

Arroyo Grande Lagoon and Adjacent Waters
Fishery and Aquatic Resources
Preliminary Draft Outline: 2018 Survey Results

Oceano Dunes State Vehicular Recreation Area
Pismo Dunes Natural Preserve

by
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DRAFT - December 2018

SUMMARY

California State Parks has been investigating and monitoring the fishery and habitat of the lowest half-mile of Arroyo Grande Creek, including a dynamic euryhaline lagoon, since 2003. These waters are within and adjacent to Oceano Dunes State Vehicular Recreation Area (SVRA) and Pismo Dunes Natural Preserve (San Luis Obispo County, California). Fish-collection surveys were made on four dates in 2018 and collective efforts included seining each date, electrofishing once, dipnetting occasionally, and direct observation. Sampling of the fishery in this area was conducted for several purposes: to gather information about various species' use of the habitats within this California State Park unit; to observe the population dynamics of the fishery following the end of a multi-year drought and other past disturbances; to evaluate whether any Park activities may be impacting the fishery or aquatic habitat; and to document the impacts of habitat disturbance caused by upstream water management activities.

Eight species of California native fish were collected in the lagoon and its inlet stream between February and October 2018. Three non-native species were also collected, each in very low numbers. Abundant Tidewater Goby *Eucyclogobius newberryi* (federally-listed as Endangered) and one steelhead Rainbow Trout *Oncorhynchus mykiss* (federally-listed as Threatened) were notable collections. Also among native species in the 2018 catch were Threespine Stickleback *Gasterosteus aculeatus*, Prickly Sculpin *Cottus asper*, Sacramento Sucker *Catostomus occidentalis*, Staghorn Sculpin *Leptocottus armatus*, Starry Flounder *Platyichthys stellatus*, and Topsmelt *Antherinops affinis*.

The habitat quality provided by stream and lagoon conditions in 2018 is best described as mixed. The persistence of streamflow in Arroyo Grande Creek was relatively short, and of late onset. Despite dry early conditions caused by a late onset of winter rains, the lagoon persistently provided good rearing habitat for most juvenile fishes. A new feature (lateral expansion) of the shape of the lagoon's southern end required modification and minor enlargement of the associated vehicle closure zone. The lagoon pool shrank throughout the 2018 season, due to three factors affecting both width and depth: seasonal diminishment of water level, aggressive encroachment of aquatic and riparian plants, and encroachment of windborne sand. However, for the species present, the lagoon remained adequately deep and expansive in area and was characterized by good habitat complexity.

The fish assemblage observed in 2018 continues to reflect, to some degree and in several respects, an improvement in habitat conditions following the end of the 2013-2016 drought. However, upstream activities affecting the timing and volume of streamflow (lagoon inflow) appear to remain threats to this aquatic habitat and the sensitive species dependent upon that habitat.

Attached to this draft 2018 summary/outline is Table 1, listing the species of fish collected on respective dates and some species-specific noteworthy observations. The four previously-produced individual survey-specific write-ups follow Table 1, for reference. In the coming weeks, a more detailed report will elaborate on the summary above. Sampling on the general scale and of the frequency described in the following attachments is proposed to be repeated in 2019.

TABLE 1. Fish of Arroyo Grande Creek and lagoon pool: approximate numbers of each species collected over four surveys, 2018.

<u>SPECIES</u>	<u>STATUS</u>	<u>FEB 27, 2018</u>	<u>APR 25-26, 2018</u>	<u>JUL 30, 2018</u>	<u>OCT 31, 2018</u>	<u>COMMENTS</u>
Tidewater Goby <i>Eucyclogobius newberryi</i>	N	hundreds	hundreds	thousands	thousands	Distributed throughout lagoon in large numbers.
Threespine Stickleback <i>Gasterosteus aculeatus</i>	N	dozens	2	few	few	Once one of the more abundant species, possibly now recovering from anomalous 2015 loss.
Prickly Sculpin <i>Cottus asper</i>	N	0	2	1	few	Young-of-year (YOY) growing to juvenile-size (112 mm TL) at end of year – no adults.
Staghorn Sculpin <i>Leptocottus armatus</i>	N	0	hundreds	few	few	YOY growing to juvenile-size (116 mm TL) at end of year.
Topsmelt <i>Antherinops affinis</i>	N	dozens	0	0	0	All similar-size (juveniles), probably escaped lagoon upon subsequent breach (MAR-APR).
Steelhead <i>Oncorhynchus mykiss</i>	N	0	1	0	0	220 mm FL smolt in good condition; may have had opportunity to escape to ocean.
Starry Flounder <i>Platyichthys stellatus</i>	N	few	0	few	few	Largest numbers and largest individuals (juveniles rearing) in many years.
Sacramento Sucker <i>Catostomus occidentalis</i>	n	0	0	0	2	Either survivors or recolonized from upstream, following significant fish-kill DEC 2017.
Green Sunfish <i>Lepomis cyanellus</i>	I	0	1	2	0	Either flushed from upstream (early in year), or later migrated through flood control flapgates.
Largemouth Bass <i>Micropterus salmoides</i>	I	0	0	1	0	Either flushed from upstream (early in year), or later migrated through flood control flapgates
Black Crappie <i>Pomoxis nigromaculatus</i>	I	0	0	0	1	Either flushed from upstream (early in year), or later migrated through flood control flapgates

KEY Status: N = Native to watershed; n = Native to California, but likely introduced to watershed; I = Introduced

AQUATIC SURVEY (REFERENCE PERMIT #TE-101154-2)
ARROYO GRANDE CREEK AND LAGOON
OCEANO DUNES SVRA, PISMO SB DUNE PRESERVE

February 27, 2018

Cold, Clear, Light Winds; Air mid-40s F

California State Parks:
Douglas Rischbieter
Josh Willems

Assisting Agencies:
Andrew Johnson, Upper Salinas Las Tablas RCD
Alyssa Bucci, Coastal San Luis RCD

Summary

This was the first 2018 survey of the fishery and general habitat and hydrologic conditions of Arroyo Grande Lagoon. The lagoon has not been open to the ocean since mid-January, and at that time only briefly, after being supercharged by one or more mid-January high-tide events. Surface inflow to the lagoon was negligible, and had been so through most of the winter until a larger storm arrived a few days after this survey. Arroyo Grande Creek had low flow at the 22nd Street bridge, but all surface water had percolated into the gravel streambed a short distance later and was completely dry at Guiton Crossing. The lagoon pool behind the beach remained extensive in area and especially north-south length, as it had through 2017, with its southern extent about one-third of a mile south of Post #1.

Using beach seines we made six hauls in separate areas throughout the length of the main lagoon pool. We collected four species of California native fish: Tidewater Goby *Eucyclogobius newberryi*, Threespine Stickleback *Gasterosteus aculeatus*, Starry Flounder *Platyichthys stellatus*, and Topsmelt *Antherinops affinis*. Numbers and lengths of fish caught were estimated.

0915

A dry winter has provided little if any surface flow into Arroyo Grande Lagoon since last year. The lagoon was closed to the ocean, but extensive in depth and volume. Wetted width of the lagoon pool averaged about 75' up to about 100'. The southern half of the pool was dominated by sandy substrates, but small gravel was well distributed in the northern half. A few mud-bottomed areas gave the smell of hydrogen sulfide when disturbed, indicating limited areas of moderately anaerobic conditions. Maximum water depth was over 6' in some places. Water quality was moderately turbid, and aquatic vegetation was absent.

We first used a 30'x4' seine (3/64" mesh) to make a haul in the relatively narrow and shallow (4" deep) southern end of the lagoon; there we collected two adult Tidewater Goby (~30 mm total length [TL]). We made two more hauls with this net in deeper water (30"-36" deep), advancing north but still in the southern third of the lagoon pool, and collected dozens of additional adult and juvenile goby, two adult (~50mm TL) and numerous young-of-year Threespine Stickleback, and a juvenile Starry Founder (~13cm TL).

We then used a 50'x5' seine (3/16" mesh) for three hauls in the northern third of the lagoon pool, beginning about 75' south of Post #1 and concluding just downstream from the confluence of Meadow Creek. The hauls were of substantial length – typically across the full width of the pool (>75') and including areas up to 5' deep. Adult Tidewater Goby were in each haul. Additional stickleback and juvenile flounder were also in the catch throughout here, and a couple dozen juvenile (~120-130mm) Topsmelt were collected in the fifth haul which was made approximately 150' north of Post #1. Intermittently in the catch also were various small invertebrates – aquatic insects and amphipods -- and a few crayfish pieces.

Evaluation and Other Notes

The protracted closure of Arroyo Grande Lagoon to the ocean, which normally opens seasonally for weeks or months when runoff from winter storms increases, has influenced the fish assemblage seen in this early-season survey. A brief lagoon opening documented by Park staff on January 15, 2018, was the result of high-tide overwash into the lagoon “supercharging” the lagoon stage, which subsequently broke through the sandbar and partially drained back to the ocean as the tide receded. This is a somewhat unusual combination of events and may have influenced respective fish species here, as elaborated upon below

Tidewater Goby remain well-distributed throughout the lagoon and are present in modest numbers, consistent with 2017 having been a successful year for goby reproduction and population expansion here. Tidewater Goby populations can often be impacted when there are protracted high flows through their habitat, so the number of goby that have successfully overwintered present an excellent opportunity for this species to dominate the lagoon in 2018 in the absence of Piscean predators. The sizes of the Starry Flounder present during this survey are substantially larger than usual, suggesting they are likely of the same cohort that had spent 2017 rearing here. The presence of this cohort alone suggests that the brief mid-January opening (outflow) from the lagoon was not sufficient to allow their expected escape to the ocean, nor allow the immigration of adult or larval flounder so far in 2018. While this protracted closure might also explain why Staghorn Sculpin *Leptocottus armatus* were not collected, as they normally are this time of year, it should be noted that Staghorn Sculpin numbers here have often been observed to inexplicably dwindle and even disappear toward the end of past calendar years. However, the brief opening of the lagoon mouth associated with high-tide drainage was apparently sufficiently attractive to Topsmelt – which frequently occupy habitat at the surface of the ocean and lagoons – and modest numbers of this species may have arrived following their apparent absence at the end of 2017.¹

The persistent closed condition of the mouth of Arroyo Grande Creek and the dry streambed upstream, especially during this time of year, makes it exceedingly unlikely that adult steelhead *Oncorhynchus mykiss* have had any opportunity to migrate upstream to spawn. The absence of juvenile steelhead in this survey is also consistent with limited surface inflow to the lagoon. Hydrologic conditions this winter thus will exacerbate the negative impact to steelhead that has been cumulative through the recent 4-year drought that ended winter 2016-2017. A subsequent survey, likely to be conducted in late-April or early-May, 2018, will be of great interest to fishery managers in this respect.

¹ Larval Topsmelt were tentatively identified as present in the lagoon early in June 2017, but this species was not collected in later 2017 surveys (late-July and late-October). It is not known whether they had any unlikely opportunity to emigrate back to the ocean during summer 2017, or if they were perhaps eliminated by avian predators or habitat conditions, or if they were actually present in the lagoon but undetected during the latter half of 2017. The size of Topsmelt collected in this 2018 survey may be consistent with what would be expected if the 2017 larval Topsmelt had spent the last nine months rearing in the lagoon, inviting consideration of the latter possibility.

AQUATIC SURVEY (REFERENCE PERMIT #TE-101154-2)
ARROYO GRANDE CREEK AND LAGOON
OCEANO DUNES SVRA, PISMO SB DUNE PRESERVE

April 25-26, 2018

Cool, Cloudy, Calm; Air mid-50s F

California State Parks:
Douglas Rischbieter
Karen Feldheim
Josh Willems
Leigh Patterson (4/25)
Stephanie Little (4/26)

Volunteer Assistance:
Ken Jarrett, Stillwater Sciences (4/25)

Summary

Arroyo Grande Lagoon was open and draining to the ocean from its southern end – surface inflow to and outflow from the lagoon appeared to be about 1-3 cfs. The lagoon reportedly has been open to the ocean for several recent weeks, though outflow has occasionally ceased some days. Using beach seines we made four seine hauls near the outlet area of the lagoon pool, and three more in the middle of the northern half of the main lagoon pool. We also electrofished about 1,000' of lotic Arroyo Grande Creek upstream from the lagoon to the vicinity of Guiton Crossing. In the lagoon we collected four species of California native fish: Tidewater Goby *Eucyclogobius newberryi*, Staghorn Sculpin *Leptocottus armatus*, Threespine Stickleback *Gasterosteus aculeatus*, and one steelhead Rainbow Trout *Oncorhynchus mykiss*. We also caught one non-native young-of-year Green Sunfish *Lepomis cyanellus*. Upstream of the lagoon, in the flowing creek, we observed and avoided additional Tidewater Goby; once beyond the goby distribution, we electrofished and observed and collected additional stickleback and a couple young-of-year Prickly Sculpin *Cottus asper*.

1015 (April 25)

As is often observed, Arroyo Grande Lagoon had changed in dimensions since the previous survey. Some winter storms had delivered and reconfigured sand and gravel to the northern reaches of the lagoon pool, which now seemed generally shallower than in February but was still about 5' deep in places. Shoreline marks indicated that the lagoon water level had been as much as 12" to 18" higher within the last few days. Wetted width of the main lagoon pool averaged about 75', up to about 100'. Additionally, hydrodynamics in the outlet area – the seasonal opening of the lagoon mouth and daily tidal action there -- had enlarged a relatively-new southwestern lobe of the lagoon pool. Such a feature had existed in some 2017 surveys, but the current configuration of this feature was doubled in size from any previous observation. About 150' to 200' in east-west length, and 2'-3' deep in the middle, almost 100' of this sand-bottomed "lobe" extended west and outside of the vehicle/entry closure-post boundary. Water quality was seemed generally good and submerged aquatic vegetation was absent.

We began surveying fish using a 30'x4' seine (3/64" mesh) to make several hauls in the sandy outlet area at the southwestern end of the lagoon (up to 2' deep). Before the first seine haul we found one dead adult Tidewater Goby (>40mm total length [TL]) near the shoreline, in an inch of water; though identifiable, the specimen was in poor condition owing to one or more factors (decomposition, predator/scavenger mastication, and/or other trauma). We subsequently collected several dozen adult Tidewater Goby (30-45mm TL) in good condition, over 100 young-of-year (YOY) Staghorn Sculpin (11-32mm TL), and a couple of juvenile Threespine Stickleback (36, 37mm TL). After measuring representative specimens of

the captured fish, we released them on the east side of the closure-post boundary where they would not be subject to disturbance by beach traffic.

We then used a 50'x5' seine (3/16" mesh) for three hauls in the northern third of the lagoon pool, beginning abreast of Post #1, then about 100' south of Post #1, and concluding just downstream from the confluence of Meadow Creek. The hauls were of substantial length – typically across the full width of the pool (>75') and including areas up to 5' deep. Adult Tidewater Goby and YOY Staghorn Sculpin were in each haul. One steelhead smolt (220mm fork length and in very good condition) was collected in the southernmost of these three hauls, and one YOY Green Sunfish was in the northernmost. Intermittently in the catch also were various small invertebrates – aquatic insects and amphipods.

1045 (April 26)

We entered Arroyo Grande Creek a short distance upstream from the lagoon's backwater, where illegal campers have been maintaining a crude low bridge across the creek's lower riffles. We encountered some limited pools and other instream features 1'-2' deep there, and upon preliminary visual examination noticed that Tidewater Goby were occupying this freshwater lotic habitat. Several adult specimens (exemplar, 43mm TL) were captured using a dipnet.

We hiked upstream beyond the apparent distribution of Tidewater Goby, probably more than 100 yards. Once goby were no longer observed, and additional dipnet efforts came up empty, we commenced electrofishing (200V, 60 Hz) and proceeded to attempt collection from most promising stream features (up to 3' deep) to a point about 100' upstream from Guiton Crossing. The highest streamflow of the year had noticeably rearranged (variously scoured and aggraded) several gravel bars. About 465 seconds of electrofisher current (proxy for effort) were expended. We observed few fish, other than some schools of YOY Threespine Stickleback that were generally unresponsive to the electric current; we collected only a couple of YOY Prickly Sculpin (both 34mm TL) and a couple of age classes of stickleback (23, 45mm TL).

Evaluation and Other Notes

Arroyo Grande Lagoon had been closed at the time of the last survey, two months ago, and its subsequent opening and resultant protracted flow exchange with the ocean has been a dramatic ecological event. Two months ago we had captured Starry Flounder *Platyichthys stellatus*, and Topsmelt *Antherinops affinis*; those species, absent in this survey following the opening of the lagoon, have likely migrated to their primary marine environment. The same open condition and tidal influence has conversely allowed recolonization by Staghorn Sculpin, which apparently had been absent for the last few months – now, a new generation is using this habitat to rear. (It is not really known if Staghorn Sculpin may spawn in the lagoon and the larvae hatch there, though it is generally believed that the larvae wash-in on the tides following marine spawning and hatching.)

The changes in the fish community described above complement the federally-listed species present. The steelhead smolt collected is the largest in many years, and it is likely other individuals are present as we sampled only a tiny fraction of the extensive lagoon habitat. However, it seems surprising that we did not find any steelhead in any of the several suitable and complex pools upstream from the lagoon. It is possible that the rich environment of the lagoon is more attractive at this time than is the unreliable stream habitat – a suitable food base may not have developed in the relatively short time that the stream has been rewetted. (Owing to drought and other impacts to the hydrology, areas upstream from the lagoon had been dry for several of the last few months before the arrival of more substantial late-winter and early-spring storms.)

Tidewater Goby remain well-distributed throughout the lagoon and are present in modest numbers. Their distribution into the extended lagoon “lobe” feature, outside of the closure-zone boundary, was promptly addressed through installation of additional posts, rope enclosure, and signage. As mentioned above, we thought it prudent to release fish captured in this pool farther within the protected area; we seined 90% or more of the area initially outside of the protected area and thus likely relocated most of the individual fish therein. Also of significance – as was observed early in 2017 – Tidewater Goby have expanded their range well upstream into freshwater. Recently-higher lagoon pool levels, creating a more extensive backwater, may have facilitated the upstream distribution of this typically-lagoon species. Nevertheless, some individuals were observed harboring in shallow gravelly pools with quite tangible flow velocities.

The Green Sunfish collected likely had Oceano Lagoon as its origin, and was conveyed into Arroyo Grande Lagoon via Meadow Creek and the flood control flapgates at the end of the northern Arroyo Grande Creek levee. It was not possible to meaningfully collect from the lower reaches of Meadow Creek and the confluence with the lagoon, as emergent aquatic vegetation has become prohibitively dense and occluded most of the area previously sampled there. The encroachment of this vegetation towards both sides of the flapgates will probably motivate some facility maintenance in the coming months.

It is not know whether adult steelhead *Oncorhynchus mykiss* have had sufficient opportunity to migrate upstream to spawn. A closed condition at the mouth of Arroyo Grande Creek, and dry streambed upstream, persisted through February. A subsequent survey, likely to be conducted in late-June or early-July, 2018, should and will allocate more effort to locating steelhead in the greater lagoon pool.

AQUATIC SURVEY (REFERENCE PERMIT #TE-101154-2)
ARROYO GRANDE CREEK AND LAGOON
OCEANO DUNES SVRA, PISMO SB DUNE PRESERVE

July 30, 2018

Cool, Cloudy, Calm; Air high-50s F

California State Parks:
Douglas Rischbieter
Stephanie Little
Tara DeSilva
Karen Feldheim
Robert Pavlik

Volunteer Assistance:
Brian Dugas, Terra Verde Environmental Consulting
Jacob Feldheim, Student
Jesus Jimenez, Student

Summary

The purpose of this survey was to document the mid-summer status of the fishery in Arroyo Grande Lagoon. The lagoon was closed to the ocean and surface inflow into the lagoon appeared negligible. The lagoon reportedly has been closed to the ocean for several recent weeks, whereas it had been open and flowing out during the previous survey three months earlier. In mid-July, during a couple of days of extreme high tides, some ocean water may have washed into the southern end of this closed lagoon pool.

Using beach seines we made two seine hauls near what had been the outlet area of the lagoon pool (southern end), and two more in the northern half of the main lagoon pool. We collected five species of California native fish: Tidewater Goby *Eucyclogobius newberryi*, Staghorn Sculpin *Leptocottus armatus*, Starry Flounder *Platichthys stellatus*, Threespine Stickleback *Gasterosteus aculeatus*, and one Prickly Sculpin *Cottus asper*. We also caught a couple non-native young-of-year Green Sunfish *Lepomis cyanellus* and one young-of-year Largemouth Bass *Micropterus salmoides*. An algae bloom and evidence of congregations of various shorebirds were degrading water quality to some extent.

0930

The southern end of the Arroyo Grande Lagoon pool had a westward lobe occupying what had been the outlet channel earlier in the year. This lobe was typically 2'-3' deep and extended about 100' from the main north-south pool alignment, towards the ocean and beach – it had shrunk in area since the previous survey (end of April), and remained fully within a posted closure area installed to prevent vehicle access to this relatively new and transient lagoon feature. Shoreline marks indicated that the lagoon water level had been a few inches higher within the last few days. Wetted width of the main lagoon pool averaged about 75', up to about 100'. Water quality appeared to have deteriorated over the summer, as algal blooms in the south end and growth of aquatic vegetation throughout the rest of the lagoon pool limited the suitability and efficiency of the seines.

We began surveying fish using a 30'x4' seine (3/64" mesh) to make two hauls in the sandy outlet area at the southwestern end of the lagoon. We collected thousands of Tidewater Goby at various stages of maturity (15-48mm total length [TL]), several Staghorn Sculpin (67-88mm TL – largest specimen was collected dead), and a few young-of-year (YOY) Starry Flounder (45-62mm TL). Also conspicuous while we were working was a hatch of many thousands of small winged aquatic insects, seen emerging from the sand or water at the lagoon shoreline and walking en masse away from the water's edge.

We then used a 50'x5' seine (3/16" mesh) for two hauls in the northern half of the lagoon pool, one roughly 200 yards south of Post #1 and the other about 200 yards north of Post #1. Patchy submerged algal growth interfered with efficient use of the seine, but we added several species to the catch in this area. A few Threespine Stickleback (34-49mm TL) and one YOY Prickly Sculpin (53 mm TL) were native species collected here, with additional individuals of the aforementioned native species. A couple of larger specimens of the earlier species were in the catch – Starry Flounder and Staghorn Sculpin (coincidentally each up to 92 mm TL). We also caught one YOY Largemouth Bass (124mm fork length [FL]) and two YOY Green Sunfish (63, 68mm TL) in this area, which were not returned to the water.

The head of the lagoon pool was densely vegetated with bulrush and cattails, and meaningful seining was not possible farther upstream. On either side of the flood control flapgates, at the west end of the Arroyo Grande Creek levee, the end of Meadow Creek was flooded by lagoon backwater but overgrown (more than usual) and sampling not practicable. About 200 or 300 yards upstream from the flooded Meadow Creek confluence, the channel of Arroyo Grande Creek was predominantly dry with only a few remnant isolated pools.

Evaluation and Other Notes

Arroyo Grande Lagoon has had some irregular opening and closing events this year, which have influenced the assemblage of marine species present. Starry Flounder were not in our catch three months ago, though they were five months ago. It is not known if the individuals collected during this survey escaped capture during the previous survey, or if they have recolonized by virtue of high surf bringing in larvae or eggs to the lagoon.

A single Rainbow Trout (steelhead) *Oncorhynchus mykiss* was caught during our previous seining (April 2018). Though it was our intention to allocate more effort to locating steelhead in the greater lagoon pool during this survey, the density of algal patches did not allow long seine hauls. Given the context of irregular 2017-2018 hydrology and timing of lagoon opening/closing, and the negative impacts of the still-recent 4-year drought that ended winter 2016-2017, it seems unlikely that steelhead would be present here this summer in even modest numbers.

Overall however, the rich environment of the lagoon provides very good nursery habitat for the native species present. The federally-listed Tidewater Goby are thriving and remain well-distributed throughout the lagoon – not surprisingly, they are the dominant species by number. The Green Sunfish and Largemouth Bass collected likely had Oceano Lagoon as their origin, and were conveyed into Arroyo Grande Lagoon via Meadow Creek and the flood control flapgates at the end of the northern Arroyo Grande Creek levee. The dense emergent aquatic vegetation on both sides of the flapgates will probably motivate some facility maintenance (removal and clearing of aquatic vegetation) in the coming months. One more survey of this type is scheduled for this year, and will likely occur between mid-October and mid-November.

AQUATIC SURVEY (REFERENCE PERMIT #TE-101154-2)
ARROYO GRANDE CREEK AND LAGOON
OCEANO DUNES SVRA, PISMO SB DUNE PRESERVE

October 31, 2018

Clear, Light Winds, Mild/Warm; Air mid-60s F

California State Parks:
Douglas Rischbieter
Stephanie Little

Assisting Agencies:
Andrew Johnson, Upper Salinas-Las Tablas RCD
Sal Zaragoza, AmeriCorps WSP (Upper Salinas-Las Tablas RCD)
David Lopez-Portillo, AmeriCorps WSP (Upper Salinas-Las Tablas RCD)

Summary

This was the last scheduled 2018 survey to document the fishery and general habitat and hydrologic conditions of Arroyo Grande Lagoon. The lagoon was closed to the ocean and had no discernible surface inflow. The lagoon pool behind the beach was somewhat smaller in area than the previous survey (July), but still was moderately extensive in area and north-south length. Some narrowing had occurred from sand encroachment over the summer, and an unusually expansive colony of a floating aquatic plant (mosquito fern *Azolla filiculoides*) was covering open water at the north end of the lagoon pool.

Using beach seines we made three seine hauls generally at the southern end of the lagoon pool, including both the southwestern and southeastern nearshore areas. We also made two seine hauls in the northern half of the main lagoon pool, in the vicinity of Post #1. We collected six species of California native fish: Tidewater Goby *Eucyclogobius newberryi*, Threespine Stickleback *Gasterosteus aculeatus*, Staghorn Sculpin *Leptocottus armatus*, Starry Flounder *Platichthys stellatus*, a few Prickly Sculpin *Cottus asper*, and two Sacramento Sucker *Catostomus occidentalis*. We also caught one non-native adult Black Crappie *Pomoxis nigromaculatus*.

1030

The southern end of the Arroyo Grande Lagoon pool has had a persistent westward lobe occupying what had been the outlet channel earlier in the year – this feature was “new in 2018.” This lobe was currently up to about 2’ deep, and extended no more than 100’ from the main north-south pool alignment towards the ocean and beach; it had shrunk somewhat in area since the previous survey (end of July). Shoreline marks indicated that the lagoon water level had been a couple inches higher within the last few days. Wetted width of the main lagoon pool averaged about 75’, up to about 100’. Water quality appeared poor, with a greenish turbidity apparently due to small algae, foraging shorebirds’ feces, and occasional hydrogen sulfide stench when anaerobic bottom sediment (mud) was disturbed. Sandy substrate areas were also common, and areas upstream of Post #1 still had conspicuous gravel bars deposited from previous two winters’ high flows.

We began surveying fish using a 30’x4’ seine (3/64” mesh) to make three hauls in the sandy southern area of the lagoon. We sequenced these hauls from west-to-east, starting with a 30’ pull and ending with a 100’ pull. We collected many-hundreds of Tidewater Goby in each haul (22-43mm total length [TL]); also among the catch were a few Threespine Stickleback (33-48mm TL), a few Staghorn Sculpin (77-116mm TL), and one juvenile Starry Flounder (290 mm TL).

We then used a 50’x5’ seine (3/16” mesh) for two hauls in the northern half of the lagoon pool, one roughly

200' south of Post #1 and the last roughly abreast of Post #1. There was wetted lagoon pool upstream from this point, but beginning about 200' upstream from Post #1 the surface of the pool was entirely covered by dense floating aquatic vegetation (mosquito fern). In the open-water area that we could sample with a seine, Tidewater Goby remained the dominant species in terms of numbers (thousands captured) but we also added three more species to the total catch: Several YOY and juvenile Prickly Sculpin (54-112mm TL) and two Sacramento Sucker (275, 178 mm fork length [FL]) were native species collected here, plus one non-native adult Black Crappie (230 mm TL). The crappie was not returned to the water. We also caught additional individuals of the aforementioned four native species previously caught at the southern end. Also conspicuous while we were working was the presence at the edge of the water of many thousands of tiny black invertebrates, about 1/8"-long, unidentified.

The head of the lagoon pool has become very densely vegetated with bulrush and cattails, and meaningful seining was not possible farther upstream. On either side of the flood control flapgates, at the west end of the Arroyo Grande Creek levee, the end of Meadow Creek was flooded by lagoon backwater but overgrown (more than usual) and sampling not practicable. An unusually expansive colony of a floating aquatic plant (mosquito fern *Azolla filiculoides*) was covering open water at the north end of the lagoon pool, also limiting practicability of seining much upstream of Post #1. About 100 yards upstream from the flooded Meadow Creek confluence, the channel of Arroyo Grande Creek was completely dry.

Evaluation and Other Notes

Arroyo Grande Lagoon supports a large number of fish of several native species and appears to be an important foraging location for piscivorous birds. Most notably, Tidewater Goby (federally-listed, Endangered) are very well-established. A federally-listed (Threatened) steelhead Rainbow Trout *Oncorhynchus mykiss* was caught during our April 2018 survey, but seasonal lagoon conditions no longer appear suitable to support this species. Given the context of irregular 2017-2018 hydrology and timing of lagoon opening/closing, and the negative impacts of the still-recent 4-year drought that ended winter 2016-2017, it seems unlikely that steelhead were present here this year in any modest number.

Conversely, the single Sacramento Sucker caught indicates that some relatively cool freshwater refuge still exists in Arroyo Grande Lagoon. (It may be timely to remind readers that Arroyo Grande Creek supports the southernmost known population of reproducing Sacramento Sucker, a California native species that is not actually native to this region of the Central Coast.) Last year in December, many Sacramento Suckers succumbed to a mass fish-kill in this lagoon, apparently triggered by an overwhelming influx of seawater during extraordinarily-high tides. Park staff should remain aware of the possibility of this recurring in 2019, though suckers are likely present in much lower numbers than they were in 2017. .

The Black Crappie collected likely had Oceano Lagoon as its origin, and was conveyed into Arroyo Grande Lagoon via Meadow Creek and the flood control flapgates at the end of the northern Arroyo Grande Creek levee. Black Crappie have only been observed in this location once or twice in over the last 15 years. The dense emergent aquatic vegetation on both sides of the flapgates will probably motivate some facility maintenance (removal and clearing of aquatic vegetation) in the coming months. The dramatic expansion of a mat of floating mosquito fern (*Azolla*) has not been observed here to this degree in the past, and will certainly be flushed-out when the lagoon breaches and flushes from anticipated winter rains.

In the coming weeks, this report and the other three preceding 2018 survey/sampling summary-notes will be consolidated into a 2018 annual report. A similar survey frequency, 4-5 times throughout the year, is proposed for 2019.