

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

Fish Health Services Investigations & Management

July 1, 2016– June 30, 2017



STATE: Colorado
PROJECT: F-83-R-25
PROJECT TITLE: Aquatic Animal Health Investigations & Management
Period Covered: July 1, 2016 – June 30, 2017

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 15-16.

Pathogen type	Publicly owned fisheries				Privately owned fisheries		Totals
	Salmonid culture	Salmonid free-ranging	Warmwater fish culture	Warmwater free-ranging	Salmonid culture	Warmwater fish culture	
Bacteria	26	24		1	8		59
Parasite	16	7			8		31
Virus	49	27	5	19	8	2	110
Totals	91	58	5	20	24	2	200

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 16-17.

BACTERIOLOGY		
# Inspections	# Cultures	# DFAT tests
59	3,074	6,621

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 16-17.

PARASITOLOGY		
# Inspections	# PTD tests	# PCR tests
31	801	360

Table 4. Approximate numbers of virology samples analyzed at the AAHL for regulated viruses during FY 15-16.

VIROLOGY	
# Inspections	# Virology tests
110	12,302

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 16 -17, AAHL personnel provided hands on examinations and/or diagnostics on state fish hatcheries in a total of 60 troubleshooting cases (Case Type TS in Appendix A). 62 of these were on state fish hatcheries, 3 on free-ranging public fisheries, and 1 cases on private fish culture facilities.
- Six fish health cases were handled remotely by electronic media (Case type EX in Appendix A). 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:

- Two investigations of fish health problems ranging from reports of environmental problems to major fish kills were conducted in FY 16 -17.

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 2,017 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
5,547	371	6,455

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 16-17, 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
- AQUI-S 20E (eugenol) #11-741
- SLICE (emamectin benzoate) #11-370
- 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 50+ veterinary feed directives, prescriptions and extra-label prescriptions between July 1, 2016 and June 30, 2017 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 written prescriptions and, 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 12-hour courses of training in fish health management including the following major topics: anatomy and physiology, the role of stress in fish health management, bacterial diseases of fishes, viral diseases, ectoparasites, metazoan parasites, and Colorado fish health regulations and biopolitics. The courses included hands-on dissection and microscopy training.

Work performed:

- The AAHL veterinarian presented ten fish health assessment trainings to hatchery personnel on fish health management, anatomy, physiology, and common pathological findings.

Job 2: Assist school aquarium and aquaculture programs by providing information regarding regulatory requirements, technical information, educational materials, and guidance specific to each school's circumstances.

Approach:

Contact schools with aquarium or aquaculture programs, explain agency regulations and policies, and provide guidance, information, and assistance as warranted.

Work performed:

- The AAHL staff was the advisor to the science teachers at participating in the Trout Unlimited Trout in the Classroom project; helped instructors with fish health issues or die-offs during school year.
- Workshop on fish dissection and ANS at Trout Unlimited (TU) Youth Camp, June 2017, NI Ranch, Stonewall, CO.

Job 3: 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:

- April 26, 2017: Colorado State University, Department of Fish, Wildlife and Conservation Biology: Guest Lecturer: Fish Health Management

Meetings attended:

- September 12 -13, 2016: Senior Aquatic Staff meeting
- September 27-28, 2016: CPW Hatchery Manager's meeting
- October 2016: Colorado Fish Health Board meeting
- January 6-7, 2017: WAFW meeting
- January 10-11, 2017: CPW Hatchery Manager's meeting
- January 17-18, 2017: CPW Aquatic Biologist's meeting
- January 24-26, 2017: Rocky Plains Regional Fish Health meeting
- February 3-4, 2017: Colorado Aquaculture Association Annual Board meeting
- February 14, 2017: Colorado Fish Health Board meeting
- February 19-22 Aquaculture America conference
- April 5-6, 2017: Senior Aquatic Staff meeting
- May 9-10, 2017: CPW Hatchery Manager's meeting
- May 25, 2017: Colorado Aquaculture Board meeting
- June 6-7, 2017: Tri state Aquatic Coordination meeting
- June 13, 2017: Colorado Fish Health Board meeting
- June 20-22, 2017: American Fisheries Society Western Fish Health Section meeting

Meetings presented at:

- July 26, 2016: CPW Aquatic Animal Health Lab Meeting: Powerpoint presentation: Motile Aeromonas Septicemia
- September 27-28, 2016: CPW Hatchery Manager's meeting: Upcoming Changes to All Medically Important Antibiotics
- January 10-11, 2017: CPW Hatchery Manager's meeting: VFD Final Rule Update and Extra-label Use of Medicated Feeds for Finfish
- January 17, 2017: CPW Aquatic Biologist's meeting: Federal Regulation Changes to All Medically Important Antibiotics
- February 3, 2017: Colorado Aquaculture Association Annual Board meeting: Federal Regulation Changes to All Medically Important Antibiotics: Veterinary Feed Directive (VFD) Final Rule and Extra-label Use of Medicated Feeds for Finfish
- May 9-10, 2017: CPW Hatchery Manager's meeting: VFD Update, Earlier Disease Detection, and Iodine Disinfection of Fish Eggs
- May 9, 2017: Hatchery Manager's Meeting: Powerpoint presentation: Wild fish survey update & Observed fish pathogens and diseases in 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.