

DRAFT Memorandum

To:	Salinas River Long-Term Management Plan Planning Group
From:	Consultant Team
CC:	Monterey County Water Resources Agency
Date:	September 7, 2018
Re:	Salinas River Lagoon Management Background and Potential Objectives, Management Issues, and Actions for Long-Term Management Plan Integration

Monterey County Water Resources Agency (MCWRA) is leading development of a long-term management plan (LTMP) for the Salinas River, including the lagoon that forms when a seasonal sandbar blocks the river from entering Monterey Bay. The LTMP will include management objectives and actions for the Salinas River system, including the management of flows, water quality, and the sandbar at the mouth of the lagoon. The purpose of this memorandum is to provide background on the history of lagoon management and planning, summarize on-going management issues, and to propose a series of objectives and actions that, if implemented, have potential to reduce flooding and improve habitat conditions.

The summary information in this memorandum is primarily drawn from the Salinas River Lagoon Management and Enhancement Plan (Salinas River Lagoon MEP) and monitoring reports authored by the MCWRA, FISHBIO, and Hagar Environmental Sciences. The potential management objectives and actions are drafted based on on-going or incomplete recommended measures in the Salinas River Lagoon MEP and from a Working Group meeting held on August 3, 2018. The purpose of the Working Group meeting was to discuss ongoing management challenges and opportunities related to the Salinas River lagoon, and recommended management actions to inform LTMP development. The Working Group meeting was attended by the following individuals.

- Brian O'Neill, California Coastal Commission
- Sarah Paulson, California Department of Fish and Wildlife
- Tom Gandesbery, California State Coastal Conservancy
- Amy Palkovic, California State Parks
- Ross Clark, Central Coast Wetlands Group



- Kim Sanders, Central Coast Regional Water Quality Control Board
- David Shaman, Coastal Biologist
- Dale Huss, Grower
- Henry (Hank) Balone, Landowner
- Mike Scattini, Landowner
- Brent Buche, Monterey County Water Resources Agency
- Elizabeth Krafft, Monterey County Water Resources Agency
- Shaunna Murray, Monterey County Water Resources Agency
- Tom Bugary, Monterey Dunes Colony
- Bill Stevens, National Marine Fisheries Service
- Paul Robins, Resource Conservation District of Monterey County
- Steve Shimek, The Otter Project
- Tim Frahm, Trout Unlimited
- Jake Martin, U.S. Fish and Wildlife Service
- Diane Kodama, U.S. Fish and Wildlife Service (Salinas River National Wildlife Refuge)
- Consultants:
 - Gina Bartlett, Consensus Building Institute (Facilitator)
 - Stephanie Horii, Consensus Building Institute
 - Dana Lee, FISHBIO
 - Tyler Pilger, FISHBIO
 - Paul Frank, FlowWest
 - Gordon Thrupp, Geosyntec
 - David Zippin, ICF
 - Danielle Tannourji, ICF
 - Kathryn Gaffney, ICF
 - Les Chau, Wood, Inc.

Background

The Salinas River Lagoon Task Force was formed in the late 1980s to address flooding, water quality, and ecological concerns in the estuary, lagoon, and surrounding uplands. The Lagoon Task Force was composed of federal, state, and local agencies along with local agricultural

representatives, landowners, non-profit organizations as well as other local and regional organizations.

The Lagoon Task Force worked with a consulting team between 1990 and 1996 to prepare and review the Salinas River Lagoon MEP. The Salinas River Lagoon MEP—which put forth 27 recommended measures to be implemented primarily by the MCWRA and the U.S. Fish and Wildlife Service (USFWS)—was adopted by MCWRA in 1996 (Monterey County Water Resources Agency 1997). As described in the Salinas River Lagoon MEP, the Salinas River Lagoon project area included the lowermost end of the Salinas River system, starting just upstream of State Highway 1 (approximately 2 miles upstream from the mouth) and continuing downstream to the sandbar that separates the river from the Monterey Bay.

Now, in 2018, the Salinas River Lagoon MEP-recommended measures provide a starting point for evaluating the status and success of lagoon management over the last 20 years and proposing management objectives and actions for inclusion in the Salinas River LTMP. The recommended measures also provide insight into the assumptions about lagoon function.

Table 1 includes all 27 recommended measures in the Salinas River Lagoon MEP and provides the status of implementation.

Table 1. Recommended Measures from Salinas River Lagoon Management and Enhancement Plan

	Recommended Measures	Implementing Entity	Status
1	Accommodate higher winter lagoon water elevations, between 4 and 5 feet	MCWRA, Landowners, CCC	Ongoing
2	Install and operate the new OSR slidegate system in accordance with breaching plan	MCWRA	Complete
3	Install a water level monitoring gage	MCWRA	Complete
4	Minimize short duration breaches by using OSR Channel when dredged	MCWRA	In Progress
5	Encourage riparian enhancement measures by Highway 1 bridge	CCC, RCD, Lagoon Task Force	Unknown
6	Encourage program to enhance riparian habitat within the project area	CCC, Lagoon Task Force, Landowners	Unknown
7	Implement enhancement and management measures within fore dunes and dune scrub	CCC, CDPR, USFWS	Ongoing
8	Maintain permitted facilities where necessary on north bank of slopes	MCWRA	Unknown
9	Monitor the Monterey slender-flowered gilia population on public property	CDPR	Unknown
10	Implement habitat enhancement on a portion of the USFWS refuge	USFWS	Ongoing
11	Reduce hunting activity within sensitive areas on USFWS property	USFWS	Complete
12	Maintain the quality of Smith's Blue Butterfly habitat on public property	USFWS	Ongoing

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	Recommended Measures	Implementing Entity	Status
13	Control public recreational use to avoid impacting wildlife	USFWS	Ongoing
14	Manage the pond on the USFWS refuge to maintain wildlife values	USFWS	Ongoing
15	Encourage management of boating activities to protect sensitive species	USFWS	Ongoing
16	Control red fox populations	USFWS, CDPR	Ongoing
17	Protect snowy plover habitat on public property in the study area	USFWS	Ongoing
18	Install bird nest boxes and bat roost boxes on public properties	USFWS	Measure Replaced
19	Establish baseline salinity levels in the OSR to operate double weir and enhance freshwater fisheries habitat in the lagoon	MCWRA	Unknown
20	Evaluate the potential to reintroduce native freshwater species, enhance Sacramento blackfish/perch community.	CDFW, USFWS	Unknown
21	Evaluate the potential to reintroduce tidewater goby into the lagoon	CDFW, USFWS	Complete
22	Establish a sediment and water quality monitoring program	MCWRA, RWQCB, Lagoon Task Force, AMBAG	Water Quality Monitoring Ongoing; Sediment Monitoring Unknown
23	Encourage participation in the Water Quality Protection Plan by the Monterey Bay National Marine Sanctuary	MCWRA, RWQCB, Lagoon Task Force, MBNMS	Unknown
24	Develop a public use and access plan on public properties	Lagoon Task Force	Unknown
25	Recognize the ability of property owners to make necessary and permitted improvements	CDFW	Unknown
26	Operation of culvert shall not increase flooding or excess salinity along the OSR	MCWRA	Unknown
27	Form Interagency/Property Owners' Management Committee	MCWRA, CCC, CDPR, Lagoon Task Force, Landowners, USFWS	Unknown

Source: Salinas River Lagoon Management and Enhancement Plan 1997.

AMBAG: Association of Monterey Bay Area Governments

CCC: California Coastal Conservancy

CDPR: California Department of Parks and Recreation

CDFW: California Department of Fish and Wildlife

MCWRA: Monterey County Water Resources Agency

MBNMS: Monterey Bay National Marine Sanctuary

RCD: Resource Conservation District

RWQCB: Regional Water Quality Control Board

USFWS: U.S. Fish and Wildlife Service

WQPP: Water Quality Protection Program

Special-Status Species

Federally listed species known to occur in the lagoon include:

- South-Central California Coast steelhead (*Oncorhynchus mykiss*) (threatened);
- Tidewater goby (*Eucyclogobius newberryi*) (endangered); and
- Western snowy plover (*Charadrius nivosus nivosus*) (threatened).

Since lagoon monitoring began in 2002, steelhead presence has been recorded in the lagoon in only two years: 2011 and 2012 (Hagar Environmental Sciences 2012, 2013). In 2011, one fish was captured in each of May, July, and October, for a total of three fish; the October fish was an adult. In 2012, one juvenile was captured during April surveying. Tidewater goby was discovered during October 2013 fish surveys (Hagar Environmental Sciences 2015).

The most recent fish surveys were conducted on April 2014. Although fish seining was hampered by dense rooted aquatic vegetation and floating algal mats, tidewater goby were captured and found to be abundant. No steelhead were captured. July 2014 fish surveys were attempted but abandoned due to excessive algal growth. Given the lagoon did not open until January of 2017, fish surveys were also abandoned in 2015 and 2016 for the same reasons as noted above.

Monitoring of adult steelhead migration and juvenile migration and rearing in the upper reaches of the Salinas and lower reaches of the Nacimiento and Arroyo Seco have been implemented since 2009 with reporting through the 2014 monitoring season. Results from that monitoring indicate steelhead are successfully breeding and rearing in the watershed, though in low numbers.

Western snowy plovers nest along the beaches of Monterey Bay, including the beach at the mouth of the Salinas River. In 2017, nests were found directly to the north and south of the mouth of the Salinas River (Neuman et al. 2017). California red-legged frogs are not known to be present in the lagoon although there are some occurrences of larvae and juveniles in the portions of the Salinas just upstream from the lagoon (California Department of Fish and Wildlife 2018).

Regulatory History

In 2002, the MCWRA applied to the U.S. Army Corps of Engineers (Corps) for a permit under Clean Water Act (CWA) Section 404 (dredge and fill of waters of the U.S.) to construct projects proposed under the Salinas Valley Water Project, including construction of the Salinas River Diversion Facility. When a project requires a permit under the CWA, the Corps (as a federal agency) is required by Section 7(a)(2) of the Endangered Species Act (ESA) to consult (seek a take permit and confirm no jeopardy to a listed species) with the appropriate Service (NMFS or USFWS, depending on the listed species in question). Consultation with NMFS resulted in MCWRA preparing the Salinas Valley Water Project Flow Prescription for Steelhead Trout (Flow Prescription) in 2005. The Flow Prescription defines flow requirements and operational targets for managing steelhead trout in the Salinas River. The Flow Prescription was incorporated into the NMFS Biological Opinion for the SVWP, ultimately issued in 2007. The Biological Opinion also requires monitoring of lagoon and riverine water quality, flow, and steelhead habitat, distribution, and population.

USFWS (2007) issued a Biological Opinion for Salinas Valley Water Project activities, and breaching of the Salinas River Lagoon to prevent flooding. The USFWS BO addressed the effects of the SVWP on the federally threatened California red-legged frog (*Rana aurora draytonii*) and western snowy plover (*Charadrius nivosus nivosus*), and the federally endangered brown pelican (*Pelecanus occidentalis*), which was subsequently delisted 2009. No effects or “take” of these species were anticipated from the Nacimiento spillway modifications; however, the USFWS found that construction of the SRDF and changes in flow regimes could result in effects to California red-legged frog. USFWS also found that changes in flow regimes and concomitant changes in breaching at the Salinas River Lagoon could affect western snowy plover and brown pelicans.

In 2009, NMFS issued a draft Biological Opinion to the Corps for sandbar management. However, after issuance of the Biological Opinions, the Corps determined that it does not have jurisdiction over management of the sandbar because sandbar management actions do not affect Waters of the U.S. Thus, NMFS did not issue a final Biological Opinion or Incidental Take Statement for effects that sandbar breaching and associated lagoon changes might have on steelhead.

In a letter to NMFS, dated August 5, 2016, the Corps reinitiated ESA consultation with NMFS for the SVWP permit. MCWRA staff has been meeting regularly with NMFS since September 2016 to determine the content updates to be included in the new BO that is anticipated to be issued in the next year or so. The new BO will likely be only a 3-year permit, leaving both the operations of the San Antonio and Nacimiento reservoirs and SVWP facilities without take coverage for steelhead under the ESA.

Through the reinitiation of consultation, the Corps has indicated that there is no federal nexus for sandbar management activities. As such, MCWRA anticipates that sandbar management will require coverage under a future habitat conservation plan (HCP), with permits issued by both NMFS and USFWS, in order to be in compliance with the ESA.

Monitoring

MCWRA monitors the below variables to inform lagoon management and to meet permit requirements.

- Steelhead and goby presence in the lagoon (spring, summer, and fall surveys)
- Adult migration, juvenile outmigration and juvenile rearing (annual surveys in the upper watershed)
- Streamflow throughout the watershed
- Lagoon and upper watershed water quality
- Water levels and quality at the Salinas River Diversion Facility
- Lagoon surface water elevation
- Reservoir releases

Current Management Issues

MCWRA has been managing the lagoon consistent with the Salinas River Lagoon MEP, the 2007 USFWS Biological Opinion, and the draft 2009 NMFS Biological Opinion. However, key management issues persist. The primary challenge is minimizing the risk of flooding while maintaining or enhancing habitat for native species. Flooding of adjacent agricultural fields incurs a significant financial loss to farmers; however, the management of surface water elevation can limit the quantity and quality of habitat for steelhead, tidewater goby, and western snowy plover. The below sections detail current constraints and considerations for lagoon management.

Lagoon Elevation, Sandbar Management, and Flooding

When the sandbar is in place, lagoon elevation is managed between 3.0 and 3.5 feet above sea level; flooding of adjacent lands begins when elevation reaches approximately 5.5 feet. Lagoon elevation is primarily controlled by the OSR slidegate and Potrero tidegates. An adjacent waterway, the Tembladero Slough, drains a significant watershed and outlets into the OSR upstream of the Potrero tidegates. This can limit outflow from the lagoon, causing elevations to raise with limited inflow from the Salinas River. Currently, when water elevation reaches 5 feet and inflows to the lagoon are predicted to increase (as a result of a storm event), preparations are made for an emergency breach of the lagoon. During preparations for sandbar breaching, lagoon elevation can reach 7 or 8 feet.

Flooding primarily affects agricultural lands to the north of the lagoon. When agricultural lands are flooded, it destroys or degrades crops such that they cannot be sold, washes away topsoil, and can change the chemical composition of the soil. Food safety regulations also prohibit replanting for a period of 60 days or more for certain crop types. During large storm events, flooding can also inundate homes and threaten infrastructure including roads and bridges.

Breaching of the sandbar is performed during a storm event as high flows increase the scour potential at the mouth; if the flows are not high enough to scour the sand out of the river mouth, the sandbar has increased potential to form again soon after the breach. The timing of sandbar breach is also an important consideration for steelhead as their life history requires ocean connectivity. If the sandbar is not breached until later in the winter or spring season, this can delay adult steelhead migration which begins at the end of December and continues on through April. Similarly, if the sandbar closes early in the spring, the number of out migrating juveniles that reach the ocean will be limited. In dry years, river flow events may not be large enough to trigger sandbar breaching (natural or artificial), leaving the sandbar in place for a year or more. This most recently occurred when the sandbar was closed between January 2013 to January 2017.

The timing and location of an artificial sandbar breach must also consider the western snowy plover nesting season. Plovers nest on the beach near the mouth of the Salinas River between March 1 and September 30. If artificial sandbar breaching occurs during this time, the presence of people and construction equipment may cause plovers to either not nest or abandon their nests, or it may result in destruction of nests if they are washed away as the breach occurs.

Tidewater gobies benefit from a relatively stable surface water elevation provided when the sandbar is in place and have a tolerance for a wide range of salinities and oxygen concentrations.

However, if there is a need for sandbar management during the late spring or early summer, or the lagoon stays open for most or all of the summer, this could disrupt the goby breeding season which begins in late spring and continues through to early fall. Because goby live an average of one year, the loss of one breeding season could limit overall survival potential in the Salinas lagoon. In addition, tidewater goby overwintering survival is highly dependent on a large population going into the fall and winter; because large flood events often sweep most individuals out to the ocean, a large population increases the potential for some individuals to survive winter events. It is these survivors that will comprise the initial breeding population the following summer.

Infrastructure

Water management infrastructure around the lagoon affects how the lagoon is managed. The OSR slidegate separates the Salinas River lagoon from the OSR, and the OSR drains to Moss Landing Harbor through the Potrero Road tidegates. The OSR slidegate is used to maintain surface water elevations in the lagoon. The slidegate is opened when the sandbar closes. The slidegate allows water from the Salinas River to “spill out” when it reaches approximately 3 feet. The slidegate is not ideal for surface water management because it allows the fresh, oxygenated surface water to exit the lagoon. Allowing freshwater to exit the lagoon slows or stops the conversion of the lagoon from a salinity stratified system with poor bottom water quality to a more uniformly freshwater system; allowing the freshwater to remain within the lagoon could slowly convert the lagoon to a freshwater system and thus maximize habitat quantity and quality for rearing steelhead. Tidewater gobies have a wide range of salinity tolerance and are generally able to reproduce so long as the lagoon is formed and relatively stable in elevation.

The Potrero Road tidegates are a series of flap gates that are located at the northern end of the OSR. Water exits the channel and enters the harbor through these gates. The purpose of these gates is to reduce the amount of salt water that can enter the OSR and degrade the quality of surrounding agricultural lands through water quality and inundation of land from high tides. The Potrero Road tidegates limit the volume of water that can exit the lagoon because the function of the gates is subject to tidal levels: at high tides, the surface water elevation is raised and the pressure from the water flow caused by the rising tide keeps the flapgates closed. Thus, the function of the OSR as a mechanism for controlling surface water elevations is limited during high tides.

The size of the OSR channel, along with the diameter of the culverts at the OSR slidegate and the Potrero Road tidegates, limits the volume of water that can be transported out of the lagoon. This limits the ability of MCWRA to manage surface water elevations during large storm events; water cannot be carried out of the lagoon fast enough to keep up with inflow and the water elevation starts to rise. To compound this management issue, Temblardo Slough also contributes water to the OSR. During dry weather, most of this discharge is in the form of agricultural runoff returns. However, during storm events, the flows from Tembladero Slough increase dramatically. It has even been observed that with zero flow from the Salinas River, flows from the Tembladero Slough are capable of causing flooding.

The Salinas River Diversion Facility became operational in 2010. As a permit condition for facility operation, the NMFS Biological Opinion flow prescription requires the MCWRA release 15 cubic feet

per second to the lagoon through June 30, then 2 cubic feet per second when three primary conditions are met:

- the Salinas River Diversion Facility is operational (i.e., the rubber dam is inflated),
- the sandbar is closed, and
- a certain reservoir storage capacity is met (220,000 acre feet).

The Salinas River Diversion Facility is more likely to be operational and the storage conditions are more likely to be met in normal or wet years, or one year after a normal or wet year. The result is that in dry years, when the river is more likely to be naturally dry, there is no mechanism to provide for artificial, reservoir releases to the lagoon. That is, the flow prescription required as a result of Salinas River Diversion Facility operation has no provision for freshwater input into the lagoon during a dry summer when it is likely most critical for species.

Water Quality

Water quality conditions vary with water year and the status of the sandbar; when the sandbar is open and when freshwater inflows are high, water quality is good. When the sandbar is closed and freshwater inflows are low or absent, water quality can be poor.

Water quality degradation occurs, primarily as the result of water column stratification, particularly in the summer. The water column stratifies with the more dense saline water on the bottom becoming isolated from the fresh surface water layer. As a result of no mixing between layers in the water column, bottom water becomes hypoxic (< 2 mg/l) or anoxic (0 mg/l) and surface waters experience diurnal (daily) fluctuations in dissolved oxygen concentrations. These diurnal fluctuations are a result of oxygen levels becoming “super saturated” (> 15 mg/l) during the day as a result plant respiration and then dropping at night when microbial and animal respiration continue without the oxygen input from plants.

Warm temperatures and stagnant water fosters “blooms” of rooted and floating vegetation which is exacerbated by nutrient inputs from agricultural and urban sources. Chemical toxins such as Diazinon and Chlropyrifos remain in the system, rather than being flushed out to the ocean and diluted. Prior to 2010, freshwater inflows from the upper watershed were typically low or non-existent in the summer and fall. Since 2010 and the operation of the Salinas River Diversion Facility, freshwater inflows to the lagoon are a requirement of the SVWP permits.

It has been noted in other Central California coastal systems (e.g., Pescadero) that inflow quantity can influence water quality. With freshwater inflows, the denser saltwater is slowly “pushed” out of the lagoon, primarily as a result of subsurface flow through the sandbar. When the lagoon “converts” to a freshwater system, and the stratification is removed, water quality can improve. When water quality improves, the extent of habitat and steelhead prey abundance increases.

Potential Management Objectives and Actions for the LTMP to Address Lagoon Management Needs

The following potential management objectives and actions were drafted based on the Salinas River Lagoon MEP and the outcomes of the Working Group meeting for the Salinas River Lagoon.

Objectives are targets that will be sought to achieve a given goal. Objectives are typically quantitative or at least measurable. Objectives describe a specific desired outcome.

Actions are specific activities that will be carried out to meet the associated objectives. Actions describe how objectives can be achieved. A single action can support multiple objectives.

Objective LAG-1. Develop a feasible and implementable (i.e., can be permitted by regulatory agencies) floodwater management program that reduces flooding while allowing MCWRA to meet all of its jurisdictional and regulatory obligations. Include an assessment of inflows to the OSR from both the lagoon and Tembladero Slough, areas most vulnerable to flooding when the OSR is at capacity, and inter-annual variability in lagoon conditions.

Action LAG-1. Recognize the ability of property owners to make necessary and permitted improvements. (Source: Salinas River Lagoon MEP, Measure 25.)

Action LAG-2. Accommodate higher winter lagoon water elevations, between 4 and 5 feet. (Source: Salinas River Lagoon MEP, Measure 1.)

Action LAG-3. Evaluate the condition of current infrastructure, including if it is in good operating condition and if the infrastructure is providing the service for which it was designed. Consider infrastructure adjustments that could help better manage water levels and salinity in the lagoon and OSR. (Source: Partially adapted from Salinas River Lagoon MEP, Measure 26.)

Action LAG-4. Explore the viability of new engineered solutions for flood management (e.g., levees). Include an assessment of existing infrastructure that are affected by flooding (e.g., Twin Bridges).

Action LAG-5. Consider the establishment of a lagoon management committee. (Source: Salinas River Lagoon MEP, adapted from Measure 27.)

Action LAG-6. Develop a sandbar management approach that provides clear guidelines and triggers for implementing a breach that is considerate of steelhead and plover.

Action LAG-7. Investigate the potential for establishing flood easements (payment to landowners in exchange for the ability to flood lands under certain conditions) on targeted agricultural lands. Assess the implications of flooding agricultural lands including issues related to food safety requirements. Also evaluate the financial costs and benefits of flooding targeted agricultural lands in the context of the landowner/grower and the larger Salinas Valley basin.

Action LAG-8. Investigate the potential for flow attenuation through reservoir management (including construction and operation of the Interlake Tunnel) and retaining floodflows upstream of the lagoon.

Action LAG-9. Evaluate the effects of downstream flooding related to impermeable surface runoff, including plastic tarps used for agricultural purposes. Consider relative contribution of different runoff sources and the associated effects of higher peak flows and velocities. Identify approaches to ameliorate the effects of increased surface runoff.

Action LAG-10. Conduct a study of lagoon and OSR bathymetry and changes to the bathymetry over the period of the study to better understand how the sediment levels of the lagoon and OSR shift over time and identify if there are opportunities to increase the capacity of the lagoon and OSR.

Objective LAG-2. Maintain flows and habitat conditions in the Salinas River sufficient to maintain connectivity for steelhead between the lagoon and areas in the upper watershed suitable for spawning.

Action LAG-11. Accommodate higher winter lagoon water elevations, between 4 and 5 feet. (Source: Salinas River Lagoon MEP, Measure 1.)

Action LAG-12. Minimize short duration breaches by using OSR Channel when dredged. (Source: Salinas River Lagoon MEP, Measure 4.)

Action LAG-13. Continue the current sediment and water quality monitoring program. (Source: Salinas River Lagoon MEP, adapted from Measure 22.)

Action LAG-14. Develop a reservoir flow release prescription that defines when and under what conditions in-stream flows will be established and maintained for steelhead.

Action LAG-15. Develop a sandbar management approach that provides clear guideline and triggers for implementing a breach that is considerate of listed species habitat needs.

Action LAG-16. Assess existing data to better understand the correlation between upstream flows on the Salinas and in-channel flows capable of supporting steelhead migration.

Action LAG-17. Evaluate alternative steelhead migration corridors, including through the OSR, when the sandbar is closed.

Objective LAG-3. Manage the lagoon to provide suitable habitat for tidewater goby and rearing steelhead.

Action LAG-18. Establish baseline salinity levels in the OSR to operate double weir and enhance freshwater fisheries habitat in the lagoon. (Source: Salinas River Lagoon MEP, Measure 19.)

Action LAG-19. Restore marsh plain and backwater refugia habitat for steelhead and tidewater goby that provide foraging habitat for juvenile steelhead and freshwater refugia habitat for tidewater goby.

Objective LAG-4. Protect and manage snowy plover habitat on public property. (Source: Salinas River Lagoon MEP, Measure 17.)

Action LAG-20. Control red fox populations. (Source: Salinas River Lagoon MEP, Measure 16.)

Action LAG-21. Develop a sandbar management approach that provides clear guideline and triggers for implementing a breach that is considerate of steelhead and plover.

Objective LAG-5. Improve aquatic and upland habitat in and surrounding the lagoon.

Action LAG-22. Enhance riparian habitat around the lagoon, including by the Highway 1 bridge. (Source: Salinas River Lagoon MEP, Measures 5 and 6 combined.)

Action LAG-23. Implement enhancement and management measures within fore dunes and dune scrub to improve ecosystem function, including stabilizing the sand and providing wave attenuation. (Source: Expanded from Salinas River Lagoon MEP, Measure 7.)

Action LAG-24. Monitor the Monterey slender-flowered gilia population on public property (source: Salinas River Lagoon MEP, Measure 9) and identify habitat enhancement needs.

Action LAG-25. Develop a public use and access plan on public properties, including measures to avoid and minimize potential effects on sensitive habitats and wildlife. (Source: Salinas River Lagoon MEP, adapted from Measure 13 and 24.)

Action LAG-26. Evaluate the potential to reintroduce native freshwater species, enhance Sacramento blackfish/perch community. (Source: Salinas River Lagoon MEP, Measure 20.)

Action LAG-27. Conduct a study to better understand the relationship between retention of sand in the reservoirs and replenishment of the sand dunes at the mouth of the Salinas River. Based on the results of the study, consider adaptive management approaches to reduce the adverse effects of reduced sediment in the Salinas River system.

Action LAG-28. Develop an invasive species management plan that addresses, at a minimum, invasive plants and striped bass. May require an initial assessment of the current status of invasive species in and around the lagoon.

Objective LAG-6. Assess current water quality issues in the lagoon and identify approaches to reduce pollutant sources.

Action LAG-29. Encourage participation in the Water Quality Protection Plan by the Monterey Bay National Marine Sanctuary. (Source: Salinas River Lagoon MEP, Measure 23.)

Action LAG-30. Review the monitoring program currently being implemented by MCWRA, consider if changes are needed, and continue monitoring water quality in the lagoon.

Action LAG-31. Based on the results of MCWRA water quality monitoring, identify best management practices that could help better manage pollutants in the lagoon.

Objective LAG-7. Manage USFWS National Wildlife Refuge to support sensitive habitats and wildlife.

Action LAG-32. Implement habitat enhancement on a portion of the USFWS refuge. (Source: Salinas River Lagoon MEP, Measure 10)

Action LAG-33. Reduce hunting activity within sensitive areas on USFWS property. (Source: Salinas River Lagoon MEP, Measure 11)

Action LAG-34. Maintain the quality of Smith's Blue Butterfly habitat on public property.
(Source: Salinas River Lagoon MEP, Measure 12)

Action LAG-35. Control public recreational use to avoid impacting wildlife. (Source: Salinas
River Lagoon MEP, Measure 13)

Action LAG-36. Manage the pond on the USFWS refuge to maintain wildlife values (Source:
Salinas River Lagoon MEP, Measure 14)

Action LAG-37. Control red fox populations. (Source: Salinas River Lagoon MEP, Measure 16.)