**WA SFR - Freshwater Resident Sport Fish Management (Stocking and Hatchery O&M)**

**WA - Freshwater Resident Sport Fish Management**

Grant Program: Sport Fish Restoration (Freshwater/Inland)

Washington Department of Fish and Wildlife

Grant Start and End Dates: 11/01/2019 to 10/31/2020 (F19AF01143)

Grant Recipient Contact and Project Point of Contact: Robert Stately

Grantor Contact: Jane Federalis

**Public Description:**

The purpose of this project is to enhance recreational freshwater sport fish populations and provide increased recreational fishing opportunities throughout the state of Washington. There is a need to maintain and enhance existing sport fish populations, in order to ensure species continued viability, as well as meeting angler catch rates that are acceptable to the public.  In 2011, data from the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation indicated over 554,000 anglers fished in Washington for a total of 10.2 million angler-days.  These anglers expended over $807 million in trip and equipment-related expenditures.

Unfortunately, many of Washington’s sport fish species are not able to sustain adequate populations through natural reproduction as a result of water level fluctuations, man-made impoundments, inadequate spawning habitat, environmental perturbations, and intense angling pressure.   Washington’s native trout fisheries typically do not successfully reproduce annually.  Although trout spawn annually, surveys have shown that these species, oftentimes, produce a strong year-class only once in every 2-3 years.  The Washington Department of Fish and Wildlife is the state agency charged with managing the state’s recreational sport fisheries.  It is our statutory responsibility to operate fish hatcheries and stock fish to meet the needs of Washington’s anglers, in addition to conserving and managing existing fish populations.  Without supplemental stocking efforts, many of the state’s recreationally important sport fish species would decline to unviable levels which would ultimately result in unacceptably low angler catch rates.

**Need:**

There is a need to maintain and enhance existing sport fish populations, in order to ensure species continued viability, as well as meeting angler catch rates that are acceptable to the public.  In 2011, data from the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation indicated over 554,000 anglers fished in Washington for a total of 10.2 million angler-days.  These anglers expended over $807 million in trip and equipment-related expenditures.

Unfortunately, many of Washington’s sport fish species are not able to sustain adequate populations through natural reproduction as a result of water level fluctuations, man-made impoundments, inadequate spawning habitat, environmental perturbations, and intense angling pressure.   Washington’s native trout fisheries typically do not successfully reproduce annually.  Although trout spawn annually, surveys have shown that these species, oftentimes, produce a strong year-class only once in every 2-3 years.  The Washington Department of Fish and Wildlife is the state agency charged with managing the state’s recreational sport fisheries.  It is our statutory responsibility to operate fish hatcheries and stock fish to meet the needs of Washington’s anglers, in addition to conserving and managing existing fish populations.  Without supplemental stocking efforts, many of the state’s recreationally important sport fish species would decline to unviable levels which would ultimately result in unacceptably low angler catch rates.

**Purpose:**

The purpose of this project is to enhance recreational freshwater sport fish populations and provide increased recreational fishing opportunities throughout the state of Washington.

**Objectives (Objective 1 already entered)**

**Objective 1 - Title: Operate and maintain two (2) facilities by October 31, 2020.**

* Strategy: *Facilities/Areas O&M*
* Objective: *Operate and maintain facilities*
* Activity 1: *fish hatcheries*
* UOM: # of Facilities - 2
* Requires: Identify target species
	+ Coastal Cutthroat Trout (Oncorhynchus clarkii clarkii)
	+ Columbia River redband trout (Oncorhynchus mykiss gairdnerii)

Approach:

*Key Fish Hatchery* – Key Fish Hatchery is located in Franklin County and resides upon 145 acres adjacent to Elkhorn Creek, which acts as the primary water source for the entire hatchery.  The hatchery has a total of 48 earthen production ponds encompassing approximately 50 acres of production water: 37 (0.9 acre ponds), 8 (0.5 acre ponds), 1 (4.0 acre pond), and 2 irregular ponds (totaling 8.5 acres).  Each pond contains one concrete fish harvesting kettle and some ponds have liners installed to prevent water seepage or for specific fish production purposes.  Water supply and drain lines exist at each pond, in addition to electricity to aid with the operation of aerators.

Two modern fish hatching/intensive culture buildings are also located at the hatchery.  A total of 24 raceways and 16 large circular tanks are permanently established within the buildings.  Numerous smaller raceways and tanks are also present and may be constructed/deconstructed based upon the production species desired and their individual needs.  Additional infrastructure includes pumps, biofilters, settling chambers, computer monitoring systems, heat pumps, chillers, scales, and generators.

The remaining hatchery infrastructure is comprised of: (1) three hatchery residence houses (furnished); (2) one main office building; (3) three storage sheds; and (4) one well pump structure.  Other capital assets include vehicles, ATV’s, aerators, hauling tanks, mowers, welders, microscopes, and other typical fish hatchery items.

*Edwin Fish Hatchery* – Edwin Fish Hatchery is located in Rowan County and resides upon 300 acres, immediately below the dam that forms Cave Run Lake and which provides water for the hatchery.  The hatchery has 97 earthen production ponds encompassing approximately 122 acres of production water: 83 (1.0 acre ponds), 10 (1/10th acre ponds), two (7 acre ponds), one (10 acre pond), and one (14 acre pond).  Each pond contains one concrete fish harvesting kettle and some ponds have liners installed to prevent water seepage or for specific fish production purposes.  Water supply and drain lines exist at each pond, in addition to electricity to aid with the operation of aerators.

One large, modern fish hatching/intensive culture building is also located at the hatchery.  A total of 8 raceways and 12 large circular tanks are permanently established within the building.  Additional circular tanks may be constructed/deconstructed based upon production species desired and their individual needs.  Additional infrastructure includes pumps, biofilters, settling chambers, monitoring systems, heat pumps, chillers, scales, and generators.

The remaining hatchery infrastructure is comprised of: (1) three hatchery residence houses (furnished); (2) one main office building; (3) one workshop building; (4) four storage sheds; and (5) one well pump structure.  Other capital assets include vehicles, ATV’s, aerators, hauling tanks, mowers, welders, microscopes, and other typical fish hatchery items.

Operational and maintenance activities (actions necessary to ensure useful life and grant objectives are met) at each hatchery will include the following:

* Mowing/spraying of vegetation (terrestrial/aquatic) around ponds, office/production buildings, storage sheds, and residence houses.
* Roadway and levee repairs/maintenance.
* Vehicle and equipment operation/repair/replacement.
* Plumbing, electrical, HVAC maintenance/repair/replacement.
* Pond (including kettles and liners) and production building (including raceways, pumps, recirculating systems, biofiltration systems, heat pumps, settling chambers, and electrical monitoring systems) maintenance/repair.
* Maintaining existing brood fish species for future production.
* Maintenance of existing structures (residence houses, storage sheds, and office buildings).
* General administrative functions (timesheets, developing reports, employee evaluations, answering phone/emails, record keeping).
* Continuing education/training of hatchery staff (production techniques, disease/parasite, chemical application, staff leadership development, OSHA, CPR/First Aid, and other state mandated employee development).

Larger maintenance activities will include the following:

* Install new well pump (Edwin Fish Hatchery).
* Replace existing roofs at office building and one hatchery residence house (Key Fish Hatchery).
* Replace existing sump pump at one hatchery residence house (Key Fish Hatchery).

**Objective 2 - Title: Stock 4 million fish by October 31, 2020. (ENTER INTO TRACS)**

Stock XX of fish or wildlife by XXXX.

* Strategy: *Species Stocking*
* Objective: *Stock fish or wildlife*
* Activity 1: *Production and stocking for recreation or subsistence purposes*
* UOM: # of individuals – 4 million
* Requires: Identify target species & number
	+ Coastal Cutthroat Trout (Oncorhynchus clarkii clarkii)
	+ Columbia River redband trout (Oncorhynchus mykiss gairdnerii)

Approach:

Hatchery staff maintain on-site brood stock of native trout species Columbia River Redband Trout (Oncorhynchus mykiss gairdnerii). For Coastal Cutthroat Trout (Oncorhynchus clarkii clarkii) brood fish will be collected from wild stocks. Fish will be collected using boat mounted DC electrofishing or gillnets once surface water temperatures reach 35-40F (typically mid/late February). Once collected, brood fish will be placed onto hauling trucks and immediately transported to their respective hatcheries where they will be quarantined and treated (salt) to minimize mortality and prevent disease or parasite outbreaks.

Fish will be artificially spawned using the “dry” method (Piper et al. 1989). Human chorionic gonadotropin (HCG) may be used to help induce spawning (injections will follow prior accepted standards for each species). Following fertilization, eggs will be placed in hatching jars to allow for incubation. Post hatching, swim up fry will be collected and immediately stocked into earthen aquaculture ponds that have been extensively fertilized to promote suitable plankton forage. Redband Trout fry will be retained indoors intensively and immediately offered a commercially prepared diet to begin the feed training process.

Cutthroat trout will be allowed to spawn naturally in earthen aquaculture ponds. Spawning mats will be provided while spawning canisters will be provided for both species. After spawning, adults will be removed and the resulting fry will be allowed to remain in the pond for grow-out. Eggs will be incubated intensively indoors. Post hatching, all fry will be stocked into earthen aquaculture ponds for grow-out.

The native trout species will be reared to a size of approximately 2”, using plankton as the food source. On average, these species reach their desired stocking size by late May/mid June. Fish will initially be reared using plankton as the food source. Once fingerlings reach a size of 2” they will be regularly stocked to provide the remaining forage necessary to reach the target stocking size. Trout will be reared using commercially prepared diets. These diets will be feed according to established aquaculture standards for each species. Water quality, dissolved oxygen, disease, and growth of each pond will be monitored regularly throughout the grow-out phase.

As species reach stocking size, fish will be harvested from ponds by draining each pond and fish will be collected in the kettle basins. Nets will be used to collect fish and will be immediately loaded onto hauling trucks and taken to the fish hatching houses and placed in raceways. Length, weight, and numbers will be determined for each species/pond. Fish will then be loaded onto hauling trucks based on stocking density/location. Liquid oxygen will be provided in each hauling compartment to sustain dissolved oxygen concentrations greater than 4.0 ppm. Dissolved oxygen will be monitored every 3 hours en route to each stocking location. At the stocking site, fish will be tempered to ensure that water temperatures do not differ by more than 5 degrees between the hauling truck and the receiving surface water temperature. A list of stocking locations, numbers, and GPS coordinates for each species is provided in Table 1.

*This is demo approach only - practices may or may not be accurate for cold-water trout species.*

**Results & Benefits:**

This grant will help to conserve, supplement, and improve recreational sport fish populations throughout the state of Washington. Supplemental stocking helps to offset poor (or complete lack thereof) year-class production.

This grant will benefit anglers through increased catch and satisfaction rates. These stocking efforts will help to maintain acceptable angler catch rates that have been determined through management plans and ongoing creel surveys.

This grant will also benefit local economies as anglers are willing to travel considerable distances to enjoy their fishing experiences. Local economies will derive benefits from increased sales of gasoline, food, supplies, lodging, and fishing equipment. Society will benefit from a healthy environment and increased outdoor recreation participation.

**Budget Narrative:**

Personnel -  budget estimate comprised of staff (15-20) in the following classifications: (1) Hatchery Manager; (2) Assistant Hatchery Manager; (3) Fisheries Biologist; (4) Fisheries Technician; (5) Fish and Wildlife Seasonal.

Fringe benefits - consists of the required employer contribution of Social Security, Medicare, unemployment tax, retirement, and employee health insurance, and is estimated at 51.47% of salaries.

Travel - staff will attend in-state meetings related to fish production issues.  Staff may also attend regional/national meetings such as AFS and SDAFS (including the various committees and sections), as well as SEAFWA and MAFWA.  Travel costs will include lodging, transportation, and per diem following state policies and procedures.

Supplies - budget estimate includes general office/lab supplies, field attire (raingear, overalls, rubber boots), HCG and oxytetracycline HCl (fish marking chemical), nets, tubs, jars, vials, containers, salt.

Contractual - budget estimate comprised of one contract ($20,000) with University of Washington to perform genetic analysis of tissue samples from trout broodstock in order to differentiate between native-strain vs other strain adults prior to spawning.  Additionally, to perform genetic analysis of native trout species broodstock to determine allele frequency of other genes present.  Also includes contract ($480,000) for fish food acquisition (prepared diets and fathead minnows).

Other - budget category estimates include utilities and bottled gas.

Federal Share: $ 1,617,285 (75%) - Sport Fish Restoration subprogram (9514)

State Share: $ 539,095 (25%) - WDFW restricted Fish and Game Fund

**Total Cost: $ 2,156,380**

|  |  |
| --- | --- |
| Budget Class Category | Cost |
| Personnel | $692,000 |
| Fringe Benefits (@51.47%) | $356,172 |
| Travel | $10,500 |
| Equipment | $275,000 |
| Supplies | $100,000 |
| Contractual | $500,000 |
| Construction | $0 |
| Other | $55,000 |
| Total Direct Costs | $1,988,672 |
| Indirect Costs | $167,708 |
| **TOTAL** | **$2,156,380** |

**Equipment Narrative:**

Equipment - the following equipment is necessary and reasonable for the accomplishment of grant objectives.

Key Fish Hatchery

* Two Ford F-150 Supercab ¾ ton trucks - $25,000 each. Useful life = 6 years.
* International truck with ten compartment hauling tank - $90,000. Useful life = 10 years.

Edwin Fish Hatchery

* Two Ford F-150 Supercab ¾ ton trucks - $25,000 each. Useful life = 6 years.
* John Deere 5085E Tractor - $85,000. Useful life = 15 years.

**Useful Life Narrative**

The useful life of the new well pump at Edwin Fish Hatchery is expected to be 15 years. The useful life of the new roof at the Key Fish Hatchery office building is expected to be 20 years. The useful life of the new roof at the Key Fish Hatchery residence house is expected to be 20 years.

**Timeline:**

Period of Performance is November 1, 2019 – October 30, 2020

November 1, 2019 – February 29, 2020

* Collection of wild brood fish.
* Setup and prepare all spawning equipment, hatching jars, rearing tanks, and ponds (fertilize/lime).
* Complete strip spawning of brood fish and distribute eggs/fry in rearing jars/tanks/aquaculture ponds.
* Monitor ponds for water quality.
* Initiate feed training practices on select production species.

March 1, 2020 – May 30, 2020

* Complete spawning actions.
* Continue grow-out phase of target species.
* Monitor hatchery production for survival, growth, and disease issues.
* Maintain hatchery grounds, facilities, and equipment.
* Stock native trout at target locations.

June 1, 2020 – August 30, 2020

* Continue grow-out phase of target species.
* Maintain hatchery grounds, facilities, and equipment.
* Monitor hatchery production for survival, growth, and disease issues.
* Stock native trout at target locations.

September 1, 2020 – October 31, 2020

* Continue grow-out phase of target species.
* Maintain hatchery grounds, facilities, and equipment.
* Monitor hatchery production for survival, growth, and disease issues.
* Stock native trout at target locations.
* Winterize hatchery grounds, facilities, and equipment.
* Draft stocking summary/accomplishment reports.

 **Financial Information**

Funding Source/FBMS Award: **F19AF01143**

Grant Specialist: (FED USER)

Funding Amounts:

* Applicant: $0
* State: $21,463
* Local: $500,000

**Performance Report**

**Activity Reports:**

**Objective 1 - Title: Stock 4 million fish by October 31, 2020.**

* Strategy: *Species Stocking*
* Objective: *Stock fish or wildlife*
* Activity 1: *Production and stocking for recreation or subsistence purposes*
* UOM: # of individuals – **4.5 million - 4500000**
* Requires: Identify target species & number
	+ Coastal Cutthroat Trout (Oncorhynchus clarkii clarkii): 2000000
	+ Columbia River redband trout (Oncorhynchus mykiss gairdnerii) : 2500000

**Activity Comments:**

A total of 4.5 million fish were stocked during the period of performance. This was an increase in 500,000 fish from the proposed total of 4 million fish. The excess production was comprised entirely of Columbia River Redband Trout. See the Performance Questionnaire for additional details.

**Objective 2 - Title: Operate and maintain two (2) facilities by October 31, 2020.**

* Strategy: *Facilities / Areas O&M*
* Objective: *Operate and maintain facilities*
* Activity 1: *fish hatcheries*
* UOM: # of Facilities - 2
* Requires: Identify target species
	+ Coastal Cutthroat Trout (Oncorhynchus clarkii clarkii)
	+ Columbia River redband trout (Oncorhynchus mykiss gairdnerii)

**Activity Comments:**

There were no deviations to the approved objectives or approaches during the period of performance. Both fish hatcheries successfully achieved the objectives of the grant in terms of producing fish for stocking and maintaining each facility as proposed in the project statement.

**Performance Report Questionnaire:**

**Q1 What progress has been made towards completing the objective(s) of the project?**

Both fish hatcheries successfully achieved the objectives of the grant in terms of producing fish for stocking and maintaining each facility as proposed in the project statement. All target fish species were successfully propagated and reared at both fish hatcheries. Key and Edwin Hatcheries successfully produced and stocked more Columbia River Redband Trout than was originally anticipated. A total of 2.5 million Columbia River Redband Trout were stocked, while only 2 milion were originally planned for stocking. Excess Columbia River Redband Trout were evenly split and stocked at Cave Run Lake and Green River Lake. The excess Columbia River Redband Trout resulted from above average numbers of eggs collected, as well as above average hatching success of fertilized eggs.

Additionally, both fish hatcheries were adequately operated and maintained during the period of performance as proposed in the project statement. As planned, new roofs were installed at both the main office building and one hatchery residence house at Key Fish Hatchery. The new roofs have an expected useful life of 20 years. Additionally, a new sump pump was also installed at one hatchery residence house at Key Fish Hatchery. Since its installation, the basement no longer floods during significant rainfall events. At Edwin Fish Hatchery, a new well pump was installed that will increase the amount of well water made available to the hatchery during periods where the primary source of water (Cave Run Lake) is unavailable. The expected useful life of the new well pump is 15 years. All other operational and maintenance activities, as outlined in the project statement, were performed during the period of performance to ensure that both facilities are able to meet the fish production and stocking needs of the Washington Department of Fish and Wildlife.

**Q2 Please describe and justify any changes in the implementation of your objective(s) or approach(es).**

A significant snow fall event (25+ inches) and below normal temperatures occurred through much of Washington during February that resulted in delayed brood fish collection activities.Therefore, all brood fish collections occurred during the first and second weeks of March. This postponement resulted in increased collections of Columbia River Redband Trout as a result of water temperatures being slightly cooler and higher relative abundance of prespawn fish in historic sampling areas. The remainder of the fish production and stocking season was implemented as outlined in the project statement.A total of 4.5 million fish were stocked during the period of performance. This was an increase in 500,000 fish from the proposed total of 4 million fish. The excess production was comprised entirely of Columbia River Redband Trout. A total of 2.5 million Columbia River Redband Trout were stocked, while only 2 milion were originally planned for stocking. Excess Columbia River Redband Trout were evenly split and stocked at Cave Run Lake and Green River Lake.

**Q3 If applicable, please share if the project resulted in any unexpected benefits, promising practices, new understandings, cost efficiencies, management recommendations, or lessons learned.**

Staff at Key Fish Hatchery continue to refine the propagation and culture practices of native trout species. Edwin Fish Hatchery is considered one of the leading authorities for the culturing of native trout species in the Northwest. Staff have published numerous papers over the years that have improved freshwater culture techniques for native trout throughout the United States. Staff are presently attempting to refine their techniques for improving hatching success and minimizing bacterial infestation of trout eggs using enhanced water quality and temperature management strategies. Additionally, staff at Key Fish Hatchery continue to refine the propagation and culture practices of Columbia River Redband Trout. Over the last several years, staff have developed a domesticated brood stock of female Columbia River Redband Trout that can be held on-site in larger brood ponds. The benefit of this practice is that wild stocks may not need to be harvested annually and undergo the significant stress from collection techniques and transportation to the hatchery complex. Such stress can often degrade the quality of eggs from female brood fish and result in lower hatching success. If female trout can be held on-site, this would minimize the need for wild brood fish to be collected annually.

**Q4 For Survey projects only: If applicable, does this project continue work from a previous grant? If so, how do the current results compare to prior results? (Grantees may elect to add attachments such as tables, figures, or graphs to provide further detail when answering this question).** N/A

**Q5 If applicable, Identify and attach selected publications, photographs, screenshots of websites, or other documentation (including articles in popular literature, scientific literature, or other public information products) that have resulted from this project that highlight the accomplishments of the project.**

No publications, photographs, screenshots, or other documentation resulted from this project during this grant period of performance.

**Q6 Is this a project you wish to highlight for communication purposes?** No – check N/A