

# Hawai'i Aquaculture News

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## ***Job Opportunity - Microalgal Culture***

***Cyanotech Corporation***, a world leader in producing high value-products from microalgae, is seeking qualified applicants for a *Cultivation Laboratory Specialist*. The Specialist provides laboratory scale culture support for production of microalgae, including maintenance of stocks, nutrient solutions and water chemistry tests. This position requires some input into research and development towards optimization of current systems, as well as into additional microalgae species. The successful applicant will be able to work effectively and cooperatively as part of a team in a fast-paced manufacturing environment. Bachelors Degree required, B.S. in Biology preferred. Experience cultivating microalgae a plus. Position is full time (non-exempt - hourly), and comes with a generous benefits package; compensation will be commensurate with experience. Mail, fax or email resume to: Cyanotech Corporation; 73-4460 Queen Kaahumanu Hwy. #102; Kailua-Kona, HI 96740; Fax 808-329-3597; [tcote@cyanotech.com](mailto:tcote@cyanotech.com). Closing date: March 21, 2008.

## ***Hatchery Technology Workshop - March 20***

On Thursday, March 20, from 9:30 A.M. to 1:00 P.M. at the HIMB Coconut Island Lab, invited researchers from Hawaii and Japan will present this workshop to "provide an opportunity to learn more about the challenges and opportunities of developing and /or streamlining hatchery technologies for marine finfish." The session is jointly sponsored by the Hawaii Aquaculture Association, UH Sea Grant, the Hawaii Aquaculture Development Program and the NOAA Aquaculture Program. Topics will include culture of copepods and other live feeds, and their use in hatchery rearing of opakapaka and grouper. There is a fee of \$20 to cover costs of refreshments and lunch. Time is short, seating is limited; email Dr. Clyde Tamaru at [ctamaru@hawaii.edu](mailto:ctamaru@hawaii.edu) to reserve a place and receive directions to the session.

## ***Emergency Agricultural Loans Available for December 2007 Storm Damage***

Farmers suffering damage from wind, heavy rains and flooding that occurred from December 4 to 14, 2007, may be eligible for low-interest loans from the Hawai'i Department of Agriculture (HDOA) Agricultural Loan Division. Farmers may apply for the emergency loans up to \$250,000 at 3 percent interest. In order to fast-track the loan process, requests of \$75,000 or less will not require credit denials from other financial institutions, which would normally be required for agricultural loans. The board also waived the three-year residency requirement.

*continued on page 6)*

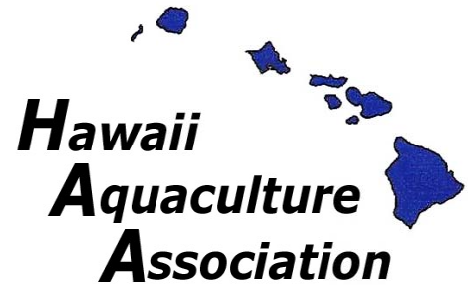
*Hawaii Aquaculture News is published as a cooperative effort of the Hawaii Aquaculture Extension Program (sponsored by the University of Hawaii Sea Grant College Program and the Aquaculture Development Program of the Hawaii Department of Agriculture) and the Hawaii Aquaculture Association.*

*Readers' contributions are invited with aloha, and much appreciated. They should be emailed to the editor at [jszyper@hawaii.edu](mailto:jszyper@hawaii.edu), or discussed by telephone for other means of transmittal.*

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The **Hawaii Aquaculture Association** is the statewide producers' organization. Its mission is to foster the development of commercial aquaculture production in Hawaii. HAA provides a unified industry voice for legislative issues, opportunities for networking and fellowship with other aquaculturists, and numerous other benefits to members.



## President's Message

Dear HAA members,

The 2008 legislature has passed the "cross-over" or mid point of the current session, and most aquaculture related bills are still alive. The cross-over is when all of the House-introduced bills that have passed the House subject matter committee(s), the House Finance Committee (FIN), and "third reading" by the overall House membership are then passed over to the Senate for consideration, and all Senate-introduced bills that have passed the Senate subject matter committee(s), the Senate Ways and Means Committee (WAM), and third reading by the overall Senate membership are then passed over to the House for consideration. The process is then repeated during the second half of the session with the Senate deciding whether or not to hear, amend, and pass the House bills and visa versa. By the end of the session, all surviving bills must have passed all assigned subject matter committee hearings and both "money committees" (FIN and WAM), pass final reading, and then be signed by the Governor to become law. It is a long and tortuous process but is also the safeguard to hopefully ensure that inappropriate bills do not survive and become law.

Leonard Young has provided us a status report on the aquaculture related bills at this time in the session in his legislative report. It will be increasingly important to have broad industry support during the second half of the legislative session as our aquaculture and related bills will be competing for limited hearing schedules and for limited funds due to current time and budget constraints. Therefore, your strong support is critical for the hearing and passage of these important bills.

A number of HAA members have responded with written letters of support for hearings on specific bills when email alerts were broadcast to the industry asking for such letters during the first half of this session, and these letters have been critical to the passage of the bills that have survived to the cross-over. However, the total number of letters submitted have represented less than 10% of our overall HAA membership. If our bills are to survive the second half of this year's legislature, then we will need a much greater outpouring of letters of support for any upcoming hearings on our supported bills and perhaps even to have our bills scheduled for hearing. The latter is often the most difficult task, and bills that are not scheduled for hearing automatically die in committee. So, please respond when you receive an email alert requesting your letters of support. We often only receive 24 hours notice of a scheduled hearing and have had one instance this year and one last year when one of our bills were scheduled with less than three hours notice.

Please remember that we are all in this together and need to show the Legislature that we are a unified and active industry and association. All of HAA's activities are entirely voluntary but we need broad membership support in order to be fully effective.

Please also be involved in offering topic suggestions for this year's HAA Conference.

I thank you in advance for your support of this years' bills and of this years' Conference.

With warm regards, **Ron Weidenbach**

## Appeal for Ideas *from Joe Tabrah*

At the last HAA workshop, preceding the 2007 annual meeting, we all had the opportunity to discuss the state of Hawaii's aquaculture industry and focus on the reasons for the decline in annual turnover attributable to aquaculture. Since that discussion the economy has continued to soften and there is wide spread concern over the prospects of a recession. This affects all stakeholders in Hawaii's aquaculture. Against this backdrop, the HAA Board seeks ideas on subjects and timing for our annual conference. We would like to provide a venue for discussion of issues and/or technology that would contribute to growth of the industry and in which you would consider it worth your valuable time to participate.

Please send your suggestions and comments to Clyde Tamaru at [ctamaru@hawaii.edu](mailto:ctamaru@hawaii.edu). We look forward to hearing from you and the opportunity to be responsive to your interests and needs.

# Hawaii Aquaculture Extension Program




**The Hawaii Aquaculture Extension Program** is your state-wide extension service. We support the development and sustainability of aquaculture business in Hawaii by providing information, education, and technical assistance to existing businesses, potential entrepreneurs and the general public. The Program is sponsored by the UH Sea Grant College Program, the Aquaculture Development Program of the Hawaii Dept. of Agriculture, and the UH College of Tropical Agriculture and Human Resources.

## Control of Sex Ratio in Groups of Ornamental Swordtails

Clyde Tamaru, our extension program's specialist for Honolulu and Kauai counties, has been researching various aspects of swordtail culture for some years. These small members of the family Poeciliidae are a large item in the freshwater ornamental fish trade, and a major product of Hawaii.

He has recently prepared a research report for a conference that describes current research results, and he has also passed along a journal article by others on the topic of control of sex ratio in cultured varieties of commercial swordtails, *Xiphophorus helleri*. In general, and particularly for the fancier varieties, males are the product item of interest and value in the industry, with the less elaborate females naturally required for breeding. The problem is that under most conditions of mass culture, too many females are produced.

The research paper reports early success with a two-stage process that uses a female hormone (17β-estradiol) in the feed for batches of fry to make nearly all of them into apparent and reproductively functional females. Some of these, however, retain the male genetic makeup that they began with. If one does this with fancy-finned males,

those genes remain in the phenotypic female batch. When members of such a batch are bred to untreated fancy-finned males, a greater percentage of the offspring (the second stage of the process) receive the male factors/genes resulting in a larger number of individuals exceeding a "threshold," resulting in the production of more higher-valued males. The reported work shows a substantial gain in males, from a control ratio of 2.8 females per male in a batch of product, to 0.8 females per male in the treated batches.

The outside research of interest (Rubin, D.A., 1985. Effect of pH on sex ratio in cichlids and a poeciliid (Teleostei). *Copeia* 1985:233-235.) reports the effect of breeding fish and rearing the fry at controlled pH levels under laboratory conditions. *X. helleri* breeders kept at pH 6.2 produced all males (in batches of about 30 fry from breeder groups of one male and two females), and nearly-all females at pH 7.8.

These are research results that have not yet been taken to practical on-farm trials. There are plans to develop such trials soon.

## Selling Live Fish at Farmers' Markets

Marketing methods for Hawaii's aquaculture products are diverse, reflecting the great diversity of the products themselves, the socioeconomic diversity of the customers, and of course the creativity of the sellers. Much of our freshwater food fish crop, consisting mainly of tilapia and Chinese catfish, is sold live, some of it at public farmers' markets. Some would say that the live sale strategy caters to a tradition derived from some of our citizens' ancestral homelands, where live fish are obviously fresh while others may not be so. Another factor here may well be that there are no state health department restrictions on the sale of live or whole dead (usually iced) fish, while any processing of the product implies further regulatory requirements. And of course, lesser processing is less costly for the seller.

Recently, a researcher at West Virginia University made a nationwide inquiry through the USDA's aqua-ext list serve,

asking what members of this aquaculture extension email list knew about live sales, including whether the vendor dresses fish at the market. He received 12 responses, most of them describing restriction or prohibition of sales, not to mention dressing. Selling was acceptable in Illinois, Florida, and possibly in Massachusetts and Rhode Island. Three responses (including your editor's) stated the Hawaii conditions above. A response addressing Kauai noted that wild-caught ocean fish were sold on ice just outside the Kauai farmers' market, and constituted serious competition to the cultured freshwater fish sold in the market, but in general Kauai market sales were vigorous. A few years ago, UH Hilo students sold iced tilapia on just one Saturday morning at the Hilo farmers' market. They had had to sign up and wait for an opening. They sold out quickly. The most common question was, "Are you going to be here next week?" There was some disappointment with the "no" answer, with one buyer commenting, "Too bad; I'd have brought a cooler."



## *UH Expanding Its Aquaculture Faculty and Staff*

The University of Hawaii, with support from the Hawaii Legislature, is substantially expanding its aquaculture programs by the addition of four senior positions, two junior technical positions and two support positions. Seven of the eight positions are at UH-Hilo's Pacific Aquaculture and Coastal Resources Center (PACRC). The eighth position will be based on Oahu.

An ***Aquaculture Program Coordinator*** is currently being recruited to work within the Office of the Vice Chancellor, Research & Graduate Education, at UH-Manoa. The Coordinator will be a visionary, accomplished and entrepreneurial specialist with the exceptional leadership and communication skills needed to bring together UH system-wide aquaculture research, education, and outreach programs. The ongoing recruiting process will hopefully be complete by the end of this semester.

PACRC has two new, general-funded (i.e. permanent) ***Aquaculture Technicians***. Mr. Matt Barton is graduate of the Marine Science program at UH-Hilo while Mr. Adam Daw, a graduate of Texas A&M at Galveston, joined the PACRC staff after working at USC's marine laboratory on Catalina Island. Their broad range of skills will greatly enhance the development of PACRC's facilities and programs.

UH-Hilo is currently in the process of recruiting five more people to work at the PACRC:

1. A tenure-track ***Assistant Professor of Aquaculture*** will teach undergraduate and graduate courses in aquaculture and coastal resources; advise and mentor students; and conduct research on marine algae and invertebrates. Details of this position can be found at [www.uhh.hawaii.edu/uhh/hr/job\\_display.php?job=400](http://www.uhh.hawaii.edu/uhh/hr/job_display.php?job=400).

2. The position of Interim ***Director of PACRC*** which has been held by Kevin Hopkins (in addition to his faculty position) for the last seven years is finally being converted into a permanent position. The recruiting announcement should be forthcoming within the next month.

3. The position of ***Associate Director of PACRC*** held by Sharon Ziegler-Chong (in addition to her duties as Hawaii Cooperative Studies Unit Leader) is also being converted into a permanent position.

The fourth and fifth new positions are a ***Secretary*** to be assigned to the PACRC's coastal facilities in Keaukaha and a ***General Laborer*** to work at both the Keaukaha and Panaewa (inland) facilities.

The recruiting process for the last three positions is not quite as advanced as the first two so the recruiting announcements may not appear until May or June. Information on these jobs will be posted in Jobs at UH Hilo; visit [www.uhh.hawaii.edu/uhh/hr/jobs.php](http://www.uhh.hawaii.edu/uhh/hr/jobs.php).

## ***Publications***

***Open Ocean Aquaculture - Moving Forward*** (edited by Cheng-sheng Lee and Patricia O'Bryen) is available free on line from the U.S. Aquaculture society during 2008 and 2009. Find it at <https://www.was.org/usas/openocean.html>. This compilation of an Aquaculture Interchange Program workshop in Honolulu in October 2006 reviews the history, current status, and prospects of open ocean aquaculture worldwide, with discussion of business and particularly environmental aspects, with "every effort ... made to avoid going over the same topics and issues covered previously .. ." Chapter authors include Jim McVey, John Corbin, Neil Sims, and Charles Helsley, among others. The 80-page document (1.09 Mb) can be opened and read on line, saved to your device, or printed; it can also be accessed one chapter at a time.

While you're in the neighborhood, change the url a bit to [https://www.was.org/usas/USChapter\\_files/Newsletter/Winter%202007.pdf](https://www.was.org/usas/USChapter_files/Newsletter/Winter%202007.pdf), and read the short article "***Should We Eat Seafood?***" by Gary Fornshell. His answer, not surprisingly, is yes, but this is an excellent summary of the facts and

guidelines he collected in the course of developing a curriculum for extension educators to deliver to general consumers. The lessons may well be more broadly useful to educators of other clientele and other users.

***Loko I'a - A Manual on Hawaiian Fishpond Restoration and Management*** (by Graydon 'Buddy' Keala with James R. Hollyer and Luisa Castro) is newly available from the UH College of Tropical Agriculture and Human Resources. This 74-page softbound book is a genuine practical manual, with background and discussion as needed (including an excellent history chapter), but with instructions as the primary focus. There are abundant lists, photos and diagrams. As of this date, it is not yet listed on the CTAHR publications site, but interested parties may contact the College's Office of Communications Services at 808 956-7036 or email [ocs@ctahr.hawaii.edu](mailto:ocs@ctahr.hawaii.edu).





*The Aquaculture Development Program (ADP) provides a wide range of support for Hawaii's aquaculture industry. ADP is a planning, development and problem-solving organization, whose goals are to get production and service businesses started, and once started - to help ensure their success through active assistance.*

## ***Initial Regulatory Compliance for Hawaii Aquaculturists***

**by Allen Riggs, Veterinary Medical Officer**

Aquaculture Development Program is often contacted by individuals interested in getting started in commercial aquaculture operations, or modifying their current operation, within the State of Hawaii. The following is a preliminary checklist of items and their order of implementation to better understand what is required to be a Hawaii aquaculturist.

#1. What species do you want to produce? Hawaii is unique in what aquatic species can be legally cultured compared to other mainland states in the US. One should contact the Plant Quarantine Branch – Hawaii Department of Agriculture (PQB-HDOA) to confirm that the species being considered is on either the Restricted B list for private and commercial use or the conditionally approved list. Mr. Vernon K. Nakamoto, the Invertebrate & Aquatic Biota Specialist, telephone 808-832-0577 is the contact person for questions regarding species suitable for culture in Hawaii. Make sure that the species you are considering can be raised in Hawaii before proceeding through the process.

#2. Has your aquaculture facility/site been inspected and approved by PQB-HDOA? The next step is to schedule a facility/site inspection by PQB-HDOA staff. Again Mr. Nakamoto is the PQB-HDOA contact for scheduling this mandatory step. On occasion the state aquaculture veterinarian with ADP-HDOA may be asked to provide input on biosecurity aspects or other aquatic animal health concerns as a component of this site inspection. Dr. Allen Riggs, telephone 808-832-5005, is the contact individual for questions regarding biosecurity / aquatic animal health. Contacting both departments, PQB and ADP, for the mandatory requirements to pass this inspection and also get other “good ideas” on methods to improve efficiency and biosecurity are recommended before the actual inspection.

#3. What permits does one need to get your aquatic animals / plants actually to your site? After your site has been inspected / approved by PQB-HDOA for the propagation of specific animals/plants, one needs to acquire certain permits for animal/plant introduction. Generally either a Import Permit for stocks entering Hawaii from outside the state or an Intra-State Permit

for stocks moving within the state are required for aquacultural purposes. There are often specific conditions, especially regarding health status of these imported or potentially moving stocks, which is required before these permits can be issued. Again contacting PQB and/or ADP for detailed information on what is exactly required, well in advance of when the permits are actually needed to be in hand, can save time and avoid frustration.

In many cases there are other more detailed questions/requirements that must be addressed before one can actually start producing an aquaculture product in Hawaii. Dr. Leonard Young, Acting Manager of ADP (telephone 808-587-0485), is another source of information regarding site permitting and other questions on Hawaii aquaculture in general. Getting the answers and working through the process on the above three questions is a good starting place for most folks.

**Contact ADP at:**

**1177 Alakea St, Rm 400  
Honolulu, HI 96813**

**Phone: 808 587-0030  
Fax: 808 587-0033**

**Email: [info@hawaii-aquaculture.org](mailto:info@hawaii-aquaculture.org)**

**Web: [www.hawaii-aquaculture.org](http://www.hawaii-aquaculture.org)**



## ***2008 Legislation as of 03/11/08***

**by L. Young, Acting Manager & A. Lowrey, Microbiologist**

Here is a quick summary of the bills, which are still active for this current legislative session. We feel that the aquaculture industry ought to support (or oppose as noted) the passage of these bills owing to the manner in which we do our business, or seek funding for projects.

HB935 HD2. RELATING TO AGRICULTURE. Money for UH Sea Grant Extension Service to assist statewide aquaculture and to attract federal funding. Passed over to Senate and referred to Committees on Agriculture and Hawaiian Affairs/ Education, and Ways and Means. AHW/EDU testimony hearing 3/14/08.

(continued on page 6)

**ADP, continued**

*(2008 Legislation, from page 5)*

HB1616. RELATING TO AQUACULTURE. Money for preliminary studies to establish a primary quarantine and laboratory facility for aquatic species used in Hawaii's aquaculture industry. Passed over to Senate and referred to Committees on Agriculture and Hawaiian Affairs, and Ways and Means. AHW Testimony hearing held 03/11/08, decision making deferred to 03/18/08.

HB2261 HD2. RELATING TO AGRICULTURAL LOANS. Establishes loan program specifically for development of sustainable energy by farmers and aquaculturists. Passed over to Senate and referred to Committees on Agriculture and Hawaiian Affairs, and Ways and Means. Passed AHW with amendments 03/11/08.

HB2415 HD1. RELATING TO HIGH TECHNOLOGY. Removes \$25,000 cap on matching grants to allow grants of up to 50 % of moneys awarded to small businesses by Federal Small Business Innovation Research and Small Business Technology Transfer programs. Passed over to Senate and referred to Committees on Economic Development and Taxation, and Ways and Means. Passed EDT with amendments 03/11/08.

HB2739 HD1. RELATING TO STATE ENTERPRISE ZONES. Allows agricultural businesses to qualify for enterprise zones, allows them to receive benefits in case of force majeure, to count leased employees and joint employment workers in hiring formulas, and to qualify certain value-added agricultural sales towards certification for income tax credit purposes. Passed over to Senate and referred to Committees on Agriculture and Hawaiian Affairs, Economic Development and Taxation, and Ways and Means. Passed AWH with amendments 03/11/08.

HB3310 HD1. RELATING TO AGRICULTURE. Appropriates funds for a grant to the Hawaii Farm Bureau Federation. Passed over to Senate and referred to Committees on Agricul-

ture and Hawaiian Affairs, and Ways and Means. AWH testimony hearing held 03/11/08, decision making deferred to 03/18/08.

SB2467 SD2. RELATING TO LOANS TO ASSIST AGRICULTURAL AND AQUACULTURAL INDUSTRIES. Establishes a new class of loans for farm and aquaculture sustainable projects. Passed over to the House and referred to Committees on Agriculture/Energy and Environmental Protection, and Finance. AGR/EEP testimony hearing 03/13/08.

SB2639 SD1. RELATING TO LOANS FOR AGRICULTURAL AND AQUACULTURE PURPOSES. Increases aquaculture loan limits, makes credit denial requirements identical to the agricultural loan program by, creates a "new aquaculturist program", transfers and incorporates aquaculture funds into the agricultural loan reserve fund and increases the expenditure ceiling of the agricultural loan revolving fund. Passed over to the House and referred to Committees on Agriculture, and Finance. AGR testimony hearing 03/12/08.

HB1615, HD1 SD1. Relating to the Development of a Shellfish Aquaculture Industry & Opihi Restoration. Appropriates funds (\$75k) to UH Hilo, Pacific Aquaculture and Coastal Resource Center (PACRC) for feasibility study of developing shellfish industry in Hawaii and including opihi restoration program. Referred to WAM in 2007, awaiting WAM hearing in 2008.

Possible interest because HAA has already submitted testimony:

Oppose HB 2085 HD1. RELATING TO THE AGRIBUSINESS DEVELOPMENT CORPORATION. Requires at least four of the eight members of the Board of the Agribusiness Development Corporation to have knowledge, experience, and expertise within certain secondary industries related to agriculture. Passed over to Senate and referred to Committee on Agriculture and Hawaiian Affairs.

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*(Emergency Ag Loans, from page 1)*

Under the emergency loan program, farmers needing loans of \$25,000 or less may apply for micro-loans which involve less paperwork and swifter processing. Loan applications for emergency loans relating to the December 2007 storms will be accepted until October 31, 2008.

For more information on agricultural loans, call the Agricultural Loan Division:

- O'ahu - 973-9460
- Hilo - 933-9976
- Kona - 323-7591

Information is also available on the division's web page: <http://hawaii.gov/hdoa/agl>

HDOA approved 46 emergency agricultural loans, totaling \$1.8 million for the Spring 2006 heavy rains and flooding, three emergency loans totaling \$57,000 for the October 2006 earthquakes and one emergency loan totaling \$75,000 for the August 2007 wildfire in Waialua, O'ahu.



## ***Hawaii Aquaculture Pioneer: Terry Astro***

*From several contributors*

Hawaii aquaculture pioneer Terry Astro died on Wednesday, March 5 of a heart attack; he was 61.

Richard Fassler, long-time friend, met Astro in 1977 when his company - Astro Marine - was raising tilapia at a 775,000-gallon intensive aquaculture facility at Port Allen on Kauai and Fassler was working for the Aquaculture Planning Program. "Terry was the most well-rounded aquaculturist I've ever known. He raised topminnows, clams, lobsters, tilapia, marine shrimp, brine shrimp, ogo and ornamentals in a variety of ponds, raceways, tanks and trenches. He was the first in Hawaii to use power plant cooling water for aquaculture after receiving a \$50,000 award from the U.S. Department of Energy to study the culture of hybrid tilapia in Kauai Electric's discharge. "It seemed like there was nothing he couldn't grow once he put his mind to it," said Fassler.

With the failure of Taylor Pryor's oyster farm in Kahuku, Astro took over the facility and turned it into an intensive tilapia hatchery and grow-out operation, using massive amounts of saltwater in concrete raceways. This was long before this culture method was widely adopted on the Mainland and throughout the world. Astro diverted the effluent into ponds where he then produced limu.

Decades before tilapia gained global popularity, Astro was trumpeting its potential. He knew that the aquacultured fish was a first-class product, but he had to get over the local prejudice against an "Ala Wai Canal" critter. He changed the name, calling it "Hawaiian Sunfish," and the color - from black to red. When multimillionaire seafood importer Richard Fowler became interested in investing in aquaculture, Astro persuaded him to take a chance on his tilapia.

Fassler was present at Fowler's Kahala Avenue mansion when his chef cooked up Astro's fish. "It's tasteless!" Fowler declared. "We were greatly disappointed," recalls Fassler. "We were headed towards the door when Fowler yelled: 'That's why I love it!'" He started the venture and Astro was soon producing 1,000 pounds of tilapia per day - the largest quantity in the state, and perhaps the nation.

Astro named his first child "Aurea" after a species of tilapia that he had been working with. He launched Kahuku High School's aquaculture program with \$25,000 from the state legislature, and then years after that, set up a tilapia farm at Paauilo on the Big Island. He worked closely with the community and Honokaa High School to provide students with the necessary skills to work at, or start, an aquaculture enterprise. The project was just getting underway when he died.

"With more and more specialization in this industry, I doubt whether we're going to see the likes of a Terry Astro again," said Fassler. "We should never forget his contagious enthusiasm for fish culture and his enormous contribution to aquaculture in Hawaii."