

**PROJECT PERFORMANCE REPORT
FEDERAL AID PROJECT F-83-R-25**

Fish Health Services Investigations & Management

July 1, 2017 – June 30, 2018



STATE: Colorado
PROJECT: F-83-R-25
PROJECT TITLE: Aquatic Animal Health Investigations & Management
Period Covered: July 1, 2017 – June 30, 2018

OBJECTIVES:

The main objectives of the Aquatic Animal Health Investigations & Management project include:

- Provide aquatic animal health services
- Aquatic species protection
- Aquatic animal health technical assistance

STUDY 1: PROVIDE AQUATIC ANIMAL HEALTH SERVICES

OBJECTIVE:

Assist in the protection, conservation, and management of Colorado's aquatic animal resources through monitoring, investigation, and management of aquatic animal health in state fish hatcheries, research facilities, free-ranging public fisheries and free-ranging aquatic animal populations, as well as aquatic animal resources in the private sector by providing diagnostics, research, regulated pathogen inspections, and laboratory analysis. Maintaining or improving aquatic animal health will help insure the stability of many populations, enable the recovery of others, and improve the quality of Colorado's wildlife resources.

Sub-Study 1-1:

Objective:

Please see Grant Narrative for detailed objectives and procedures

Job 1: Provide regulated and precautionary salmonid fish disease inspections conforming to state regulations, agency policies, U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS), American Fisheries Society, and/or the World Organization for Aquatic Animal Health (OIE) standards in public and private fish hatcheries and free-ranging fisheries.

Approach:

Fish tissue samples will be collected for analysis for regulated pathogens, generally from statistical numbers of fishes from public and private fish culture facilities and wild populations destined for translocation or from which gametes will be taken for culture.¹ These samples will either be collected by AAHL personnel or AAHL personnel will coordinate and supply inspections by contracted Qualified Sample Collectors (QSC). The samples will be transported or shipped to the AAHL and/or cooperating and contracted laboratories for analysis for viral, bacterial, and myxosporean parasite pathogens. Results of regulated inspections will be reported in the form of Fish Health Certificates.

Work performed:

See Table 1 (also see Appendix A).

Table 1. Regulated pathogen inspections performed by the AAHL in FY 17-18.

Pathogen type	Publicly owned fisheries				Totals
	Salmonid culture	Salmonid free-ranging	Warmwater fish culture	Warmwater free-ranging	
Bacteria	41	35			76
Parasite	30	2			32
Virus	59	33	5	9	106
Totals	130	70	5	9	214

Job 2: Provide laboratory analysis of bacteriology and parasitology samples submitted from inspections of public fish culture facilities and wild populations destined for translocation or from

¹ By agency policy, individual lots, as defined by the American Fisheries Society/Fish Health Section Blue Book, are sampled for viruses at the assumed pathogen prevalence level of 5% at the 95% level of confidence as determined by Ossiander and Wedemeyer 1973. Regulated bacterial pathogens are sampled at the same level per water supply rather than by lot. Samples for *Myxobolus cerebralis*, causative agent of Whirling Disease, are determined in the same way. However, under Colorado Wildlife Regulation Chapter 0, Appendix C, #C, 1, a, salmonids tested for *M. cerebralis* by spore concentration technique must be in a water supply at least six months prior to testing. Agency policy recognizes only the validity of testing of lethal kidney and spleen samples for IPN Virus and VHS Virus and the testing of reproductive fluids of parental broodstock for IHN Virus.

By policy or regulation, some exceptions to these sampling standards are made under certain circumstances. In situations where attribute samples of broodstock are not available, the sampling of all fish involved in the making of an egg lot will be acceptable. By internal policy, in the case of extremely valuable and/or critical stocks of threatened or endangered species, lethal samples may be minimized or eliminated on a case by case basis. However, such fish and/or progeny will be restricted to quarantine facilities and their fate carefully considered after weighing the risks and role of such actions in recovery efforts.

which gametes will be taken for culture, as well as samples submitted for fishery management purposes.

Approach:

Using techniques and procedures described by Markiw and Wolf 1974, O'Grodnick 1975, and the American Fishery Society/Fish Health Section Blue Book and approved by regulations (Colorado Wildlife Regulations, Chapter 0) and agency directives and policies, analyze fish tissue samples for regulated bacterial pathogens and myxosporean parasites by biochemical, serological, and/or molecular means. Details of individual cases are presented in Appendix A.

Work performed.

See Tables 2 and 3.

Table 2. Approximate numbers of bacterial samples processed at the AAHL for regulated salmonid disease inspections in FY 17-18.

BACTERIOLOGY		
# Inspections	# Cultures	# DFAT tests
76	3,818	5,130

Table 3. Approximate numbers of salmonid heads analyzed for the presence of spores of *Myxobolus cerebralis* (Whirling Disease agent) by Pepsin-Trypsin Digestion in regulated inspections at the AAHL during FY 17-18.

PARASITOLOGY		
# Inspections	# PTD tests	# PCR tests
32	3,812	845

Table 4. Approximate numbers of virology samples analyzed at the AAHL for regulated viruses during FY 17-18.

VIROLOGY	
# Inspections	# Virology tests
106	13,995

Job 3: Provide coordination, training, and logistics for Qualified Sample Collectors. QSCs are private veterinarians and Certified Veterinary Technicians as authorized by the Colorado Aquaculture Advisory Board.

Approach:

Schedule fish disease inspections requested by public and private sector fish culturists and fishery biologists to fit the availability of QSCs and laboratories. Prepare and provide collection equipment

and supplies to agency fish pathologists for regulated salmonid disease inspections. Provide training for new QSC candidates as needed and annual refresher training, reporting activities regularly to the Colorado Aquaculture Advisory Board.

Work performed:

- AAHL Fish Pathologists and Technicians perform collections for public sector hatcheries.

Job 4: Conduct comprehensive fish pathogen screening on shipments of warm and cool water fishes imported by CPW fish hatcheries and fishery managers.

Approach:

By regulation, attribute numbers of tissue samples are collected from all lots of nonsalmonid fishes under culture as well as from free-ranging fisheries from which fish will be transferred or eggs taken.

Work performed

- See Table 1.

Sub-Study 1-2:

Objective:

Please see Grant Narrative for detailed objectives and procedures

Job 1: Provide diagnostic services to agency fish hatcheries and installations, university and other research facilities, private sector facilities, and the public as needed.

Approach:

Investigate and diagnose fish health problems in public and private fish culture on a case-by-case basis. Depending upon circumstances, investigations may be made in the field, in the laboratory, or handled by electronic means.

Work performed:

- In FY 17 -18, AAHL personnel provided hands on examinations and/or diagnostics on state fish hatcheries in a total of 64 troubleshooting cases (Case Type TS in Appendix A). 62 of these were on state fish hatcheries, 4 on free-ranging public fisheries.
- 80+ fish health cases were handled remotely by electronic media. Cases such as these are greatly facilitated by the use of electronic photography.

Job 2: Conduct health investigations in free-ranging aquatic animal populations including fish kills as needed.

Approach:

Investigate and diagnose fish kills and aquatic animal health problems in public waters and private ponds on a case-by-case basis. Depending upon circumstances, investigations may be made in the field, in the laboratory, or handled by electronic means.

Work performed:

- Four investigations of fish health problems ranging from reports of environmental problems to major fish kills were conducted in FY 17 -18.

Approach:

Conduct wild fish survey for presence of *Renibacterium salmoninarum*, causative agent of Bacterial Kidney Disease, in cooperation with USFWS Bozeman Fish Health Center and CPW Aquatic Research.

WILD FISH SURVEY		
# ELISA tests	#DFAT tests	#PCR tests
3,520	3,444	3,444

Sub-Study 1-3:

Objective:

Please see Grant Narrative for detailed objectives and procedures

Job 1: Quantitative laboratory analysis of fish heads for the myxospores of *Myxobolus cerebralis*, causative agent of Whirling Disease, by Pepsin-trypsin Digestion (PTD) Technique.

Approach:

Process individual salmonid fish heads for the isolation of myxospores of *Myxobolus cerebralis*, causative agent of Whirling Disease by sequential enzymatic digestion as described in Markiw and Wolf 1974 and enumerate the spores as outlined in O’Grodnick 1975.

Work performed:

- The AAHL processed 910 trout heads by PTD for *Myxobolus cerebralis* submitted by whirling disease researchers. (See Appendix A)

Job 2: Analyze fish tissues and bacteria cultures by polymerase chain reaction (PCR).

Approach:

All positive findings of regulated pathogens must be confirmed by PCR.

The PCR laboratory at the AAHL was reactivated in June 2014.

PCR		
# <i>R. salmoninarum</i> tests	# <i>M. cerebralis</i> tests	Total tests
6,764	845	7,669

STUDY 2: AQUATIC SPECIES PROTECTION

OBJECTIVE:

Assist in the protection for Colorado's native aquatic animals from the introduction and spread of non-endemic fish diseases and aquatic species through regulation and proactive physical means. Maintaining the present species compositions in each drainage, compromised though they may be, will help prevent further habitat degradation and assist state and federal recovery efforts for the 23 fishes, 8 amphibians, 2 mollusks, and 1 turtle presently listed as endangered, threatened, or species of concern.

Sub-Study 2-1:

Objective:

Please see Grant Narrative for detailed objectives and procedures

Job 1. Review, approve, or deny Aquatic Species Importation Licenses.

Approach:

In cooperation and coordination with the Special License Agent, scrutinize applications for Aquatic Species Importation Licenses for compliance with regulations, policies, and directives and approve or deny based upon disease certification, species, and likelihood of contamination by aquatic nuisance species (ANS).

Work performed:

- Approximately 85 Aquatic Species Importation Licenses were processed.

Job 2. Evaluate and recommend approval or denial of CPW Whirling Disease Exemptions that allow the operation of positive facilities within salmonid habitat through stipulated best management practices (BMPs) for minimization of impact on wild resources.

Approach:

Make on-site visits before submitting written recommendations to the Statewide Manager of Aquatic Resources for signature. Study annual infection analyses of fish collected at permitted sites as well as free-ranging fish samples collected above and below facility effluents and evaluate the impact and effectiveness of BMPs. Review and evaluate existing permits on an annually for modification and renewal.

Work performed:

- At the end of the FY 17-18, 10 facilities – 6 state and 4 private – remain positive and continue to exist under the terms of regulation. Data was reviewed and all of these received exemption renewals.

Job 3. Review and comment on all Colorado Department of Agriculture Aquaculture Permit applications from the standpoint of protecting native aquatic species and aquatic animal health. Issue CPW statewide Aquatic Species Stocking Permits to those applicants who have fulfilled requirements.

Approach:

Applications received by the Colorado Department of Agriculture will be forwarded to the State Fish Pathologist for review and comment.

Work schedule:

- Approximately 62 applications were reviewed and comments filed.

Sub-Study 2-2:

Objective:

Please see Grant Narrative for detailed objectives and procedures

Job 1: Serve as advisor and acting CPW representative to the Colorado Fish Health Board and Colorado Aquaculture Advisory Board which addresses issues in aquatic animal health, transportation, culture, and importation regulation making and related issues.

Approach:

Attend regular monthly meetings of the statutory board and assist the CPW representative and other board members by providing guidance and expertise, literature searches, informal surveys, white papers, etc. as called upon.

Work performed:

- Each monthly meeting of the Colorado Fish Health Board was attended by one or more fish pathologists.
- Advisory input and presentations were made as warranted.
- Most of these board meetings also involved Colorado Aquaculture Advisory Board meetings as well. Attendance and participation occurred as warranted.

Job 2. Advise and participate in internal policy and directive making in issues involving aquatic animal health, culture, transportation, prohibited species, ANS, and related issues.

Approach:

Represent aquatic animal health interests in internal meetings to discuss and formulate policy and directives.

Work performed:

- One or more fish pathologists participated in several meetings and conference calls with the Statewide Manager of Aquatic Resources, Chief of Hatcheries, and CPW Fish Health Board member to discuss, formulate, or modify fish health and ANS policy.

Sub-Study 2-3:

Objective:

Assist hatchery managers/owners in planning renovations to eliminate Whirling Disease and regain regulatory negative status by exposure and testing of specially tagged sentinel fish.

Job 1. Advise and assist hatchery managers and owners in regaining negative status for infection by *M. cerebralis* (Whirling Disease).

Approach:

Provide on-site evaluation and advice on renovating to establish security from Whirling Disease infection. When warranted, assist in locating point sources of contamination by testing strategically placed sentinel fish by PCR or PTD. As outlined in Colorado Wildlife Regulations, mark long-term sentinel fish with individual tags and return at post exposure intervals to collect and analyze samples for the presence of *M. cerebralis* to re-establish negative status.

STUDY 3: AQUATIC ANIMAL HEALTH TECHNICAL ASSISTANCE

Objective:

Provide aquatic animal health management expertise, education, and technical assistance to agency biologists and fish culturists and private aquaculture. Fish health management can prevent disease outbreaks, increase quality, and thus improve the product of fish culture enterprises in both the public and private sectors. Fish health education enables fish culturists to monitor and avoid potential problems or respond with treatment more rapidly than would otherwise be possible. Fish health management enables fishery managers to find ways to maintain or improve fisheries in the presence of chronic disease or environmental problems.

Job 1. An AAHL veterinarian will serve the CPW Hatchery Program as Study Monitor and facilitate access to treatment options unavailable by prescription through cooperative participation with the U.S. Fish & Wildlife Service's Aquatic Animal Drug Approval Partnership Program (USFWS-AADAP) and the U.S. Food and Drug Administration's (FDA) Investigational New Animal Drug (INAD) studies.

Approach:

Facilitate access to compassionate treatment options using investigational new animal drugs through cooperative participation with the USFWS and FDA studies, supplying all required information to USFWS and/or FDA.

Work performed:

Study Monitor for the following INAD drugs under the Aquatic Animal Drug Approval Partnership Program (AADAP):

- Common Carp Pituitary #8391
- Erymicin 200 Injectable (Erythromycin) #12-781

Job 2. Provide aquatic animal veterinary services, including prescription of therapeutants and investigation of new treatment options to the CPW Hatchery and Aquatic Resources Sections.

Approach:

After initial diagnoses, prescribe drugs and therapeutants as warranted, keeping up with changing laws governing use in aquatic situations, demonstrating that conditions dictated by FDA/Center for Veterinary Medicine, the Animal Medicinal Drug Use Clarification Act (AMDUCA), U.S. Department of Agriculture (USDA), and Environmental Protection Agency (EPA) have been met when treatment is appropriate and that the hatchery managers understand their responsibilities under federal law.

Work performed:

- Reported hatchery therapeutant use monthly to the Colorado Department of Public Health and the Environment (CDPHE) to remain in compliance with Discharge Permits for the state hatchery system.
- Prescriptions – provided 40+ veterinary feed directives, prescriptions and extra-label prescriptions between July 1, 2017 and June 30, 2018 to hatchery personnel and biologists for use of approved substances for finfish and amphibians. Veterinary medical duties – continued monitoring compliance with guidelines for use of drugs in aquaculture for the state hatchery system, monitored use of FDA-approved drugs and drugs of low regulatory priority status in the state hatchery system and maintained records of all drug use, including veterinary feed directives (VFDs) and written prescriptions with withdrawal times. Maintained

required continuing education hours necessary to keep veterinary license active and in good standing in the state of Colorado. Maintained USDA/Animal and Plant Health Inspection Service (APHIS) accreditation for issuing certificates of inspection. Served as veterinarian for research fish at Colorado State University, Ft. Collins.

Sub-Study 3-2:

Objective:

Please see Grant Narrative for detailed objectives and procedures

Job 1: Conduct fish health management short courses

Approach:

Provided 16-hour courses of training in fish health management including on the following major topics: anatomy and physiology, the role of stress in fish health management and disease, nutrition, record keeping, bacterial diseases, viral diseases, diseases caused by ectoparasites and endoparasites, disinfectants, biosecurity, HACCPs, ANS, water quality, and Colorado fish health regulations and biopolitics. The courses included hands-on dissection and microscopy training.

Work performed:

The AAHL senior fish pathologist, fish pathologist, veterinarian, and technicians conducted three 16 hour fish health courses to hatchery personnel

Job 2: Provide lectures, presentations, instruction and training in fish health, ANS, or other related subjects and technical assistance as needed.

Approach:

Per inquiry or request from agency employees, the private aquaculture industry, institutions of higher learning, angling groups, or the general public, provide lectures, training, and specific information.

Work performed:

- September 7, 2017: Third year veterinary student fish necropsy and microscopy lab, Watson Hatchery

Meetings attended:

- August 22, 2017: Colorado Fish Health Board
- September 9-13, 2017: AFWA Annual Meeting. Drug Approval Working Group Meeting, Utah
- September 11-15, 2017: American Fishery Society QA/QC meeting Idaho
- September 20-21, 2017: USGS Petroleum Spill and Fish Kill training, Fort Collins

- September 26-27, 2017: CPW Hatchery Manager's meeting
- October 30, 2017: Colorado Fish Health Board
- November 2-3, 2017: CPW Senior Aquatic Staff Meeting
- November 29, 2017: Utah DWR/USFWS/CPW Fish Health Condition Profile Workshop, Grand Junction
- January 9-10, 2018: CPW Hatchery Manager's meeting
- January 17-18, 2018: CPW Aquatic Biologist's meeting
- January 23-24, 2018: CPW Branch Senior meeting
- February 2-3, 2018: Colorado Aquaculture Association Annual Board meeting
- February 6-9, 2018: Rocky Plains Regional Fish Health meeting
- February 26, 2018: Colorado Fish Health Board
- February 28, 2018: CPW Hatchery In-service
- February 19-22, 2018: Aquaculture America conference
- March 5-7, 2018: NAHLN/APHIS QA/QC meeting Ames, Iowa
- April 24-25, 2018: CPW Senior Aquatic Staff meeting
- May 9-10, 2018: CPW Hatchery Manager's meeting
- June 11, 2018: Colorado Fish Health Board meeting
- June 19, 2018: USFWS AADAP workshop and Aquatic Drug Approval Coalition meeting, Bozeman
- June 20-22, 2018: Western Fish Disease Workshop and Continuing Education, Bozeman
- June 26-27, 2018: CPW Senior Aquatic Staff meeting

Meetings presented at:

- July 18, 2017: Fish Health Assessment training, Crystal River State Fish Hatchery
- September 26, 2017: CPW Hatchery Manager's meeting: VFDs/Chemical Facility Anti-Terrorism Standards/Microbiomes
- February 2, 2018: Colorado Aquaculture Association Annual meeting: Federal Regulation Changes: Veterinary Feed Directive Final Rule Update, Extra-label Use of Medicated Feeds for Finfish, Chemical Facility Anti-Terrorism Standards and CPW Regulation Updates
- February 28, 2018: CPW Hatchery In-service: Aquatic Animal Health Laboratory
- May 8, 2018: Hatchery Manager's Meeting: Powerpoint presentations: The Importance of Measuring Carbon Dioxide in Aquaculture; Erythromycin 200 Injectable INAD #12-781 at Fish Research Hatchery; Fish Health Assessments Update
- June 22, 2018: BKD Continuing Education program at Western Fish Disease Workshop: BKD: Perspective and experiences from Colorado

Sub-Study 3-3:

Objective:

Please see Grant Narrative for detailed objectives and procedures

Job 1. Maintain laboratory database.

Procedures:

Maintain AAHL database, enter laboratory data from new case accessions and laboratory results as completed. Insure laboratory database is continuously running and available from a CDOW server.

Approach:

Enter data from existing case files current and historical into MS Excel files for use in Microsoft Access database management program constructed by contract and open access to selected publics.

Work performed:

- Data from AAHL was entered into T-6 as warranted

PROJECT COSTS

Estimated cost of the proposed project is \$ -----. Of this amount \$ ----- (25% of the total project costs) will come from state funds. Federal funds are requested for the remaining \$ (75% of the total project costs). A more detailed budget is attached.

PROGRAM INCOME:

No program income is expected from this project.

PERSONNEL:

Vicki Milano	CPW, Managing Fish Pathologist	970-842-6308
Paula Nicholas	CPW Federal Aid Coordinator	303-291-7244

SCHEDULE:

MAINTENANCE:

No maintenance costs are associated with this project.

LAND CONTROL:

No land control issues are associated with this project.

RELATION TO OTHER FEDERAL PROJECTS:

This project will have no known or identifiable impacts on any other federal projects.

PRIME/UNIQUE FARMLANDS:

This project will have no impact on prime or unique farmlands.

FLOODPLAINS/WETLANDS:

This project will have no impact on any floodplains or wetlands.

ENDANGERED SPECIES:

This project should have positive impacts on the recovery of state and/or federally listed endangered species.

ENVIRONMENTAL ASSESSMENT:

This project is covered by a categorical exclusion under 516 DM 6, Appendix 1. See attached NEPA Compliance Checklist for more detail.

ENVIRONMENTAL JUSTICE (Executive Order 12898):

This project will not have disproportionately high and adverse human health or environmental effects on low-income populations, minority populations or Indian tribes.

INVASIVE SPECIES (Executive Order 13122):

The proposed activities of this project will not result in the introduction of any invasive species not impact the status of an existing invasive species.

HISTORICAL/CULTURAL RESOURCES:

The proposed activities of the project will have no impact on historical or cultural resources.