

COLORADO RIVER RECOVERY PROGRAM
FY-2015 - 2017 PROPOSED SCOPE OF WORK for:
O&M of Highline Lake Fish Barrier Net

Project No.: C-20

Lead Agency: Colorado Division of Parks and Wildlife

Submitted by: Alan Martinez, Park Manager

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Category:

- Ongoing Project
 Ongoing-revised project
 Requested new project
 Unsolicited proposal

Expected Funding Source:

- Annual funds
 Capital funds
 Other (explain)

I. Title of Proposal: Replacement and O&M of the Highline Lake Fish Barrier Net

II. Relationship to RIPRAP:

General Recovery Program Support Action Plan:

III Reduce negative impacts of nonnative fishes and sport fish management activities.

III.A.2. Identify and implement viable control measures.

III.A.2.c. Implement and evaluate the effectiveness of viable active control measures.

- III.B. Reduce negative impacts to endangered fish from sport fish management activities.
- III.C. Ensure public involvement occurs as appropriate.

Colorado River Action Plan: Mainstem

- III.B.1.a. Operate and maintain Highline Reservoir net.

III. Study Background/Rationale and Hypotheses:

The Procedures for Stocking Nonnative Fish Species in the Upper Colorado River Basin (hereinafter Procedures; CDOW et al. 1996, revised 2009) included specific reference to the need to screen reservoirs to control escapement of nonnative, warm-water fish species, including the spillway at Highline Lake. This requirement prescribed that "Public and private waters that have a direct connection to rivers in the Upper Colorado River Basin (e.g. Elkhead Reservoir, Highline Reservoir and many ponds) will be equipped or managed with an anti-escapement device or practice acceptable to the Service (USFWS) and the State fish and Wildlife Agency." In addition, the Procedures, section IV.6, state "The Program (RIP) will pursue funding for equipping public reservoirs with anti-escapement devices" (CDOW et al. 1996, Martinez 1997). Funding from the Recovery Implementation Program for Endangered Fishes in the Upper Colorado River Basin (RIP) became available in 1998 (Martinez 1999) for installation of a fish screen at Highline Lake and the net was installed on 18 August 1999.

The spillway barrier net installed at Highline Lake was fabricated of the high tech fiber Dyneema, a high molecular weight polyethylene material. This material was well suited for the net at Highline due to its resistance to abrasion, light degradation, and fatigue without special coverings or coatings (Martinez 2002). The net is 363 feet wide, 19 feet deep, has a dry weight of 1,400 pounds and mesh openings of 0.25 inches (Martinez 2001). The first net had a projected service life of up to 5 years under local conditions (Martinez 2000) and was in place six and a half years, until March 2006. It was determined that the net could be left in place year-round, even during winter when the lake is frozen (Martinez 2001).

The spillway barrier net that was installed on 18 August 1999 was replaced with an identical net on 21 March 2006. The second net was removed on March 12, 2014 and the third spillway barrier net was installed on March 14, 2014. The lake was drawn down 20 feet due to a dredging operation that took place during the fall of 2013 and the removal and installation was able to take place on dry land. All of the remnants of the original net were removed, and all of the existing thimbles and manta ray bolts were inspected. The replacement net was connected and tightened in a manner, which ensures, there would not be openings that fish would be able to escape through. During the 2014 season, after the net was installed the dive team was used three times to clean the net due to an increased algal/debris buildup in years past.

In addition to the monitoring and maintenance of the original net by State Parks, the Colorado Division of Wildlife (CDOW) performed an evaluation of fish escapement following the placement of this net. Evaluation of the net's performance in controlling escapement of resident and stocked nonnative fishes from the reservoir was favorable (Martinez 2001, 2002). As a

result of the findings of this evaluation, the Recovery Program has recommended maintaining a net at this site to continue to control escapement of nonnative fish (PDO 2002). The stocking of warm-water fish species allowed under the Procedures due to the placement of the net at Highline Lake has proven popular with anglers.

Routine monitoring of the new net was performed under the supervision of Alan Martinez, Park Manager at Highline Lake State Park. Colorado Parks and Wildlife continues to provide up to \$10,000 per year to cover O&M costs. Monitoring will continue under the supervision of the Park Manager at Highline Lake State Park with Colorado Parks and Wildlife.

Mandatory annual maintenance/opening of the Highline Lake outlet is supposed to be performed during the summertime period of hypolimnetic oxygen depletion to prevent/minimize entrainment or escapement of warmwater fish species from the reservoir during these unscreened releases. Piper (1982) reported that fish thrive at ≥ 5 mg/l of oxygen, show a decrease in feeding and growth from 3-5 mg/l, and may die from 0-3 mg/l, depending on the species. The EPA (1986) provides information showing that various life stages of several species of nonnative warmwater fish known to occur in Highline Lake are tolerant of oxygen levels < 5 mg/l, including smallmouth bass *Micropterus dolomieu* (Edwards et al. 1983) whose escapement from the reservoir is of particular concern. Burdick et al. (1954) reported that lethal oxygen concentrations for smallmouth bass ranged from 0.73-1.15 mg/l at 60-80° F. Martinez (2002, 2003) reported that oxygen levels typically fell below 2 mg/l below 6-8 from mid-July until late August and recommended this 2 mg/l threshold for future unscreened outlet releases. Given annual variation, monitoring oxygen levels near the outlet in Highline Lake to detect the period when oxygen is > 2 mg/l should provide up to a six-week window between the first week of July and the first week of September in which the mandatory annual maintenance/opening of the Highline Lake outlet could be performed. During the 2013/2014 season the outlet structure was operated over a two week period in October 2013 to draw the lake down 20 feet for a dredging operation. Since the outlet structure was operated outside of the period where oxygen levels would be > 2 mg/l an escapement net was installed on the culvert directly south of the outlet structure. The net opening similar to those on the barrier net and was effective in catching fish that were flushed out of the outlet structure. There were no surviving fish found in the net and we believe that there were no surviving fish that made it past the culvert net.

The only exception to the outlet structure being opened outside of the six-week window would be in case of an emergency and outlet had to be opened. In this case USFWS would immediately be notified of the outlet opening.

IV. Study Goals, Objectives, End Product:

Study Goals: To operate and maintain a spillway barrier net at Highline Lake to control escapement of resident and stocked nonnative fishes that may reach designated critical habitat for endangered fishes in the Colorado River main-stem.

Objectives:

1. To monitor and maintain the new net to maintain its function in controlling escapement of nonnative fishes while providing for public safety and maximizing the service life of the net.
2. To provide public awareness of the net's purpose both in facilitating the recovery of endangered fishes and in allowing for stocking and management of select nonnative warm-water sport fish species.

End Products:

1. Further documentation of the feasibility and costs to operate and maintain a large-scale net in a high public use setting.
2. Reduced infusion and interaction of nonnative sport fish into critical habitat that might otherwise escape the reservoir and contribute to negative impacts on endangered fishes.
3. Positive public response to enhanced sport fish management in Highline Lake.

V. Study Area:

Highline Lake State Park near Loma, Colorado.

VI. Study Methods/Approach:

- A. Maintenance: Formerly, the O&M of the original net was funded via a cooperative agreement between State Parks and the CDOW to cover up to \$10,000 in annual costs incurred by Highline Lake State Park. A new agreement to cover the net's O & M costs went into effect as of March 2005. As of July 1, 2011 Colorado Parks and Wildlife will cover the net's O & M.
- B. Monitoring: Colorado Parks and Wildlife has established standardized sampling sites (electro fishing) in Mack Wash and Salt Creek to annually monitor use by native fish species and concurrently detect escapement of warm-water sport fishes.

VII. Task Description and Schedule:

FY 2016-ongoing:

- A. Maintenance: Ensure funding is available to Highline State Park to provide for net's O&M in future years.
- B. Monitoring: Ensure that annual electro fishing is performed in Mack Wash and/or Salt Creek to monitor escapement of fish from Highline Lake.

VIII. FY- 2016-17 Work:

Deliverables/Due Dates FY 2016 - 2017

Provide annual report on O&M, including documentation of costs, to Recovery Program.

Budget

FY 2016 Cost Estimates:

A. Maintenance: Annual	\$5,000
The net will get cleaned at least 4 times this year by a diving contractor for a total cost of \$4,000, \$1,000/cleaning. The fourth cleaning will need to take place due to an increase in algae buildup that was found on the previous net. These cleanings should keep the buildup down and make cleaning of the algae off the net easier as the net begins to age. If a 5th cleaning needs to take place due to surging of water and debris the total cost for cleaning will be \$5,000.	
B. Monitoring:	\$4,920
Labor: 2 biologists for 2 days each for 4 days @ \$1,500/wk	\$1,200
2 temporary employees 2 days each @ \$15.00/hr.	\$480
Travel: Vehicle (2 days)	\$240
Equipment: Electro-fishing unit	\$1,000
Supplies:	\$500
Miscellaneous expenses:	\$1,500
Total:	\$9,920

IX. Budget Summary:

Colorado Parks and Wildlife will cover annual O&M costs up to \$10,000. If costs for a given year exceed \$10,000 then a request will be submitted to the Recovery Program to cover the additional costs. This situation has not occurred to date.

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XI. References:

- Burdick, G. E., M. Lipshuetz, H. J. Dean, and J. Harris. 1954. Lethal oxygen concentrations for trout and smallmouth bass. *New York fish and Game Journal* 1:84-97.
- Edwards, E. A., G. Gebhart, and O. E. Maughan. 1983. Habitat suitability information: smallmouth bass. U. S. Fish and Wildlife Service, Fort Collins. 47 pp.
- EPA. 1986. Ambient aquatic life water quality criteria for dissolved oxygen (freshwater). U. S. Environmental Protection Agency, Duluth, Minnesota. 46 pp.
- (CDOW et al.) Colorado Division of Wildlife, Utah Division of Wildlife Resources, Wyoming Game and Fish Department, and U.S. Fish and Wildlife Service. 1996. Procedures for stocking nonnative fish species in the Upper Colorado River basin. U.S. Department of the Interior, Fish and Wildlife Service, Denver, Colorado. 25 pp.
- Martinez, P. J. 1997. West slope warm water fisheries. Colorado Division of Wildlife, Federal Aid in Sport Fish Restoration, Project F-325R-1, Progress Report, Fort Collins. 137 p.
- Martinez, P. J. 1999. West slope warm water fisheries. Colorado Division of Wildlife, Federal Aid in Sport Fish Restoration, Project F-325R-3, Progress Report, Fort Collins. 168 p.
- Martinez, P. J. 2001. West slope warm water fisheries. Federal Aid in Fish and Wildlife Restoration Project F-235-R6, Progress Report. Colorado Division of Wildlife, Fort Collins, 221 pp.
- Martinez, P. J. 2002. West slope warm water fisheries. Federal Aid in Fish and Wildlife Restoration Project F-235-R7, Progress Report. Colorado Division of Wildlife, Fort Collins, 133 pp.
- Martinez, P. J. 2003. West slope warm water fisheries. Federal Aid in Fish and Wildlife Restoration, Progress Report. Colorado Division of Wildlife, Fort Collins. 106 pp.
- (PDO) Program Director's Office. 2002. Nonnative fish control workshop. Summary, conclusions, and recommendations. Upper Colorado River Endangered Fish Recovery Program, Lakewood, Colorado. 101 pp.
- Piper, R. G., I. B. McElwain, L. E. Orme, J. P. McCraren, L. G. Fowler, and J. R. Leonard. 1982. Fish hatchery management. U. S. Fish and Wildlife Service, Washington, D. C. 517 pp.