U.S. Fish & Wildlife Service

The Aquatic Animal Drug Approval Partnership Program

"Working with our partners to conserve, protect and enhance the Nation's fishery resources by coordinating activities to obtain U.S. Food and Drug Administration approval for drugs, chemicals and therapeutants needed in aquaculture"

Volume 10-1

AADAP NEWSLETTER

March 2014

Sacajawea Peak in the Bridger Mountains, Bozeman, Montana
(Jerry Blank photo)

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WHAT'S SHAKIN'

Remembering Mike Mason, Iowa DNR

Mike Mason, Fish Culture Supervisor for the Iowa Department of Natural Resources (DNR), passed away February 24, 2014, at Mercy Hospital in Des Moines, Iowa. Words cannot express the sorrow and sadness that those at Iowa DNR and we at AADAP felt on hearing of Mike's passing. Mike was a true friend to all of us; he loved anything "fish," he loved to travel, and he certainly loved to make his yearly pilgrimage to AADAP's annual Aquaculture Drug Approval Coordination Workshop in Bozeman, Montana. It was our privilege and honor to have Mike as part of "our group," and all of us are "for-the-better" because of Mike's presence, thoughtfulness, humor, and the true enjoyment he got out of "simply living life." Always positive, always a smile, always willing to keep on going…..Mike's attitude and energy were truly something to be envied.

Please keep Mike and his family in your thoughts and prayers. We'll always cherish our memories of Mike and the time we spent with him. And please take time to read **A Tribute to Mike Mason**, which was sent to us by Alan Johnson and Iowa DNR.

20th Annual Aquaculture Drug Approval Coordination Workshop, July 29-31, 2014, Bozeman, Montana USA

The 20th Annual U.S. Fish and Wildlife Service Aquaculture Drug Approval Coordination Workshop is tentatively scheduled for July 29-31, 2014, in Bozeman, Montana. The Workshop will update attendees on the status of recently completed and ongoing aquaculture drug approval work in the U.S. Also, there will be a session on the status and use of vaccines in U.S. aquaculture. Details will be available later this spring.

AADAP Receives 2013 Rachel Carson Group Award for Scientific Excellence

Jim Bowker (Research Program Manager), Dan Carty, Molly Bowman, and Niccole Wandelear, fishery biologists and researchers with the Aquatic Animal Drug

Approval Partnership (AADAP) Program located in Bozeman, Montana, are the 2013 recipients of the U.S. Fish and Wildlife Service's (FWS) Rachel Carson Group Award for Scientific Excellence. This national award recognizes a group of FWS employees who exemplify the best in the FWS tradition of scientific contributions to applied conservation science for the achievement of extraordinary results in fish and wildlife conservation.

"AADAP is a science-based program that is focused on putting safe and effective drugs into the hands of fisheries biologists from across the U.S.," said AADAP Branch Chief Dr. Dave Erdahl. "AADAP works with many aquaculture and fisheries management partners in this effort, and AADAP-generated research data help to ensure these new management tools are safe to fish, safe to people who might consume treated fish, safe to the environment, and perform as per label guidelines. As such, this award is not only a tremendous accomplishment for AADAP, but also reflects very positively on the partnership efforts of many. We are truly honored to be a recipient of this award."

The AADAP Research Program conducts research to establish treatment regimens and to ensure that such regimens are effective and safe to fish. The staff comprises fishery biologists with specialized skills in experimental design, data collection and analysis, and technical writing; conducting research within a strict regulatory framework; and leading a diverse collective of public and private partners in their efforts to support legal and judicious use of drugs on fish in the U.S.

"This award is well deserved recognition for nearly two decades of hard work and rigorous scientific research by our AADAP staff," said David Hoskins, FWS Assistant Director for Fish and Aquatic Conservation. "Their work has not only advanced the development of new and effective treatment regimens but has made it possible for the FWS and many of our partners to continue to use these essential drugs in a wide range of facilities nationwide." Mike Weimer, FWS Chief—Division of Fish and Aquatic Conservation Programs, added, "The group's efforts to promote the use of state-of-the-art tools in aquaculture have provided significant benefits to the conservation of our nation's fish and other aquatic species."

The AADAP Program was established in 1994 to solve a crisis created when the U.S. Food and Drug Administration (FDA) began to enforce the Federal Food, Drug, and Cosmetic Act and FDA regulations regarding the use of drugs in Minor Species, including fish. The FDA decision effectively stripped the fisheries profession of the tools it had used for decades to manage fish health and achieve fish culture, fisheries management, and fisheries research objectives. The AADAP Program's goal was to work within the newly enforced regulatory framework to put these essential tools back in the hands of the FWS personnel who needed them. To achieve this goal, the AADAP Research Program became essential in helping to develop the process by which aquatic animal drugs are approved, working with FDA to create science-based approaches to address the rigors of the regulatory process.

"This is the only monetary award given out by the FWS," said Dr. Gabriela Chavarria, who is the Science Advisor to FWS Director Dr. Dan Ashe. Dr. Chavarria went on to say that, "This award represents Science Excellence within the FWS. We receive many nominations annually for this award, and the selection process is very competitive. My congratulations to this group."

The AADAP Research Program staff are consummate professionals and exemplary employees whose hard work, dedication, and commitment to putting crucial fish health and propagation tools in the hands of fisheries professionals make them worthy of receiving the 2013 Rachel Carson Group Award for Scientific Excellence.

AQUAFLOR® (florfenicol): New Approvals

Merck Animal Health recently received FDA approval for two new label indications for AQUAFLOR® (50% florfenicol)-medicated feed. The new approvals are:

- An increase in the maximum daily dosage for freshwater-reared finfish other than freshwater-reared warmwater finfish to provide a dosage range of 10-15 mg/kg body weight/day.
- Changes the conditions of use to permit the use of florfenicol in recirculating aquaculture systems.

Please see the *Fins & Tails* section of the Newsletter to learn how these two approvals will affect AQUAFLOR® use under U.S. Fish and Wildlife Service INAD 10-697.

Halamid® Aqua (chloramine-T): Pending Approvals

On February 7, 2014, Axcentive SARL and Western Chemical, Inc. (Ferndale, Washington) announced the pending approval of a New Animal Drug Application (NADA) by FDA for the use of Halamid® Aqua (chloramine-T) in aquaculture in the U.S.

All technical sections for this NADA have been submitted to FDA, and the remaining administrative procedure is expected to take ~2 months. In the U.S., the product will be marketed as Halamid® Aqua and will be available in 25 kg drums and 5 kg buckets.

The approval will cover treatment of all freshwater-reared salmonids, walleye, and all freshwater-reared warmwater finfish either for bacterial gill disease or external columnaris disease.

For more information, contact Western Chemical, Inc. (*info@wchemical.com*), who will be the exclusive U.S. distributor of Halamid® Aqua.

AADAP DRUG UPDATES

There's been a little lull in the storm because we've completed virtually all of our major projects and are looking out on the horizon for new opportunities. Here's a snapshot of what we've been up to:

AQUI-S®20E (10% eugenol)

Sedation to handleable—Currently, all effectiveness and target animal safety data to support a claim of sedation to handleable in freshwater finfish have been submitted to CVM. To date, all reports and requests that have been reviewed by FDA have been accepted. There are two outstanding reports (target animal safety studies done on yellow perch and channel catfish) that have not yet been reviewed by FDA. As such, our commitment to the sponsor and to the Association of Fish and Wildlife Agencies (AFWA) Drug Approval Working Group (DAWG) has been completed. Now, it's time for us to look into opportunities to generate data to support expanding the initial draft label claim for AQUI-S®20E.

Effectiveness—Recently, we had an opportunity to sedate a variety of coldwater marine fish (Atlantic salmon, steelhead trout, and sablefish) with AQUI-S®20E. Working with collaborators Armin Ramirez (Fish Health Manager, American Gold Seafoods) at their netpen operation in Manchester, Washington, and Tom Flagg, Carlin McCauley, and Chris Tarata at the National Oceanic and Atmospheric Administration (NOAA) Manchester Laboratory, we sedated fish with AQUI-S®20E at the same dose (25 mg/L eugenol) that we have used to sedate freshwater salmonids. This was done to address a CVM concern about whether times to sedation would be comparable between freshwater fish and marine fish. Although we sedated the marine fish at a lower water temperature (9-10°C) than that used to sedate freshwater fish (13-14°C), results were very comparable.

Dr. Jesse Trushenski (Center for Fisheries, Aquaculture, and Aquatic Sciences, Southern Illinois University at Carbondale) provided AADAP with AQUI-S®20E sedation data that support what we observed with coldwater marine fish. One of Dr. Trushenski's students sedated hybrid striped bass (HSB) at 60 mg/L eugenol in water with a salinity ranging from 0 to 25 ppt (at 5 ppt increments) and at a water temperature of ~23°C. Times to sedation for 30 individually sedated fish ranged from 0.87 to 1.05 min. These results are comparable to results (0.95 min) obtained when HSB were sedated at 60 mg/L eugenol in trials conducted to support a claim for effectiveness for freshwater finfish. We (AADAP) anticipate that we'll encounter similar findings when we have an opportunity to sedate a broader range of marine fishes.

On January 27, 2014, AADAP submitted a pivotal efficacy study protocol entitled "The Efficacy of AQUI-S®20E (10% Eugenol) to Sedate a Variety of Finfish to Handleable in Seawater" to CVM for review. We hope to receive CVM concurrence but anticipate an End-Review-Amendment request to address some of their questions and concerns. As usual, stay tuned.

Over the past few months, we've been evaluating the effectiveness of AQUI-S®20E administered at low concentrations (3-5 mg/L eugenol) to lightly sedate a variety of salmonids and investigating whether the UV-Vis spectrophotometric method to measure eugenol concentrations is accurate and precise at these levels. We've generated some great data and are developing a protocol to submit to CVM so that we can get rolling and generate data to help expand the proposed initial draft label claim for AQUI-S®20E.

AQUAFLOR® (50% florfenicol)

On January 21, 2013, we submitted a pivotal efficacy study protocol entitled "The Efficacy of AQUAFLOR® (50% Florfenicol; Type A Medicated Article) Administered in Feed to Control Mortality in Seawater-Reared Finfish" to CVM for their review. In anticipation of conducting effectiveness and safety trials to support expanding the current AQUAFLOR® label to include claims for seawater use, we have been running the trap lines looking for partners. We've lined up a few and are anxious to get the protocol approved so that we can move forward with helping the sponsor gain approvals for the use of this antibiotic in seawater finfish.

Text provided by Jim Bowker, Research Program Manager; USFWS AADAP; Bozeman, Montana USA. (*jim_bowker@fws.gov*)

FINS & TAILS, BITS & BOBBERS

2014 INAD Program Participants

Invoices and revised cooperative agreements are scheduled to be emailed in April. This is a bit later than usual; however, we wanted to give folks time to enroll in the 2014 INAD Program after receiving the letter about the fee increase. Please remember that INAD enrollment does not automatically carry over to the new calendar year. The Investigator will need to add the 2014 enrollment information to their "Account Info" page and click on the "Save" button. You will then be able to create new study requests and order additional drug if needed.

The AADAP website was last updated in December 2012, and thus there is a fair amount of outdated INAD-related information on the website. Although we continue to attempt to rectify this issue, it will be several months before it is fully resolved. Please note that we have not been able to update the (1) Drug Fact Sheets, (2) treatment authorizations, (3) list of current INADs, and/or (4) some of the study protocols. Consequently, contact Bonnie Johnson (*bonnie_johnson@fws.gov*) if

you are seeing or hearing conflicting information about any INAD authorization or use parameters.

AQUAFLOR® (50% florfenciol)

Merck Animal Health (MAH) recently received FDA approval for two new label indications for the use of AQUAFLOR®-medicated feed. The new approvals are:

(1) An increase in the maximum daily dosage for freshwater-reared finfish other than freshwater-reared warmwater finfish to provide a dosage range of 10-15 mg/kg body weight/day.

(2) Changes the conditions of use to permit the use of florfenicol in recirculating aquaculture systems.

Treatments that fall under the two new approvals will no longer be allowed under INAD 10-697; instead, such treatments will need to be conducted under Veterinary Feed Directive (VFD).

CHORULON® (HCG)

A number of folks have expressed concern to us that the FDA approved drug CHORULON® (Merck Animal Health; MAH) may soon no longer be available for use as a spawning aid in finfish. We have contacted MAH, and they have indicated to us that they currently **do not** anticipate an interruption in CHORULON® availability. We will keep you posted with respect to any additional information we receive from MAH concerning the future availability of CHORULON®.

Text provided by Bonnie Johnson, National INAD Program Administer; USFWS AADAP; Bozeman, Montana USA (bonnie_johnson@fws.gov)

FEATURE ARTICLE

A Tribute to Mike Mason

by

Alan Johnson and Iowa DNR

Mike Mason, Fish Culture Supervisor for the Iowa Department of Natural Resources (DNR) passed away February 24, 2014, at Mercy Hospital in Des Moines, Iowa, surrounded by his family, friends, and coworkers.

Mike was a great friend and coworker. He never had a negative attitude and will be sorely missed by all. Mike worked for Iowa DNR for 32 years and was recently awarded the "Award of Excellence" from the Fish Culture Section of the American Fisheries Society. This is a very prestigious award, and it recognized Mike for his lifetime achievement of improving fish and fishing opportunities in Iowa. This award was presented to Mike in October 2013 in Des Moines. The text for the award presentation is reproduced below because it captures so well Mike's lifetime achievements in Fisheries:

Mike Mason

"The American Fisheries Society (AFS) is the oldest, largest, and most influential association of fish professionals in the world. The Fish Culture Section (FCS) is one of the founding groups of professionals of that society. The AFS FCS Award of Excellence is a new award. It was created in response to our membership to recognize current practitioners in the field of fish culture and allied fields who provide fish for recreation, conservation, restoration, and the dinner table. Mike is a life member of AFS, with over 30 years of membership.

Mike's career began in Virginia, where he held several seasonal and full-time positions with the Virginia Department of Game & Inland Fisheries from 1974 to 1980. Mike was hired by Iowa DNR in 1981 to manage Rathbun Fish Hatchery, a newly built intensive culture facility for channel catfish, walleye, and largemouth bass.

- In the beginning, walleye culture was especially challenging because culture techniques were still under development, and the facility was designed for catfish culture.
- Mike's observations of walleye survival in the hatchery with larger pond fingerlings was noted in the 1988 Coolwater Fish Culture Conference proceedings. His observations were one of the keys to successful walleye culture at Rathbun, and his observations assisted other states.
- Thanks to Mike's can-do attitude and dedication to producing quality hatchery products, Iowa is now recognized nationally as a leader in walleye culture.
- Mike's leadership skills were recognized and valued by the Iowa DNR, and he was promoted to Supervisor of the DNR's Fish Culture Section in 1998. Mike's primary responsibility as Supervisor was to supervise 22 fish culturists at three coldwater hatcheries and three warmwater/coolwater hatcheries.

- One of Mike's employees commented, 'He has been the most supportive supervisor I have ever had; his people skills are bar none. He encourages excellence in his staff and allows them the freedom to explore new culture methods and technologies.'
- Mike played an important role in the Management Team. In addition to leading the Culture Section, Mike doubled as an Assistant Chief of the Fisheries Bureau. He regularly worked behind the scenes to ensure that all Fisheries Bureau teams had the resources that they needed to manage Iowa's fisheries resources.

Mike was also very active at the U.S. Fish and Wildlife Service's Aquaculture Drug Approval Coordination Workshops and served as Iowa's representative to the Drug Approval Working Group (DAWG) of the Association of Fish and Wildlife Agencies.

- Mike's knowledge of daily hatchery operations and administrative savvy made him an excellent representative to the DAWG.
- Mike successfully advocated for therapeutants for warmwater and coolwater fish species that were reared in Iowa and by other state agencies.

Mike was always committed to maintaining the continuity of the Coolwater Fish Culture Workshop and Midcontinent Warmwater Fish Culture Workshop. Mike viewed these meetings as training opportunities that allowed hatchery employees to stay abreast of new fish culture research and developments. Mike's commitment to employee development led to producing quality-size fish in the most efficient and cost-effective means.

Mike was also instrumental in developing and organizing the fish-trading session at the Midcontinent Workshop. The fish trades that were arranged during this session permitted many agencies to stock fish that might not otherwise be available in their state. There are undoubtedly entire sport fisheries in Iowa and elsewhere that would not exist today if it weren't for Mike's efforts.

Each of Mike's activities as hatchery manager, supervisor, and INAD and DAWG team member had substantial impacts internally and externally. Many of Iowa's fisheries, including most channel catfish, walleye, and hybrid striped bass fisheries, are dependent on stocking. Much of this activity was made possible by successful stocking programs that were implemented or improved under Mike's leadership."

Please continue to keep Mike's family in your thoughts and prayers. A celebration of Mike Mason's life and his many accomplishments was held Friday, February 28, at Overton Funeral Home in Indianola, Iowa.

Your condolences can be made online at *www.overtonfunerals.com*. Or, you may send your condolences to the following address:

To the Family of Mike Mason
c/o Overton Funeral Home
501 West Ashland Avenue
Indianola, IA 50125

(phone: 515-961-5121)

Mike's biography and more information on the arrangements can be accessed at the following address: *http://www.overtonfunerals.com/memsol.cgi?user_id=1252342*

Memorial Fund: Donations will be given as a memorial to the DNR's State Fair Aquarium Exhibit.

Checks should be made out to Iowa AFS and all donations should be sent to:

Iowa AFS
c/o Mike Mason Memorial Fund
15053 Hatchery Place
Moravia, IA 52571

USGS's UMESC CORNER

AQUI-S®20E (10% eugenol)

The U.S. Geological Survey's (USGS) Upper Midwest Environmental Sciences Center (UMESC) in La Crosse, Wisconsin, completed work assessing a method to determine eugenol concentrations in edible fish fillet tissue. Eugenol is the marker residue for AQUI-S®20E. The following method characteristics were assessed: selectivity, sensitivity, accuracy and precision with eugenol-fortified tissue, precision with tissue containing biologically incurred eugenol, stability, and method ruggedness. With regard to selectivity, there were no compounds in fillet tissue extracts from seven fish species that would interfere with eugenol analyses. In addition, select aquaculture drugs incorporated into fish fillet tissue did not interfere with eugenol analyses. Method sensitivity (~0.01 µg/g) was more than adequate relative to the working tolerance of 11 µg/g established by the U.S. Food and Drug Administration (FDA) Center for Veterinary Medicine (CVM). Method accuracy and precision with eugenol-fortified fillet tissue were within CVM acceptance criteria, i.e., a recovery of 80 - 110% for accuracy and a precision of <10% CV. Method precision with biologically incurred eugenol was within CVM acceptance criteria, i.e., <10% CV in virtually all cases. Eugenol was stable for at least 14 d in solutions of acetonitrile and water, in tissue extracts for 4 d, in frozen fillet tissue for more than 12 weeks, and in tissue undergoing freeze-thaw cycles. In most cases the method was rugged, i.e., small changes in the method procedures did not impact method performance. The final report (2,191 pages) for the work was submitted to CVM on December 10, 2013. Contact Jeff Meinertz, *jmeinertz@usgs.gov*, for more information.

UMESC conducted a series of studies to assess the utility of using AQUI-S®20E as a sedative to reduce the activity of yellow perch and tilapia during live transport. A portion of the research assessed exposure parameters (concentration and duration) that would safely sedate fish while maximizing fish loading density during transport. Both species were exposed to 0, 100, 200, and 300 mg AQUI-S®20E/L at three loading densities: yellow perch at 120, 240, and 360 g/L; tilapia at 240, 360, and 480 g/L. After exposure durations of up to 10 h at all concentrations and densities, there was >95% survival with yellow perch and >90% survival with tilapia. Preparation of data to submit to CVM is ongoing. Contact Aaron Cupp, acupp@usgs.gov, for more information.

35% PEROX-AID® (35% hydrogen peroxide)

UMESC is conducting research to expand the label for 35% PEROX-AID® to include the reduction of *Gyrodactylus* sp. infestation density on cool- and warmwater fish species.

Two trials have been completed, one with fathead minnow with a natural infestation of *G. hoffmani* and a second with yellow perch with a natural infestation of *G. freemani*. The objective of the trials was to assess the efficacy of 35% PEROX-AID® to reduce *Gyrodactylus* sp. infestation density on fish following one of three treatment regimens: (1) a nontreated control group; (2) a group treated at 50 mg/L for 60 min; and (3) a group treated at 75 mg/L for 60 min. The 35% PEROX-AID® treatments were applied once daily on alternate days for a total of three treatments. Following treatment, both fathead minnow and yellow perch experienced a reduction of >98% in parasite density on fish in the treated groups. Two final reports were submitted to CVM on December 23, 2013. Contact Sue Schleis, sschleis@usgs.gov, for more information.

SLICE® (0.2% emamectin benzoate)

SLICE® is currently approved for use to control sea lice on marine-reared fish in Canada, Chile, the Faroe Islands, Finland, Iceland, Ireland, Norway, Portugal, Spain, and the United Kingdom. SLICE® has been shown to be effective in reducing infestations of freshwater copepods on freshwater-reared fish. Therefore, there is interest in pursuing approval of SLICE® for freshwater uses.

UMESC is gearing up to conduct drug depletion studies with SLICE® in which fish in a freshwater recirculating aquaculture system (water temperature, 15°C) and in freshwater flow-through aquaculture systems (water temperatures, 6 and 15°C) will be treated with SLICE®-medicated feed. The depletion of the SLICE® marker residue, emamectin benzoate, from the fillet tissue will be characterized after treatment. UMESC has received protocol concurrence from FDA CVM to conduct these studies. The flow-through and recirculating aquaculture systems that will be used during the study have been constructed in the environmental chambers where the study will be conducted. The bacterial flora of the biofilter of the recirculating aquaculture system is being established. Analysts have had good success validating the analytical method to determine emamectin concentrations in fish fillet tissue to our laboratory. Contact Jeff Meinertz, jmeinertz@usgs.gov, for more information.

Text provided by Jeff Meinertz, Research Physiologist; USGS UMESC; La Crosse, Wisconsin USA (jmeinertz@usgs.gov)

FDA's CVM Notes

Minor Use/Minor Species (MUMS) Grants

The second open period of FY 2014 for acceptance of U.S. Food and Drug Administration (FDA) Center for Veterinary Medicine (CVM) Minor Use/Minor Species (MUMS) grant applications through www.grants.gov ended January 3, 2014. Responsive applications have been processed and will be under consideration by FDA for the next several months.

Grants for the first open period of FY 2014 have been awarded and total $373,687, so more than half of our available funds for this fiscal year have been dispersed. We hope to have up to $750,000 available for FY 2015, starting with the Part 1 open period scheduled for June 20 to August 15, 2014; remaining funds will be available for the FY 2015, Part 2 open period scheduled for November 21, 2014, to January 16, 2015.

Because of greater interest in our Program, we anticipate that the grant application process will be competitive; therefore, it is very important that submitted applications be of the highest quality to optimize chances for funding.

Awards made in the first half of FY 2014 for studies to further the conditional approval/approval of drugs for aquaculture uses included:

- The efficacy of PENNOX 343 (75.6% oxytetracycline HCl) to control mortality in bluegill (*Lepomis macrochirus*) due to external columnaris disease associated with *Flavobacterium columnare*
- The efficacy of PENNOX 343 (75.6% oxytetracycline hydrochloride) to control mortality in channel catfish (*Ictalurus punctatus*) due to external columnaris disease associated with *Flavobacterium columnare*
- The efficacy of PENNOX 343 (75.6% oxytetracycline HCl) to control mortality in cutthroat trout (*Oncorhynchus clarkii*) due to coldwater disease associated with *Flavobacterium psychrophilum*

- The safety of channel catfish pituitary administered via intraperitoneal injection to adult female channel catfish *Ictalurus punctatus*

Questions about the FDA MUMS Grant Program can be directed to Dr. Stuart Jeffrey at the following address: stuart.jeffrey@fda.hhs.gov

Text provided by Dr. Stuart Jeffrey, Veterinary Medical Officer; FDA CVM Office of Minor Use and Minor Species; Rockville, Maryland, USA (stuart.jeffrey@fda.hhs.gov)

RELEVANT LITERATURE

The following citation of interest was submitted for inclusion in the Newsletter:

Chen, M. F., Y. W. Cheng, D. Popochock, B. Russell, J. Kerwin, J. Bertolini, J. Gleckler, K. Snekvik, and S. Han. 2011. Isometamidium chloride reduces mortality of adult Chinook salmon due to *Cryptobia salmositica*. *North American Journal of Aquaculture* **73(3):304-310**.

Abstract—The hemoflagellate protozoan parasite *Cryptobia salmositica* causes severe mortality during the 2–4-month sexual maturation period of adult spring Chinook salmon *Oncorhynchus tshawytscha* at the Solduc State Fish Hatchery, Washington. A single injection of isometamidium chloride hydrochloride in sterile deionized water at 2 mg/kg of body weight significantly reduced broodstock mortality. The progeny of injected adults showed better survival than those of controls (injected with only sterile deionized water) at the eyed-embryo and first-feeding stages. No developmental abnormalities were observed in progeny of treated adults at 78 d after first feeding.

Editor's note: AADAP's most recent *Relevant Literature Master List* (updated December 2013) is being distributed with this Newsletter as a separate document (~1 MB pdf). Please remember that inclusion of a citation in the Newsletter or the *Relevant Literature Master List* does not imply (1) acceptance by the U.S. Food and Drug Administration's Center for Veterinary Medicine of a drug's safety or effectiveness, (2) endorsement of a drug or product by the U.S. Fish and Wildlife Service, (3) recommendation of the technique to any particular situation, or (4) concurrence with a treatment procedure/drug.

BEFORE I GO *by* Dan Carty

I'm retiring March 5, 2014, after 30 years as a fishery biologist with the U.S. Fish and Wildlife Service. I've had a reasonably interesting career, having spent 11 years in fisheries management in Yellowstone National Park; 3 years in sport fisheries mitigation in Northwest Montana; and 16 years in aquaculture drug-approval research at AADAP.

I've always been impressed by the dedication of those who work in the fisheries profession. Consequently, before I go, I'd like to thank all of the folks who, over the years, have provided me with opportunities to grow as a biologist and as a person.

Dan Carty

I don't have any words of wisdom for those aspiring to a career in fisheries or another biological science. However, I would encourage aspiring biologists to first read *The Double Helix* (1968) and then watch the documentary *Naturally Obsessed: The Making of a Scientist* (2009), simply because these two works reveal in dramatic fashion how "human" the world of science really is.

Finally, my best wishes for the continued success of the AADAP Program, whose work not only benefits aquaculture but also benefits fisheries management.

After March 5, I can be reached by email at: dgc12@hotmail.com

AADAP BRANCH CHIEF NOTE

***by* Dave Erdahl**

Good Grief Charlie Brown….another good-man-gone!! While we at AADAP obviously offer Dan our sincere Congratulations and wish him and Mary Beth "nothing but the best" in retirement, as well as our heartfelt thanks for a job-well-done….Dan's retirement is going to leave yet another "Big Hole" in AADAP. We lost Miranda Dotson in 2011 to a new career, and we lost Tom Bell in 2012 to retirement. With Dan's retirement, the AADAP staff will be down to five, and as a result of current budget constraints, it is unlikely that we will be able to fill Dan's (or any other vacant) positions in the short-term. Although AAADAP has always made a sincere effort to "step-up" and help partnership-based aquatic species drug approvals efforts in any way/ shape/form/fashion possible, I certainly believe that AADAP has now truly arrived at a "critical mass situation." And although we have certainly fought hard against the "do less with less" mantra, it would appear that the time has come where we will likely have no choice but to scale-back some of our activities. Hence, what I am really trying to say is that, at this time, the fate of the AADAP Quarterly Newsletter is a bit uncertain. We will do our best to find a way to continue it, but we can make no promises. Onward to somewhere….and as we often say, stay tuned!