

Aquaculture 2022

Come one, Come all, for Aquaculture Large and Small



February 28 - March 4, 2022
Town and Country Resort & Conference Center
San Diego, California



**WORLD
AQUACULTURE
Society**



**NATIONAL
Aquaculture
ASSOCIATION**

CO-SPONSORS



Hosted By:
California Aquaculture Association



ASSOCIATE SPONSORS

Aquacultural Engineering Society
Aquaculture Association of Canada
Aquaculture Feed Industry Association
Catfish Farmers of America
Global Aquaculture Alliance

International Association of Aquaculture
Economics and Management
Latin America & Caribbean Chapter WA
US Trout Farmers Association
World Aquatic Veterinary Medical Association
Zebrafish Husbandry Association



Aquaculture 2022

Every three years, the Triennial is held somewhere in the United States. In 2022, the Triennial returns to sunny San Diego – one of America's favorite cities.

THE TRIENNIAL IS THE LARGEST AQUACULTURE MEETING IN THE WORLD!

The Triennial is the largest aquaculture conference and tradeshow held in the world with nearly 4,000 attendees from over 90 countries and even more countries are expected to have attendees at AQUACULTURE 2022. The Triennial combines the annual meetings of the Fish Culture Section of the American Fisheries Society, World Aquaculture Society, National Shellfisheries Association, and the National Aquaculture Association. In addition to the annual meetings of the main sponsors, look what else is happening at AQUACULTURE 2022!

- AQUACULTURE AMERICA - Annual Meeting of USAS, the U.S. Chapter of World Aquaculture Society and the Aquaculture Suppliers Association.
- Annual Meeting of the U.S. Trout Farmers Association
- Special sessions organized by Aquacultural Engineering Society and International Association of Aquaculture Economics and Management
- Many other meetings of working groups, government agencies and related aquaculture activities
- Program with technical sessions and producers seminars covering virtually all species grown in aquaculture
- AND - look at all of the Associate Sponsors on the cover who are participating in the program development!

The last Triennial was held in 2019 in New Orleans where it was pronounced a huge success by over 3,000 people who attended. Don't miss this Triennial!



FOR MORE INFORMATION

Aquaculture 2022

Conference Management Office

P.O. Box 2302

Valley Center, CA 92082 USA

Questions: Tel: +1-760-751-5005 Fax: +1-760-751-5003

worldaqua@was.org



Aquaculture 2022 is the place to learn about the latest in aquaculture, see the newest technology in the trade show, and have a great time in the many fantastic restaurants and entertainment sites in San Diego!

EXPANDED PRODUCER PROGRAM

The Triennial is known for the high quality of its Producer Program organized by the National Aquaculture Association. AQUACULTURE 2022 will continue to expand the size and scope of the producer program to address all of the issues facing producers in the U.S. as well as around the world.

PRODUCER TOPICS

Aquatic Animal Drug Approval
Aquatic Animal Health and Welfare
Environmental Issues
Farm Energy Cost Reduction
Farm Planning and Management Tools: Design, Production and Farm/Firm
Federal Agency Town Hall Meeting
Feed, Feeding and Feed Ingredients
Marketing and Promotion
Offshore Aquaculture
Regulatory Costs
Remote Sensing: Farm and Environment
Science and Public Policy
Start Up Aquaculture
Women in Aquaculture

A CRITICAL TRADE SHOW FOR AQUACULTURISTS!

AQUACULTURE 2022 will have the largest aquaculture trade show in the Western Hemisphere and one of the largest anywhere in the world with nearly 200 booths! This is your opportunity to inspect the latest in products and services for the aquaculture industry. It is the place to visit current suppliers and make new contacts. To keep ahead and to keep profits building, you need to keep pace with the technological advancements in the industry - and AQUACULTURE 2022 is the place to do it!

TECHNICAL PROGRAM COVERS THE LATEST RESEARCH

The Triennial Sponsors will put together an extensive technical program featuring special sessions, contributed papers and workshops on all of the species and issues facing aquaculturists around the country. There will be several Featured Sessions covering current topics of global concern. Sample topics will include:

Shrimp	Fish Physiology
Shrimp Nutrition	Larval Finfish
Shrimp Health & Disease	Eels
Shellfish Disease	Finfish Breeding, Genetics, Genomics
Finfish Disease	Striped Bass & Hybrids
Finfish Nutrition	Dermo Disease
Shellfish Nutrition	Probiotics and feed additives
Marine Finfish	Therapeutic drugs
Aquaculture Engineering	Vibrio
Zebrafish	Biosecurity
Aquaponics	Probiotics in aquaculture
Tuna	Nutraceuticals
Open Ocean Aquaculture	Biotechnology
IMTA / Integrated Aquaculture	Stock Enhancement
Biofouling	Broodstock propagation and management
Conservation / Restoration	Fish transport
Aquaculture	Hatchery technology
Disaster Relief	Recirculation technology
Sea Lice	Freshwater Pond Aquaculture
GMO Fish and Shellfish	Recreational and ornamental pond management
Consumer Perceptions	Small scale aquaculture
of Farm-raised Seafood	Urban aquaculture
History of Aquaculture	Artemia
Mussels	Harmful algal blooms
Scallops	Law, Regulations, and Policy
Oysters	Aquaculture Without Frontiers
Clams	Aquaculture education (including minority-serving institutions)
Abalone	Market driven aquaculture: developing and sustaining an industry
Geoducks	Aquaculture Economics
Pearl oysters	Ecology & Environment
Freshwater mussels	Policy & regulations
Tridacna	Organic Aquaculture: Future Opportunities
Shellfish genomics	Certification
Post harvest shellfish treatment	Endangered species
Sea Urchins	Frogs
Macrobrachium	Water Quality & Effluents
Crustaceans	Extension/Technology Transfer
Tilapia	Feeds
Catfish	Latin American and Caribbean Aquaculture
Largemouth bass	Fish Oil
Sturgeon	Fish Health and Welfare
Gar, paddlefish and bowfin	
Percids	
Finfish genetics	
Pond fertilization and fish larviculture	
Ornamentals	
Mullet	



CALL FOR PAPERS – DEADLINE: October 15, 2021

AQUACULTURE 2022 encourages the submission of high quality oral and poster presentations. We strongly encourage authors to consider poster presentations because poster sessions will be an integral part of the program. Papers submitted for “oral presentation only” may not be accepted as oral presentations due to the limited number of available time slots. **All abstracts must be in English – the official language of the conference.**

Each oral presenter shall be entitled to no more than 12 minutes for a presentation, plus 3 minutes for questions. Authors of studies involving proprietary products or formulations should present this information in workshops or the trade show. Oral presentations should use Power Point. Slides, overhead projectors, and video players will not be available or allowed.

All presenters are required to pay their own registration, accommodation and travel expenses.
AQUACULTURE 2022 cannot subsidize registration fees, travel or hotel costs.

No Abstract Book will be printed – a USB Abstract Book will be given to registered attendees.

INSTRUCTIONS FOR PREPARATION OF ABSTRACTS

Expanded Abstract Format - Please refer to the sample.

- 1. TITLE OF PAPER:** The abstract title is printed in CAPITAL LETTERS, with the exception of scientific names which should be Upper/lower case and *italicized* (see example). Scientific names should not be preceded or followed by commas or parentheses or other markings.
- 2. AUTHOR(S):** The first name should be the presenting author. Use * after the presenting author. Type in upper/lower case.
- 3. ADDRESS AND EMAIL:** Type only the presenting author's institution, address and email. Type in upper/lower case.
- 4. MAXIMUM LENGTH:** One Page
- 5. PAGE SIZE:** Standard 8.5 x 11 inch paper (portrait)
- 6. MARGINS:** 1-inch margin throughout (left/right/top/bottom)
- 7. SPACING:** Single spaced
- 8. PARAGRAPHS:** Paragraphs should be separated by a blank line and should not be indented.
- 9. FONTS:** Character fonts should be 12 point type.
- 10. FIGURES & TABLES:** Figures and tables are highly recommended. They should be reduced to the appropriate size for a one page abstract and should be clearly readable at the reduced size. The reduced figures and tables should be included in the abstract in camera-ready form.

1 inch margin (2.54 cm)

EVALUATION OF JUVENILE AUSTRALIAN RED CLAW CRAYFISH *Cherax quadricarinatus* FED PRACTICAL DIETS WITH AND WITHOUT SUPPLEMENTAL LECITHIN AND/OR CHOLESTEROL

Laura A. Muzinic*, Kenneth R. Thompson, Tracey Christian, Carl D. Webster,
Lukas Manomaitis, and David B. Rouse

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Kentucky State University
Frankfort, KY 40601
lmuzinic@csr.net

Red claw crayfish (*Cherax quadricarinatus*) are one of more than a hundred species of Australian freshwater crayfish. However, because of its rapid growth rate, ease of spawning, wide temperature range, dissolved oxygen tolerance, and lack of a larval stage, red claw may be the best candidate for aquaculture in the United States. Red claw are only being investigated as an aquaculture species in this country and no information exists on their nutritional requirements and practical diet formulations. Since many crustaceans require lecithin and cholesterol to be added to their diet, these two nutrients are usually added to the diet. However, lecithin and cholesterol are very expensive. Since diet costs can be as much as 70% of the total operating expenses for an aquaculture enterprise, it is imperative that the least expensive diet be formulated that meets the nutritional requirements of the species. The present study was conducted to determine the minimum amount of lecithin needs to be added to a practical diet for red claw crayfish.

An 8-week feeding trial was conducted in a recirculating system with newly-hatched juvenile (mean individual weight of 0.2 g) red claw, each stocked in individual plastic mesh culture units. Individual units were placed within fiberglass tanks, each containing an aerator and water line. Water was recirculated through biofilters and mechanical filters. Water temperature was maintained at 27-29°C and lighting was provided by a 14-hour fluorescent ceiling lights on a 14-hour light:dark cycle. Ammonia, nitrite, and nitrate were monitored three times per week. The goal of the study was to examine the effects of growth performance of newly-hatched juvenile red claw when fed four practical diets with or without cholesterol and lecithin. The practical diets included menhaden fish meal, soybean meal, shrimp meal, wheat flour, vitamin and mineral mix, pellet binder, cod liver oil, and corn oil (Table 1).

After 8 weeks, red claw crayfish fed a practical diet without cholesterol (Diet 3) had significantly ($P < 0.05$) lower final weight, percentage weight gain, and specific growth rate (SGR) compared to crayfish fed all other diets (Table 2). These results indicate that a practical diet containing 2% cod liver oil and 1% corn oil and having no lecithin appears to be sufficient and that lecithin may not be necessary for juvenile red claw diets.

1 inch margin (2.54 cm)

8.5 inches wide (21.6 cm)

PLEASE SUBMIT YOUR ABSTRACT ONLINE

Submit your abstract via the internet at the meeting website.
Follow the complete instructions on the website for online submission.

www.was.org

If you are unable to submit your abstract online, contact the Conference Manager for alternative methods at:

worldaqua@was.org



ATTENDEE REGISTRATION FORM

Aquaculture 2022

February 28 - March 4 • San Diego, California

Return address for payments in USD:
 AQUACULTURE 2022
 Conference Manager
 P.O. Box 2302
 Valley Center, CA 92082 USA
 Tel: +1 760 751 5005
 Fax: +1 760 751 5003
 Email: worldaqua@was.org

Online registration is preferred at www.was.org OR fax or mail both sides with payment. Use one form per person.

PLEASE PRINT CLEARLY OR TYPE

NAME BADGE INFORMATION: (As you want your name badge to read - No titles, please)

First Name _____ SURNAME (FAMILY NAME) _____

Company / Institution _____
 (Limited to 40 Letters & Spaces)

Country _____

MAILING INFORMATION: Email _____

Address _____

City _____ State / Prov _____ Postal Code _____ Country _____

Tel _____ Fax _____ Title: (circle one) Dr. Mr. Ms. Mrs.

(Include country and area code)

(Include country and area code)

REGISTRATION FEES: In order to receive the discount rates as listed below, this form and payment must be received by the date listed.

TYPE OF REGISTRATION <i>Check the appropriate boxes</i>	Register by January 21, 2022	Register by February 15, 2022	Register after February 15, 2022	<p>* To qualify for Member Rate you <u>must</u> complete the Association Memberships section on the reverse side.</p> <p style="text-align: center;">• • • • •</p> <p>Trade Show is <u>included</u> in the Full Conference Registration Rate.</p> <p>TOTAL REGISTRATION FEE</p> <p>US\$ _____</p>
MEMBER RATE*	<input type="checkbox"/> US\$ 495	<input type="checkbox"/> US\$ 595	<input type="checkbox"/> US\$ 695	
STUDENT MEMBER RATE* <small>Include copy of Student I.D.</small>	<input type="checkbox"/> US\$ 260	<input type="checkbox"/> US\$ 260	<input type="checkbox"/> US\$ 325	
Non-Member Rate	<input type="checkbox"/> US\$ 590	<input type="checkbox"/> US\$ 690	<input type="checkbox"/> US\$ 790	
Student Non-Member Rate <small>Include copy of Student I.D.</small> You can join WAS on the reverse side and use the Member Rate.	<input type="checkbox"/> US\$ 330	<input type="checkbox"/> US\$ 330	<input type="checkbox"/> US\$ 390	
<input type="checkbox"/> Spouse Rate <small>Name _____</small>	<input type="checkbox"/> US\$ 395	<input type="checkbox"/> US\$ 495	<input type="checkbox"/> US\$ 595	
TRADE SHOW PASS (Trade show pass is included with the Full Conference Registration) <small>Good for 3 days admission to exhibits only - March 1, 2, 3</small>				
			<input type="checkbox"/> US\$ 50	TOTAL TRADE SHOW PASS US\$ _____
INDUSTRY TOURS See website for current tour information				
MEMBERSHIP DUES - Enter amount from Membership Application on other side if applicable.			TOTAL MEMBERSHIP DUES US\$ _____	
Do not mail registration after Jan. 31, 2022 or fax after Feb. 20, 2022. After those dates, bring this form with you to register at the show.			➔ TOTAL AMOUNT US\$ _____	

Registration Confirmation and Receipt will be emailed after processing.

CANCELLATION POLICY: Cancellation of registration must be received - in writing - no later than February 1, 2022. Refunds for registration fees will be subject to a 20% handling fee. Refunds are processed after the conference. No refund will be made for cancellations received after February 1, 2022 or for "no shows". After February 1, 2022, no refunds will be made for professional or personal emergencies, flight cancellations, denied visa, weather related cancellation or other travel emergencies. Fees for memberships are non-refundable.

PAYMENT METHOD: All fees must be paid to the order of AQUACULTURE 2022.

☐ Check # _____ ☐ Visa ☐ Mastercard ☐ American Express

Card # _____ Expiration Date _____

Name on Card _____ Signature _____ Date _____

For bank transfer details, contact us.

REGISTRATION FORM - SIDE 2



Name _____

ASSOCIATION MEMBERSHIPS: Please check all boxes for associations for which you are a current member. Membership in any of those associations qualifies you for the Member Rate* on the Registration Fees. You can join an association at any time before registering to qualify for the Member Rate.

- | | | |
|---|---|---|
| <input type="checkbox"/> Aquacultural Engineering Society | <input type="checkbox"/> Fish Culture Section - AFS | <input type="checkbox"/> Southern African Aquaculture Society |
| <input type="checkbox"/> Aquaculture Association of Canada | <input type="checkbox"/> Global Aquaculture Alliance | <input type="checkbox"/> Spanish Aquaculture Association (SEA) |
| <input type="checkbox"/> Aquaculture Without Frontiers | <input type="checkbox"/> Korean Aquaculture Society | <input type="checkbox"/> US Trout Farmers Association |
| <input type="checkbox"/> Asian Fisheries Society | <input type="checkbox"/> Malaysian Fisheries Society | <input type="checkbox"/> World Aquaculture Society |
| <input type="checkbox"/> California Aquaculture Association | <input type="checkbox"/> National Aquaculture Association | <input type="checkbox"/> World Aquatic Veterinary Medical Association |
| <input type="checkbox"/> China Society of Fisheries | <input type="checkbox"/> National Shellfisheries Association | <input type="checkbox"/> Zebrafish Husbandry Association |
| <input type="checkbox"/> Egyptian Aquaculture Society | <input type="checkbox"/> Sociedad Brasileira de Acuicultura | |
| <input type="checkbox"/> European Aquaculture Society | <input type="checkbox"/> Society of Aquaculture Professionals (India) | |

MEMBERSHIP APPLICATIONS

☐ NEW APPLICATION

☐ RENEWAL

FISH CULTURE SECTION OF AMERICAN FISHERIES SOCIETY

☐ **FCS Membership for Current AFS members** \$5.00

All FCS members must be full members of the American Fisheries Society

Join or pay your membership dues online at fishculture.fisheries.org

WORLD AQUACULTURE SOCIETY (WAS) APPLICATION

www.was.org

For details on the different types of memberships and options, please contact the WAS home office at

Tel: +1-225-578-3137 Fax: +1-225-578-3493 Email: judya@was.org

MEMBERSHIP CATEGORY: (Indicate only one)

- ☐ **Individual** (Electronic JWAS) (USD 65/yr) Applies to an individual only
- ☐ **Individual** (E Access) (USD 45/yr) Applies to an individual only
- ☐ **Student** (Electronic JWAS) (USD 45/yr) (Copy of Student ID or Signature of Professor required)
- ☐ **Sustaining** (Electronic JWAS) (USD 105/yr) Applies to any one individual from a company
- ☐ **Corporate** (Electronic JWAS) (USD 255/yr) Allows all employees of one company to attend meeting at Member Rate
- ☐ **Lifetime** (Electronic JWAS only) (USD 1000 with no chapter) Applies to an individual only
- ☐ **Lifetime** (Electronic JWAS only) (USD 1100 with one chapter) Applies to an individual only

CHAPTER OPTIONS:

One chapter included in membership.
Mark the chapter you choose.

- ☐ **Africa**
- ☐ **Asian Pacific**
- ☐ **Korea**
- ☐ **Latin American/Caribbean**
- ☐ **United States (USAS)**
- ☐ **None** (deduct USD 5)

You can add extra Chapters for USD 5

Fees for memberships are non-refundable.

Total Amount for WAS Membership USD _____

Please enter this amount under "Membership Dues" section on opposite side of this form.

NATIONAL SHELLFISHERIES ASSOCIATION

For details on the different types of memberships and options please contact the NSA office at:

www.shellfish.org

MEMBERSHIP CATEGORY: (Indicate only one)

- ☐ **Regular** (USD 95/yr) ☐ **Student** (USD 50/yr)
- ☐ **Sustaining** (USD 200/yr)

Includes subscription to the *Journal of Shellfish Research*

Signature of Professor or copy of Student ID required

Total Amount for NSA Membership USD _____

Please enter this amount under "Membership Dues" section on opposite side of this form.

NATIONAL AQUACULTURE ASSOCIATION (NAA)

For details on the different types of memberships and options, please contact the NAA home office at:

Tel: +1-850-216-2400 Fax: +1-850-216-2480 Email: naa@thenaa.net Web: www.thenaa.net

For membership in other associations, please contact them directly.

If you need a phone number, contact the Conference Manager worldaqua@was.org.

TRAVEL

Special car rental fares have been arranged with AVIS. you can make reservations at 800-331-1600 or +1-918-624-4338 and mention the special discount code #J770126.

HOTELS

We have arranged for fantastic rates at the recently renovated Town and Country Resort and Conference Center. You can reserve your room by phone or on their website.

Check the conference website for details.

OUR FULL CONFERENCE REGISTRATION INCLUDES:

- Admission to all conference sessions and the trade show
- Admission to the receptions
- Conference Bag and Show Directory
- Refreshment Breaks and Happy Hour
- Abstract Book on USB
- Students receive the full registration package plus the Student Reception. To qualify for the student rate, a copy of your student I.D. is required.

Only pre-registered attendees are guaranteed materials.



Stay in touch with the program developments for

Aquaculture 2022

through our Web Page at:

www.was.org

<https://fishculture.fisheries.org>

www.shellfish.org





TENTATIVE SCHEDULE

Monday, February 28

Exhibit Set-up.....	10:00 – 6:00
Registration Open	12:00 – 6:00
Welcome Reception	6:00 – 8:00

Tuesday, March 1

Registration Open	7:30 – 5:00
Opening Ceremonies & Plenary Session	8:30 – 10:00
Refreshment Break.....	10:00 – 11:00
Sessions	11:00 – 12:30
Trade Show Open.....	10:00 – 6:00
Lunch (on your own).....	12:30 – 1:30
Sessions	1:30 – 5:00
Happy Hour & Posters.....	5:00 – 6:00
Student Reception & NSA Auction....	7:00 – 9:00

Wednesday, March 2

Registration Open	7:30 – 5:00
Sessions	8:30 – 10:00
Trade Show Open.....	10:00 – 5:30
Refreshment Break.....	10:00 – 10:30
Sessions	10:30 – 12:30
Lunch (on your own).....	12:30 – 1:30
Sessions	1:30 – 4:30
Happy Hour & Posters.....	4:30 – 5:30
NAA Auction	5:30 – 7:30

Thursday, March 3

Registration Open	7:30 – 5:00
Sessions	8:30 – 10:00
Trade Show Open.....	10:00 – 1:30
Refreshment Break.....	10:00 – 11:00
Sessions	11:00 – 12:30
Lunch (on your own).....	12:30 – 1:30
NSA Members Luncheon	12:30 – 2:00
Sessions	1:30 – 3:00
Exhibit Move-out	1:30 – 7:00
Refreshment Break.....	3:00 – 3:30
Sessions	3:30 – 5:30
Presidents Reception	6:30 – 8:30

Friday, March 4

Registration Open	8:00 – 5:00
Sessions	8:30 – 10:00
Refreshment Break.....	10:00 – 10:30
Sessions	10:30 – 12:30
Lunch (on your own).....	12:30 – 1:30
Sessions	1:30 – 3:00
Refreshment Break.....	3:00 – 3:30
Sessions.....	3:30 – 5:00
Closing Happy Hour.....	5:00 – 6:00