	A	B	C	D	E	F
1	**Preliminary List of Potential Flood and Sediment Reduction Actions**					
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3	**#**	**Action**	**Objective**	**Brief Description**	**Pros**	**Cons**
4						
5	1	Levee raise	Increase flood capacity	Includes raising the existing levees to obtain adequate flood protection along the Arroyo Grande Creek Flood Control Channel. The height of the levee will depend upon the level of flood protection required and existing infrastructure elements such as bridges. Levee raise could account for and allow for riparian vegetation and habitat with specific performance-based maintenance requirements.	- Increased flood conveyance and protection of adjacent properties - Improved levee stability if combined with geotechnical evaluation and structural improvements - Ability to confine work to areas outside of ordinary high water	- Level of protection limited by existing infrastructure (i.e. - bridge low chord elevations) - May require purchase of property along edge of levee to accommodate larger footprint
6	2a	Levee setback and raise	Increase flood capacity	Includes all elements of the levee raise with the addition of a levee setback, where appropriate, to increase the overall capacity of the flood channel. Could create an additional floodplain within the channel and allow for integration of expanded wetlands. This option would require purchase of adjacent parcels to setback levee and restore floodplain.	- Could potentially provide a significant increase in conveyance if combined with infrastructure improvements (i.e.-bridge lengthening). With this approach, may be able to forego levee raise. - Could significantly increase functional floodplain area and provide larger riparian corridor and off-channel wetlands	- Without infrastructure improvements, a levee setback approach would not significantly improve conveyance - Increased conveyance may be limited by current constriction at the lagoon - High cost to build a new levee and purchase properties/easements - Significantly loss of high value agricultural land
7	2b	Retain existing levee and build second levee	Increase flood capacity	Would provide for additional conveyance and flood storage without dismantling the existing levee system. The floodplain could be managed differently in existing channel as compared to the overflow/bypass channel. This option would require purchase of adjacent parcels to setback levee.	- Could potentially provide a significant increase in conveyance if combined with infrastructure improvements (i.e.-bridge lengthening). With this approach, may be able to forego levee raise. - Could significantly increase functional floodplain area and provide larger riparian corridor and off-channel wetlands	- Without infrastructure improvements, building a second levee would not significantly improve conveyance - Increased conveyance may be limited by current constriction at the lagoon - High cost to build a new levee and purchase properties/easements - Significantly loss of high value agricultural land
8	3	Bridge modification or replacement	Increase flood capacity and reduce sedimentation in flood control channel	Preliminary observations suggest that existing bridges may constrict flow and result in backwatering, sediment deposition, and levee overtopping. This project will include modifications to existing constrictions to reduce potential flooding. May need to be combined with a levee raise to achieve desired flood protection.	- Combined with a levee raise, this option greatly improves flood conveyance. - Newer bridges could also be designed to minimize debris buildup at piers	- Very costly to replace bridges - Temporary traffic disruptions - Construction related biological impacts of working in channel
9	4	High flow weirs and flood easements	Detain flood waters	This approach would consist of creating a low point in the levee where flood waters could be controlled with known consequences. This option would have to either include agricultural land purchase with potential lease-back option or payment guarantees in the case of crop failure on affected land (i.e. - flood easements).	- Manages flood waters along with risks and impacts - Retains agricultural production with reduced risks due to loss compensation agreements	- Costly to purchase easements and develop smaller perimeter levees to contain flooding - Controlled flooding of farmland has additional impacts other than crop loss, such as sedimentation, impacts from poor water quality, and future productivity losses that may not be compensated for under traditional farm flood easement programs
10	5	Vegetation maintenance program	Increase flood capacity and reduce sedimentation in flood control channel	This alternative would most likely be bundled with other flood protection alternatives and would include an environmentally sound approach to vegetation maintenance with specific roughness targets identified for each reach.	- Cost effective approach to increasing flood conveyance - Sensitive to environmental concerns - Potential tool to improve riparian species diversity and removal of non-natives	- Impacts to aquatic and riparian habitat must be closely monitored - Potential "flood fighting" threat due to downed trees and log jams
11	6	Restoration of floodplain in vicinity of airport	Detain flood waters and restore habitat	Restoring floodplain may be a multiobjective approach that reduces flood risk and mitigates for habitat impacts associated with other flood reduction actions.	- Potentially large floodplain storage area that would remove a portion of the downstream constriction - Potential riparian habitat mitigation area	- Costly to purchase property and restore as floodplain - Ordinances in place discouraging elimination of regional airport facilities
12	7	Restoring floodplain and flood capacity on tributary streams	Detain flood waters, restore habitat, reduce sedimentation in flood control channel	Opportunities may exist to expand floodplain and increase flood storage in several tributary areas such as Los Berros, Tar Springs, and Corbett-Carpenter Creeks. This approach would have the added benefit of reducing sediment inputs to the flood control reach.	- Multi-objective approach to attenuating flood peaks, restoring floodplain, and mitigating for loss of riparian habitat - Net benefit of developing multiple sites on several tributaries can significantly attenuate peak flows	- Cost relatively high due to property or easement acquisitions - Requires detailed design to maximize timing and magnitude of flood attenuation benefits
13	8	Restore floodplain on mainstem Arroyo Grande Creek above flood control channel	Detain flood waters, restore habitat, reduce sedimentation in flood control channel	There are several locations where there may be opportunities to restore floodplain and increase flood storage along the mainstem between Lopez Dam and the flood control channel. The approach could either be a passive or active approach to flood storage.	- Multi-objective approach to attenuating flood peaks, restoring floodplain, and mitigating for loss of riparian habitat - Net benefit of developing multiple sites on several tributaries can significantly attenuate peak flows	- Cost relatively high due to property or easement acquisitions - Requires detailed design to maximize timing and magnitude of flood attenuation benefits
14	9a	Restore historic Los Berros Channel	Redirect portion of high flows away from main channel	Before the flood control project was built, Los Berros Creek entered Arroyo Grande Creek much further downstream. Reactivating this old channel as an overflow channel would reduce stresses on the upper portion of the flood control channel.	- Potentially significant reduction in peak flows along most of the flood control channel - Potential habitat enhancement benefits (e.g. - red legged frog) in Los Berros bypass channel	- Relatively high cost since the channel is not continuous; May require relocation of houses and other structures and new bridges or crossings - Detailed hydrologic/hydraulic evaluation would be required to understand net benefit since the outlet of the channel is upstream of the AG constriction
15	9b	Construct alternative bypass channel	Redirect portion of high flows away from main channel	Construct a new bypass channel as an overflow channel.	- Could potentially provide a significant increase in conveyance if combined with infrastructure improvements (i.e.-new culverts under existing bridges). With this approach, may be able to forego levee raise.	- Without infrastructure improvements, a bypass channel approach would not work - Increased conveyance may be limited by current constriction at the lagoon - High cost to build bypass channel and purchase property/easements - Significantly loss of high value agricultural land
16	10	Alter Lopez Dam operations to provide flood detention	Detain flood waters	The current focus of operations at Lopez Dam are to maximize water storage. Operations could be adjusted to allow for flood detention, though this may impact storage in some years.	- Managing flood waters to limit uncontrolled releases during peak rainfall months would significantly reduce the frequency of flooding through the flood control channel - Managed releases in fall/early winter could improve habitat and sediment conditions (e.g. - flushing flows)	- Potential reduction in water availability during droughts - Study goes beyond scope of addressing Zone 1/1A issues - Potential very costly (water = money)
17	11	Reduce bank erosion on mainstem and gully formation in tributaries	Increase flood capacity and reduce sedimentation in flood control channel	Bank erosion, channel incision and gully formation have been identified as the most significant sources of erosion in the lower watershed. Reducing erosion would reduce the frequency of maintenance dredging required in the flood control reach to maintain flood capacity.	- Maintenance of design flood capacity - Reduce maintenance costs associated with dredging - Improved habitat quality if sediment is primarily fine material - Protection of infrastructure locally due to bank protection	- Benefit of individual projects is difficult to evaluate - Relatively costly when entire program is implemented -
18	12	Excavate benches within channel	Increase flood capacity	Excavate benches to create geomorphically stable channel; allow vegetation on low flow channel banks.	- Increases flood capacity - Can combine with overflow and secondary channels to improve channel morphology and sorting of fines and gravel	- Most likely requires long-term maintenance of overflow areas due to recolonization of riparian vegetation and sedimentation - Significant cost associated with environmental review and permitting - Initial and long-term impacts to riparian corridor
19	13	Sediment retention basin in channel	Reduce sedimentation downstream	Create a stilling basin in channel to settle sediments and reduce loss of channel capacity downstream - perhaps 20-75 acres total. May be especially useful around bridges.	- Focuses sediment management activities in one or several locations	- Costly to develop and difficult to evaluate performance - Environmental impacts associated with fish stranding and water temperatures - Would enhance sediment deposition - Costly environmental impact analysis phase and challenges with permitting
20	14	Off-channel Sediment basin	Reduce sedimentation downstream	Create a stilling basin adjacent to the main channel to settle sediments and reduce loss of channel capacity downstream.	- Focuses sediment management activities in one or several locations	- Costly to develop and difficult to evaluate performance - Environmental impacts associated with fish stranding and water temperatures - Would enhance sediment deposition - Costly environmental impact analysis phase and challenges with permitting
21	15	Flood Plain Management	Non-structural, site specific measures to eliminate and/or minimize flood damage to property or structures	Raise and flood proof structures, install ring levees or floodwalls; move vulnerable structures; install overflow weirs and energy dissipaters to control overflow, improve drainage network to drain flood plain quickly after floods.	- Reduces impacts of flooding rather than reducing risk of flooding - Would be long-term solution - Would provide greater level of flood protection than provided by other alternatives	- Would not likely be feasible to protect farmland - Could potentially be very expensive - Would require coordination that goes beyond the scope of Zone 1/1A
22	16	Maintain/enlarge existing retention basins in housing developments	Detain flood waters	Several housing developments have been identified that have incorporated stormwater detention basins that appear to be poorly designed. Simple modifications could be made to these basins to make them more effective at capturing peak events.	- Manages increases in peak flows associated with urban development - Cost effective	- Benefit limited to urban/developing watersheds - Outside of scope of Zone 1/1A
23	17	Change county and/or local development codes	Reduce impermeable surfaces in developed areas; reduce erosion	Revise zoning and building regulations to reduce upslope impermeable surfaces, allowing for greater infiltration and diminishing flashiness of stream flows. Improve and enforce erosion control rules to reduce delivery of sediment to tributaries and main channel.	- Manages increases in peak flows associated with urban development - Cost effective	- Benefit limited to urban/developing watersheds
24	18	In off-season, rip benches/banks in flood control channel	Increase sediment mobility	Use machinery to loosen soil on upper benches/banks of flood control channel, making it easier for accumulated sediment to be entrained and moved downstream and flushed to ocean during high flows.	- Maintains flood capacity achieved from initial dredging - Encourages improved channel morphology by creating main and overflow channels	- Requires long-term maintenance of overflow areas due to recolonization of riparian vegetation - Significant cost associated with environmental review and permitting - Long-term impacts to riparian corridor - Concerns exist about lagoon sedimentation
25	19	Have all landowners or district self-insure for crop loss	Financial compensation for potential flood loss; reduce flood prevention costs	Rather than implementing expensive engineering fixes, let farmland risk flood losses, and be covered for losses by insurance.	- Manages impacts of flooding rather than reducing risk of flooding - Retains agricultural production with reduced risks due to loss compensation agreements - May prove to be cost effective but would need to be evaluated; Can be combined with flood protection efforts to reduce premiums and frequency of loss	- Controlled flooding of farmland has additional impacts other than crop loss, such as sedimentation, impacts from poor water quality, and future productivity losses that may not be compensated for under traditional farm flood easement programs