



THE FISHLINE

Web site: www.colaqua.org

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Nov/Dec 2014

LEGAL AND JUDICIOUS USE OF THERAPEUTANTS IN FOOD FISH

by Carolyn Gunn, DVM, Aquatic Veterinarian, Colorado Parks and Wildlife

When fish in an aquaculture setting have a disease outbreak that management practices can't resolve, it is often necessary to treat the fish with a therapeutic to decrease mortality and bring the group of fish back to health. But the use of drugs on fish that are destined as potential human food (either directly or indirectly) is a highly regulated activity. This is because the U. S. Food and Drug Administration (FDA), an agency within the Department of Health and Human Services, is responsible for keeping the human food chain free of contaminants that might harm humans. Drug

residues resulting from treating fish come under this category of contaminants.

Other federal agencies involved in regulating use of chemicals/products that may affect fish include the U. S. Environmental Protection Agency (EPA) which has jurisdiction over chemicals such as disinfectants and aquatic treatments for control of algae or pests other than pathogens in or on fish. Additionally, the Animal and Plant Health Inspection Service Center for Veterinary

Legal & Judicious Use of Therapeutics in Food Fish - Cont. on Page 3

COLORADO AQUACULTURE ASSOCIATION 2015 ANNUAL MEETING

Come join the CAA for our annual meeting and warm up in the hot-springs this winter!

Date: Friday, January 23 and Saturday morning
January 24, 2015

Location: Mt Princeton Resort in Nathrop, CO.
(<http://www.mtprinceton.com>)

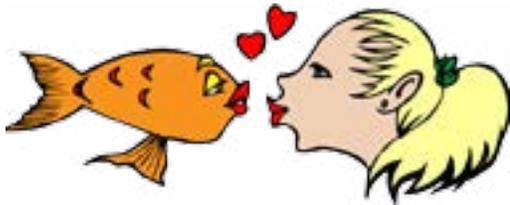
The meeting will be similar to previous years with presentations on Friday and happy hour and dinner on Friday night. The CAA membership business meeting is Saturday morning. All members are invited to attend the membership meeting on Saturday morning. An agenda for the Friday meeting will be available on the CAA website by early January 2015.

A hot lunch will be available Friday in the restaurant for \$12.50 per person (including tax, gratuity). A hot breakfast buffet will be available on Saturday morning at 7:15 am in the restaurant for \$13.70 per person (including tax & gratuity). Dinner on Friday evening will be sponsored by the CAA.



Room rates for Cliffside (near conference room) are \$110 per night (plus 6.8% lodging tax) which includes admission to the hot springs.

Contact the Mt Princeton Resort at (888) 395-7799 to make a room reservation. Mention that you are with the "Colorado Aquaculture Group" to get the discounted room rate. The Mt Princeton Resort is full on weekends, so we suggest booking your rooms ASAP to ensure availability.



President's Corner

Tis the Season...

Can you believe that Thanksgiving is already gone and Christmas is just around the corner? Me neither! This year has sure flown by. Production and sales of recreational fish has seemed to increase and some aquaculturists have found opportunities in the food fish sector. I recently found out that the City and County of Denver has planned a local food movement to buy and sell at least 20% of all food locally by 2020. I was surprised to find out that the local EPA representative and Denver extension office initiating this push was not too familiar with the local aquaculture industry. I stepped forward to introduce myself, as well as our membership, to these group(s) and they seem to have new hope for additional potential protein sources. They may provide a small presentation at our annual meeting in January to gain a better understanding of this initiative and the goals of the project.

Speaking of a meeting, the CAA board has been busy planning and coordinating the annual membership meeting. Presentations and updates will be held on Friday, January 23rd at Mt. Princeton Resort in Nathrop, Colorado. Representatives from Colorado Parks and Wildlife, as well as Colorado Department of Agriculture, will be there as usual to provide updates on programs and changes in regulations. We have also decided to focus Friday afternoon to fish health/disease with presentations and a wet lab dissection! This is an excellent time to get a better understanding of what to do when a problem arises with your fish and what to look for with basic disease issues.

The business meeting will follow on Saturday, January 24th and ALL members are encouraged to attend. Two board positions are up for (re)election. Nominations are for term 2015-2017. If you are interested in getting involved or know someone who is, this is your opportunity! We are always trying to come up with new ideas for meeting topics that are of interest and pertain to our membership. Contact any board member for further information.

Patrick, CAA Board Secretary, will be reaching out to you in the upcoming weeks to get an attendance head count for the resort. We also need to

President's Letter - Cont. on Page 6

In This Issue ...

Legal & Judicious Use of Therapeutants in Food Fish	1
Colorado Aquaculture Association 2015 Annual Meeting.....	1
President's Corner.....	2
Developing a Specific Immune Response Following Vaccination	5
56th Western Fish Disease Workshop.....	7
4-Day Aquaponic Farming Course	7
Colorado Currents Physical Security at Aquaculture Facilities becomes a Priority.....	7
Fishbits.....	8
Aquaculture Research Program Fiscal Year 2014 Grants.....	9
SBA Economic Injury Disaster Loans Available.....	10

THE FISHLINE is published by the CAA. Contact Erin Stewart, Aqua Sierra, Inc., with your submissions for the next issue of The Fishline at erinstewart1@aqua-sierra.com or 303-697-5486.

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Biologics, an agency within the U.S. Department of agriculture, regulates vaccines, bacterins, diagnostic kits, and other products of biological origin.

All states must comply with federal regulations, but some states may have their own requirements that go beyond or are in addition to what is required at the federal level. This is especially true for chemicals and drugs having their point of source at an aquaculture facility, limits of which are often set by the state's public health department (if the state has primacy over EPA relative to discharge).

Legal and judicious use has many ramifications and can be confusing and difficult to understand. This article will cover main points and definitions to help the aquaculture producer. To ensure proper use of drugs in an aquaculture setting, the owner/manager should seek the services of a fish health expert, pathologist, or licensed veterinarian when a disease outbreak occurs in a facility. For more in-depth information, the American Fisheries Society Fish Culture Section has compiled an excellent "Guide to Using Drugs, Biologics, and other Chemicals in Aquaculture" available at <https://sites.google.com/site/fish-culturesection/resources/guide-to-using-drugs-biologics-and-other-chemicals-in-aquaculture>.

A few definitions will help explain some salient points:

Food fish are defined by the FDA's Center for Veterinary Medicine (CVM) as an aquaculture species in which it is reasonably likely that a significant percentage of the species population will be consumed directly or indirectly by humans for food. This definition includes fish raised for stocking into private or state waters where anglers may keep and consume their catch and fish sold to restaurants and markets.

A **drug** is defined by the Federal Food, Drug, and Cosmetic Act as any article intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease, an article which affects the structure or function of the body, or articles recognized in official drug compendia. For the aquaculture setting, this includes antibiotics, fish sedatives, spawning aids, microbicides, and external or systemic parasite treatments.

Judicious use of therapeutants in animals is defined by the American Veterinary Medical

Association as striving to optimize therapeutic efficacy and minimize resistance to antimicrobials to protect public and animal health and well-being once the decision has been made for treatment or control of disease. This definition refers to use of antibiotics, but should apply to all drugs used in aquaculture to prevent misuse or overuse.

Legal use refers to administration of therapeutants only in accordance with labeled instructions of FDA-approved drugs for use in aquaculture, or compliance with other regulations governing Investigational New Animal Drug (INAD) use or extra-label use (ELU). Such use is backed by enforcement priorities set forth by the FDA-CVM.

Extra-label use refers to use of an approved drug in a manner not in accordance with the approved label directions for certain situations and if specifically prescribed by a licensed veterinarian within the context of a valid veterinarian-client-patient relationship.

An **Investigational New Animal Drug (INAD) compassionate exemption** allows producers to use an unapproved drug under certain conditions for purposes related to the health and well-being of an

animal. Such use must be within strict protocols and reporting requirements outlined by the FDA-CVM.

Drug withdrawal time refers to a period of time after the end of treatment in which treated fish cannot be released/stocked to ensure that any drug residues in the body of the fish are eliminated prior to release. Withdrawal time is included on product labels, package inserts, and feed tags of approved drugs, or as determined by a veterinarian in the case of extra-label use of a drug.

Prohibited drugs refer to a group of therapeutants, the use of which is forbidden by the FDA in all or specific groups of animals. This prohibition decision is based on safety to the target animal, the environment, or humans who may come in contact with the drug either directly (during administration of the drug) or indirectly (via consumption of an animal with drug residues or exposure to effluent water containing the drug).

A **Veterinary Feed Directive (VFD) drug** is limited to use only via a written prescription under the



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President/Aquatic Biologist

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Legal & Judicious Use of Therapeutants - Cont. from Page 3

supervision of a licensed veterinarian authorizing the food fish owner or manager to use feed containing a VFD drug to treat the animals in accordance with the FDA-approved directions for use. No extra-label use of VFD drugs is permitted.

Where disease is concerned, *prevention* should be the primary objective, thereby alleviating the need for drug treatment. Utilization of Best Management Practices (BMP) such as biosecurity, disinfection practices, proper nutrition, maintenance of high water quality, decreased crowding and stress, mortality management, removal of organic debris, vaccination programs, and other management techniques help prevent disease outbreaks.

But even with employment of BMPs, disease outbreaks periodically occur. The next step in ensuring legal and judicious use of drugs in an aquaculture setting is *early and accurate diagnosis* of a fish health problem. Enlistment of a fish health expert, fish pathologist, or veterinarian to examine the fish and develop a definitive diagnosis is optimal. This prevents unnecessary and inappropriate use of drugs due to misdiagnosis, use of one or more drugs in hopes that they will be effective ("shotgunning"), repeated treatments, potential development of antibiotic resistance, and other issues.

Legal and judicious use of all therapeutants in aquaculture is important, but especially so for *medically important antibiotics* (those that are important for use in combating infectious disease in humans.) Antibiotics are important to both human and animal health, and development of bacterial resistance could render many antibiotics ineffective in both human and animal health. Misuse and overuse of antibiotics increases the chance that bacteria will become resistant. There is scientific evidence that antibiotic resistance can be transferred from animals to humans and could pose significant human health risks.

The ability of current food animal drug regulations to prevent the spread of potential bacterial resistance has been recently debated, and revisions to current regulations have been proposed. With the goal of preventing overuse and misuse of antibiotics, in particular, the FDA-CVM has been working to provide guidance to the animal industry, including aquaculture. In December, 2013, the FDA began implementing a plan to ensure judicious use of antibiotics

in all food animals. This plan will have a three-year transition process from its current status to the new regulations. The purpose of the plan is twofold:

1. For animal pharmaceutical companies to voluntarily revise their FDA-approved use conditions on the labels of these products to remove production indications (to enhance growth or improve feed efficiency.) This is not an issue with aquaculture drugs because no approved label makes this claim.

2. The plan also calls for changing the current over-the-counter (OTC) status to bring the remaining appropriate therapeutic used to treat, control, or prevent disease in animals under veterinary oversight (i.e., VFD drug status.)

By June 30, 2014, all 26 drug manufacturers affected by this Guidance for Industry agreed to fully engage in the proposed strategy.

The FDA also issued a proposed rule to update the existing regulations relating to Veterinary Feed Directive (VFD) drugs, which currently require specific authorization by a licensed veterinarian. The proposed rule intends to facilitate this expanded oversight by clarifying and increasing the flexibility of the administrative requirements for distribution and use of VFD drugs.

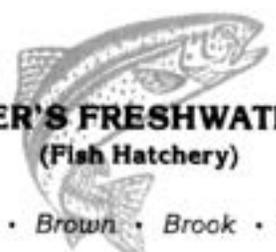
Current and proposed regulations for use of therapeutants in food fish are in place to protect human food sources, not to put undue burdens on food animal producers. It is to everyone's benefit to understand and comply with these regulations to ensure the safety of aquaculture staff, food fish, and the anglers/shoppers who may consume fish.



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DEVELOPING A SPECIFIC IMMUNE RESPONSE FOLLOWING VACCINATION

By: Dr. John Drennan, Fish Pathologist, Colorado Parks and Wildlife, Aquatic Animal Health Laboratory

Vaccination of fish can be an important fish health management tool to prevent or minimize disease caused by a specific pathogen. Vaccines used today can be administered to fish by injection, immersion, or oral route. But how does a vaccine stimulate a specific immune response that will provide protection from a disease causing pathogen? The following is a simplified view of how a specific immune response is initiated. In order to avoid the complicating details necessary to fully describe the dynamics of an immunological response, many of the specific details of the complex interactions of molecules and processes are omitted.

When describing the components of the fish immune system, we generally categorize the different mechanisms of the immune response as non-specific and specific. The non-specific, also called the innate immune system, is the first line of defense. This includes the epithelial surface (skin barrier) of the fish. Within the skin are goblet cells that produce mucous, making up the slime coat. The slime coat has an essential role of preventing the attachment of microbes (bacteria, fungus, parasites, and viruses) to the epithelial surfaces. Additionally, the innate immune system is comprised of soluble blood proteins that circulate throughout the body destroying or inhibit-

ing microbial growth. Growth inhibiting substances act by binding up nutrients essential for bacteria growth. Antiproteases block some microbial toxins that target host tissue. Lysins can disrupt bacterial cell walls. Substances like C-reactive protein and complement bind to pathogens, neutralizing or targeting them for further microbicidal action by the host. In addition to these soluble blood proteins the innate immune system also includes macrophages, neutrophils, and natural cytopathic cells (NCC) that react against pathogens by releasing different bactericidal compounds, destroying infected cells, or eliminating pathogens by the process of phagocytosis (engulfing).

If a pathogen successfully penetrates or evades the first line of defense, then it is dealt with, not only by the non-specific immune response, but also by the specific immune response (adaptive immune system). Specific immunity describes an immune response that is inducible, directed towards specific molecules on the surface of pathogens. The major cells that participate in this kind of response are macrophages, T-lymphocytes, and B-lymphocytes. Specific antibodies produced by B-lymphocytes circulate throughout the vascular system to bind to pathogens,

Developing a Specific Immune Response Following Vaccination - Cont. on Page 6



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Developing a Specific Immune Response - Cont. from Page 5

neutralizing or targeting them for further microbicidal action by the host. Activated T-lymphocytes, such as cytotoxic T-cells attack infected cells.

In mammals, the hematopoietic stem cells that give rise to erythrocytes (red blood cells) and lymphocytes/leucocytes (white blood cells) are located in the bone marrow. Fish do not contain bone marrow and the tissue responsible for producing these types of cells is the anterior portion of the kidney (head kidney). This is the primary site for the development of immature B and T cells, monocytes/macrophages, NCC, and neutrophils.

Unlike mammals that have defined lymph nodes for trapping and processing antigen (foreign bodies) for initiating a specific immune response, the primary tissues in fish for this process are the spleen, gut associated lymphoid tissue (GALT), and kidney. The thymus and head kidney are sites for T-cell and B-cell development, respectively. The spleen, kidney, and GALT are the primary sites where T and B cells interact with macrophage and antigen.

In order to present a scenario of how a specific response is generated, we need to start at early development of T and B-cells. When these cells are created from the hematopoietic stem cells in the head kidney, they are considered immature. On the surface of these cells are receptor molecules made up of proteins folded into grooved structures, which are specific for binding proteins that will fit into that space like a puzzle piece. At this early stage, there is a population of T and B cells where each cell possesses its own unique receptor. Each cell contains many of these receptors, all of which are identical. During development, the specificity of the receptors are randomly generated. Some of these receptors could have been created that recognize self-proteins within the fish. All of these immature cells have to be screened and the cells that recognize self-proteins must be eliminated. Immature T-lymphocytes migrate to the thymus and the immature B-lymphocytes stay in the head kidney for this screening process. Any lymphocyte that reacts with self-proteins is programmed for death. This "clonal deletion" removes self-reactive immature lymphocytes from the body. Once these cells pass this screening process they are allowed to move throughout the blood system and to the antigen trapping tissues of the kidney, spleen, and the GALT.

This process gives rise to a pool of mature lymphocytes, moving throughout the body, where each individual lymphocyte possesses a unique cell surface receptor that is specific for a foreign body. They move around "feeling" objects and other cells. When one of these cells bumps into something that fits the surface receptor like a puzzle piece, the interaction causes that individual cell to respond by cloning itself many times. Usually, the help of macrophages brings about this

interaction. Macrophages have the unique ability to trap, engulf, break the foreign body into many pieces, and present these pieces on the outside of their cells for T and B lymphocytes to recognize. This proliferation of an activated lymphocyte to form many clones of itself now creates a subpopulation of lymphocytes, which all have the same specific cell surface receptors. This ultimately gives rise to an immune response where large numbers of cells are capable of recognizing the same antigen for the initiation of a specific immune response. B-cells that have become activated develop into plasma cells that secrete antibody (immunoglobulin) and T-cells that become activated develop into either cytotoxic T-cells which are capable of identifying and destroying infected cells or they become T-helper cells that directly assist B-cells for the production of antibodies. The cloned lymphocytes are now differentiated into effector cells that have the capabilities of eliminating the antigen.

This scenario is but a brief description of the specific immune defense system and is much generalized. But understanding this particular scenario allows the perception on how a vaccine protects a fish against a pathogen. A vaccine is formulated with antigens, which typically consist of killed whole bacterial cells or inactivated virus or subunits of the specific pathogen that provide fish with protection against disease. Vaccinated fish develop subpopulations of lymphocytes that are specific to antigens on the pathogen. Every time a mature lymphocyte encounters a protein from the vaccine that fits into the groove of its surface receptor, a population of lymphocytes specific towards that antigen is produced. This creates multiple subpopulations of effector cells that have the ability to create numerous disease killing antibodies and cytotoxic T-lymphocytes. In effect, the fish's immune system is now primed and ready to fight off the onset of infection from disease-causing pathogens encountered in its environment.

President's Letter - Cont. from Page 2

know who will be attending our happy hour. Be sure to check out the CAA website later this month for further details pertaining to the meeting and the finalized agenda.

As a reminder the CAA still needs your help! Erin Stewart has worked on the Fishline for the last year and agreed to contribute to keeping the publication in circulation, but she cannot do it alone. We have already reduced the number of issues per year; however, we need to get involvement to keep it going! Let us know if you would like to be an active part of our organization!

I look forward to seeing you all in January! I wish that your New Year brings you good health, abundant happiness, and generous fortune and serenity.

Happy Holidays!

Kendra Holmes, President

56TH WESTERN FISH DISEASE WORKSHOP

56th Western Fish Disease Workshop

Date: June 2 – 4, 2015

Location: Steamboat Springs, CO at the Sheraton Steamboat Resort and Villas

Continuing education will be 6-8 hours on parasites of interest to fish health professionals on June 2nd. This will include the latest research in the discipline as well as a traditional look at the parasites that make our jobs so interesting!

Early hotel registration is available at: <https://www.starwoodmeeting.com/StarGroupsWeb/booking/reservation?id=1410026766&key=CDC42E1>

Please contact Vicki Milano (vicki.milano@state.co.us) or Brandon Taro (Brandon.taro@wyo.gov) if you have any questions. More information to follow soon.

Co Sponsored by: WY Game & Fish Department and Colorado Parks & Wildlife

COLORADO CURRENTS PHYSICAL SECURITY AT AQUACULTURE FACILITIES BECOMES A PRIORITY

By: Bill Mancini, Reprinted from Fish Farming News

Physical security at aquaculture facilities has always been an issue to one degree or another. In the past, it usually took the form of measures to exclude predatory animals, such as birds or mammals, from eating fish stocks in outdoor confinements such as ponds and raceways.

Depending on the location and other circumstances, it has also meant keeping people from stealing fish under the cover of darkness, or even stealing them in broad daylight, depending on the audacity of the thieves.

Physical security today is beginning to take on an entirely different meaning. The times in which we live may now call for tighter physical security around fish farms. Not because of some super-predator or thievery run amok, but because fish farms may now be viewed by some people as a vehicle to do harm to others or set an example.

Recent news stories suggest that radicalized malcontents (with some sort of perverted religious motive or not) appear to be mobilizing in growing numbers. I don't claim to understand or analyze why they do what they do, but so-called "soft targets" are seemingly in their sights—literally.

Those facilities and institutions with no or modest physical security seem to represent to these nutcases attractive soft targets.

With death, destruction, and mayhem as their primary goal (and disruption at the very minimum), physical security can and does offer at least some deterrence to acts of violence.

Many of these incidents involve relatively few people or often just one—the so-called "lone wolf." One person

Physical Security at Aquaculture Facilities - Cont. on Page 10

4-DAY AQUAPONIC FARMING COURSE APRIL 23-26, 2015 DENVER, COLORADO AT FLOURISH FARM

The four day course curriculum is designed to prepare students to manage and operate an aquaponic farming business. This is an advanced course and its strongly recommended that attendees have a solid understanding and grasp of aquaponics basics, system types, the nitrification cycle and entry level aquaponic terminology. Students are encouraged to attend an aquaponics basics class in advance. This goal of the course is to train the whole farmer for success, by showing how to build, start and successfully operate an aquaponics farm. With registration you receive training manual with detailed instructions and plans for building everything demonstrated during the course including all six aquaponic growing styles. The Aquaponic Farming Course features a balanced mix of classroom theory and practical hands-on experience, along with a focus on the critical business skills needed to make a successful aquaponic farm. Go to

<http://aquaponicfarmingcourse.com/> for more information.

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🦄 Senate Republicans Announce Committee Assignments

On Nov. 18th 2014, the Senate Republicans announced their committee assignments for the 70th General Assembly. "The Senate Republicans have a dedicated and talented team committed to ensuring a fair and open process for all committee hearings," said Senate Majority Leader-elect Mark Scheffel (R-Parker). "We look forward to working with our Democratic colleagues to build a better Colorado in the upcoming legislative session." Senate Agriculture, Natural Resources, and Energy

Senator-elect Jerry Sonnenberg – Chair, Senator Ellen Roberts – Vice Chair, Senator Randy Baumgardner Senator-elect Ray Scott, Senator-elect John Cooke

From : <http://blogs.denverpost.com>

🦄 The Colorado Department of agriculture has appointed a new representative to the aquaculture industry: Wayne East (wayne.east@state.co.us). Wayne has a great background that will help serve this role well. We are excited to have him on board and welcome his new insight to aquaculture, captive cervids, and wildlife-agriculture interactions.

Wayne was born in La Junta and is a fifth generation Coloradan. Wayne has a B.S. degree in Wildlife Biology from Colorado State University and a Master's of Public Administration from the University of Colorado at Denver. Prior to joining the Animal Health Division Wayne served as the first full time water conservation coordinator for the City of Northglenn, Executive Director of the Colorado Wildlife Federation, Executive Director

of the International Hunter Education Association, contract administrator for the Colorado Department of Public Health and Environment, and conservation specialist for the Department of Agriculture's State Conservation Board. Wayne enjoys traveling, golfing, hunting, fishing, camping and skiing in his spare time.



Dr. Sara Ahola will continue as the official voting member on the Fish Health Board and Colorado Aquaculture Board for the near future and then we will decide moving forward what is best for the industry and CDA. Wayne will be taking over licensing for the upcoming 2015 renewal season.

🦄 **International team sequences rainbow trout genome** - April 22, 2014 Cynthia King PULLMAN, Wash. – Using fish bred at Washington State University, an international team of researchers has mapped the genetic profile of the rainbow trout, a versatile salmonid whose relatively recent genetic history opens a window into how vertebrates evolve.

The 30-person team, led by Yann Guiguen of the French National Institute for Agricultural Research, reports its findings this week in Nature Communications.

The investigators focused on the rate at which genes have evolved since a rare genome doubling event occurred in the rainbow trout approximately 100 million years ago.

The rainbow trout, *Oncorhynchus mykiss*, is one of life's great success stories. It has straddled the worlds of nature and nurture, naturally thriving in a range of temperatures and water quality while responding to domestication so well that it has been spread by human hand from

Fish Bits - Cont. on Page 9

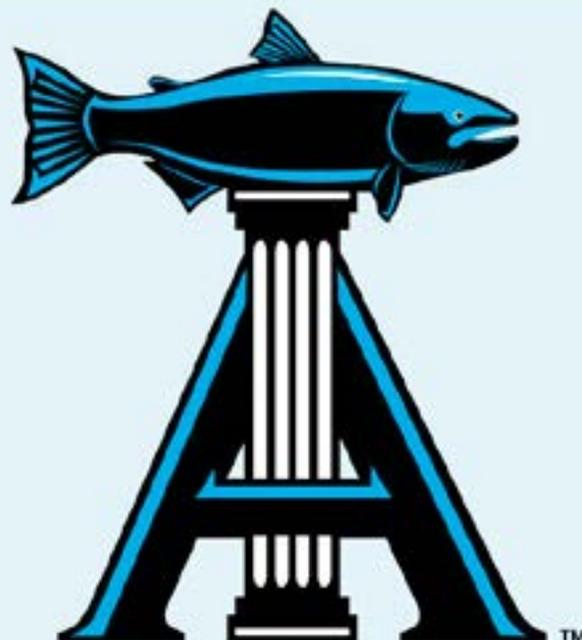
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the Pacific Rim to thrive in waters on six continents.

Guiguen and his colleagues used both the genome sequence and gene expression data from the rainbow trout to show that roughly half of all protein coding genes have been deleted since its genetic doubling event. It has retained almost all its microRNA genes, which help regulate gene expression.

The researchers also found the fish retained original or nearly original genes involved in embryonic development and development of connections between nerve cells. The timing associated with these changes suggests gene evolution after an event such as this is a much slower process than previously thought.

For more information, see "The rainbow trout genome provides novel insights into evolution after whole-genome duplication in vertebrates," Nature Communications, <http://www.nature.com/ncomms/2014/140422/ncomms4657/full/ncomms4657.html>

From : <https://news.wsu.edu/2014/04/22/international-team-sequences-rainbow-trout-genome/#.VHOYSYI0y70>

🌟 **CFIA finds no evidence of infectious salmon anaemia on the west coast; Two-year assessment targeted wild and farmed salmon populations**

November 10, 2014 Canadian Food Inspection Agency (CFIA) News Release: "CFIA finds no evidence of infectious salmon anaemia on the west coast; Two-year assessment targeted wild and farmed salmon populations"

The November 10, 2014 CFIA News Release is posted at the link below:

<http://news.gc.ca/web/article-en.do?nid=902639>

CFIA's topic page on Infectious Salmon Anaemia is posted at

<http://www.inspection.gc.ca/animals/aquatic-animals/diseases/reportable/isa/eng/1327197013896/1327197115891>

Contact: Questions about infectious salmon anaemia in Canada may be addressed to the Canadian Food Inspection Agency (CFIA) National Aquatic Animal Health Program (NAAHP) at 1 (800) 442-2342.

🌟 **Most recent ERS data on domestic, farm-raised catfish and trout and imports and exports of cultured fish and shellfish**

USDA Economic Research Service (ERS)

The November 10, 2014 update of the ERS Aquaculture Data is available via the link below:

<http://www.ers.usda.gov/data-products/aquaculture-data.aspx>

The ERS topic page on Aquaculture is available below:

<http://www.ers.usda.gov/topics/animal-products/aquaculture.aspx>

Questions about the ERS Aquaculture Data may be directed to David Harvey: (202) 694-5177;
e-mail: DJHarvey@ERS.USDA.gov.

🌟 **Research detects antibiotics traces in commercial seafood - 10/27/2014** Two scientists at Arizona State University's Bidesign Institute, doctoral candidate Hansa Done and professor Rolf Halden, have carried out a new study to examine the persistence of antibiotics in seafood raised by aquaculture. As part of their research, they measured the presence of antibiotics in shrimp, salmon, catfish, trout, tilapia and swai, originating from 11 countries. Data from this research -- published in the current issue of the *Journal of Hazardous Materials* -- show traces of five of the 47 antibiotics evaluated in the seafood samples from stores in Arizona and California acquired by The National Oceanic

and Atmospheric Administration (NOAA). "The threat of living in a post-antibiotic era cannot be avoided without revising current practices in the use of antibiotics in animal husbandry, including in aquaculture," says Halden. The results of the study convinced these scientists that changes in aquaculture are needed to ensure the practice can be carried out on a large scale in a sustainable manner. From: www.fis.com

🌟 **FDA investigation reveals limited seafood mislabeling, NFI highlights - 10/29/2014** The US Food and Drug Administration (FDA) has released the results of a two year investigation into seafood labeling from seven hundred DNA samples collected from wholesalers in 14 states, prior to restaurant or retail sale. The study found that 85 per cent of the seafood it tested was properly labeled. The identified mislabeling was found in two species, snappers and groupers, which represent less than two per cent of total seafood sales.

"This extensive federal analysis brings the challenge of mislabeling into a much clearer focus," said John Connelly, President of the National Fisheries Institute (NFI) "While at the same time calling into question other mislabeling 'studies' that suggest the issue is widespread and in need of a legislative fix." The FDA maintains jurisdiction over misbranded food under the Federal Food Drug and Cosmetic Act. The Better Seafood Board (BSB) was established by the National Fisheries Institute to provide a mechanism for industry's partners in the supply chain – restaurants, retail operations, producers and processors - to report suppliers suspected of committing economic fraud. From : www.fis.com

AQUACULTURE RESEARCH PROGRAM FISCAL YEAR 2014 GRANTS

On Oct. 22, 2014, the U.S. Dept. of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA) announced \$1.3 million in funding to support the Aquaculture Research Program. This initiative will support the development of environmentally and economically sustainable aquaculture in the United States, and generate new science-based information and innovations to address industry constraints.

GRANTS - In fiscal year 2014, the Aquaculture Research program funded projects that directly address major constraints to the U.S. aquaculture industry. Funded projects focus on one or more of the following program priorities: 1) genetics of commercial aquaculture species, 2) critical disease issues impacting aquaculture species, 3) design of environmentally and economically sustainable aquaculture production systems, and 4) economic research for increasing aquaculture profitability.

IMPACT - Results from the program will help improve the profitability of the U.S. aquaculture industry, reduce the U.S. trade deficit, increase domestic food security, provide markets for U.S.-produced grain products, increase domestic aquaculture business investment opportunities, and provide more jobs for rural and coastal America.

Aquaculture Research Program - Cont. on Page 10

FISCAL YEAR 2014 AQUACULTURE RESEARCH AWARDS

Auburn University, *Auburn, AL*

\$310,000 The program will identify closely linked markers to the major gene locus controlling low oxygen tolerance and validates and applies such markers for selection of channel catfish and blue catfish used for the production of hybrid catfish, providing immediate benefits to the catfish industry.

University of Connecticut, *Storrs, CT*

\$313,739 This proposed project will promote development of a sustainable sugar kelp industry that can help revitalize working waterfronts and increase employment and economic opportunities for seafood production, processing, and distribution services in Southern New England and New York.

The Massachusetts General Hospital, *Boston, MA*

\$310,000 This project aims to develop efficient sterilization techniques. Sterilization of fish would be invaluable to minimizing the impact of escaped GE fish lines and would also provide increased culture performance by preventing loss of energy to gonad development.

Mississippi State University, *Mississippi State, MS*

\$310,000 This study will evaluate the 35 novel *E. ictaluri* mutants already developed as live attenuated vaccine candidates and establish an optimal immersion-oral vaccination regime.

From: <http://www.nifa.usda.gov/aquaculture.cfm>

Physical Security at Aquaculture Facilities - Cont. from Page 7

certainly can do a lot of damage. But one person is a far cry from even a small group whose effects can far outweigh the mere sum of their parts.

The Earth Liberation Front (ELF) and ISIS sympathizers are prime examples of individuals and small groups who are hell-bent on maximizing destruction by targeting poorly secured facilities.

The lone wolf can be likened to a burglar scoping out a house or shop. The vicinity of the burglar may be full of targets. But the burglar generally chooses the one that is the easiest to access.

Barred and locked windows and doors, security cameras, and security fences often suggest to the criminal they should look elsewhere. The burglar thinks, why take an unwarranted risk or take on too much work to achieve a goal?

Fish farms are usually some of the softest targets around. Indeed, facilities run by government agencies (the focus of many terrorist groups or disgruntled individuals) often encourage visitation! Losing these facilities as tools for educating the general public would be very unfortunate, but could soon become a reality if the pace of attacks quickens and originality of targeting broadens.

While it's the responsibility of each facility owner—public sector or private sector—to make their own determination as to the vulnerability of their facility and the likelihood of it being attacked in some way, all of them are in some way at a higher relative risk as compared to the past.

An attack could come in many different forms including direct physical attacks on the facility's workers, fish stocks, water supply, containment vessels (e.g., ponds, tanks, raceways), or support equipment and structures.

**SBA ECONOMIC INJURY DISASTER
LOANS AVAILABLE TO COLORADO
SMALL BUSINESSES**

SACRAMENTO, Calif. – Small, nonfarm businesses in the Colorado counties of Bent, Crowley, Kiowa, Las Animas, Otero and Pueblo are now eligible to apply for low-interest federal disaster loans from the U. S. Small Business Administration (SBA). These loans offset economic losses because of reduced revenues caused by the hailstorm that occurred on July 16, 2014, in Otero County, announced Tanya N. Garfield, Director of SBA's Disaster Field Operations Center West.

"SBA eligibility covers both the economic impacts on businesses dependent on farmers and ranchers that have suffered agricultural production losses caused by the disaster and businesses directly impacted by the disaster," Garfield said.

Small, nonfarm businesses, small agricultural cooperatives, small businesses engaged in aquaculture and most private nonprofit organizations of any size may qualify for Economic Injury Disaster Loans (EIDLs) of up to \$2 million to help meet financial obligations and operating expenses which could have been met had the disaster not occurred.

By law, SBA makes EIDLs available when the U. S. Secretary of Agriculture designates an agricultural disaster. Secretary Tom Vilsack declared this disaster on October 15, 2014.

Disaster loan information and application forms are also available from SBA's Customer Service Center by calling (800) 659-2955 or e-mailing disastercustomerservice@sba.gov. Individuals who are deaf or hard-of-hearing may call (800) 877-8339. For more information about SBA's disaster assistance programs, visit <http://www.sba.gov/disaster>. Applicants may apply online using the Electronic Loan Application (ELA) via SBA's secure Web site at <https://disasterloan.sba.gov/ela>.

The deadline to apply for these loans is June 15, 2015.

Poisons and toxicants could be used to kill fish as they swim. Or, even more insidious, contamination of fish with sub-lethal doses of chemicals or biological agents could lead to illness and death of consumers eating the fish as food.

I fear it will take a real-life incident to move some owners to action on this matter. That seems to be the case these days. Sometimes that is not even enough for people to stop saying, "That can't happen to me."

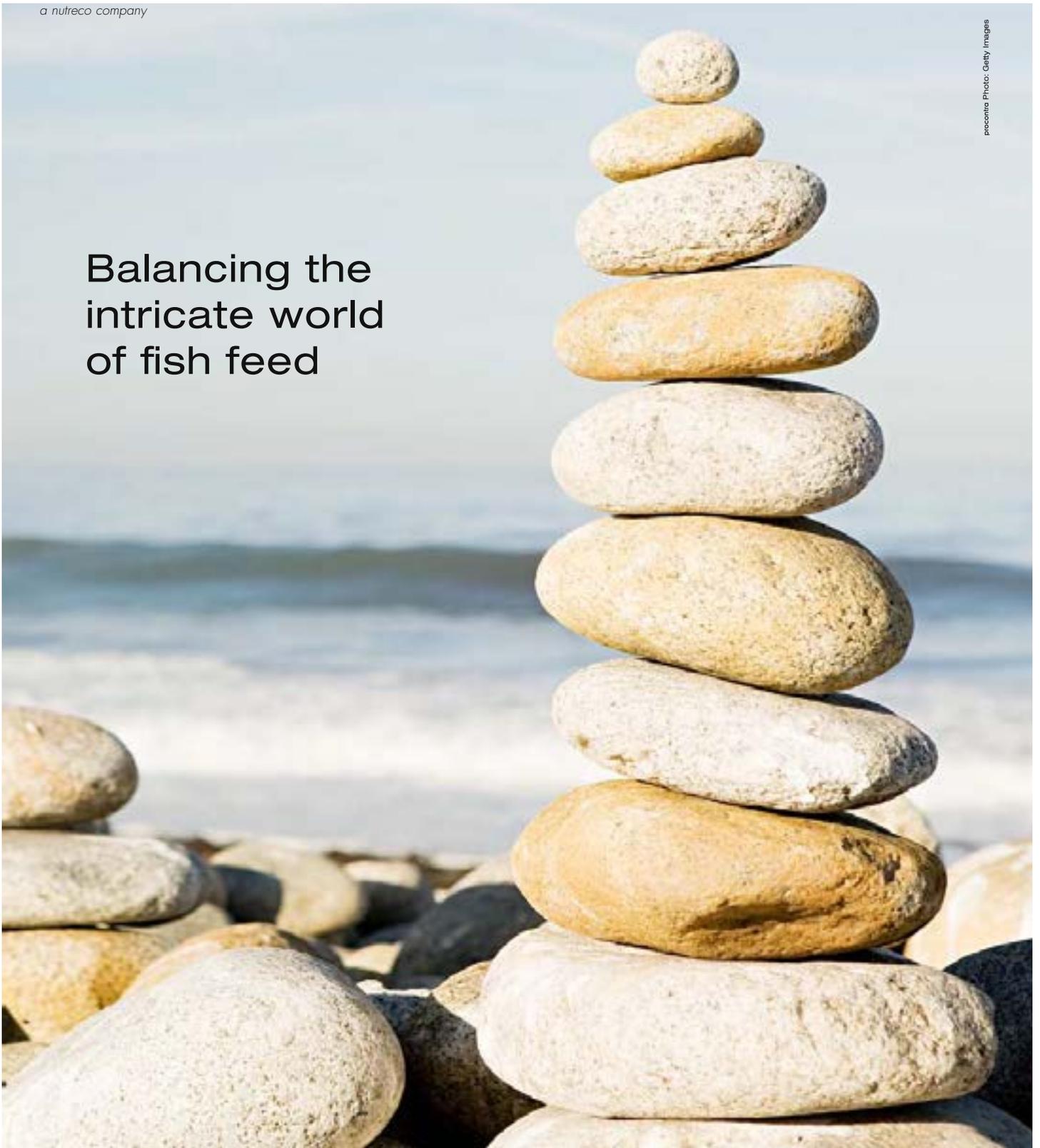
I have been alive enough years and have enough objectivity to deny that I suffer from the Chicken Little Syndrome. While the sky definitely is not falling, we all must be more sober about the times in which we live, and be more willing to give security at our facilities a bit more thought.

If for whatever reason, some psychopath is determined to single out your facility as a focus of his wrath, there is probably not much any of us can do about it.

On the other hand, making our facilities less inviting and less accessible is probably a good idea.

Bill Mancini is president of Fisheries Technology Associates, Inc., a Fort Collins, Colorado-based aquaculture, aquaponics, and fisheries consulting firm. He may be reached at 970-225-0150 or mancini@ftai.com.

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This information will help us categorize your business in the CAA Directory:

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- 3. Warm Water Fish Producer
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- 5. Egg Producer
- 6. Feed Supplier & Producer
- 7. Aquatic Consultant
- 7a. Fish Health Services
- 8. Equipment, Supplies, etc.
- 9. Aquaculture Management Services
- 10. Fee Fishing, Catch-Out
- 11. Educator
- 12. Food Fish
- 13. Public Sector Personnel
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