

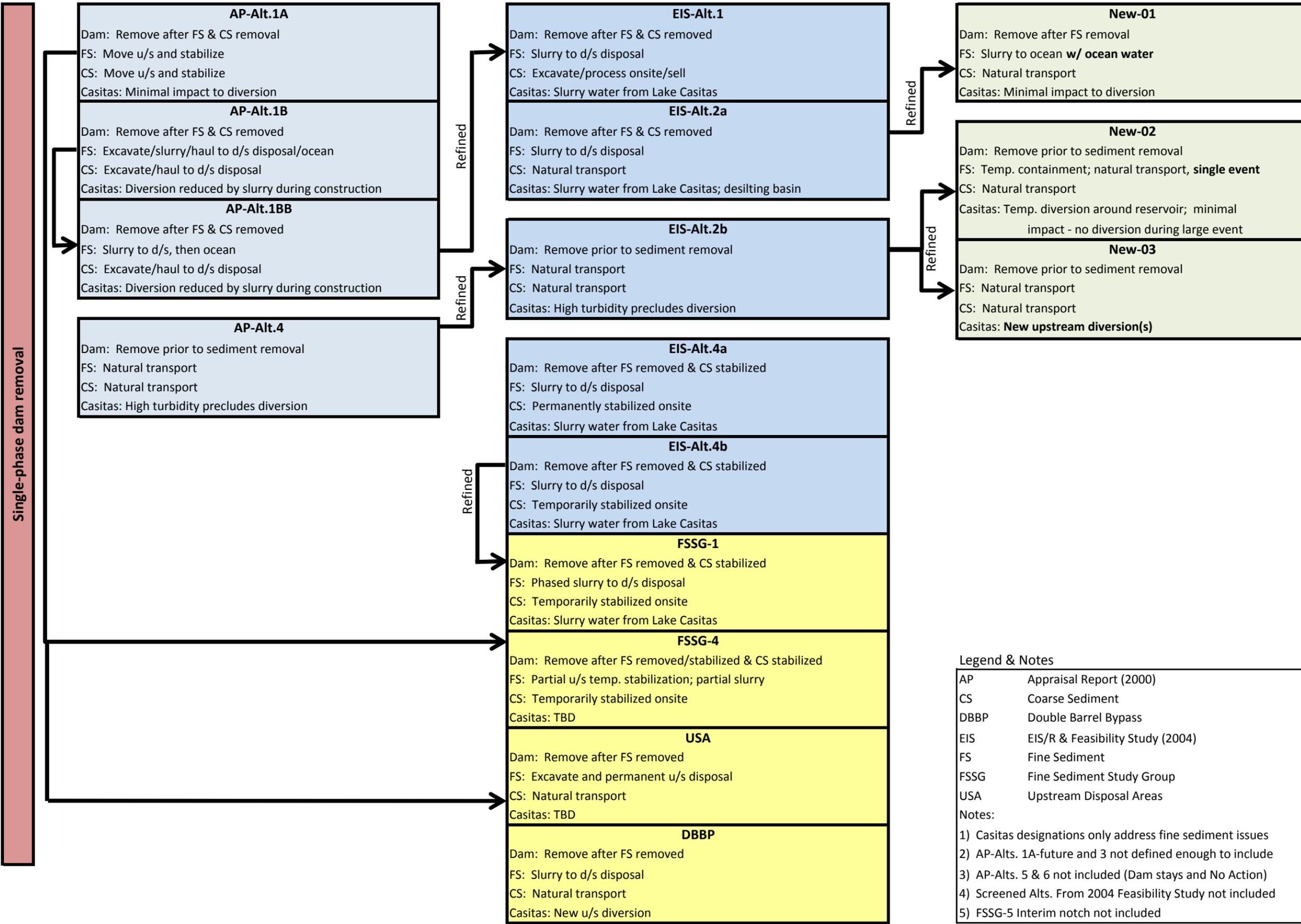
Previous Concepts Summary

ID	Concept Name	General Description	Reference	Detailed Technical Analysis (Previously Documented)		
				Fine Sediment	Coarse Sediment	Casitas Water Diversion
AP-Alt. 1A	Move Sediment Upstream of the Dam and Stabilize (Alt. 1A)	Sediment moved to the right side of the reservoir and stabilized/restored. River channel graded and restored on left side of reservoir. The dam would be completely removed in parallel with the sediment excavation/placement.	Appraisal Report USBR 2000	Accumulated sediment is removed from the river system by stabilizing onsite. No sediment modeling of this alternative.		Approx. 400 AF/yr less yield for Casitas MWD with dam removal. High flow sediment bypass at Robles Diversion to flush chronic sediment.
AP-Alt. 1A Future	Partial Dam Removal & Move Sediment Upstream of the Dam and Stabilize	Partial dam removal with a fish ladder over the lowered dam. Sediment moved (down to revised dam elevation) to the right side of the reservoir and stabilized/restored. River channel graded and restored on left side of reservoir.	Appraisal Report USBR 2000	Accumulated sediment is removed from the river system by stabilizing onsite. No sediment modeling of this alternative.		Similar to AP-Alt. 1A
AP-Alt. 1B	Move Sediment to a Site or Sites Downstream by Trucking (Alt. 1B)	Sediment would be excavated and hauled downstream (ocean or other site) by truck. The dam would be completely removed, but in stages.	Appraisal Report USBR 2000	Fine material (accumulated) removed from the river system. Material would be excavated and hauled to either a downstream permanent disposal site, downstream temporary disposal site, or the ocean.	Coarse material (accumulated) removed from the river system. Material would be excavated and hauled to either a downstream permanent disposal site, downstream temporary disposal site, or the ocean. Material could be processed for commercial sale. No sediment modeling of this alternative.	Approx. 400 AF/yr less yield for Casitas MWD with dam removal. High flow sediment bypass at Robles Diversion to flush chronic sediment.
AP-Alt. 1BB	Remove Sediment to Ocean by Slurry Pipeline and Conveyor/Trucking (Alt. 1BB)	Fine sediment (<=1mm) would be slurry dredged and piped to the ocean and coarse material would be excavated and conveyor/trucked to the ocean (or other downstream disposal location). Dependent on water availability for slurry.	Appraisal Report USBR 2000	Fine material (accumulated) removed from the river system by hydraulic dredging and slurry pipeline. After drying, could be hauled to the ocean for beach replenishment.	Coarse material (accumulated) removed from the river system using a conveyor belt and trucking system to transport to ocean or downstream temporary disposal site.	Approx. 400 AF/yr less yield for Casitas MWD with dam removal. High flow sediment bypass at Robles Diversion to flush chronic sediment.
AP-Alt. 2	Phased Natural Transport of Sediment (Alt. 2)	Dam would be removed in 9 separated phases (2-3 years btwn). Sediment would be sluiced by natural creek flow.	Appraisal Report USBR 2000	Accumulated reservoir area fines allowed to erode without other stabilization during various phases. 6.0 MCY total sediment. Silt/clay: 38% of reservoir sediment; assumed transport £ 200,000 mg/l.	Accumulated coarse material allowed to erode without other stabilization during various phases. Sand: 54% of reservoir sediment. Gravel/cobble: 8%. Total natural transport limited by sand transport using Yang (1973).	Sediment deposition at Robles Diversion will increase. Sediment removal at diversion may need to occur more frequently. Turbidity a water quality problem in Casitas Reservoir; would need to restrict diversions during high turbidity periods. No mitigation provided.
AP-Alt. 3	Combination of Alts. 1 & 2 (Alt. 3)	Combination of Alts. 1 & 2 - not carried forward in Appraisal Study	Appendix E, Appraisal Report USBR 2000	Not addressed	Not addressed	Not addressed
AP-Alt. 4	Complete Removal of Dam in 1 Phase with Uncontrolled Natural Erosion of Sediment (Alt. 4)	Minimal removal of sediment to allow full single-phase dam removal. Sediment would be left to erode slowly until large events carry the sediment downstream. This was not carried forward in Appraisal Study.	Appendix E, Appraisal Report USBR 2000	6 MCY of sediments eroded during one or more high flow seasons.		Sediment deposition at Robles Diversion may increase.
AP-Alt. 5	Construction of Fish Ladder or Bypass with No Dam Removal (Alt. 5)	Fish ladder or bypass would be constructed to allow upstream passage of steelhead past the dam.	Appendix E, Appraisal Report USBR 2000	Accumulated sediment stabilized in place by dam. As sediment accumulates behind the dam, eventually it would begin passing naturally over the dam. No modeling of this alternative.		Not addressed
AP-Alt. 6	No Action (Alt. 6)	Leave the dam and sediment in place. Sediment would continue to accumulate in the reservoir until storage is gone, at which point the sediment load would be transported downstream.	Appendix E, Appraisal Report USBR 2000	Accumulated sediment stabilized in place by dam. As sediment accumulates behind the dam, eventually it would begin passing naturally over the dam. No modeling of this alternative.		Not addressed
EIS-Alt. 1	Full Dam Removal/ Mechanical Sediment Transport: Slurry 'Reservoir Area' Sediment to Disposal Site/Sell Coarse from Dam	Full single phase dam removal and mechanical removal of all accumulated sediment. Fine material hydraulically dredged and piped to downstream disposal site. Majority of coarse material processed onsite and sold commercially. Requires "lower level "downstream flood control protection improvements.	Draft and Final EIS/R and Feasibility Study 2004	2.1 MCY accumulated reservoir area fines hydraulic dredged and piped to downstream Baldwin Road disposal area (118-acre floodplain). Residual fines (800K CY) from onsite material processing hauled to Baldwin Road disposal area. Slurry would be contained and dried, then a portion would be allowed to mobilize into the river system during larger storms.	3.8 MCY of accumulated delta area sediments to be excavated and processed onsite (east side of channel). Approximately 3 MCY coarse material sold as aggregate, and 800K residual fines hauled to Baldwin Road disposal area.	Source of water for slurry (4,500 ac-ft) would be pumped from Lake Casitas. Increased sediment at Casitas Robles Diversion (2x existing - see "downstream flooding").
EIS-Alt. 2a	Full Dam Removal/ Natural Sediment Transport: Slurry 'Reservoir Area' Sediment OffSite	Full single phase dam removal and partial removal of accumulated sediment (reservoir area fines) to downstream disposal site. Coarse material allowed to mobilize naturally with storm flows. Requires "higher level "downstream flood control protection improvements.	Draft and Final EIS/R and Feasibility Study 2004	2.1 MCY accumulated reservoir area fines hydraulic dredged and piped to downstream Baldwin Road disposal area (118-acre floodplain). Material would be contained and dried, then a portion would be allowed to mobilize into the river system during larger storms.	3.8 MCY (includes 800K CY of residual fines) of accumulated coarse material allowed to erode without other stabilization.	Source of water for slurry (4,500 ac-ft) would be pumped from Lake Casitas. Increased sediment at Casitas Robles Diversion (8x existing - see "downstream flooding"). 11-14 AC desilting basin offline of river and Robles-Casitas Canal to allow fines to settle before entering canal.
EIS-Alt. 2b	Full Dam Removal / Natural Sediment Transport: Natural Transport of 'Reservoir Area' Sediment	Full single phase dam removal and natural transport of the majority of accumulated sediments (fine and coarse). Requires "higher level "downstream flood control protection improvements.	Draft and Final EIS/R and Feasibility Study 2004	2.1 MCY accumulated reservoir area fines allowed to erode without other stabilization. In order to complete the dam removal, approximately 0.5 MCY sediment behind dam excavated and stockpiled in reservoir using clam-shell dredges.	3.8 MCY (includes 800K CY of residual fines) of accumulated coarse material allowed to erode without other stabilization.	Increased sediment at Casitas Robles Diversion (9x existing - see "downstream flooding"). Increased impacts at Casitas diversion resulting in missed water diversion opportunities (for up to 8 yrs) to Lake Casitas necessitates procurement of 48,000 acre-feet of water from other water sources.
EIS-Alt. 3a	Incremental Dam Removal / Natural Sediment Transport: Slurry "Reservoir Area" Sediment Off Site	Two-phase dam removal and partial removal of accumulated sediment (reservoir area fines) to downstream disposal site. Fine material hydraulically dredged and piped to downstream disposal site. After fine sediment removal, dam is removed to elevation 1000 feet. Coarse material allowed to mobilize naturally with storm flows. After reaching equilibrium, remainder of dam is removed and coarse material allowed to mobilize naturally downstream with storm flows. Requires "higher level "downstream flood control protection improvements.	Draft and Final EIS/R and Feasibility Study 2004	2.1 MCY accumulated fines hydraulic dredged and piped to downstream Baldwin Road disposal area (118-acre floodplain). Material would be contained and dried, then a portion would be allowed to mobilize into the river system during larger storms.	3.8 MCY (includes 800K CY of residual fines) of accumulated coarse material allowed to erode without other stabilization over two phases of dam removal. Excavate pilot channel from each incremental notch through remaining sediments. Stockpile excavated material in reservoir.	Source of water for slurry (4,500 ac-ft) would be pumped from Lake Casitas. Increased sediment at Casitas Robles Diversion (6x existing - see "downstream flooding"). 11-14 AC desilting basin offline of river and Robles-Casitas Canal to allow fines to settle before entering canal.
EIS-Alt. 3b	Incremental Dam Removal / Natural Sediment Transport - Natural Transport of "Reservoir Fines"	Two-phase dam removal and natural transport of the majority of accumulated sediments (fine and coarse). After minimal fine sediment removal, dam is removed to elevation 1030 feet. Accumulated sediment allowed to mobilize naturally with storm flows. After reaching equilibrium, remainder of dam is removed and remaining accumulated sediment allowed to mobilize naturally downstream with storm flows. Requires "higher level "downstream flood control protection improvements.	Draft and Final EIS/R and Feasibility Study 2004	2.1 MCY accumulated reservoir area fines allowed to erode without other stabilization. For each of two phases of dam removal, approximately 300K CY of accumulated fine sediment would be excavated and placed upstream to complete phased removal.	3.8 MCY (includes 800K CY of residual fines) of accumulated coarse material allowed to erode without other stabilization over two phases of dam removal. Excavate pilot channel from each incremental notch through remaining sediments. Stockpile excavated material in reservoir.	Increased sediment at Casitas Robles Diversion (6x existing - see "downstream flooding"). Increased impacts at Casitas Robles diversion resulting in missed water diversion opportunities (for up to 8 yrs) to Lake Casitas necessitates procurement of 48,000 acre-feet of water from other water sources.

ID	Concept Name	General Description	Reference	Detailed Technical Analysis (Previously Documented)		
				Fine Sediment	Coarse Sediment	Casitas Water Diversion
EIS-Alt. 4a	Full Dam Removal/Long-Term Sediment Transport - Long-Term Transport Period	Full single phase dam removal with removal of accumulated fine reservoir area sediment to downstream disposal site, and stabilization of coarse sediment onsite. Requires "lower level" downstream flood control protection improvements.	Draft and Final EIS/R and Feasibility Study 2004	2.1 MCY accumulated reservoir area fines hydraulic dredged and piped to downstream Baldwin Road disposal area (118-acre floodplain). Material would be contained and dried, then a portion would be allowed to mobilize into the river system during larger storms.	3.8 MCY (includes 800K CY of residual fines) of accumulated coarse sediment stabilized within reservoir (to be eroded by events ³ 50-100 year return). 1.2 MCY coarse sediments excavated during initial construction to create channel, and subsequently stabilized onsite.	Source of water for slurry (4,500 ac-ft) would be pumped from Lake Casitas. Increased sediment at Casitas Robles Diversion (2x existing - see "downstream flooding").
EIS-Alt. 4b	Full Dam Removal/Long-Term Sediment Transport - Short-Term Transport Period	Full single phase dam removal with removal of accumulated fine reservoir area sediment to downstream disposal site, and temporary stabilization of the coarse sediments onsite. Stabilized sediment would be allowed to slowly erode and mobilize over time during large storms. Requires "higher level" downstream flood control protection improvements.	Draft and Final EIS/R and Feasibility Study 2004	2.1 MCY accumulated reservoir area fines hydraulic dredged and piped to downstream Baldwin Road disposal area (118-acre floodplain). Material would be contained and dried, then a portion would be allowed to mobilize into the river system during larger storms.	Excavate channel in remaining coarse sediments. Stabilize sediments (coarse and residual fines) within reservoir with soil-cement revetment along sediment storage areas; to be eroded by events ³ 2-10 year return (short-term natural transport).	Source of water for slurry (4,500 ac-ft) would be pumped from Lake Casitas. Increased sediment at Casitas Robles Diversion (6x existing - see "downstream flooding").
NP	No Project/No Action Alternative	Models and analysis show over time the reservoir behind the Matilija Dam will completely fill with fines and other sediments. When the reservoir is filled, water and fines will over top the Dam. This occurrence is expected in 38 to 40 years. The effect of the Dam will be nullified except for its physical presence.	Draft and Final EIS/R and Feasibility Study 2004	Estimated additional 3.5 MCY of sediment, beyond the 6 MCY currently trapped, could continue to accumulate. Eventually, more sediment will pass over the dam and be deposited along the river and then carried to the ocean.		Estimated >50 AF of remaining reservoir capacity in 2020
Scr1	Full Dam Removal/Pool and Riffle System	Sediment stabilized into steps for fish passage; only fines would be removed.	Final EIS/R 2004	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.
Scr2	Partial Dam Removal / Restoration, with Fish Ladder	Remove part of dam, stabilize rest; remove all sediment either mechanically or naturally; add a fish ladder; restore water supply and storage functions.	Final EIS/R 2004	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.
Scr3	Partial Dam Removal / No Restoration, with Fish Ladder	Remove part of dam, stabilize rest; remove all sediment (mechanical or natural) to new top elevation; add a fish ladder.	Final EIS/R 2004	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.
Scr4	Partial Dam Removal with "V" Notch	Top-to-bottom notch in dam, stabilize rest; remove or displace sediment as needed and regrade; natural transport of trapped sediment.	Final EIS/R 2004	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.
Scr5	No Dam Removal / Fish Ladder / No Sediment Removal	Add fish ladder that would operate during some flow conditions; no other changes.	Final EIS/R 2004	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.
Scr6	No Dam Removal / Fish Tunnel / Bypass to N. Fork Matilija	Add 600' tunnel to divert flows around dam and reservoir for fish passage; most sediments remain in place.	Final EIS/R 2004	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.
Scr7	Restoration of Dam w/ Fish Ladder	Would restore dam to ~1960 state, bringing back water storage and some flood control; would add fish ladder; sediment would be removed mechanically or be sluiced through dam and transported naturally.	Final EIS/R 2004	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.	Not applicable. Screened prior to analysis.
FSSG 1	Optimize Alternative 4b	Optimize to reduce costs and improve feasibility. Phase slurry operation to promote rapid erosion and transport from BRDA.	FSSG Final Report 2011	High costs for slurry of fine sediment due to long drying times and uncertainties would be mitigated by phasing the slurry operation over a longer period; allowing erosion of fines from disposal areas	Not addressed	Not addressed
FSSG 2	Hybrid Option	Hybrid of Alternatives 2a and 4b. Modify Alt 4b to reduce the amount of water and sediment that must be slurried to BRDA by a combination of fines management techniques.	FSSG Final Report 2011	Combination of management techniques: slurry a portion of fine sediment, notch dam to 2011 sediment level, notch dam and meter fine sediment transport over time, and/or sequester fine sediment upstream	Not addressed	Not addressed
FSSG 3	Full notching and phased natural transport	Notch dam in phases to complete removal. Phased/metered transport of fine sediment. Reduce risk to water supply by various techniques.	FSSG Final Report 2011	Meter release of fine sediment to reduce risks to water supply	Not addressed	Manage impacts through: diverting flows upstream of reservoir, infiltration gallery below dam, treat upstream bypass as a manifold to inject supply wells, enhance desilting basin, divert less water through conservation
FSSG 4	Matilija Canyon Restoration and Hybrid Alternative Analysis	Naturally stabilize a major volume of fine sediments within the footprint of the restoration effort for Matilija Canyon.	FSSG Final Report 2011	Secure more fines upstream and revegetate in appropriate locations as part of the natural restoration of the floodplain, upland terraces, and adjacent canyons of the creek. Restore Matilija Cr channel to promote controlled natural release from these temporary storage areas over time. Slurry remaining fines.	Not addressed	Not addressed
FSSG 5	Interim Notch Design	Notch dam to the existing sediment level.	FSSG Final Report 2011	Intent is to prevent additional accumulation (and future costs for removal) of sediment		Not addressed
DBBP	Double-barrel bypass	Two bypass pipes upstream of the reservoir installed to (1) provide clean water to Robles Diversion and (2) permit slurrying of fine sediment to a temporary disposal site or downstream of the diversion point for natural river transport to the estuary.	March 12, 2011 memo from Stoeker Environmental: http://matilijadam.org/documents/Comments/DoubleBarrelByPass_MS.3-12-11.pdf	Transported via slurry pipeline using Matilija Creek water during high flows; at lower flows, diversion around reservoir area would minimize transport. Additional fine sediment in "delta" area under gravel cap would transport naturally over time, during multiple subsequent flood events.	Leave in place for natural transport.	Supplied by bypass pipeline from Matilija Creek above reservoir during periods of moderate and high flow.
USA	Upstream Disposal Areas	Excavate fine and residual coarse sediments and dispose in upstream disposal areas. Fine sediments would be protected from erosion by soil cement along the river bank and covered by coarse sediment.	DOG Presentation, January 14, 2010	Fine sediment removed and permanently stored in upstream disposal areas	Majority of coarse material left in place for natural transport, residual fines placed in upstream disposal areas.	Not addressed

New Concept Summary

ID	Concept Name	General Description	Reference	Detailed Technical Analysis		
				Fine Sediment	Coarse Sediment	Casitas Water Diversion
New-01	Slurry fine sediment to the ocean using ocean water for slurry source; one season dam removal	Slurry fine sediment to the ocean, remove dam in one season, natural transport of coarse sediment. Incoming water from Matilija Creek Upstream is diverted around the dam and returned to the river just downstream of the dam. Similar concept came up during feasibility but was dismissed due to cost and risk of introducing sea water into the riverine environment.	New Alternative	Construct two pipes (one pipe pumps sea water upstream, one pumps slurry to ocean) to transport fine sediment directly to the ocean. Fine sediment removal will be accomplished within one dry season. Additional fine sediment in "delta" area under gravel cap would transport naturally over time, during multiple subsequent flood events.	Leave in place for natural transport.	Lost diversion for approximately 1 day (or a few hours) - this alternative provides the least loss of water diversion among all the possible alternatives.
New-02	One phase removal, quick erosion of sediment	Construct cofferdam upstream and large water diversion around the reservoir. Remove dam. Construct a berm downstream of the dam to contain potential sediment slide from upstream of the dam. Connect diversion downstream of downstream berm. Allow only high flows to pass into reservoir area.	New Alternative	Leave in place for natural transport.	Leave in place for natural transport.	Clear water diversion around reservoir area during flows up to ~ 2000 cfs. Casitas continues operation at Robles Diversion until high flow event occurs. Lost water diversion for approximately one storm event.
New-03	Alternative water diversion, one time dam removal	Establish alternative water diversion for Casitas, remove dam in one season by first blast open a tunnel on the base of the dam to drain the reservoir followed by structure removal.	New Alternative	Leave in place for natural transport.	Leave in place for natural transport.	New diversion for Casitas from Matilija Cr upstream of reservoir and from N.F. Matilija Cr. Potentially no lost water.
New-04	Delayed one time dam removal	Installation of large sluice gates at bottom of dam to allow rapid sediment removal during large storm events (requires emptying of reservoir prior to large event). Sediment transport would only be effective while flows are less than the open channel capacity of the gates. Operate until fine sediment has been removed from reservoir then demolish dam in a single season -or- potentially remove a portion of dam as fine sediment is removed.	New Alternative	Leave in place for natural transport. Some excavation at face of dam would likely be needed to install gates.	Leave in place for natural transport.	Robles diversions able to be made during all storms, except those storms that are determined to be of such a size that gates would be opened for sediment flushing.
New-05	Gated notching and phased natural transport	Notch dam in phases to complete removal. Gate would be installed in notch to limit when fine sediment would be transported. Phased/metered transport of fine sediment during storm events in excess of some predetermined size.	New Alternative (similar to FSSG-3)	Leave in place for natural transport. Some excavation at face of dam would likely be needed to install notched.	Leave in place for natural transport.	Robles diversions able to be made during all storms, except those storms that are determined to be of such a size that gates would be opened for sediment flushing.



Legend & Notes

AP	Appraisal Report (2000)
CS	Coarse Sediment
DBBP	Double Barrel Bypass
EIS	EIS/R & Feasibility Study (2004)
FS	Fine Sediment
FSSG	Fine Sediment Study Group
USA	Upstream Disposal Areas

Notes:

- 1) Casitas designations only address fine sediment issues
- 2) AP-Alts. 1A-future and 3 not defined enough to include
- 3) AP-Alts. 5 & 6 not included (Dam stays and No Action)
- 4) Screened Alts. From 2004 Feasibility Study not included
- 5) FSSG-5 Interim notch not included

Multiple-phase dam removal

AP-Alt.2
 Dam phase 1: Initial notch
 Dam future phase(s): 9 incremental notches
 FS: Natural transport
 CS: Natural transport
 Casitas: Diversion reduced during high turbidity periods

EIS-Alt.3a
 Dam phase 1: Lowered to 1000 ft elev.
 Dam future phase(s): full removal after equilibrium
 FS: Slurry to d/s disposal
 CS: Phased natural transport
 Casitas: Slurry water from Lake Casitas; desilting basin

EIS-Alt.3b
 Dam phase 1: Lowered to 1030 ft elev.
 Dam future phase(s): full removal after equilibrium
 FS: Phased natural transport
 CS: Phased natural transport
 Casitas: High turbidity precludes diversion

New-04
 Dam phase 1: Orifice with gate at base to transport fines
 Dam future phase(s): Remove after FS removal
 FS: Natural transport, selective storms
 CS: Natural transport
 Casitas: Minimal impact - no diversion during large event

New-05
 Dam phase 1: Gated notches installed
 Dam future phase(s): Remove after multiple gated notches
 FS: Natural transport, selective storms
 CS: Natural transport
 Casitas: Minimal impact - no diversion during large event



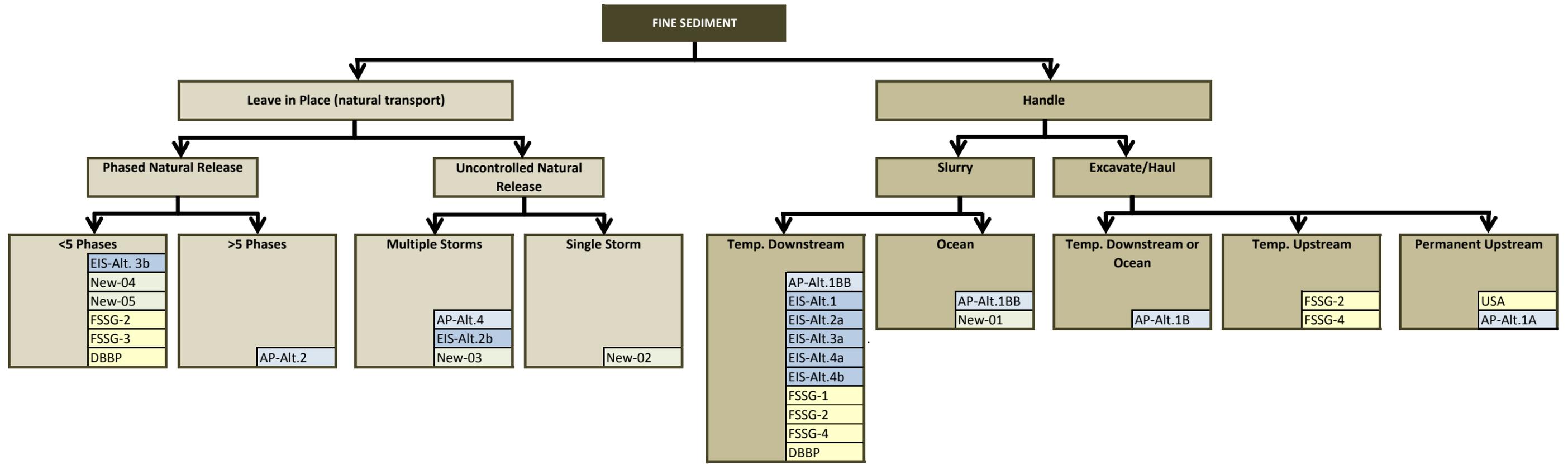
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5) FSSG-5 Interim notch not included	

FSSG-2
 Dam phase 1: notch after partial FS removal
 Dam future phase(s): progressive notching to meter FS
 FS: Slurry portion; Phased natural transport remaining
 CS: Temporarily stabilized onsite
 Casitas: TBD

FSSG-3
 Dam phase 1: notch to manage FS
 Dam future phase(s): progressive notching to meter FS
 FS: Phased natural transport
 CS: Phased natural transport
 Casitas: New u/s and d/s diversions

DBBP
 Dam: Phased removal after phased FS removal
 FS: Phased slurry to d/s disposal
 CS: Phased natural transport
 Casitas: New u/s diversion



Legend & Notes

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USA	Upstream Disposal Areas
Notes:	
2)	AP-Alts. 1A-future and 3 not defined enough to include
3)	AP-Alts. 5 & 6 not included (Dam stays and No Action)
4)	Screened Alts. From 2004 Feasibility Study not included
5)	FSSG-5 Interim notch not included