California
AQuatic Farming

Official Bi-Annual Publication of the California Aquaculture Association
www.caa-aqua.org
Spring 2001

CAA's Waterwise Aquaculture Makes its Mark

The 2001 California Aquaculture Conference and Trade Show held March 18-21, 2001 at the Radisson Hotel provided the varied program, informative exhibits and interesting tours that we promised. The Monday evening reception set a new standard in seafood excellence!

In response to the interest in the current energy crisis, Matt Tennis from the Agricultural Energy Consumers Association provided an excellent overview of where we are in the power crisis ... and how we got here. Dave Kranz, California Farm Bureau Federation (CFBF) Water Information Director and Carl Hauge, Department of Water Resources Chief Hydrologist explained the State's intricate hydrological scene and efforts like CAL-FED to better manage the multiplicity of demands on our limited water resources.

The second half of the first day focused on regulatory issues at the state, regional and national levels. Ria de Grassi, CFBF's Director of National Affairs shared lessons from other sectors of agriculture that will help our industry deal with public relations issues such as animal welfare and bioengineering.

Our Annual General Meeting included a discussion on the perennial question of how to launch an industry wide marketing campaign.

The following day showcased the extensive aquaculture research capabilities and accomplishments of U.C. Davis. Our "Roundtable" luncheon provided the customary informal opportunity for more focused and individualized discussions on a wide variety of aquaculture matters. The presentations from the Fish and Game Department and Fish and Game Commission provided the setting for the final four sessions on basic and advanced freshwater and marine production technologies.

Each year CAA hosts, or co-hosts, a local, regional, national or international conference and trade show. This is no small accomplishment and CAA wishes to thank the organizers, sponsors, exhibitors, speakers, chefs and attendees for another success. We urge your active participation in the development of the program and tours for next year to ensure that we continue to serve our members and the industry the very best we can.

*The collage of photographs in the centerfold captures some of the conference functions and fun.

Dedicated to furthering the success of commercial aquaculture in California.

For Membership, Publications and Aquaculture Production information, Contact

CAA
Sheryl Baldwin
Manager
3700 Chaney Court
Carmichael, CA
95608
916.944.8477
fax 916.944.2256
sherylbaldwin@aol.com

For Legislative and Regulatory Issues or Media Events, contact

CAA
Justin Malan
Executive Director
916.944.7315
fax 916.944.2256
jgmalan@aol.com

Editorial

Fish farmers are a pretty independent and resourceful breed. We generally do not look for government handouts and usually try to tackle the various obstacles alone. Over the years we have earned a well-deserved reputation in California for being both innovative and resilient. It is the Golden State farmers that have pioneered some of the cutting edge culture technology and have been in the forefront of the development of several new commercial species like abalone, sturgeon and bass.

While California aquaculture has enjoyed a steady growth over the past several decades - with revenues more than doubling in the past 6 or 7 years - we do have our challenges. Limited good quality water, expensive land and labor, exorbitant energy costs and a tough regulatory environment are key limiting factors to unbridled growth. Our diversity and our relatively small contribution to the State's $26 billion agriculture industry limit our political and collective bargaining clout. As regulations get even tougher, as water becomes more scarce and as energy bills rise, we need to safeguard our place in the economy.

Fortunately California aquaculture has an ally in our Secretary of Food and Agriculture, Bill Lyons. Recognizing that the sustainable aquaculture that we practice in the State is not only a viable and positive component of the State's agriculture base, but also significant in reducing our huge seafood trade deficit, Secretary Lyons has taken up our banner. In the article on page 10 we outline what steps we have proposed to be included in the 2002 Farm Bill to help our industry here and in other states.

There will continue to be debate over the appropriate level of regulation of business, but there should be no debate that our federal, state and local governments must be charged with assisting legitimate enterprises meet these mandates. Leveling the international trade exchange, supporting best management practices, funding research and providing efficient animal health services are some areas in which the agencies can help.

MARK YOUR CALENDARS!

CAA to host the 2002 Aquaculture America January 27 - 30, 2002

Another world-class convention with stimulating speakers, fascinating tours and CAA's famous Aquaculture Product Reception will make this the aquaculture event of the year. For more information contact John Cooksey at 760-432-4270 worldaqua@aol.com

January 27 - 30, 2002
Town and Country Resort
San Diego, California
800-772-8527

Nation at a Glance

NATION AT A GLANCE

• The Pacific Coast Shellfish Growers' Association recently received a $60,000 grant from the US Department of Agriculture (USDA) intended to benefit oyster growers in Alaska, Washington, Oregon & California. The grant will be used to assess current marketplace trends and patterns, and to identify possible niches and consumer sectors for the industry to explore. Additionally, an interactive database will be developed to assist growers.

• In late October 2000, President Clinton signed an appropriations bill for USDA authorizing $2.5 million for a feasibility study by USDA's Agricultural Research Service and the University of Maine to determine what kind of programs and facilities might be appropriate as part of a cold-water aquaculture center that could serve the salmonid industry.

Congress added $500,000 to USDA's Agricultural Research Service budget last year to address high priority aquaculture research needs of the Harbor Branch Oceanographic Institute (HBOI) (Florida). An Agricultural Research Service scientist will likely be located at HBOI and focus on developing high tech systems for aquaculture, primarily small scale, indoor recirculating systems that are environmentally sustainable, energy efficient, and cost effective.

Governor Bush of Florida recently submitted an e-budget to the Legislature containing nearly $5 million for the Division of Aquaculture (Included are 55 staff positions and $1 million for aquaculture development program grants.). Additional information is available at <www.leg.state.fl.us>.

• Florida's Aquaculture Review Council surveyed other states to see how they dealt with funding for aquaculture projects. Of the 16 states responding, 5 do not fund aquaculture at the state level, 4 fund projects irregularly through the legislature or fund a center, and 7 fund projects through grant programs for all agriculture or other appropriate areas. One state has a grant program specifically for aquaculture. "Connecticut provides up to $40,000 for infrastructure and capital improvement projects in the form of a matching grant. Maine provides $150,000 annually to the Maine Aquaculture Innovation Center. Maryland has a loan fund of $1-2 million that funds 80% of projects for capitol projects. Low interest loans are available and private entities can team up with the University of Maryland with $1 of match for every $2 of university funding. Virginia funds grant programs for research and development such as at Virginia Tech or VIMS. Wisconsin has an Agriculture Development and Diversification Program funded at $400,000 annually and expected to go to over $1 million this year for industry driven projects evaluated competitively. Industry is free to choose their research partners." Source: Florida Aquaculture Association Newsletter.

• For the first time ever, the American Heart Association has released guidelines recommending Americans eat two servings weekly of fish containing high levels of Omega-3 fatty acid.

The United Nations Food and Agriculture Organization, in a report called "The State of World Fisheries and Aquaculture 2000", claimed aquaculture will be providing more than half of the world's fish & seafood consumption by 2030. The Code of Conduct for Responsible Fisheries adopted by the Food and Agriculture Organization of the United Nations is available on the Internet at <www.fao.org/fi/agreem/codecond/ficonde.asp>.

• Rainbow trout have magnetic compasses in their noses that assist them in navigation according to research biologists at the University of Auckland, New Zealand. They found cells in the nose of rainbow trout containing a magnetic crystal known as magnetite. These cells make up nerve fibers in the fish's face and fire when exposed to a magnetic field. They traced the fibers and connections to the fish's brain, where the fibers and connections acted as little compass needles, providing the fish information about the earth's magnetic field that enabled them to determine their position and aided them in migration. Dr. Michael Walker of the University of Auckland's School of Biological Science believes similar results will be found in a wide range of migratory animals.

• The Environmental Protection Agency (EPA) developed a mandatory survey instrument intended to be completed by every aquaculture facility in USA that, even by EPA's own estimate, would require 31 hours to complete. Results of the survey would then be used to develop effluent limitation guidelines for the aquaculture industry. The outrageous survey motivated American Farm Bureau and others to strongly object. AFBF's (and state farm bureaus) comments on the draft survey in the Federal Register were sent to EPA and were also sent to the Office of Management and Budget (OMB), which must approve the survey. The result, OMB questioned EPA about their proposed survey. EPA's initiative is now being held to a higher standard due to the cooperation between AFBF and USDA's

National Agricultural Statistics Service. (Farm Bureau News, March 5, 2001)

• Dr. Ray RaLonde, a fisheries professor at the University of Alaska, accused the Alaska Department of Fish & Game (ADFG) of working to prevent Alaska from developing a potentially lucrative shellfish growing industry. In the last two-year licensing cycle, not a single geoduck or littleneck clam license was approved. In typical bureaucratic fashion, ADFG responded by saying changes in regulations were not significant and that further information was needed on many applications. Like California Department of Fish & Game, ADFG is charged with developing the shellfish aquaculture industry. Ken Imamura, of the Mariculture Division said that it depends on how you interpret that duty under the regulations (Does this sound familiar?).

• In a 5-4 ruling, the U.S. Supreme Court said the U.S. Army Corps of Engineers over stepped its authority and all reason when in 1986 the Corps rewrote their regulations claiming the occasional use of isolated ponds, mudflats, trenches, and other isolated waters by migratory birds made them "waters of the United States" under the 1972 Clean Water Act. In this case the Corps sought to prohibit several suburban Chicago cities from using 17 acres of ponds and small lakes for landfill. On other occasions, federal officials have cited pools of winter rainwater on ranchlands as a basis for jurisdiction to prevent landowners from planting certain crops or grazing cattle on the land.

• The Pacific Legal Foundation (PLF) continues to challenge, in state and federal courts, Organ's bizarre policy of slaughtering hatchery-spawned coastal coho salmon as a method of preserving so-called "wild" salmon, which are indistinguishable from hatchery salmon. Yet coho salmon are listed as a threatened species. PLF is arguing in state court that under the Alsea River Management Plan the state lacks authority to kill the salmon. PLF is arguing in federal court that the U.S. National Marine Fisheries Service should prevent the state from killing returning coho salmon and allow them to propagate.

• The Pacific Legal Foundation is predicting activist environmental organizations will initiate a wave of large-scale lawsuits against private landowners and business property owners during the Bush administration to stimulate contributions for their causes, and, in the process, fatten the pockets of trial lawyers.

• The Environmental Protection Agency estimates that 2.4% of the nation's water wells exceed the maximum acceptable 10-ppm nitrate standard it set for drinking water. Nitrates are highly soluble and can move quickly into groundwater. Primary causes of nitrate contamination are fertilizers, human and animal waste, and explosives. Recently researchers at the University of New Mexico discovered a solution to the problem of nitrate contaminated groundwater. The addition of a form of vinegar (neutralized acetate) to nitrate contaminated groundwater provides a food source to naturally occurring bacteria in the soil that promoted denitrofication. Denitrofication is the biochemical reduction of nitrate-nitrogen to nitrogen gas in the absence of oxygen. The report, "Technology Overview on Emerging Technologies for Enhanced In Situ Biodenitrification of Nitrate-Contaminated Groundwater", may be accessed at <www.itrcweb.org>.

According to Dr. Gerard Nihous, spokesman for The Ocean Sequestration of CO2, the bottom the ocean acts as storehouse for excess carbon dioxide. But in nature this is a slow process, not fast enough to significantly affect the "global warming" perceived by some to be occurring. Yet when The Ocean Sequestration of CO2 announced a proposed experiment to dump 60 tons of CO2 into the waters off the Kona Coast to speed up the process, a storm of protest ensued. Nihous said the opponents are irresponsible, xenophobic and their claims are without scientific basis.

• The average American family earned enough from January 1, to February 7 (38 days) to pay its entire 2001 food bill, 10.4% of their disposable personal income. In contrast, the average American family must work from January 1 to May 3 to pay their taxes. Source: California Farm Bureau Federation.

• Maryland caviar import companies (U.S. Caviar and Caviar Ltd.) were fined $10.4 million in February 2001. In addition, Hossein Lolavar, company president, received a 41 month prison sentence, Ken Noroozi (Lolavar's brother-in-law) received a 15 month prison sentence, and Faye Briggs received a 21-month prison sentence for smuggling black market Russian caviar into USA between 1995 and 1999.

California at a Glance

• Shellfish aquaculture in Tomales Bay has long been threatened by failed septic systems and contaminated run-off water. Recently, a Marin County Grand Jury found the entire system for monitoring and enforcing septic standards needs to be overhauled and that even current standards were not being enforced. Two county staff members lost their job as a result of the investigation. As a result of the investigation, a 15 member Septic Technical Advisory Committee was formed to revise the current septic code in the county. Additionally, a new Watershed Council was formed to look at land use and water quality issues from a comprehensive, long-term perspective.

• The use of waterdogs (salamanders) for live bait fishing was banned by the California Fish & Game Commission on March 15, 2001. The Commission and DFG was pressured by US Fish & Wildlife Service (USFWS) to take this action because USFWS considers the California species (Ambystoma Californiense) a species of special concern and a candidate for listing under the Federal Endangered Species Act. USFWS considers the imported non-native sub-species (Anbystoma tigrinium ssp.) commonly used for bait a threat to the California salamander. The ban is statewide even though the California tiger salamander is found principally in the lower San Joaquin Valley, over to the Central Coast and down to the Ventura County area. The Commission's action exceeded the recommendation of the Department of Fish & Game to still permit waterdog use in San Diego & the Colorado River. A special DFG permit is now required to possess, transport, or sell waterdogs for any purpose, anywhere in California.

• California Farm Bureau Federation (CFBF) filed lawsuits in both federal and state courts seeking injunctions to prohibit further land and water acquisitions and conversion until adequate environmental reports are prepared and the Cal-Fed program complies with federal land and state water and environmental laws. CFBF contends the Call-Fed plan seeks to remove approximately one million acres of farmland from production and hundreds of thousands acre-feet of water allocated for farming. Such impacts have devastating impact on rural areas and agriculture interest while offering little benefit to endangered species and perhaps negative overall impact on wildlife.

• In a recent Editorial, Western Outdoor News complained that there is too much marshland in California. There is so much seasonally flooded marshland it said, including over 150,000-plus acres of rice land, that ducks are abandoning the refuges and scattering to such degree that they are no longer available to duck hunters.

• The 23.76 pound rainbow trout caught by Craig Joachim bested the existing California record, but soon after submitting data for record consideration he withdrew his application for a record. Why? He was fed up with the hassle he was getting over it being a hatchery-reared fish.

• A "killer algae", Caulerpa taxifolia, was discovered in California's Huntington Harbor and Aqua Hedionda Lagoon in Southern California. The fast growing seaweed is foreign to United States and is apt to take over and displace some native seaweed such as eelgrass and kelp, threatening some native marine life. This alga has devastated large areas of the Mediterranean Sea and is known to grow up to one-inch per day. Additional information is available at <http//:swr.nmfs.noaa.gov/hcd/caulerpa.htm>.

• In February 2001, the California Department of Fish & Game (DFG) held a series of scoping workshops to receive public comment on the Department's approach for developing a Nearshore Fisheries Management Plan.

• Susan Williams is the new Director of Bodgea Marine Laboratory (UCD). <slwilliams@ucdavis.edu>.

Congratulations to Perry & Diane Engle. They celebrated their 50th Wedding Anniversary at a surprise party given by their children Eileen, Ken & Paul, with about 60 people in attendance to help them celebrate. Perry represents Nelson Silver Cup Feeds.

SactoNews

from the Briefcase of CAA Executive Director Justin Malan (jgmalan@aol.com)

The energy crisis continues to dominate Capitol politics as we move into the early summer with little room for optimism that it will be quickly resolved. It does appear that only huge injections of cash from State coffers with keep the lights on, rates manageable and political egos at least partially intact. CAA has recognized the need to join the all-consuming debate and advocate for the protection of agricultural energy supplies and the regulatory flexibility to use backup power sources that will keep our fish alive during the inevitable summer blackouts. Several energy bills, including SB 1003 (Poochigian) which would urge the Department of Food and Agriculture to protect the industry from power problems, deserve our support. Everyone interested in helping agriculture through this difficult period is encouraged to call CAA or his or her local farm bureau to find out how they can support these legislative efforts. (See list of bills being tracked by CAA on Page 11.)

• Other proposed legislation that may help our industry include AB 7 (Cardoza) which exempts farm equipment and machinery from state sales tax; AB 801 (Salinas) which encourages institutional purchase of California produce; AB 1332 (Cardoza) which promotes agricultural marketing; and both SB 875 and AB 290 which would provide income tax credits for certain agricultural activities.

• Compliance with existing laws and regulations remains a significant challenge for the industry in California. CAA is working actively with several growers on NPDES water quality monitoring requirements, shellfish growing waters classification and kelp harvesting regulations. CAA urges all members to contact our office for help on regulatory issues such as these.

• At the 2001 Conference and Trade Show held in Sacramento in mid March, the newly elected Board voted in its new officers. After nearly two decades of serving a Secretary of the organization, George Ray was chosen to be President. The four Vice -Presidents, Dr. Robert Rofen, Jim Michaels, Tony Vaught and David McHone each serve as Chairs of CAA's committees - the Member Services, the Research and Promotion, the Government Affairs and Conference Committee respectively. Dennis Faria continues to serve as Treasurer. We have no shortage of tasks to accomplish. All members are urged to join CAA's Board in identifying and addressing the industry's greatest needs.

Getting to know you...
an interview with CAA Board member Randy Reed

CAA: What exactly are you raising?

Randy: Reed Mariculture is the leading commercial producer of marine microalgae in the world. Our algae concentrates are used to grow larval fish, shrimp, and bivalve shellfish. Our current products are Nannochloropsis, Tetraselmis, Isochrysis, and Chaetoceros and we ship to countries all over the world.

CAA: Are you doing this alone? Do you have any partners in this venture?

Randy: This is primarily a family run business, although we do have several shareholders. We do not have any partners.

CAA: How long have you been in aquaculture? What made you chose this field?

Randy: Our company was founded by my brother Tim in 1995. The original idea behind the company was to produce marketable oysters and other shellfish in a closed recirculating system several miles from the ocean. We built large tanks with racks to hold the oysters, and designed large photobioreactors to produce the algae needed to feed them. Our market niche was high end oysters bars where we could promote our super clean oysters, and the ability to sell fresh oysters year round without seasonal or weather closures. After 3 years of development we were ready to launch our product, but at the same time we started getting calls asking if we could sell our excess algae. In February 1998 we introduced our first algae product at the World Aquaculture Convention and the rest is history. Microalgae is critical to marine larviculture. Fish hatcheries use it to grow rotifers and copepods, and for greenwater; shrimp hatcheries feed algae during the zoea, mysis, and early PL stages; and bivalve shellfish hatcheries use it for setting larvae, remote setting, and broodstock conditioning. Hatcheries have traditionally grown live algae in the hatchery, where it consumes up to 40% of the space and over half the cost. Producing live algae also increases risk because if the cultures crash the animals are put at risk. Our products reduce costs and risks by providing an "off-the-shelf' algae solution. Our products are concentrated up to 4,000 X so they can easily be transported and stored. This allows the hatchery to focus on their target animals and effectively utilize their space. And with our economies of scale in producing algae we can provide it at a much lower cost. We are not currently working on the shellfish product but plan to get back to it. I've been part of the company since the beginning, mostly working on weekends. My background is Computer Information Systems and I worked for Hewlett Packard for 13 years doing programming, database design, artificial intelligence applications, and built a multi-million dollar Windows NT data center at their corporate headquarters. I left HP in 1998 when our business really started taking off and currently work full time (100+ hours / week!) at RMI.

CAA: What are your plans for expansion?

Randy: Our goal is to be the recognized leader in marine plankton feeds (microalgae, macroalgae, and zooplankton). We have established ourselves in microalgae and plan to introduce our first zooplankton products (rotifers, copepods, and mysid shrimp) later this year. Next year we will be introducing macroalgae products for grazing animals such as abalone and sea urchins.

CAA: We understand that you also design and support websites, and other Internet applications. Is this a business interest, or just a hobby?

Randy: I do limited consulting for a couple of dot.com start-ups here in the silicon valley. HP gave me a strong background in a variety of computer fields so I can help steer them through the hurdles that small companies face. It's mostly a hobby but it also keeps my fingers in the IT world.

CAA: You have offered to establish CAA's website — www.caa-aqua.org What services and features are you planning for the site?

Randy: I have found that what most customers want from a website is fast, easy access to information - not fancy graphics or sounds. My goal will be to organize the website into several broad areas, then use easy menus to "drill down" into the information. Quick loading pages are very important since not everybody has fast internet access. I'd also like to set up "e-mail newsletters" to get information out to members, and "e-mail discussion groups" about various topics.

CAA: Finally, in your opinion, what should CAA do to help members like you?

Randy: Justin - that's a hard one to answer since I really don't know much about CAA, even though I'm now on the board. We've been part of CAA since 1995 and all we've ever done is pay our dues. I guess that's a problem right there - if I don't know what it does, probably many other people don't either.

CALIFORNIA SEAGRANT AQUACULTURE RESEARCH AND DEVELOPMENT

"Collaborative Studies with the University of Hawaii: Studies Addressing the Growth-Stimulating Potential of Recombinant Bovine Growth Hormone in the Aquaculture of Tilapia and Shrimp", (R/A-111), E.S. Chang (UCD) & T.B. Hayes (UCB).

"Control of Rickettsial Infections in White Seabass (Atractoscion mobills)", (R/A-114, R.P. Hedrick (UCD) & K.D. Arkush (BML).

"Tools for Management of Withering Syndrome in Abalone, Haliotis ssp.: PCR Detection and Feed-Based Therapeutic Treatment", (R/A), C.S. Friedman (UCD).

"Development of a Recirculation System and Diet for the Culture of California Halibut (Paralichtys californicus)", (R/A), R.H. Piedrahita & D.E. Conklin (UCD).

"Characterizing the Role of Environmental Stressors in the Development of Withering Syndrome in Red Abalone", (R/A), R.A. Tjeerdema, et al (UCD).

The University of California recently published Aquatic Pest Control, a 168-page study guide for preparation of the pesticide applicator's exam. Information is provided on identifying aquatic weeds & pests, understanding pesticide labels, mixing & applying pesticides safely, equipment, and regulations.

DFG Contacts

Significant changes have occurred in organization and staffing at the Department of Fish and Game over the past year. Current key contacts for California Registered Aquaculturists at local regional offices are listed below:

Region 1 - Northern California and North Coast - Redding Regional Manager - Don Koch Aquaculture contact - Gary Stacy - (530) 225-2300 Region 2 - Sacramento Valley and Central Sierra - Rancho Cordova Regional Manager - Banky Curtis Aquaculture contact - Nick Villa - (916) 358-2943 Region 3 - Central Coast - Napa Regional Manager - Rob Floerke Aquaculture contact - John Emig - (707) 944-5567 Region 4 - San Joaquin Valley and Southern Sierra - Fresno Regional Manager - Bill Loudermilk Aquaculture contact - Randy Kelley - (559) 243-4017 Region 5 - South Coast - San Diego Regional Manager - Chuck Raysbrook Aquaculture contact - Marty Muschinske (619) 468-3064 Region 6 - Inland Deserts and Eastern Sierra - Long Beach Regional Manager - Curt Taucher Aquaculture contact - Terry Foreman - (760) 788-5727 Marine Region - Monterey Regional Manager - Patty Wolf Aquaculture contact - Fred Wendell - (805) 772-1714

NEW COLORADO REGULATIONS

California aquaculturists importing or exporting live fish through Colorado should be aware of new regulation, effective March 1, 2001, that governs transportation of live fish through that state. In summary, the regulations require appropriate documents to be carried in the delivery truck whether fish are being delivered to Colorado or merely being transported through Colorado in route to another state. All fish haulers must carry in their truck: 1. An importation permit if fish are being brought into Colorado. A current fish health certificate is required for all trucks stocking salmonids in Colorado waters. Or, 2. Documentation that the shipment is being transported through Colorado for permitted release in another state, or, if the receiving state does not require any such permits, documentation showing name, address and phone number of the receiving facility.

Business Developments

Whole Foods Market, a natural-foods retailer, announced plans to pull caviar produced from wild sturgeon stocks and instead carry only caviar from sturgeon farm raised in California's Sacramento Valley. (Source: Seafood Business 12/2000)

In a letter to the editor of the Colorado Aquaculture Association's Newsletter, Jim Keeton, President of **Keeton Industries, Inc.** of Fort Collins, CO, describes his struggle with the City of Fort Bragg, CA in his effort to construct a fish and finfish farm for the propagation of abalone, shrimp, and finfish species (species already approved for culture in California by DFG). After two and one-half years and an expenditure of over $180,000, the city has not issued one permit that would allow the project to begin and there is no clear date in sight. In frustration, he says, "we (fish farmers) are on the brink of extinction, more so than the endangered species we try to protect."

Randy Lovell's **Balanced AquaSystems** company recently merged with Royce Instrument Corporation, with Randy becoming the manager of Royce's newly formed aquaculture division.

The 4th District Court of Appeals overturned a judgement against the California Department of Health Services in which a jury unanimously awarded $290,000 to **Carlsbad Aquafarm** for lost revenues in 1996-97 because the Department failed in its due process obligation when it removed Carlsbad Aquafarm from the Interstate Certified Shellfish Shippers list. The Court said Carlsbad Aquafarm should have immediately filed a petition with the Superior Court in March 1996 seeking to overturn the delisting rather than wait 14 months to file a civil complaint. The Appeals court concurred with the lower court that due process was denied to Carlsbad Aquafarm by the Department of Health Services.

Dave Ptak, VP and General Manager of Chesapeake Fish Company, died on January 17, 2001 following a vehicle accident in Mexico. Dave & Chesapeake Fish Company have been friends of the aquaculture industry for many years.

CAA "WishList" for the 2002 Farm Bill

CALIFORNIA AQUACULTURE "WISHLIST" OF ISSUES FOR INCLUSION INTO THE 2002 FARM BILL

DEFINITION/DESCRIPTION OF AQUACULTURE

Aquaculture is the production of aquatic plants and animals in fresh water, brackish water and salt water for human and animal food, for recreational fishing, for resource enhancement, for the aquarium or garden trade and for other specialized purposes such as the pharmaceutical industry. Aquaculture may involve a wide variety of production methods, including ponds, tanks, raceways, net pens, cages, and racks on land, along the coast, in enclosed bays and estuaries and in the open ocean.

PRIORITIES/ELIGIBLE ACTIVITIES TO BE IDENTIFIED AND FUNDED IN 2002 FARM BILL

Tier One

1. Ensure the legal availability of adequate and effective theraputents to assist aquaculturists control and combat disease. Note: The passage of the federal Minor Use/Minor Species (MUMS) legislation would be a significant help to the industry.
2. Declare USDA the lead agency for ALL aquaculture. Note: Currently Dept. of Commerce (NOAA) takes the lead on aquaculture in the EEZ.
3. Prioritize the role of APHIS to: A) Provide disease certification of live aquaculture products - especially international exports - upon request, and B) Provide industry and state agencies with resources and assistance in the control of highly contagious, high priority diseases of aquaculture species of national significance. Note: Much, if not all, of the aquaculture industry is seeking an enhanced supportive, not an additional/duplicative regulatory role for APHIS. The VS Aquaculture Strategic Plan (April 1999) is too heavy on regulation and not focused sufficiently on supportive services.
4. Increase funding for the Western Regional Aquaculture Centers (WRAC).
5. Provide grants to industry for the development of Best Management Practices (BMPs) that increase production, reduce costs and minimize environmental impacts.

Tier 2

1. Control introduction of invasive/pest aquatic species from ballast water, unregulated movement of aquatic species or other trade.
2. Inclusion of California and other exempt states in the blanket depredation order allowing the take of cormorants - as enjoyed in other states.
3. Provide marketing assistance for domestic products and labeling requirements for imported/ foreign food products.
4. Provide assistance with industry quality assurance programs.
5. Provide assistance to aquaculture industry in foreign trade issues such as product "dumping", compliance with CITES and other international trade conventions and pacts that impair US aquaculture exports.

2001 Legislation being tracked by CAA

CAA is in the process of determining its position on each of these bills. The full text of these, and all bills introduced this year, can be found on the Legislature's website www.leginfo.ca.gov . CAA members are urged to contact Justin Malan, CAA Executive Director, with any questions regarding CAA's position on these bills or on any other legislative matter.

AB 7 Cardoza: Sales and use taxes: farm equipment and machinery.

Digest Summary: The Sales and Use Tax Law imposes a tax on the gross receipts from the sale in this state of, or the storage, use, or other consumption in this state of, tangible personal property. This bill would additionally exempt farm equipment and machinery from taxation under the Sales and Use Tax Law.

AB 52, Wiggins: California Farmland Conservation Bond Act of 2002.

Digest Summary: This bill would enact the California Farmland Conservation Bond Act of 2002 which, if adopted, would authorize, for the purpose of financing a program for the acquisition, development, improvement, rehabilitation, restoration, enhancement, and protection of farmlands in California, the issuance, pursuant to the State General Obligation Bond Law, of bonds in the amount of $____.

AB 290 Cogdill: Personal income and bank corporation taxes: credit: manufacturer's investment.

Digest Summary:The Personal Income Tax Law and the Bank and Corporation Tax Law authorize various credits against the taxes imposed by those laws, including a credit against taxes imposed by those laws in an amount equal to 6% of the amount paid or incurred by a qualified taxpayer, as defined, during the taxable year for qualified property, as defined, that is placed in service in this state. This bill would expand this credit by expanding the definitions of qualified taxpayer and qualified property to include taxpayers and property related to certain agricultural activities and the mining and quarrying of nonmetallic minerals, except fuels.

AB 384 Nation: Water quality.

Digest Summary: Under the Porter-Cologne Water Quality Control Act, the State Water Resources Control Board and the California regional water quality control boards regulate water quality in the state. This bill would make a technical, nonsubstantive change in that definition.

AB 416 Strom-Martin: Fish.

Digest Summary: Existing law requires that the additional abalone landing tax be deposited in the Fish and Game Preservation Fund, a continuously appropriated fund, for specified purposes. This bill would extend to January 1, 2007, the law requiring the additional landing tax.

AB 801 Salinas: Sale of California produce to institutional purchasers.

Digest Summary: Under existing law, the Secretary of Food and Agriculture is authorized to foster the marketing and distribution of agricultural products. This bill would state the Legislature's findings and declarations that increased consumption of California produce in institutional settings serves both the economic interests of the agricultural industry and the health interests of institutions.

AB 1192 Pavley: Water Quality and Watershed Protection Act of 2002.

Digest Summary: Under existing law, various bond acts have been approved by the voters to provide funds for water projects, facilities, and programs. This bill would enact the Water Quality and Watershed Protection Act of 2002 which, if adopted, would authorize, for purposes of financing a water quality and watershed protection program, the issuance, pursuant to the State General Obligation Bond Law, of bonds in the amount of $____.

AB 1332 Cardoza: Agricultural commodities.

Digest Summary: Existing law requires the Department of Food and Agriculture to promote and protect the agricultural industry of the state. This bill would authorize the department, in consultation with the agricultural industry, to develop programs to promote California-grown agricultural products through the use of marketing licenses, trademarks, nutrition education, and related activities.

SB 1 Alpert: Decommissioned oil platforms and production facilities: California Endowment for Marine Preservation

Digest Summary:(1) Existing law declares that the Pacific Ocean and its rich marine living resources are of great environmental, economic, aesthetic, recreational, educational, scientific, nutritional, social, and historic importance to the people of California. This bill, instead, would describe the placement of artificial reefs as including decommissioned offshore oil platforms in state and federal waters.

SB 550 Costa: Endangered species.

Digest Summary: Under existing law, until December 31, 2002, the accidental take of candidate, threatened, or endangered species on a farm or ranch is not prohibited by the California Endangered Species Act under specified circumstances. This bill would continue that exception to the act by deleting the termination date.

SB 875 Poochigian and Johannessen:: Personal income and bank corporation taxes: credit: manufacturer's investment.

Digest Summary: The Personal Income Tax Law and the Bank and Corporation Tax Law authorize various credits against the taxes imposed by those laws, including a credit against taxes imposed by those laws in an amount equal to 6% of the amount paid or incurred by a qualified taxpayer, as defined, during the taxable year for qualified property, as defined, that is placed in service in this state. This bill would expand this credit by expanding the definitions of qualified taxpayer and qualified property to include taxpayers and property related to certain agricultural activities and the mining and quarrying of nonmetallic minerals, except fuels.

SB 1003 Poochigian: Energy: protection of agriculture.

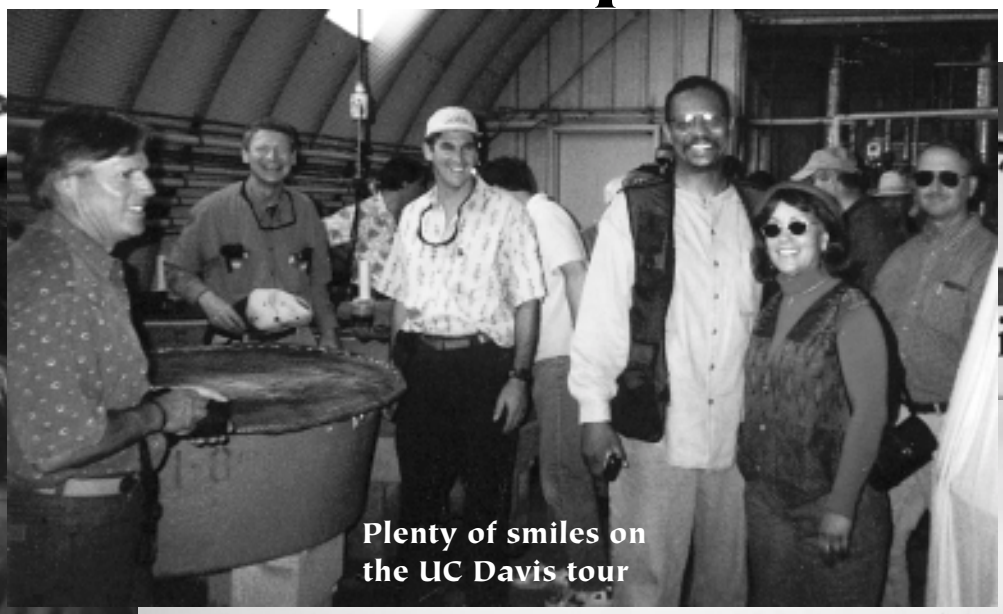
Digest Summary: Under existing law, the Department of Agriculture is required to promote and protect the agricultural industry of the state. This bill additionally would require the department to study and seek to protect agriculture against energy-related problems, including rolling blackouts.

SB 1009 Costa: Agriculture.

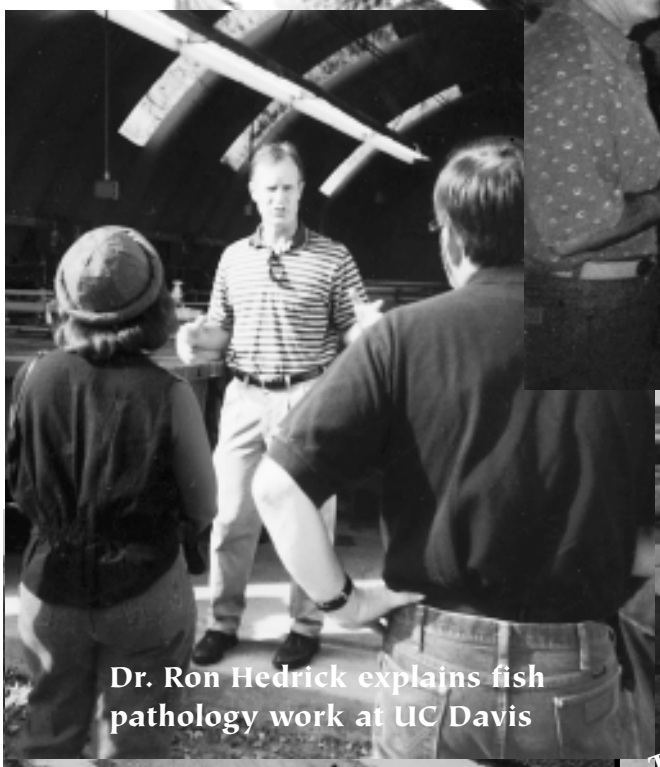
Digest Summary: Existing law requires the Secretary of Food and Agriculture to convene a Scientific Advisory Panel on Environmental Farming to review data on the environmental impacts of agricultural activities and to advise and assist federal, state, and local government agencies on issues relating to air, water, and wildlife habitat.

This bill would create the Dairy Environmental Working Group in the Department of Food and Agriculture.

"Waterwise Aquaculture"

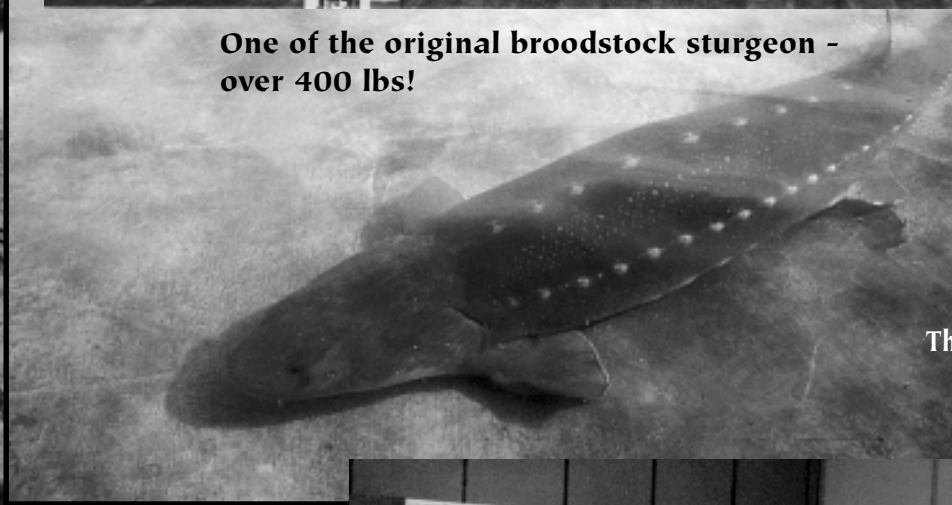


Plenty of smiles on the UC Davis tour



Dr. Ron Hedrick explains fish pathology work at UC Davis

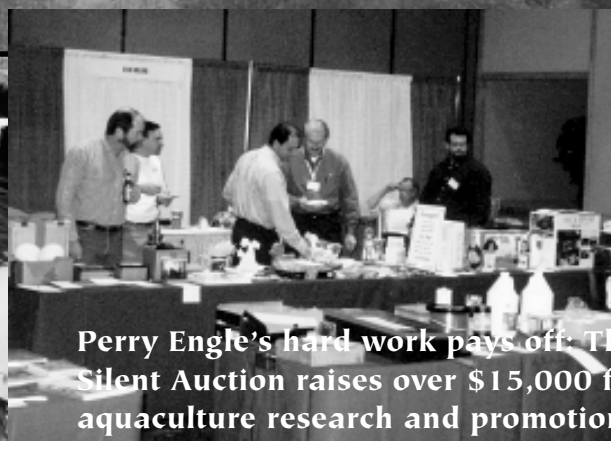
City of Davis Water Treatment Plant's innovative approach



One of the original broodstock sturgeon - over 400 lbs!

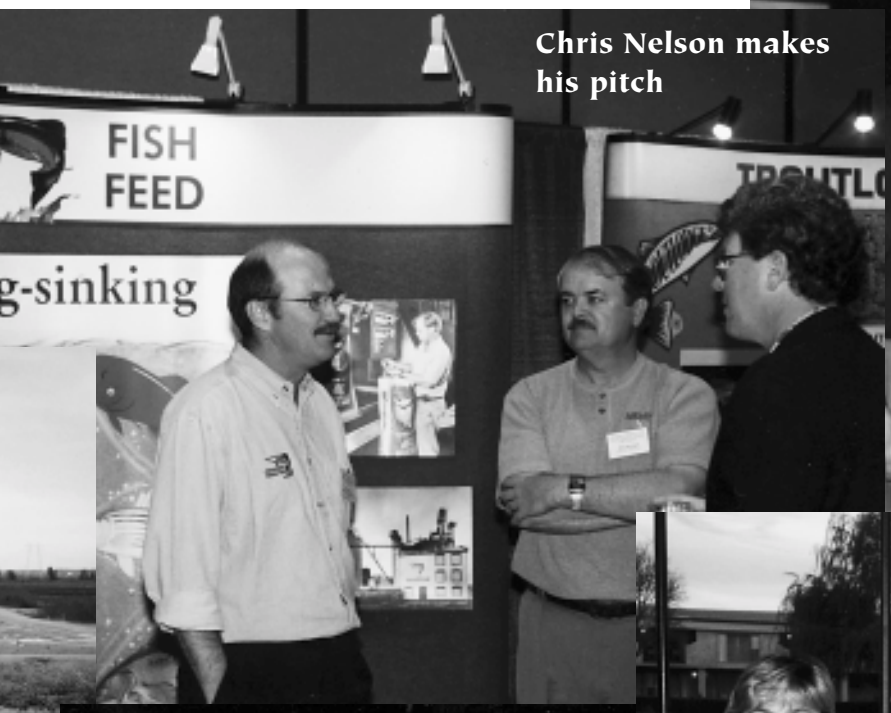
Th

Up to their elbows in sturgeon at The Fishery



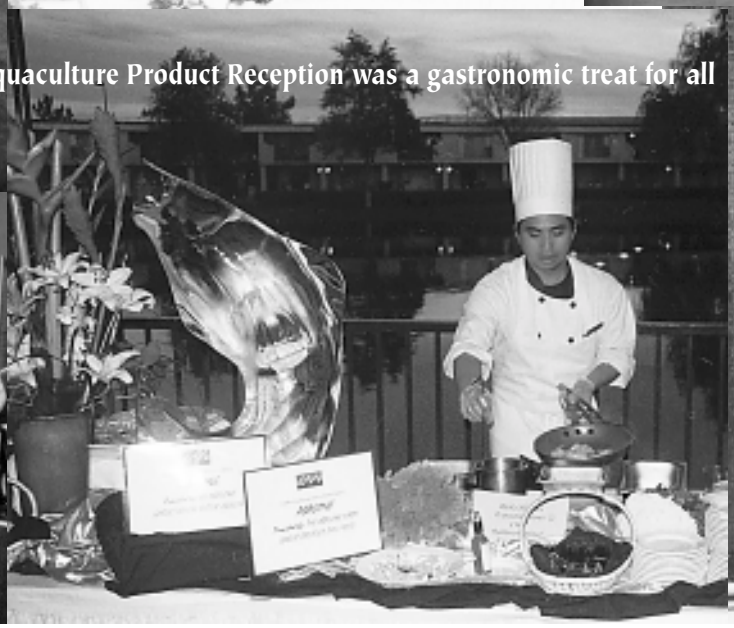
Perry Engle's hard work pays off: T
Silent Auction raises over $15,000 f
aquaculture research and promotio

Functions and Fun

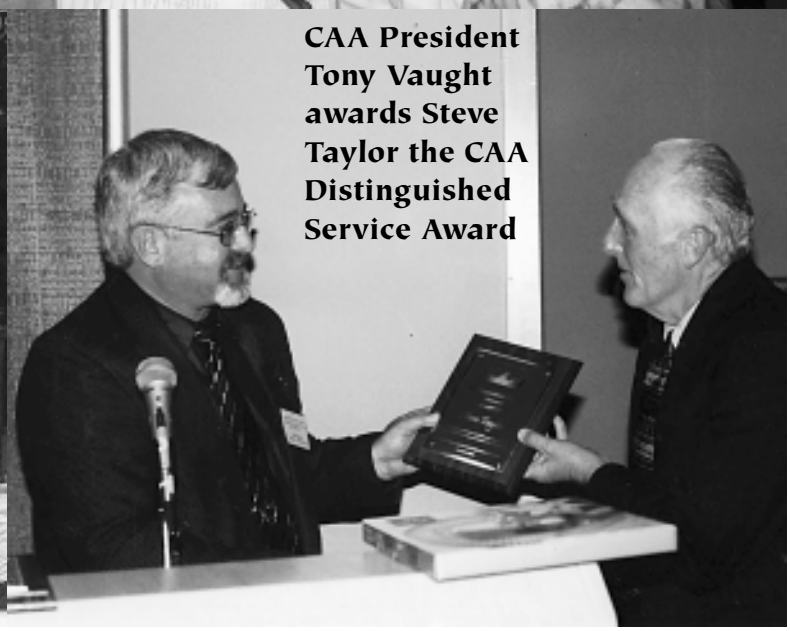


Chris Nelson makes his pitch

Sometimes we need a little magic!



he Aquaculture Product Reception was a gastronomic treat for all



CAA President Tony Vaught awards Steve Taylor the CAA Distinguished Service Award

Thank You to all! - CAA 2001 Conference Contributions

We want to thank the following companies very much for their generous product donations to the California Aquaculture Association. Without this donation it would not be possible to hold this event with the quality we have been able to achieve. The 2001 Reception was a great success

Red Top Aquafarm	Black Bass Fillets
Kent Sea Tech	Striped Bass Fillets
The Fishery	Carp
Fish Producers, Inc.	Catfish Ceviche
Namaken West Fisheries	Catfish Fillets
Ship to Shore Aquafarm	Catfish Fillets
Stolt Sea Farm California	Sturgeon Fillets
The Fishery	Sturgeon Fillets
Calaveras Trout Farm	Trout Fillets
U.S. Abalone	Abalone
The Abalone Farm	Abalone
Carlsbad Aquafarm	Clams
Ecomar	Mussels
Point Reyes Oyster Co.	Mussels
Hog Island Oyster Co.	Oysters
Tomales Bay Oyster Co.	Oysters

Thank you to everyone who gave to the Silent Auction.

Aquaneering Inc.
Airgas
AA'S Worms
Ari Hotel & Casino
Aqua Health, Inc. USA
Ark Fisheries, Inc.
Chris Banner
Herb Baker Sporting Goods
Tom Beals
Denny's Restaurant
DJ's Feed & Pet
Disneyland Theme Park
Double Tree Hotel
Glen Dougherty
Paul K. Engle
Perry V. Engle
EWOS Canada Limited
The Fly Shop
John Fish / Roche Chemicals
Home Town Buffet - Bakersfield
Mr. & Mrs. Rick Hart
Harts Fish Farm
I V Restaurant
Johnson Ranch & Fishery
Kent Sea Tech
Marineland / Aquaria
Mt. Lassen Trout Farms
Mack's Fish Hatchery
Miracle Springs Hotel & Spa
Mitchell's Outpost
Ship to Shore Aquafarm
Mr. & Mrs. David Stepp
San Diego Aerospace Museum
Stehly Brothers Drilling
Stolt Sea Farm
Trout Lodge
The Trophy Shop
Veterinary Service - Fresno
Veterinary Service - Perris
Monterey Abalone Farm
Moore Clark, Inc.
Lucero's Feed & Pet
H & M Landing
Carrows Restaurants
Universal Studios

Cooper Crayfish
Captain P. Bods Fishing Tackle
Crain Fisheries
Circuit City
Leon Chaffin Catfish
Carters Hay & Grain
Christensen Net Works
Chico Fisheries
Dutchman Creek Fishery
DCM Enterprises
FISH TECH
The Fishery
Gilman-Mayfield Firearms
Gino's Fish Farm
G & L Farm Suppy
Helena Chemical
Helgren's Sportfishing
Eileen E. Howell
Home Town Buffet - Chico
David & Yevone Eagleton
Northern Star Mills
Nelson & Sons Inc.
Namakan West Fisheries
Praxair
Professional Aquaculture
Ramada Express Inc.
Rangen, Inc.
Star Milling Company
Sizzler BMW Management
Ron & Joanne Likens
Veterinary Service - Modesto
VMG Industries
Winchills Donuts
Wright - McGill Company
Whitewater Trout Co.
Walco International
Koi Koi
Leatherman Tool Group, Inc
Longs Drug Store
Porterville Reality
P. V. Ranch Company
Kuiper Mariculture, Inc.
Westover Fisheries
Radisson Hotel - Sacramento

Thank you to our exhibitors

AG Container Specialties, Inc.
Aquaculture Systems Technologies
Aquatic Eco-Systems Inc.
Christensen Net Works
Crescent Research Chemicals
D & T Fiberglass Inc.
E & J Dist.
Ewing Industrial Plastics
Rangen, Inc.
Northern Aquaculture
Troutlodge, Inc.
Wraith, Scarlett & Randolph Insurance
Geo-Heat Center, Oregon Institute Of Technology

Airgas Northern CA & NV
Aquaneering Inc.
Campbell Scientific, Inc.
House Manufacturing Co Inc
Royce Instruments Corporation
VMG Industries, Inc.
EWOS Canada Limited
Nelson & Sons Silver Cup Fish Feed
Star Milling Co.
Process Technology
Sutton Ag Enterprises
The Aquaculture News

Thank you to the California Restaurant Association, the chefs and winery for making the Reception such a great success

Buena Vista Carneros Winery
Chef Lenore with California Fats
Chef Mike Campo with 4th Street Grille
Chef Rick Oliveras with the Radisson Hotel

Thanks !!

CALIFORNIA AQUACULTURE ASSOCIATION
2001 BOARD OF DIRECTORS & OFFICERS

George Ray
Fish Producers, Inc.
P. O. Box 1004
Niland, CA. 92257
President
(760) 359-3474

Tony Vaught
Professional Aquaculture Services
559 Cimarron Dr.
Chico, CA 95973
Secretary/Vice Pres.
(530) 343-0405 Ph/Fax

Dennis Faria
Kent SeaTech Corporation
P. O. Box 757
Mecca, CA. 92254
Treasurer
(760) 396-9223 Ph/Fax

David McHone
P V Ranch Company
2400 West Coast Hwy D
Newport Beach, CA 92663
Vice President
(949) 645-6035 Ph/Fax

Jim Michaels
Stolt Sea Farms California LLC
9149 E. Levee Rd.
Elverta, CA 95626
Vice President
(916) 991-4420

Robert Rofen
Novalek Inc./Aqua Vet
2242 Davis Ct.
Hayward, CA 94545
Vice President
(510) 782-4058

Tim Goodson
Calaveras Trout Farm
P. O. Box 111
Snelling, CA 95369
(209) 563-6561

Perry V. Engle
Nelson & Sons, Inc.
1774 Henderson Ct.
Vista, CA 92083
(760) 724-8877

Lewis Johnson
Johnson Ranch Fisheries
2950 Louis Av
Oroville, CA 95965
(530) 534-9891

Art Seavey
Monterey Abalone Company
160 Commercial Wharf #2
Monterey, CA 93940
(831) 646-0350 Ph/Fax

David Eagleton
Namakan West Fisheries
P. O. Box 311
Los Banos, CA 93635
Secretary Assistant
(209) 826-6176 Ph/Fax

Dave Ebert
U. S. Abalone
P. O. Box 254
Davenport, CA
(831) 457-2700

Randy Reed
Reed Mariculture
511 Pamlar Ave.
San Jose, CA 95128
(831) 768-3830

Randy Lovell
Royce Instrument Corp.
1051 Swanston Dr.
Sacramento, CA 95818
(916) 492-2424

John Stanley
Star Milling Company
P. O. Box 1987
Perris, CA 92572
(909) 657-3143

Justin Malan
CAA Executive Director
3700 Chaney Court
Carmichael, CA 95608
(916) 944-7315
(916) 944-2256 Fax
jgmalan@aol.com

Jeffrey Young
Pacific Seafood Industries
CAA General Counsel
1307 State St., 1st. Floor
Santa Barbara, CA 93101
(805) 884-0338
(805) 884-0799 Fax
pacificsfd@aol.com

Sheryl Baldwin
CAA Administrative Services
3700 Chaney Court
Carmichael, CA 95608
(916) 944-8477 Sac. Office
(916) 944-2256 Fax
sherylbaldwin@aol.com

California Aquaculture Research Priorities

Periodically, CAA polls it's membership to determine what the current research priorities should be for the California aquaculture community. These priorities are then presented to funding institutions such as the Western Regional Aquaculture Consortium (WRAC) and California Sea Grant as areas of research that are of interest. This information is considered when these funding institutions requests research proposals for funding considerations.

As a result of CAA's work, hundreds of thousands of dollars of research money has been obtained annually for research important to the California aquaculture industry.

CAA will be updating it's list of research priorities in 2001. Our members input regarding this list are essential. Please contact Jim Michaels at 916-991-4420 or any CAA board member or staff if you have research priorities that are not on our current list.

The last poll that CAA did was taken in 1999. Following are the results from that poll:

1) Management Strategies to Control Off-Flavor in Fish.

California Aquaculture is becoming increasingly intensive for many species, both pond and tank reared, and including tilapia, catfish, sturgeon, striped bass, and perhaps other species. The culture practices can result in off-flavor fish, which, if marketed while off-flavor, can cause severe damage to the reputation of the species and aquaculture in general. Significant research in off-flavor has been conducted, but primarily on pond reared catfish. The industry would benefit from research which:

a) Reviewed causes of off-flavor
b) Recommended guidelines to reduce off-flavor problems
c) Set depuration guidelines to eliminate off-flavor prior to marketing

2) Flavor and Shelf life manipulation in domestically produced White Sturgeon Caviar.

Historically sturgeon caviar has been produced from wild caught fish. The only chance to modify the flavor and/or shelf live of this wild caviar occurs during the processing of the eggs. With the advent of commercial scale white sturgeon culture, an opportunity exists to modify flavors and possibly enhance shelf life via diet modifications and/or manipulating the rearing conditions of the fish. In addition, domestically produced caviar allows the potential for more accurate timing of the harvest and the use of modern processing techniques to produce a more consistent and safer product. Domestic caviar production would benefit from:

a) Determining what causes various flavors, textures, colors and other sensory characteristics in caviar.
b) Determining how to manipulate these characteristics.
c) Developing the best processing methods using current food technology.

3) Use of High Energy Feeds on California Grown Finfish Species

The Salmon fish farming industry has seen great gains in egg quality, egg development feed conversion rates, and growth, by using high energy feeds. These gains were realized after systematic testing of various energy/protein ratios as well as testing various types of proteins and lipid. Similar results may be possible with other California finfish species including catfish, tilapia, striped bass, largemouth bass, sturgeon, and trout. In addition, it has been suggested that High energy feeds can improve water quality conditions that may improve effluent discharges and/or permit increased production on limited water resources. California finfish culture would benefit from:

a) Determining the dietary energy-to-protein rations, total protein level, and protein and lipid sources required for the above fish species which:

1) maximize feed conversion
2) maximize growth
3) optimize cost-to-benefit yields ($ of feed used per pound of fish grown)
4) Improves broodstock fecundity and egg or larval quality

b) Determining whether high energy feeds can substantially improve water quality parameters especially with regards to ammonia and suspended solids production.

4) Improved intensified and recirculated aquaculture systems for fish and shellfish production.

Water is essential to any aquaculture operation. Water as a resource in California is becoming more and more precious. In order for the California aquaculture industry to survive and expand, better methods of water use and reuse need to be developed. Sturgeon, catfish, tilapia, striped bass, white sea bass, abalone, mussel, and oyster seed operations as well as other species are conducive to tank culture and varying degrees of intensification and recirculation. Sturgeon, striped bass, largemouth bass, catfish, tilapia and other freshwater

species utilize precious freshwater resources for most/and or all of their culture. Fresh water resources are being placed under growing pressure by various special interest groups. Growing systems that allow for intensification by utilizing pure oxygen and recirculated systems that increase the reuse of the culture water would allow culturist to maintain and or increase production even though the available water supply is reduced. White sea bass, abalone, mussel and oyster culture all utilize sea water. Sea water technically is more abundant but regulatory constraints by the California Coastal Commission and other State and local agencies are making it more and more difficult for aquaculture operations to use this resource. The logical answer to these dilemmas are to use the available water more efficiently i.e. intensification and recirculation.

The industry would benefit from:

a) a review of current intensification and recirculation technology
b) development of systems specific to the needs of California species.
c) production testing of these systems on the species in question.

5) Interaction of California shellfish farming and the marine environment.

The west coast shellfish industry is under increasing regulatory pressure as a result of salmon listings on the Endangered Species Act, the Sustainable Fisheries Act, and associated identification and protection of Essential Fish Habitat. West Coast shellfish farmers must develop and Environmental Policy and an Environmental Code of Practice. An essential part of the Environmental Code of Practice is necessary research into shellfish farming practices and their effect on the environmental conditions in the farm area.

The industry would benefit from:

a) Exploring the option under the Endangered Species Act, Section 10 of developing the Environmental Code of Practice into an umbrella Habitat Conservation Plan. Individual farmers desiring protections from prosecution under the ESA can develop farm plans patterned after those in the umbrella Habitat Conservation Plan and receive certificates of inclusion.
b) Investigate the current oyster culture techniques used in California i.e. Rack and Bag culture, Floating Bag culture, Bottom Culture, and Suspended Culture to determine how current management practices are affecting the environment.
c) Determine the carrying capacity of intensively cultured estuaries to gain and understanding of the key phytoplankton population dynamics of species affecting growth, health and survival of the shellfish as well as other organisms in the water column and benthos.
d) Determine impact of Suspended Raft and Long Line Mussel culture on other organisms in the water column and benthos.
e) Determine impact of Bottom Bag Clam Culture on other organisms in the water column and benthos.
f) Develop, adopt, publish, and promote a shellfish industry Environmental Policy specific to growing and management techniques used by the California shellfish industry.
g) Develop, adopt, publish, and promote an Environmental Code of Practice specific to the growing and management techniques used by the California shellfish industry

6. Oyster Genetics, Biotechnology and Broodstock Development.

The West Coast oyster industry has a well developed hatchery system of which California secures 100 percent of its seed oysters, but has not develop the genetic lines capable of enhancing the industries potential as seen in salmonid aquaculture or traditional agriculture. The first programs in oyster genetic line development has been established, but additional research is required. Triploid animals produced through polarbody retention has demonstrated positive value to the industry, but research in tetraploid x diploid cross for triploid seed production, and to retain genetic options in triploid production programs requires additional research.

The industry would benefit from:

a) Increased support of oyster broodstock development, including support for genetic line assessment of heterozogosity and family trials.
b) Increased support for research in triploid production resulting from tetraploid x diploid crosses, and identification and retention of favorable family genetic traits.

7. Fish health continues to be a major priority in California finfish production. California commercial fish production both for food and environmental enhancement is a major target for both the industry and the Resource Agency. Specific pathogenic associations restrict production economics and preclude some essential commercial fish from inclusion in natural resource enhancement programs.

The Industry would benefit from:

a) Research on control of viral diseases on production and conservation sturgeon aquaculture.
b) Research of the effects of disease on mitigation and enhancement programs of salmon and white seabass.
c) Research on the diseases of and relationship to wild and cultured abalone.
d) Control of bacterial pathogens of hybrid bass and tilapia.
e) Effects of viral diseases on larval and juvenile tilapia.

CAA Fish Health Workshop

CAA Fish Health Workshop at Butte College on a sunny December day last year that seemed more fall than winter the CAA held a well attended Workshop on fish health for its producer members in Northern California at Butte College near Chico. This was one of a series held every several years at different locales in the State for the education of CAA members. These workshops allow them to meet experts, learn the latest advances in aquatic health, and have hands on experience involving microscopes and proper procedures for identifying aquatic diseases. This workshop, organized by Tony Vaught, then president of CAA, and by Dr. Fred Conte, of the aquaculture program at the University of California, Davis, was exceptional in having more experts than usual to lead the presentations, namely: Dr. Ronald P. Hedrick, Professor Fish Pathology, Department of Medicine, School of Veterinary Medicine, University of California, Davis. Tel 916 752-3411, e-mail rphedrick@ucdavis.edu. Dr. William T. Cox, Senior Fish Pathologist, Fish Health Program Coordinator, California Department of Fish and Game (CDFG) Fish Health Laboratory, 2111 Nimbus Road, Rancho Cordova, CA 94670. Tel 916 359-2827, e-mail wtcox@dfg.ca.gov. Dr. J. Scott Foott, Fish Health Biologist, USFWS California Nevada Fish Health Center, 24411 Coleman Hatchery Road, Anderson, CA 96007, tel 530 365-4271, e-mail scott_foott@r1.fws.gov.

The producers attending had brought many kinds of fishes from sturgeon to goldfish for which they had health concerns. Dissection techniques were demonstrated to find and determine disease organisms. Despite the wide variety of fishes presented for examination, the prevalent infection most evident in the skin and gill samples taken was by the protozoan Trichodina. The following can be useful for producers in carrying out procedures recommended by the CDFG in handling samples for disease diagnosis. [excerpted from CDFG Operational Manual - Fisheries Programs Branch - Fish Health Procedures. See Fish and Game Code: 1008, 1174, 6300-6306, 6400, 15500-15516; California Code of Regulations, Title 14, Natural Resources: Section 236, 238.5, 245, for the full text.] (For) Diagnostic procedures for pathogen detection follow American Fisheries Society professional standards as described in "Bluebook: Suggested Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens, Fourth Edition, 1994, John C. Thoesen, Editor." Collection of Samples. Fish tissues deteriorate rapidly and many parasites disintegrate shortly after the fish dies, especially with dry or warm conditions. Post-mortem examinations can provide valuable information if properly handled and rapidly transported to the Fish Health Laboratory.

The following procedures are recommended for sample collection for disease diagnosis.

I. Live Fish. Live fish are the best samples for examination. If a fish kill is occurring, select only live fish showing typical symptoms common to the population. Those near death but still alive are best. Try to select fish which will arrive at the laboratory alive, and not die en route. Between 5 and 10 fish showing symptoms should be collected. If possible, also collect 5 fish not showing symptoms into a separate container. Bring or ship these fish to the Fish Health Laboratory alive. For transport, fill a doubled plastic bag 1/4 full of pond water, overlay with oxygen, and seal with rubber bands. Place these into a container (styrofoam or plastic coolers) to protect from sunlight and temperature. Add ice or ice substitute to the cooler (not to the water in the bag) if needed to keep cool. Do not exceed 50 grams of fish per liter of water. Contact your nearest pathologist to arrange for examination. If shipped, use an express carrier (UPS, Federal Express, etc.) Which will deliver fish in 24 hours or less. Seal containers tightly and label UP, LIVE FISH / PERISHABLE.

II. Dead Fish. Some information may be obtained upon examination of dead fish if the fish has been dead only a short time. Fish dead longer than 24 hours in cool water, or 8 hours in warm water are virtually useless. Place fish in separate plastic bags and overlay with ice. Notify your nearest pathologist and transport or ship fish within 24 hours.

III. Frozen Fish. Very little information is recovered from frozen fish. Some viral and bacterial pathogens, or larger metazoan parasites can be recovered. Freeze only one fish per package. Do not use dry ice. Samples should arrive at the laboratory still frozen.

IV. Preserved Fish. Histological evaluation of tissues from live, freshly euthanized fish can provide valuable information on diseases, toxic reactions, or nutritional deficiencies. Dead or frozen fish are unsuitable for histology. Ten percent neutral buffered formalin,

Davidson's fixative, or Bouin's fixative are suitable for most field applications. Davidson's provides the best results for most cases. Fish smaller than one inch can be placed directly into fixative. Larger fish which fit into the container must be prepared. Make an incision from the anus to the gill isthmus and gently pull the viscera out of the abdominal cavity. Puncture the swimbladder. Slit the intestine and liver (if larger than 1/2 x 1/2 x 1/4 inch). Make an incision along the back of the fish. Slice off the operculum to expose the gill to the fixative. Place the prepared fish into the container with fixative. For larger fish (too large to fit into the container) tissue samples must be prepared. Select any abnormal appearing tissue, and any lesion material. Very useful are: gill, liver, kidney, heart, intestine, spleen. Tissue pieces should be small, not to exceed 1/2 inch square by 1/4 inch wide. Prepare tissues from sick, moribund fish and, in separate containers, healthy appearing fish from the same location. Five to ten fish per sample. The volume of fixative to tissue should be at least 10:1 (i.e. a six inch fish per pint of fixative.) Use of too little fixative results in unusable tissues which must be discarded. Since you may be unable to recollect these samples, be sure to use plenty of fixative. Err on the generous side of 1:10. Leave tissues in fixative for 48 hours. Change solution to 70% ethanol (isopropyl alcohol is suitable) after 48 hours. Always ship samples in 70% ethanol, not fixative. Label each container with date, species, location. Do not re-use fixatives. Discard appropriately after use. Containers should be plastic (Nalgene, etc.). No glass. To prevent contact of fixative with your eyes or skin wear gloves and protective eyewear.

V. Fixatives. Neutral Buffered Formalin: formalin 100 ml, sodium phosphate monobasic (NaH2PO4H2O) 4 grams, Sodium phosphate dibasic (Na2HPO4) 6 grams, distilled water 900 ml. Davidson's Fixative: 95% ethanol 300 ml, formalin 200 ml, glacial acetic acid 100 ml, distilled water 300 ml. Bouin's Fixative: Call FHL if you want to use this. Recommended for bony tissues. VI. (CDFG) Fish Health Laboratories: 2111 Nimbus Road, Rancho Cordova, CA 95670 tel 916 358-2822 or 358-2827 601 Locust Street, Redding, CA 96001 tel 530 225-2300 407 West Line Street, Bishop, CA 93514 tel 760 872-1171.

Besides the AFS Blue Book (see above), other references recommended to producers at the Workshop were: Fish Hatchery Management, by Roger P. Piper, et al., U.S. Department of the Interior, US Fish & Wildlife Service, Washington, D.C. A Guide to Approved Chemicals in Fish Production and Fishery Resource Management, by Rosalie A. Schnick, Fred P. Meyer, and D. LeRoy Gray. Publication MP 241, Arkansas Extension Service, P.O. Box 391, Little Rock, AR 72203. Diseases of Hatchery Fish, by James W. Warren, 1991, U.S. Fish & Wildlife Service. For copies contact Tina Montana, Pacific Region, tel 503 872-2763. Introduction to Fish Health Management, by Becky A. Lasee, et al., 1995, USFWS, La Cross Fish Health Center, 555 Lester Ave., Onalaska, WI 54650. All fish and shellfish producers have to cope with health problems. The CAA provides a valuable service to its members in these informative and up-to-date health workshops. They are highly recommended for participation by CAA producer members.

NEWS FROM NAA

The National Aquaculture Association continues to represent all aquaculture in Washington D.C. Even though CAA supports NAA through its membership, growers in California and beyond are urged to join NAA as individual members. This helps us keep a stong voice for aquacultue in the Nation's Capitol.

Betsy Hart, NAA's dynamic Executive Director was a featured presenter at the recent CAA Conference and Trade Show and outlined a number of activities that NAA has been involved in. Some of the major issues include:

* Proposed EPA Effluent Guidelines and survey; * Availability of Minor Use, Minor Species therapeutants * Aquaculture support in the 2002 Farm Bill * Full funding for Regional Aquaculture Centers

For additional Information on these and other national issues or to join NAA contact Betsy Hart at naa@intrepid.net or visit them on their website at www.nataquaculture.org

The Gauntlet

from CAA Executive Director Justin Malan (jgmalan@aol.com)

The views expressed in this column are not necessarily those of the California Aquaculture Association (CAA). Aquatic Farming hopes to stimulate discussion and receive feedback from its members and other interested parties from the topics raised.

BIOENGINEERING - WHERE DO WE DRAW THE LINE? In the highly charged debate over "bioengineered" or "genetically modified (GM)" foods it is hard at times to find a personal and professional comfort level. In the words of one Chicago chef commenting in the Nation's Restaurant News, the debate pits ..."(her) bleeding-heart, knee-jerk liberalism with the belief that organic is the only way to go and her sense of responsibility to the rest of the world to produce food for people who can't produce it themselves" How do we find the truth in the stacks of dire warnings and upbeat assurances from experts on both sides of the issue? Will we indeed witness "unprecedented health risks to humanity" as Dr. Michael Antoniou, Senior Lecturer in Molecular Pathology in a leading London University warns, or will we "provide an abundant, better-quality and more nutritious food supply" as claimed by the Alliance for Better Foods, a pro-bioengineering group established to counter the surge of concern over GM foods. The answer perhaps lies with both sides which, incredible as it may sound, are not necessarily mutually exclusive. There is unprecedented promise in agricultural biotechnology in improving health and nutrition, in fighting world hunger and in reducing some environmental impacts of traditional farming. It also poses some daunting perils, many of which we cannot predict or may not be able to fully control. One may ask what this has to do with fish farming in California. Consider international or even domestic boycotts of any fish raised with any level of genetic engineering - even down to the corn in the feed. Consider bans on stocking any "bioengineered" fish in the waters of the state - even if the fish have been triploided to prevent any possible genetic contamination. Consider limitations on selective breeding. Whether we want to or not, we face the challenge of formulating a responsible code of practice for biotechnology for our industry - or face it being done for us by folks who may not recognize and value the promises it does have to offer.

EWOS micro

The Best Possible Start for Fry

- Premium fishmeals and quality ingredients give fry the best start in order to maximize survival and growth throughout the production cycle. Quality ingredients ensure high digestibility and excellent water quality.
- EWOS boost, an exclusive health-promoting feed additive, provides natural-source metabolites to boost the immune system.
- A Special Taste Enhancer increases palatability to ensure maximum feed uptake and fish growth.

EWOS pacific

Formulated for Pacific Salmonids

- Formulated with high protein and moderate fat levels to assure economical production.
- This extruded diet provides improved water quality and digestibility compared to semi-moist and steam-pelleted diets.
- Strict raw material selection criteria ensure a high quality feed.

EWOS vita

Fast Growth and Economic Efficiency

- High protein and low fat levels mean fast growth and economic efficiency.
- Aquaculture-grade premium fishmeals and a highly digestible raw material blend ensure good feed conversion and excellent water quality.

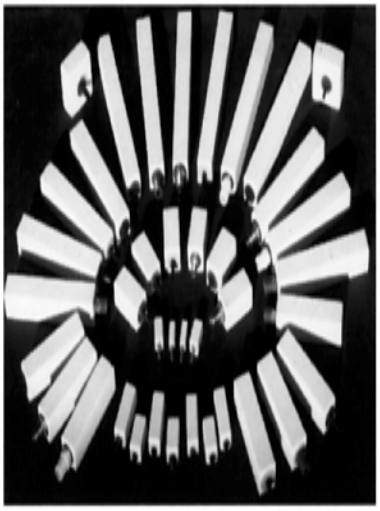
EWOS®

EWOS Canada Limited, Main Office and Mill,
7721 - 132nd Street, Surrey, BC, Canada V3W 4M8
• Telephone (604) 591-6368 or 1-888-492-7722
• Telefax (604) 591-7232 • Toll-free feed orders 1-800-663-0476
• Shipping and order fax (604) 591-7238

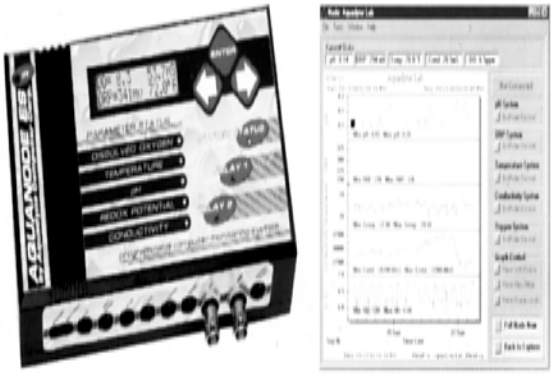
EWOS Canada Limited, Campbell River Sales Office,
1720 - 14th Avenue, Suite 212, Campbell River, BC, Canada, V9W 8B9
• Telephone (250) 286-8361 or 1-888-673-9993 • Telefax (250) 286-0788

BASICS TO STATE OF THE ART

We Have It All



5,000 In-Stock Products



The AquaNode.™ Monitor and alarm D.O. and temperature for under $1,000.

10% Below MFG. List

Ball Valves
As Low As $2.60

Sweetwater® Blowers

Self-Weighted Tubing

SEE OUR ENTIRE CATALOG

on the web
www.aquaticeco.com

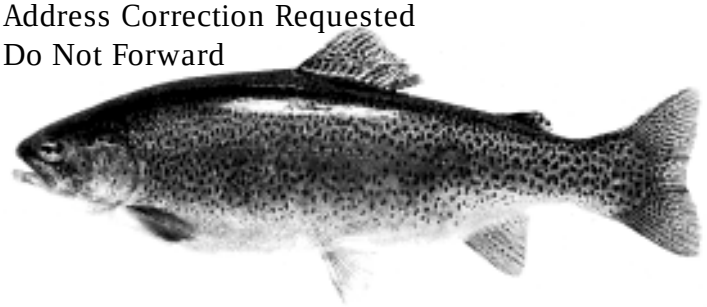
Call for a FREE copy of our 400 page catalog

AQUATIC ECO-SYSTEMS, INC.

PHONE: 407-886-3939 FAX: 407-886-6787 EMAIL: aes@aquaticeco.com

California
AQuatic Farming
Official Bi-Annual Publication of the California Aquaculture Association
3700 Chaney Court
Carmichael, CA 95608

Address Correction Requested
Do Not Forward



Non-Profit
Bulk Rate
U.S. Postage
P A I D
Permit No 555
Fair Oaks, CA