



**Colorado River-Laguna Division
Fisheries Management Plan
2019-2029**

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Approved [] by Chris Cantrell *Chris Cantrell* Date: 9/30/19
Aquatic Wildlife Branch Chief

Location

Laguna Dam is located approximately 12 miles northeast of Yuma, Arizona, and five miles downstream from Imperial Dam, on the border of California and Arizona (Figure 1). The reservoir storage area is located within the existing floodplain of the Colorado River that is currently bound by Imperial Dam on the north side, Laguna Dam on the south side, Mittry Lake and the Old River channel on the east side, and the Laguna Settling Basin on the west side

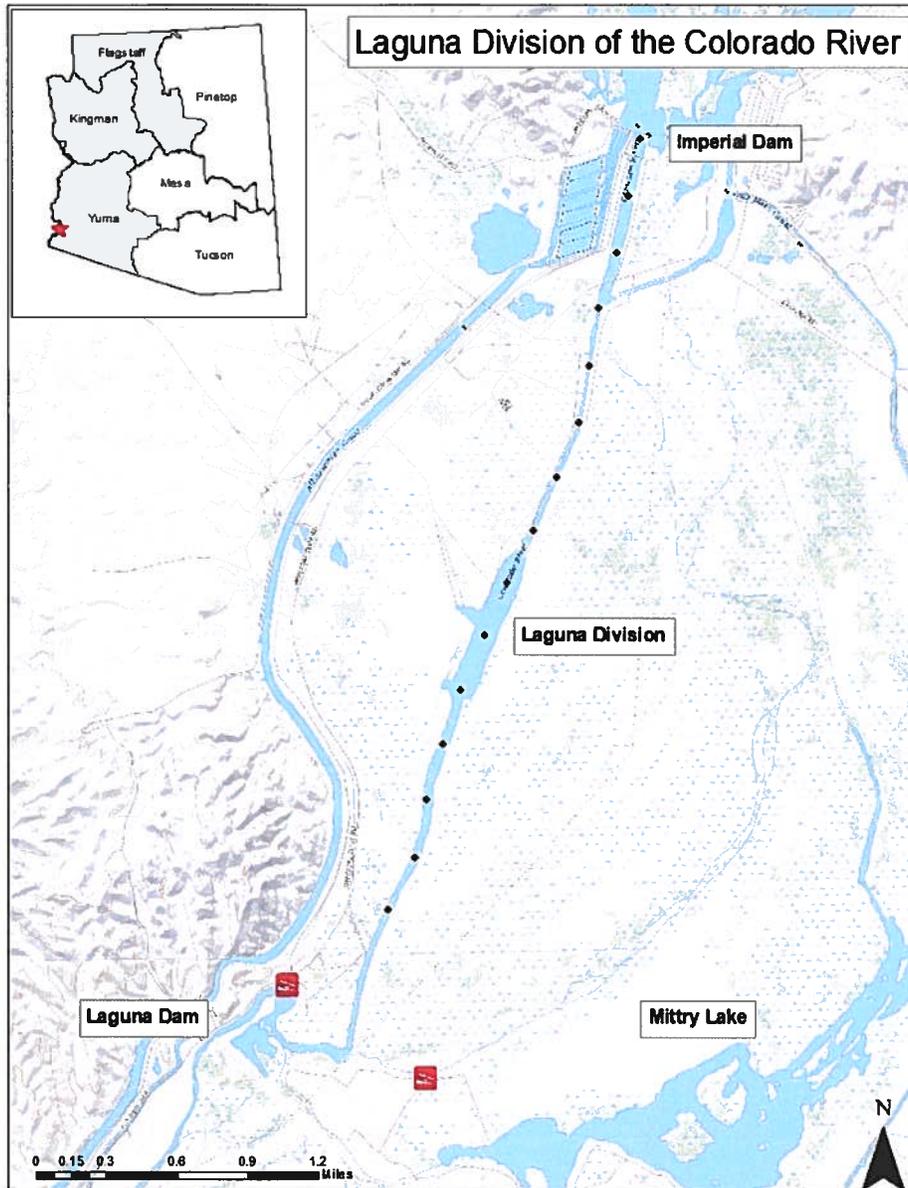


Figure 1. Location map of the Laguna Division of the Colorado River.

Management Prescription

The Arizona Game and Fish Department (AGFD, Department) has developed concepts under a Strategic Vision Document (AGFD 2019) to help guide warmwater fisheries management in Arizona. Using these concepts, fisheries management on the Laguna Division of the Colorado River will focus on general opportunity for Largemouth Bass *Micropterus salmoides* and Flathead Catfish *Pylodictis olivaris* fisheries.

Objective 1: Maintain the Largemouth Bass population to meet or exceed General Opportunity standards.

Objective 2: Maintain the Flathead Catfish population to meet or exceed General Opportunity Concept standards.

Objective 3: Maintain angler satisfaction at 80%.

Monitoring activities to determine if management objectives are being met should include: spring community-wide and/or species-specific electrofishing surveys every two to three years; creel surveys every five years, water quality, and vegetation surveys. Management strategies to meet objectives are identified in Table 1.

Table 1. Laguna Division Objectives and Adaptive Management Strategies.

| <i>Objective 1: Maintain the Largemouth Bass population to meet or exceed General Opportunity standards as listed in the Warmwater Sportfisheries Strategic Vision Document.</i> | | | |
|---|---|--|---|
| Parameters | Objective Guideline | Trigger point to address unmet Objectives | Strategies if Objectives are Unmet |
| Electrofishing Catch Rates | CPUE \geq 50 fish/hour | CPUE < 50 fish /hour for three consecutive samples. | <ul style="list-style-type: none"> ● Reevaluate survey method and/or equipment ● Stocking ● Regulation Changes |
| Size Structure | Size Structure: multiple age classes | Three consecutive sampling events showing population below management guideline. | <ul style="list-style-type: none"> ● Stocking prey items ● Regulation Changes ● Outreach/Education |
| Angler Catch Rates | Angler CPUE \geq 1 fish /hour for anglers targeting Largemouth Bass | Angler CPUE < 1 fish/hour for two consecutive creel surveys. | <ul style="list-style-type: none"> ● Stocking ● Regulation Changes |

| | | | |
|--|--|--|---|
| | | | <ul style="list-style-type: none"> ● Outreach/Education with focus on how to catch fish in the Laguna Division |
|--|--|--|---|

Objective 2: Maintain the Flathead Catfish population to meet or exceed General Opportunity standards as listed in the Warmwater Sportfisheries Strategic Vision Document.

| Parameters | Objective Guideline | Trigger point to address unmet Objectives | Strategies if Objectives are Unmet |
|----------------------------|--|--|---|
| Electrofishing Catch Rates | CPUE \geq 50 fish/hour | CPUE < 50 fish /hour for three consecutive samples. | <ul style="list-style-type: none"> ● Reevaluate survey method and/or equipment ● Stocking ● Regulation Changes |
| Size Structure | Size Structure: multiple age classes | Three consecutive sampling events showing population below management guideline. | <ul style="list-style-type: none"> ● Stocking ● Regulation Changes ● Outreach/Education |
| Angler Catch Rates | Angler CPUE \geq 1 fish /hour for anglers targeting Flathead Catfish | Angler CPUE < 1 fish/hour for two consecutive creel surveys. | <ul style="list-style-type: none"> ● Stocking ● Regulation Changes ● Outreach/Education |

Objective 3: Maintain an overall angler satisfaction at 80%.

| | | | |
|---------------------|---------------------------|--|--|
| Angler Satisfaction | Angler satisfaction > 80% | Angler satisfaction < 80% for two consecutive creel surveys. | <ul style="list-style-type: none"> ● Stocking ● Regulation Changes ● Outreach/Education |
|---------------------|---------------------------|--|--|

Background

Laguna Dam, completed by the U. S. Bureau of Reclamation (USBR) in 1909, is a rock-filled dam with a structural height of 19 feet and a length of 4,840 feet (dam and weir) (USBR 2006). Laguna Dam was originally built to create a diversion structure and desilting works for the old Yuma Main Canal on the California

side of the river and the North Gila Canal on the Arizona side of the river. In 1948, the outlet works for the Yuma Main Canal were sealed and water for the Yuma Project was diverted through the All-American Canal at Imperial Dam, built in 1938 and located about 5 miles upstream from Laguna Dam (USBR 2006). In 1953, the outlet works for the North Gila Canal were sealed and diversions to the North Gila Valley began through the Gila Gravity Main Canal, which also diverts at Imperial Dam (USBR 2006). Laguna Reservoir's original storage capacity was approximately 1,500 acre-feet and was historically maintained by dredging approximately every ten years (since the 1940's) to prevent sediment accumulation (USBR 2006).

Recreation, though popular with many local anglers, has always been a lesser priority for the management of the Laguna Division of the Colorado River. Continuous dredging of the settling basin and areas downstream by USBR has reduced suitable habitat for sport fish. Additionally, closures of the river downstream of Imperial Dam for dam related safety reasons or different portions of the division to boats when dredging operations were occurring has made fishing difficult at times. Determining if the fishery meets management objectives may be difficult because surveying the division using boat electrofishing is likely inefficient in many parts of the division due to steep shorelines from the dredging operations that causes water to be too deep to effectively sample.

Productivity/Water Quality

The Department takes basic water quality measurement prior to surveys. There has been no indication of severe or chronic water quality issues in this stretch of the river to date. Water temperature in the main channel of the river in May is approximately 70°F and water temperature in the river in November is approximately 60°F. Dissolved oxygen varies between 6 and 10 parts per million, pH varies between 7.5 and 8.5, and conductivity varies between 1,000 and 1,300 microsiemens per centimeter.

Very little is known about nutrient levels in the Laguna Division of the Colorado River. A better understanding of nutrient inputs, specifically phosphorus and nitrogen, into the river under different conditions and the corresponding changes in primary productivity of the Laguna Division could help managers understand trophic connections and the associated effect on sportfish populations. The Department will coordinate with other agencies to acquire water quality measurements and determine if additional sampling is necessary.

Forage/Prey

Management of forage fishes in the Laguna Division of the Colorado River is currently focused on maintaining a diverse prey base to support healthy predatory fish populations. Bluegill Sunfish *Lepomis macrochirus*, Redear Sunfish *Lepomis microlophus*, Threadfin Shad *Dorosoma petenense*, and Gizzard Shad contribute the most to the prey base in the Laguna Division.

Surveys conducted prior to 2014 were species-specific surveys primarily targeting Largemouth Bass. Community-wide surveys have been conducted since 2014 to collect data on species-specific abundance and species composition, which will help to better quantify abundance of forage fishes. During a 2017 fall electrofishing survey they comprised 85% of the total catch (Figure 2).

In 2018, the Region 4 Aquatic Wildlife Program began to measure total length (mm) and wet weight (g) of Threadfin and Gizzard Shad sampled to gain a better understanding of the population. With additional community-wide surveys, managers hope to better understand the connection between the abundance of shad and other forage fish, as well as lake conditions, both biotic and abiotic. If after several years of community-wide surveys, biologists are still unable to understand the connections between lake conditions and forage abundance, alternative survey methods may be required.

The Department is unaware of any data collected on non-fish forage sources (i.e. plankton, macrophytes, crayfish, invertebrates, etc.) on the Laguna Division of the Colorado River. An increased understanding of the links between the aforementioned forage sources could help better inform fisheries management on the Laguna Division of the Colorado River.

Habitat

Fish habitat is abundant in the Laguna Division of the Colorado River in areas that have not been dredged recently. Areas that have been dredged typically have steep shorelines that drop into deep water (> 20 feet) within 30 feet of shoreline and generally lack underwater cover. Areas that have not been dredged recently generally have substrate primarily of sand and the banks are lined with dense stands of *Phragmites*, cattails and bulrush providing overhanging cover in the main channel. The Laguna Division contains portions of the old Colorado River channel that does have diverse substrates ranging from silt, sand, rock and also has organic habitat inputs, including inundated tree stumps, submerged and emergent vegetation.

Species

Sportfish species

Fishes known to occur in the Laguna Division include Largemouth Bass, Smallmouth Bass *Micropterus dolomieu*, Striped Bass *Morone saxatilis*, Bluegill Sunfish, Redear Sunfish, Green Sunfish *Lepomis cyanellus*, Warmouth Sunfish *Lepomis gulosus*, Channel Catfish *Ictalurus punctatus*, Flathead Catfish, Black Crappie *Pomoxis nigromaculatus*, tilapia *Oreochromis spp.*, Common Carp *Cyprinus carpio*, Yellow Bullhead *Ameiurus natalis*, Threadfin Shad, and Gizzard Shad.

Electrofishing surveys have been periodically conducted by AGFD in the past. Surveys have largely been conducted as spot check surveys to answer specific management questions rather than to determine trends in the fish population. The national standard for assessing Largemouth Bass populations call for spring nighttime sampling however, so future population sampling will switch over to the spring months. Fall sampling is still valuable and spot check type surveys to assess relative reproductive success of centrarchids may still be done in the fall.

Largemouth Bass:

The Laguna Division of the Colorado River is managed as a general opportunity water for Largemouth Bass. General opportunity objectives include multiple age classes, as well as CPUE

goals of greater than 50 fish per hour and angler CPUE no less than one fish per hour. The 2017 survey yielded an estimated mean CPUE of Largemouth Bass of 38.4 fish per hour, which was below management objectives (Table 2). As an index of age class distribution, the Laguna Division electrofishing surveys show multiple size classes of Largemouth Bass, indicating multiple age classes (Figure 3). Since surveys are completed in the fall, fall electrofishing CPUE cannot be compared with spring electrofishing CPUE due to seasonal biases in fisheries data (Pope and Willis 1996). Additionally, centrarchids (e.g. Largemouth Bass) spawn in the spring by building and guarding nests in shallow water (Page and Burr 2011) where they are more susceptible to shoreline electrofishing, thus further seasonally biasing their estimated CPUE. Furthermore, aquatic vegetation varies seasonally, with increased growth throughout the summer, and stem density is well known to decrease capture probability (Chick et al. 1999). Finally, water conductivity in the Laguna Division is at the upper limits of the current sampling gear (Coffelt VVP-15) available to AGFD Region IV staff, which likely further limits capture probability.

Flathead Catfish:

The Laguna Division of the Colorado River is managed as a general opportunity water for Flathead Catfish. General opportunity objectives include multiple age classes, as well as CPUE goals of greater than 50 fish per hour and angler CPUE no less than one fish per hour. The 2015 survey yielded an estimated mean CPUE of Flathead Catfish of 55 fish per hour, which was above management objectives (Table 3). As an index of age class distribution, the Laguna Division electrofishing surveys show multiple size classes of Flathead Catfish, indicating multiple age classes (Figure 4).

Invasive/undesirable species

Quagga Mussels *Dreissena bugensis*, Bullfrogs *Lithobates catesbeiana*, Northern Crayfish *Orconectes virilis*, Gizzard Shad *Dorosoma cepedianum*, and Giant Salvinia *Salvinia molesta* have all been documented in the Laguna Division and Apple Snails *Pomocea spp.* occur in the vicinity. Currently, Giant Salvinia is the greatest concern and as such has required significant resources to control. Gizzard Shad are one of the most recent fish species to invade the Laguna Division of the Colorado River and the full impacts to the fishery are not yet known. The Department will continue to work with partner agencies to maintain and enhance monitoring and participate in control efforts when needed.

Access

Vehicular access to the Laguna Division section of the river is mainly from Laguna Dam Road/Avenue 7E on the Arizona side of river and via S24/Imperial Dam Road on the California side of river. Two boat ramps are available to access the Laguna Division with a boat; a gravel boat landing that can be accessed by the road to the Betty's Kitchen Watchable Wildlife Area and Interpretive Trail and a gravel/dirt landing located on Quechan Reservation land that requires a Quechan Tribal fishing license to use (Figure 1). Shoreline access for angling and camping is limited by dense vegetation on the banks.

Catch and Satisfaction

Catch, harvest, and angler satisfaction rates on the Laguna Division are not known because creel surveys have not been conducted recently due to a lack of funding and resources. It is recommended that creel surveys be conducted approximately every five years on the Laguna Division. However, limited resources, access and personnel may restrict the Department’s ability to conduct a creel survey on the Laguna Division. Other practices (i.e. tagging) may be implemented to more accurately assess angler pressure and harvest of fishes at the Laguna Division.

Literature Cited

Arizona Game and Fish Department (AGFD). 2019. Warmwater Sportfisheries Strategic Vision Document, 2019-2029. Arizona Game and Fish Department, Statewide Fisheries Program.

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Tables and Figures

Table 2. Summary stats of Largemouth Bass (MISA) caught in Laguna Division during the 2017 fall electrofishing survey.

| N | CPUE (MISA/hr) | Min Length (mm) | Max Length (mm) | Mean Length (mm) | St Dev | Min Weight (g) | Max Weight (g) | Mean Weight (g) | St Dev |
|----|----------------|-----------------|-----------------|------------------|--------|----------------|----------------|-----------------|--------|
| 48 | 38.4 | 85 | 569 | 314 | 103 | 75 | 3,105 | 567 | 602 |

Table 3. Summary stats of Flathead Catfish (PYOL) caught in Laguna Division during the 2015 spring electrofishing survey.

| N | CPUE (PYOL/hr) | Min Length (mm) | Max Length (mm) | Mean Length (mm) | St Dev | Min Weigh (g)t | Max Weight (g) | Mean Weight (g) | St Dev |
|-----|----------------|-----------------|-----------------|------------------|--------|----------------|----------------|-----------------|--------|
| 110 | 55.0 | 213 | 1,240 | 469 | 191 | 5 | 26,750 | 1783 | 296 |

Relative Species Composition of the Laguna Division of the Colorado River, Fall 2017

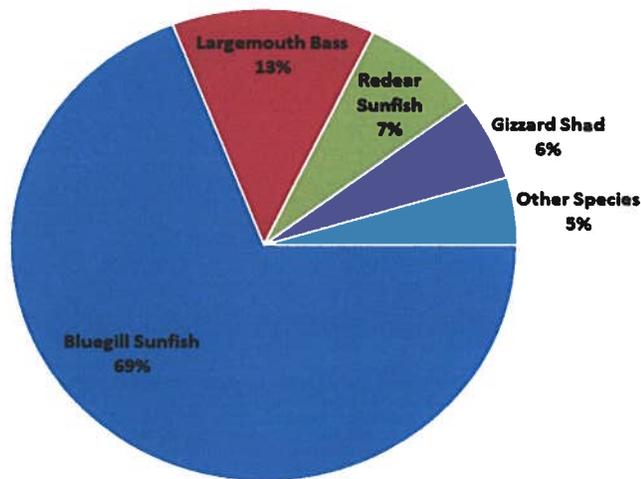


Figure 2. Relative species composition of fish caught in Laguna Division during the 2017 fall electrofishing survey.

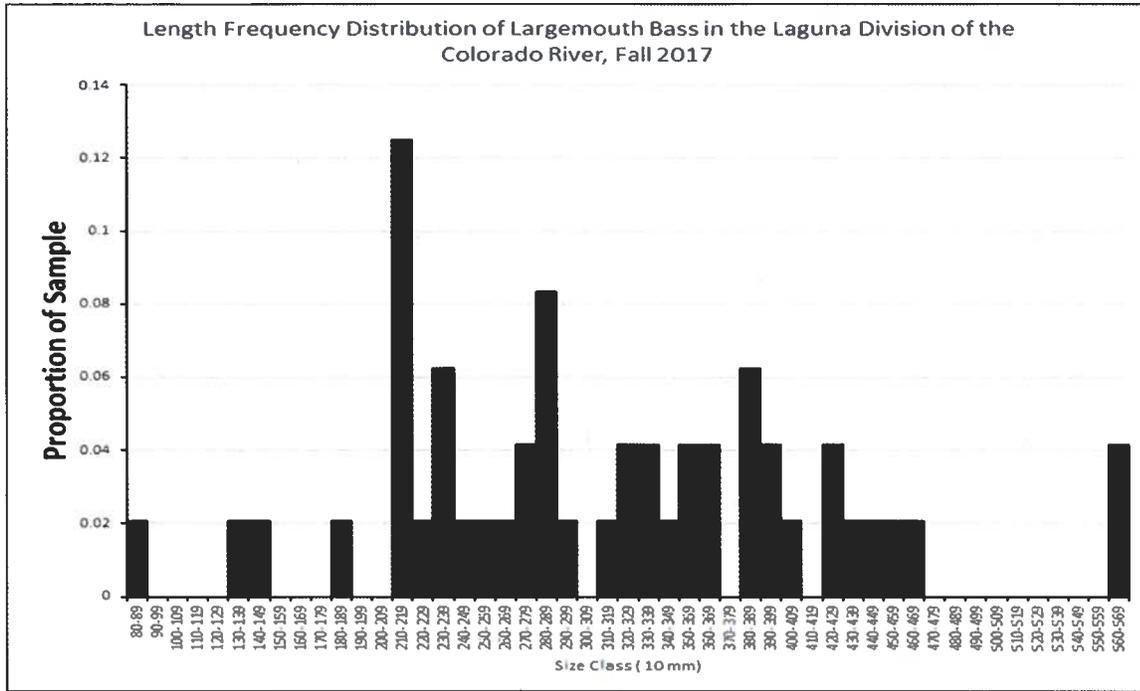


Figure 3. Length frequency of Largemouth Bass caught in Laguna Division during the 2017 fall electrofishing survey.

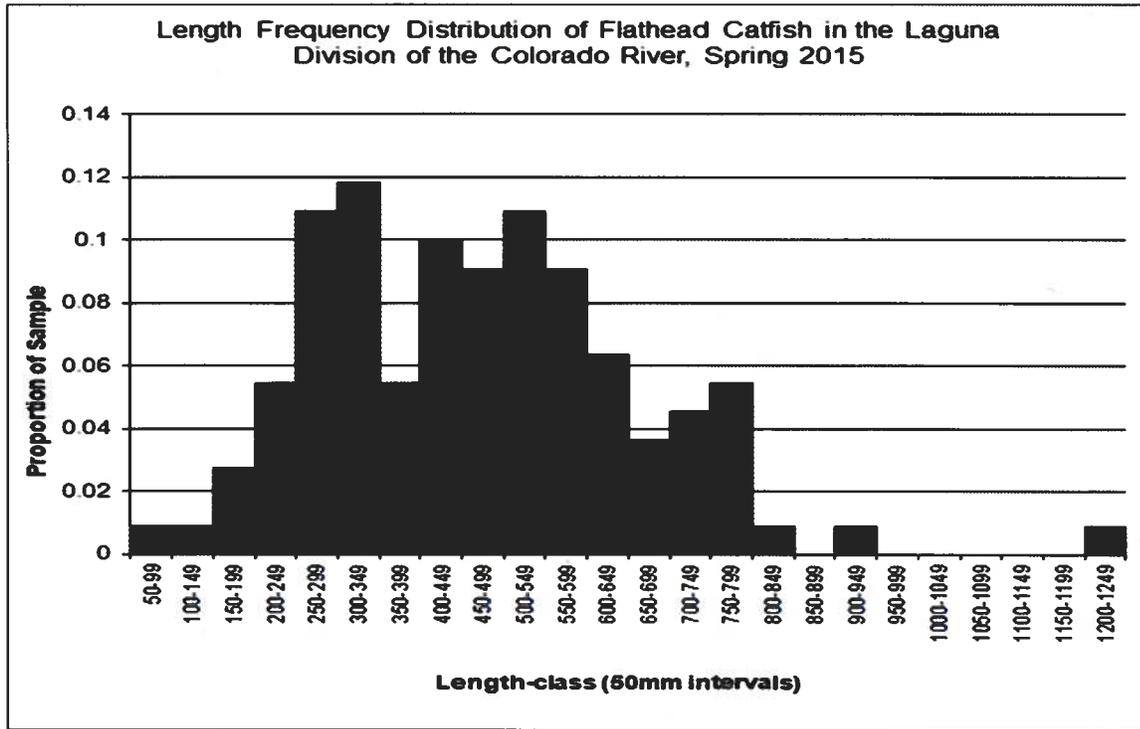


Figure 4. Length frequency of Flathead Catfish caught in Laguna Division during the 2015 spring electrofishing survey.