592	14.68	7.35	.0013	.00235	23	Same as above. Flows greater than the 2-year event are influenced by the presence of the I-505 bridge complex The reach is characterized by high near-vertical cut banks upstream from the I-505 bridge	Same as above. Vegetation in the reach is a mix of species, with high competition from tamarisk and giant reed.
100 yrs	63500	692	19.26	8.44	.0012	.00235	23	Same as above. Because of extensive excavation of materials from this reach, there is significantly greater in-channel flow capacity than the channel had historically, therefore, hydraulic energies are greater today.	During high flows the channel bottom is resculpted to a new configuration; erosion and loss of vegetation occurs;

Bed Stability	Bank Stability	Controlling Influences and Location	Process resulting in Instability
Bed stability is controlled by the amount and size of in flowing load from upstream, local velocities, bed material size, armoring, gravel extraction activities, the location and characteristics of local obstructions such as bars.	Bank stability is influenced by aggregate extraction activities, construction of berms and jetties, placement of localized revetments, size and location of haul roads, existing bridges and the size and amount of bed load delivered to the reach during a	Controlling influences include: 1. in flowing sediment load and size, 2. location of haul roads and/or man-made stabilization works 3. location and extent of gravel bars and vegetation	Annual gravel removal within subreach 6 and upstream water diversions affect channel stability. Cumulative gravel extraction upstream and downstream from the reach may also affect its stability. Reach 6 narrows and flows accelerate through the I-505 bridge leading to abrupt changes in local channel hydraulic conditions. The present

haul roads, debris, vegetation and the effects of bridges	large event. Bank stability is also controlled by the geotechnical characteristics of the bank material, the bank height, its slope, and degree of saturation.	density on the gravel bars 4. Seasonal water diversions at the Capay Dam 5. I-505 Bridge and the old Madison bridge right abutment 6. Seasonal rate and magnitude of in-channel gravel extraction upstream and downstream 7. Cumulative extraction volume removed upstream and downstream from reach 6.	system is artificially controlled in a state of disequilibrium through aggregate extraction and annual skimming. If annual extraction and regrading were to stop abruptly, it is difficult to predict where primary problems related to channel instability would occur. Abrupt changes in channel dimensions result in abrupt changes in hydraulic conditions in between bridges.

Table 3.5 Cache Creek, Guesisosi Subreach, February 1996

Subreach 5, Guesisosi, Station 1110+00 to 990+00									
Return Period	Reach Average Hydraulic Characteristics						Sediment	Channel Form	Vegetation Condition
	Discharge (cfs)	Width (ft)	Depth (ft)	Velocity (ft/sec)	Energy Slope	Bed Slope	Bed Mat'l d_{50} (mm)		
2 yrs	14500	490	9.10	4.78	.0015	.00117	17	Active aggregate skimming occurs in this reach. Because of skimming the channel cannot establish a well defined low flow channel.	Vegetation is present on both banks but not present on the channel bottom until the lower end of the reach.
10 yrs	37000	546	14.24	6.62	.0016	.00117	17	Significant bank revetment works occur through this reach. The channel width is narrower than it was historically and much deeper	Same as above. Vegetation in the reach is a mix of species, with less tamarisk and giant reed than in upstream reaches. In the downstream end more willow and other native riparian species are attempting to reestablish. Depth to groundwater is shallow, thus providing more perennial water for the support of vegetation.
100 yrs	63500	614	18.59	8.02	.0017	.00117	17	Same as above. Because of extensive excavation of materials from this reach, there is significantly greater in-channel flow capacity than the channel had historically, therefore, hydraulic energies are greater today.	During high flows the channel bottom is resculpted to a new configuration; erosion and loss of vegetation occurs

Bed Stability	Bank Stability	Controlling Influences and Location	Process resulting in Instability
Bed stability is controlled by the amount and size of in flowing load from upstream, local velocities, bed material size, armoring, gravel extraction activities, the location and characteristics of local obstructions such as bars, haul roads, debris, vegetation and the effects of bridges. Bed material size decreases in the downstream direction below I-505.	Bank stability is influenced by aggregate extraction activities upstream, the presence of berms and jetties, placement of localized revetments, size and location of haul roads, existing bridges and the size and amount of bed load delivered to the reach during a large event. Bank stability is also controlled by the geotechnical characteristics of the bank	Controlling influences include: 1. in flowing sediment load and size, 2. location of haul roads and/or man-made stabilization works 3. location and extent of gravel bars and the height and vegetation density on the gravel bars 4. The presence of perennial water in the lower portion of the reach 5. I-505 Bridge and the old Moore Canal crossing (narrows)	Annual gravel removal within subreach 5 and the existence of annual low flows in the downstream portion of the reach affect material size, vegetation density and channel stability. Cumulative gravel extraction upstream and downstream from the reach may also affect its stability. Reach 5 narrows and flows accelerate through the Moore Canal syphon area. The invert of the syphon is exposed at the surface of the creek bed and is probably functioning as a defacto grade control for the reach downstream. The present system is artificially controlled in a state of

	material, the bank height, its slope, and degree of saturation.	6. Seasonal rate and magnitude of in-channel gravel extraction upstream and downstream 7. Cumulative extraction volume removed upstream and downstream from reach 5. 8. Bed material size decreases in the downstream direction below I-505.	disequilibrium through aggregate extraction and annual skimming in the upstream reach. If annual extraction and regrading were to stop abruptly, it is difficult to predict where primary problems related to channel instability would occur. Abrupt changes in channel dimensions result in abrupt changes in hydraulic conditions.

Table 3.6 Cache Creek, Dunnigan Hills, February 1996

Subreach 4, Dunnigan Hills, Station 990+00 to 840+00									
Return Period	Reach Average Hydraulic Characteristics						Sediment	Channel Form	Vegetation Condition
	Discharge (cfs)	Width (ft)	Depth (ft)	Velocity (ft/sec)	Energy Slope	Bed Slope	Bed Mat’l d_{50} (mm)		
2 yrs	14500	690	7.38	4.49	.00110	.0019	15	The reach is not actively mined but has been in the past. There are multiple low flow channels separated by heavily vegetated islands and midchannel bars. Bed material consists of gravel, sands and finer materials trapped by the vegetation.	The reach represents the most significant area of groundwater gain, and has the largest and highest quality contiguous native riparian vegetation within the study area.
10 yrs	37000	761	12.22	5.97	.00192	.0019	15	Several in-channel berms and levees remain from past mining operations. Many of the pits behind the in-channel levees have riparian vegetation establishing or have the potential to establish riparian vegetation.	Many of the pits behind the in-channel levees have riparian vegetation establishing or have the potential to establish riparian vegetation.
100 yrs	63500	879	16.10	7.07	.00189	.0019	15	Same as above. Because of extensive excavation of materials from this reach in the past, there is significantly greater in-channel flow capacity than the channel had historically, therefore, hydraulic energies are greater today.	During high flows the channel bottom is resculpted to a new configuration; erosion and loss of vegetation occurs

Bed Stability	Bank Stability	Controlling Influences and Location	Process resulting in Instability
Bed stability is controlled by the size and volume of in flowing sediment load, the size, density and age of riparian vegetation, local depths and velocities during high flow, the location and characteristics of obstructions, revetments and bridges	Bank stability is influenced by regional aggregate extraction activities upstream and downstream; the presence of berms and jetties, placement of localized revetments, size and location of haul roads, existing bridges and the size and amount of bed load delivered to the reach during large events. Bank stability is also	Controlling influences include: 1. in flowing sediment load and size, 2. location of haul roads and/or man-made levees and stabilization works 3. location and extent of gravel bars and the height and density of vegetation on the gravel bars 4. The presence of perennial water in the lower portion of the reach	Reach 4 is the most significant area of groundwater gain. This significantly affects channel stability because vegetation is capable of re-establishing itself along the bed and banks. Cumulative gravel extraction upstream and downstream from the reach may also affect its stability. Reach 4 is relatively narrow. The present reach is attempting to recover from past mining and appears to be stabilizing well. If annual extraction outside of the reach were to

	controlled by the geotechnical characteristics of bank materials, the bank height, its slope, and degree of saturation.	5.Road 94-B Bridge and the old Moore Canal crossing and narrows upstream 6. Seasonal rate and magnitude of in-channel gravel extraction upstream and downstream from the reach 7. Cumulative extraction volume removed upstream and downstream from reach 4. 8. Bed material decreases in diameter in the downstream direction below I-505. 9. The downstream portion of reach 4 is influenced by backwater controls downstream near I-5 during high flows.	stop abruptly, it is difficult to predict where primary problems related to channel instability would occur, however, reach 4 appears to be well on its way to restabilizing itself. Abrupt changes in channel dimensions result in abrupt changes in hydraulic conditions.

Table 3.7 Cache Creek, Hoppin Subreach, February 1996

Subreach 3, Hoppin, Station 840+00 to 665+00									
Return Period	Reach Average Hydraulic Characteristics						Sediment	Channel Form	Vegetation Condition
	Discharge (cfs)	Width (ft)	Depth (ft)	Velocity (ft/sec)	Energy Slope	Bed Slope	Bed Mat'l d_{50} (mm)		
2 yrs	14500	672	18.37	2.89	.0004	.0013	7	The reach is not actively mined but has been in the past. There are multiple low flow channels separated by heavily vegetated islands and midchannel bars. Bed material consists of gravel, sands and finer materials trapped by the vegetation.	The reach has relatively high groundwater and has the potential to support high quality contiguous native riparian vegetation. Although mined in the past, the reach has dense patches of riparian vegetation. Exotic plant species competition is very high in this reach and tamarisk dominates the upper banks.
10 yrs	37000	1422	29.00	2.72	.0002	.0013	7	Several in-channel berms and levees remain from past mining operations. There are several in locations where mining has occurred recently behind levees adjacent to the main channel. Many of the pits behind the in-channel levees have riparian vegetation establishing or have the potential to establish riparian vegetation.	Many of the adjacent mining areas and pits behind the in-channel levees have riparian vegetation establishing or have the potential to establish riparian vegetation. This reach tends to be depositional during large events and has a high percentage of fine-grained bed materials.
100 yrs	63500	1584	32.57	3.55	.0003	.0013	7	Same as above. Because of extensive excavation of materials from this reach in the past, there is significantly greater in-channel flow capacity than the channel had historically, therefore, hydraulic energies are greater today.	During high flows the channel bottom is resculpted to a new configuration; erosion and loss of vegetation occurs. Reach 3 is significantly affected by backwater from the narrows at I-5, resulting in substantial deposition of sediment materials during large events

Bed Stability	Bank Stability	Controlling Influences and Location	Process resulting in Instability
Bed stability is controlled by the size and volume of in flowing sediment load, the size, density and age of	Bank stability is influenced by regional aggregate extraction activities upstream; the presence of berms and jetties, placement of	Controlling influences include: 1. in flowing sediment load and size, 2. location of haul roads and/or man-made levees and stabilization works	Reach 3 typically has high groundwater and low flows most of the year. This significantly affects channel stability because vegetation is capable of re-establishing itself along

riparian vegetation, local depths and velocities during high flow, the location and characteristics of obstructions, revetments and bridges. Because the reach is in a backwater zone, significant deposition of sediment materials occurs during large events.	localized revetments, size and location of haul roads, existing bridges and the size and amount of bed load delivered to the reach during large events. Bank stability is also controlled by the geotechnical characteristics of bank materials, the bank height, its slope, amount of vegetative cover and degree of saturation.	3. location and extent of gravel bars and the height and density of vegetation on the gravel bars 4. The presence of perennial water in the lower portion of the reach 5.Road 94-B Bridge and the I-5 Bridge complex control both ends of the reach. The channel section near I-5 causes backwater control during high flows. 6. Seasonal rate and magnitude of in-channel gravel extraction upstream from the reach 7. Cumulative extraction volume removed upstream from reach 3. 8. Bed material size fines (decreases diameter) in the downstream direction below I-505. 9. Reach 3 is influenced by backwater controls downstream near I-5 during high flows.	the bed and banks. Cumulative gravel extraction upstream from the reach may also affect its stability. Reach 3 is relatively narrow. The present reach is attempting to recover from past mining and appears to be stabilizing. If annual extraction outside of the reach were to stop abruptly, it is difficult to predict where primary problems related to channel instability would occur. Abrupt changes in cross section dimensions result in abrupt changes in hydraulic conditions.

Table 3.8 Cache Creek, Rio Jesus Maria, February 1996

Subreach 2, Rio Jesus Maria, Station 665+00 to 590+00									
Return Period	Reach Average Hydraulic Characteristics						Sediment	Channel Form	Vegetation Condition
	Discharge (cfs)	Width (ft)	Depth (ft)	Velocity (ft/sec)	Energy Slope	Bed Slope	Bed Mat'l d_{50} (mm)		
2 yrs	14500	210	27.62	4.94	.0006	.0013	10	This is the narrowest reach in the study area. The reach is not actively mined but has been in the past. There are multiple low flow channels separated by heavily vegetated islands and midchannel bars. Bed material consists of gravel, sands and finer materials trapped by the vegetation.	The reach has relatively high groundwater and has the potential to support high quality contiguous native riparian vegetation. Although mined in the past, the reach has dense patches of riparian vegetation. Exotic plant species competition is very high in this reach and tamarisk dominates the upper banks and sand bars.
10 yrs	37000	357	39.63	6.40	.0008	.0013	10	The banks are extremely steep and approximately 30 to 40 feet high. Bed materials are comprised primarily of sands and some gravels	Vegetation is present in a narrow band along the banks, but tamarisk and other invasive species are dominant along the reach.
100 yrs	63500	383.85	41.55	7.47	.0011	.0013	10	Channel features slow water velocities during high flows and reduce channel capacity as well as the ability of flows to carry sediment through the reach	Valley oaks and sycamores are scattered along the uppermost portions of the banks

Bed Stability	Bank Stability	Controlling Influences and Location	Process resulting in Instability
Bed stability is controlled by the size and volume of in flowing sediment load, the size, density and age of riparian vegetation, local depths and velocities during high flow, the location and characteristics of obstructions, revetments and bridges. Because	Bank stability is influenced by regional aggregate extraction activities upstream; the presence of localized revetments and the Corps of Engineers levees, existing bridges and the size and amount of bed load delivered to the reach during large events. Bank stability is also controlled by the geotechnical characteristics of bank materials, the bank	Controlling influences include: 1. in flowing sediment load and size, 2. location of man-made levees and stabilization works 3. location and extent of gravel bars and the height and density of vegetation on the gravel bars 4. The presence of perennial water in the reach 5. The I-5 Bridge complex and narrow channel dimensions control the hydraulic capacity of the reach. The channel section near I-5 causes backwater control during high	Reach 2 typically has high groundwater and low flows most of the year. This significantly affects channel stability because vegetation is capable of establishing itself along the bed and banks. Cumulative gravel extraction upstream from the reach may also affect its stability. Reach 2 is the narrowest reach in the study area. The present reach is attempting to recover from past mining and channel incision. If annual extraction outside of the reach were to

the reach is in a backwater zone, significant deposition of sediment materials occurs during large events.	height, its slope, amount of vegetative cover and degree of saturation.	flows. 6. Seasonal rate and magnitude of in-channel gravel extraction upstream from the reach 7. Cumulative extraction volume removed upstream from reach 3. 8. Bed material size fines (decreases diameter) in the downstream direction below I-505. 9. Reach 2 is influenced by backwater controls near I-5 during high flows. 10. There is evidence of some bedrock control (probably old Sacramento Valley formation materials) near the toe of the present high bank line that is contributing to the stability of the bed and banks through the reach.	stop abruptly, it is difficult to predict where primary problems related to channel instability would occur. Abrupt changes in channel dimensions result in abrupt changes in hydraulic conditions.

Table 3-9
INITIAL TARGET CHANNEL CHARACTERISTICS

Reach	Average 100-yr Width (ft)	Average 100-yr Depth (ft)	Channel Slope	Sinuosity[1]
Rio Jesus Maria Subreach 2	500	40	0.12% - 0.14%	1.18
Hoppin Subreach 3	1600	30	0.12% - 0.14%	1.15
Dunnigan Hills Subreach 4	800	15	0.15% - 0.18%	1.05
Guesisosi Subreach 5	800	17.5	0.12% - 0.14%	1.05
Madison Subreach 6	900	17	0.19% - 0.21%	1.15
Hungry Hollow Subreach 7	1550	11	0.19% - 0.21%	1.10
Capay Subreach 8	1760	19	0.18% - 0.20%	1.04

Source: NHC, 1995.

[1] Sinuosity is channel length divided by valley length.

Table 5-1
Conditions, Techniques, and Countermeasure Design Considerations

Conditions	Countermeasure Techniques	References to Design Considerations[1]	Projects or Maintenance
Bank erosion, outside of bends; bend migration	Bank revetments, spur dikes, groins, hard points, toe protection, channel realignment	1, 2, 3, 4, 5, 7, 8, 10	Priority projects and maintenance
Bank erosion due to contraction through narrows or bridges	Guide banks, bank revetment, groin fields, bridge widening, smooth channel transitions, rock aprons	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	Priority projects and maintenance
Channel braiding and meandering leading to bank erosion	Groin fields, bank revetment, selective bar skimming, biotechnical measures and strategic vegetative planting	1, 2, 3, 4, 7, 8, 10	Priority projects and maintenance
Degradation	Grade controls, rock sills, channel bed lining, gabions, toe protection, discharge control	1, 2, 4, 5, 6, 8, 9, 10	Priority projects and maintenance
Aggradation and large bar accumulation	Annual maintenance, selective bar skimming, channel narrowing with groins and terraces	1, 2, 5, 8	Annual maintenance
Upstream nick point migration	Rock sills, grade controls, vegetative plantings	1, 2, 4, 5, 8	Priority projects and maintenance
Pier scour at bridges	Rock pillows around piers, grade controls, concrete or rock mattresses, bridge pier modifications, widen the bridge	5, 6, 9	Priority projects and maintenance
Scour holes, depressions	Vegetation, localized grading	2, 5, 7	Maintenance
Emergency bank repair	Rock rip rap, windrow revetments	1, 3, 4, 5, 6, 8, 9, 10	Emergency repair and maintenance

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Table 7-1
CACHE CREEK BASIN STREAM GAGING STATIONS

Location	Drainage Area (mi^2)	Period of Record Used	Length of Record Used (year)	Average Annual Runoff (acre-ft)	Average Annual Yield (acre-ft/mi^2)	Average Annual Discharge (cfs)	Station Operator
Cache Creek near Lower Lake	528.0	1944-1991	47	256,000	484.8	350	USGS
North Fork Cache Creek at Hough Springs near Lower Lake	60.2	1971-1991	20	67,900	1127.9	95	USGS
North Fork Cache Creek near Lower Lake[1]	197.0	1930-1981	52	136,500	692.9	185	USGS
Bear Creek near Rumsey[1]	100.0	1958-1980	23	35,760	357.6	50	DWR, CA
Cache Creek above Rumsey[1]	955.0	1965-1986	19	541,200	566.7	755	DWR, CA
Cache Creek near Capay[1]	1044.0	1942-1976	35	556,900	533.4	770	USGS
Cache Creek at Yolo	1139.0	1903-1993	91	378,900	332.7	520	USGS

Source: COE, 1994, Westside Tributaries Study, August.

[1] Stream gage recorder discontinued.

Table 7-2
RIPARIAN VEGETATION TYPES, LOWER CACHE CREEK

Vegetation Type	Acreage
Valley oak forest	76
Cottonwood forest	39
Mixed riparian forest	85
Willow scrub	821
Nonwoody riparian vegetation	364
Freshwater marsh	7
Seasonal wetland	84
Ruderal (weedy) wetland	20
Gravel wash (unvegetated gravel bars)	543
Artificial wetlands	1,221
TOTAL	3,260

Table 7-3. Data Compilation, Storage, and Analysis Summary

Measurement Type	Data Compilation	Data Storage	Data Analysis
Water Discharge, Continuous	Review collected data and compute discharge from stage readings using current rating. Relationship inspect gage weekly for proper operation. Data compilation for Rumsey and Yolo gages is performed by DWR and USGS. Compiled data is “provisional”.	Store provisional data in tabular digital format. Data collected will be stage measurements, with a computed discharge for each time interval.	Use discharge measurements to adjust gage ratings as necessary. Provisional discharges may need to be recomputed due to adjustments. Make annual review of data and compute mean daily, mean monthly, and annual discharges. Publish reviewed data in May and November of each year. Record annual maximum and minimum discharge by water year in a separate table containing annual maxima and minima over the period of record. (Data analysis for Rumsey and Yolo gages is performed by DWR and USGS). Additional analysis may be requested by the TAC.
Water Discharge, Field Measurements	Record field measurements on standard forms, and transfer measured discharge, channel conditions, width, cross sectional area, mean velocity, stage, discharge condition (e.g., incr./decr.), number of sections, and time and date of measurement to a database.	Store field measurement forms in hard copy, store record of discharge measurements in County database.	Compare field measurements to gage rating in use. The TAC may determine that additional field measurements are needed where a rating shift is evident.
Sediment Measurements	Record sample collection date, conditions, discharge, velocity, and collection methods on standard forms . Review laboratory results. Compute total suspended load from discharge weighted samples and laboratory concentrations. Enter sample date, discharge, mean velocity, collection methods, total suspended sediment concentrations, key sediment gradation parameters (D16, D50, and D84), and computed total suspended load in County database. Review laboratory analyses of bed load samples and record in County database. Enter sample date, discharge, collection methods, mean velocity, bed load measurements, key gradation parameters, and computed total bed load in County database.	Store field measurement forms in hard copy format; store compiled suspended and bed load sediment data in County database.	Plot suspended sediment load data against discharge at each station and compare to current sediment discharge rating curve. Plot bed load against discharge in the same format. Plot ratio of bed load to suspended load against discharge and compare to relations in use for computation of total load from suspended sediment load. After TAC review of analyses above, compute daily total, suspended, and bed load discharges using mean daily flows and relationships for sediment loads versus discharge developed by TAC. Compute annual loads.
Bed Material Samples	Record field sampling locations and conditions on standard forms. Review laboratory results. Enter date, sample location, and key gradation parameters in County database.	Store field forms in hard copy format; store laboratory results in County database.	Plot D16, D50, and D84 against stream longitudinal station. Plot D16, D50, and D84 for each reach against data for all previous years of record.