



*The*



*quatic*

*eterinarian*

Volume 15, Number 2  
Second Quarter, 2021



**WHO ARE WE****MISSION**

The Mission of the World Aquatic Veterinary Medical Association is to serve the discipline of aquatic veterinary medicine in enhancing aquatic animal health and welfare, public health, and seafood safety in support of the veterinary profession, aquatic animal owners and industries, and other stakeholders.

**OBJECTIVES**

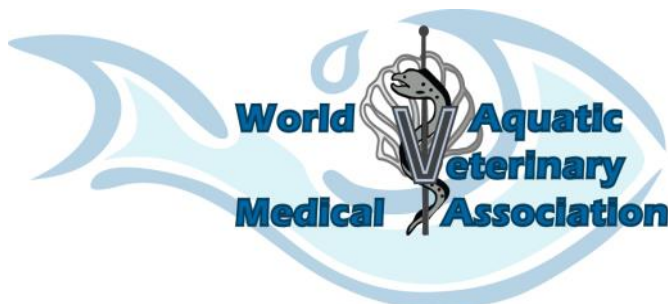
- A. To serve aquatic veterinary medicine practitioners by developing programs to support and promote our members, and the aquatic species and industries that they serve;
- B. To be an advocate for, develop guidance on, and promote the advancement of aquatic animal medicine within the veterinary profession and with associated industries, governments, non-governmental entities and members of the public;
- C. To develop and implement aquatic veterinary education programs, certifications and publications, including a credentialing process to recognize day-one competency in aquatic animal medicine;
- D. To foster and strengthen greater interactions among: aquatic veterinarians, related disciplines, veterinary allied and supportive groups and industries, governments and animal owners.

*The ideas presented in this publication express the views and opinions of the authors, may not reflect the view of WAVMA, and should not be implied as WAVMA recommendations or endorsements unless explicitly stated.*

*Information related to the practice of veterinary medicine should only be used within an established valid Veterinarian-Patient-Client Relationship.*

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ISSN 2329-5562

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**Cover Photo:**

*Dr. Ericka Johnson, from the Arizona Exotic Animal Hospital, performing endoscopy on an Alligator, removing several dozen hairballs that were diagnosed by barium radiography. See her article on pages 22-23.*

*Below: Fish surgery Lab at AQUAVET. See article on pages 24-25.*



Get The Fuller Picture From WAVMA WebCEPD Online Webinars

**WAVMA’s WebCEPD Program - Webinars for Global Aquatic Veterinary Education**

Given by leading experts, WAVMA’s real-time and recorded WebCEPD webinars are intended as educational programs on key aquatic veterinary issues and techniques to hone the knowledge and skills of aquatic veterinary students and practitioners.

<https://www.wavma.org/WebCEPD>

**Editor’s Note**

It is exciting to see some conferences are starting to have in-person attendance again. I am greatly looking forward to visiting Madeira, Portugal for the European Aquaculture Society Conference, <https://www.aquaeas.org/Meeting/AE2021>, in October, where WAVMA is planning to have our Annual General Meeting (for more information see page 11). Having been fortunate to receive two doses of the COVID-19 vaccine, I feel safe to travel again and hope that there will soon be an end to this pandemic. Please get the vaccine when you can and stay healthy!

In this issue there is a report from the AQUAVET program held at the Roger Williams University in Bristol Rhode Island USA. Any veterinary students that can attend this program will receive a fantastic introduction to Aquatic Veterinary Medicine. The courses also count towards the credits for WAVMA Aquatic Veterinary Certification. You can find out more information about AQUAVET on the website: [www.vet.cornell.edu/education/other-educational-opportunities/aquavet](http://www.vet.cornell.edu/education/other-educational-opportunities/aquavet). The seafood dinner served at the last evening of AQUAVET made me think of oysters, so the Literature Review section (pages 32-33) is all about abstracts showing the benefits of Oyster culture. Bon Appetite!

**Nick Saint-Erne, DVM, CertAqV**  
*Executive Editor*  
[TAVeditor@wavma.org](mailto:TAVeditor@wavma.org)

*The Editor keeping a Roundtail Chub from jumping out of a bin of anesthetic solution prior to tumor removal surgery at the Arizona-Sonora Desert Museum.*



Download a QR reader onto your Smart Phone and scan the Quick Response Code to the right. It will take you to the WAVMA.org website page for accessing all of the past WAVMA Newsletters.

You will need your WAVMA User ID and Password to access the most recent issues of *The Aquatic Veterinarian*.



The latest editions are available for download at <https://www.wavma.org/TAV-Current-Issues>.

Past years’ editions are available for download at <https://www.wavma.org/TAV-Archives>.



*The Aquatic Veterinarian*

**The Quarterly Magazine of the World Aquatic Veterinary Medical Association**

**Consider promoting your products, services or programs to aquatic veterinarians, veterinary students, nurses & paraveterinary professionals throughout the world**

**Advertising Rates (per issue)**

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Free 1/8 page (business card size) advertisement  
**Contact [TAVeditor@wavma.org](mailto:TAVeditor@wavma.org) for information on advertising and payment options.**

## President's Report

WAVMA Members,

I hope you, your family, and your friends are doing well. As the global pandemic continues, I hope we are all able to continue with resiliency, strength, and optimism about the future.

Thanks to each of you for your continued membership in WAVMA. Our members have been working hard since 2006 to serve the aquatic veterinary medicine community. You are what make this organization possible and successful. Thank you for all you do.

I am humbled to serve as President of this organization and have made improving the value of membership my focus during the brief time in this office. I am fortunate to be surrounded by Executive Board members who share this vision and are working hard to make it a reality. Our new website has been going strong and we have received many notes of positive feedback on the new site. We have begun rolling out Phase 2 of the new site, which includes enhancements to WAVMA programs further increasing the user interface and usability of the site while decreasing the administrative burden. This allows for our Administrators and all-volunteer leaders to focus their time and energy on adding values to our members.

Despite the pandemic, there are many things going on for WAVMA. This is the second year for our Directors-at-Large to represent specific geographic regions of the world. Several have already begun to hold regional and local meetings to raise awareness of WAVMA and highlight our many programs. WAVMA recently entered into an agreement with Aquadocs Podcast. We are excited about this opportunity to increase awareness of WAVMA throughout the world, provide an outlet for our members to share their experiences and hard work, and promote a valuable resource for our members and the community at large.

In addition to our WebCEPD Program now allowing for WebCEPD recording access and CEPD certificate earning as a FREE benefit for WAVMA members, we have expanded our collaborations with other aquatic animal health organizations and are excited to have them as co-sponsors for specific WebCEPD events. It is fantastic to see this Program continue to grow, which will help our members get the necessary CE and help us continue our pursuit of lifelong learning. We have held several excellent WebCEPDs this year and many more are scheduled. If you have not visited the WebCEPD page on the website lately, go check it out at [www.wavma.org/WebCEPD](http://www.wavma.org/WebCEPD).

As Dr. Julius Tepper, WAVMA Meeting Committee Chair, continues working with the European Aquaculture Society to hold the 2021 WAVMA Annual General Meeting at AE2021 (Aquaculture Europe 2021). We are excited at the possibility to finally meet in-person again and to do such in such a beautiful part of the world. Please let Dr. Tepper know if you will be attend-



*Dr. Stephen Reichley on his recent trip to Africa.*

ing the meeting, we will have WAVMA members there as speakers and look forward to a great AGM.

Thanks again for your membership in WAVMA. We are One Profession, One Discipline, One Voice – Cohesive and Inclusive. Please reach out to me at [President@wavma.org](mailto:President@wavma.org) if you have any suggestions on how we can add value to your WAVMA membership, improve our many services and programs, or just to check in. I wish you and your family continued health in 2021.

*Stephen R. Reichley*

Stephen Reichley, DVM, PhD, CertAqV  
WAVMA President

[President@wavma.org](mailto:President@wavma.org)

### Secretary's Report

This year has seen a significant update to the WAVMA website. The Board and administrators would encourage all members to have a browse and familiarise yourself with these changes. Some of them will not become apparent or useable unless you log in to your profile:

- Click on the Profile Button on the top Right Hand Side of the home page [www.wavma.org](http://www.wavma.org).
- Enter the email address you used to join WAVMA. This is your unique identifier so do not forget it, as it is used in all communications to members. You will need to update your email address if it changes, or you no longer have access to it. The administrators can update this for you but please provide sufficient information when requesting, so that they can confirm you are who you say you are.
- Enter your password. If you have forgotten your password, then click on the "Lost Password" button. You will receive an email within a couple of minutes. If it does not arrive, please check your spam folders. Not just on your computer but also online. From experience this is particularly true if you use Microsoft products. They do not always match! Another complicating factor is if you use an institutional email address, as sometimes, the institutional email policies may block receipt. In this case you need to check with your IT department. It is good practice to add [@wavma.org](mailto:@wavma.org) to your "safe senders" list before experiencing these issues.

Logging in to your profile opens several tabs which from left to right are:

**Current Membership** - this displays if your membership is up to date and whether your CertAqV status is current. It also opens a payment box a month or two before you need to renew your membership (You will receive an email reminder). Do not worry if you pay your membership slightly early as it defaults to one year from the end of your previous membership. There is no method to pay prior to this payment box opening so you cannot, for example, pay a year in advance. Although the payment box shows "pay via PayPal" you do not need a PayPal account, you can still use credit or debit cards. PayPal just acts as the "payment facilitator".

**Contact Information** – Many members fail to complete this, but as a minimum please complete the boxes with a  beside them. This helps the administrators confirm who you are if things go awry but perhaps more importantly helps WAVMA develop appropriate programs. At the bottom of the page are a couple of tick boxes for the various directories your details can be published in – useful free advertising! If you make any changes or additions, please remember to click save.

**Preferences** – this is where you can update your password and subscribe to the various listservs and

publications WAVMA provides. The listservs are how WAVMA keeps in touch with members, and you can subscribe to a weekly update if you feel you receive too many emails.

**Payment History** – provides downloadable receipts of any payments you have made to WAVMA as well as when you signed up to complete any KSA on [www.wavma.org/WebCEPD](http://www.wavma.org/WebCEPD) page.

**Open Orders** – This contains a record of any orders or payment made that have failed to complete properly. In all cases, it is highly unlikely that any money will have gone astray. If it is not down to entering the wrong details or other errors on your side, then please contact the administrators who will be able to resolve it for you.

**CEPD** – this lists any CEPD you have done on the WAVMA website. You can download a copy of any certificates awarded.

Many of the updates carried out this year were to increase the automation of the website and make the CMS (Computer Management System) easier for the administrators to use. It's unlikely you'll notice many of them, but it has meant a great improvement in our ability, and much less time required to do things. After all, WAVMA is run by volunteers.

The important thing though is what they mean to you as a member, and WAVMA has also concentrated on improving member benefits and how easy it is for you to use WAVMA's services. However, if you spot something that needs developing or improved then drop the administrators a line.

So what's new?

The payment system – due to the costs of running a dual system, WAVMA opted to just offer payment through PayPal. This still means you can use Credit or Debit Cards with PayPal used as the "payment facilitator". You do not need a PayPal account but in countries where PayPal is not an option (due to regulations) we still offer payment via the credit card system. From an administrative perspective there are a lot of advantages to using PayPal, not least the ability to match up payments and submitting accounts. Some of you are reticent about using PayPal but it really does make the life of the Treasurer much easier and is a safe and efficient way to pay your WAVMA dues.

The Member Resources Tab of the Home page includes a shortcut to updating your profile (you will need to be logged in to your current profile), information regarding the membership categories and current student chapters amongst others. When the EB election is running you can also cast your vote through here.

Updates include:

The Membership Directories – WAVMA offers two Directories. One that is only seen by members and one that is public. Your details can be added automatically (and removed) by clicking on the check boxes towards the bottom of the Contact Information tab in

your profile. For those who have achieved CertAqV, an additional box is added to the member details to celebrate this fact.

The Members-only Directory ([www.wavma.org/directory/search](http://www.wavma.org/directory/search)) is exclusively available to members who are logged in. It's a great way to contact colleagues. You can contact someone directly via their membership email and it also displays website information amongst other contact information. If your membership expires you will stop being listed but will automatically be added again once membership is renewed.

The Find a Fish Vet ([www.wavma.org/find-a-fish-vet](http://www.wavma.org/find-a-fish-vet)) is available to the public via the "Find a Fish Vet" on the Home page and displays the same content as the Members Directory, if you have opted to have your information available to the public.

Employment Available – ([www.wavma.org/available-jobs](http://www.wavma.org/available-jobs)) Anyone can post a job vacancy (just click on the green "Add a new job" button), which is reviewed by the administrators prior to posting, and the resultant details can only be seen by members who are logged in. At the time of writing, you need to be logged in to your profile to check out how easy it is to add a vacancy and currently there are 16 advertisements. The success of this page is dependent on making sure as many people know about it and that folk use it. An area of "tweaking" under discussion is to make adding a job open to anyone.

The Education tab of the Home page is where most work has gone in to, as these are the services currently most used by WAVMA members.

CertAqV Program – ([www.wavma.org/CertAqV-Pgm](http://www.wavma.org/CertAqV-Pgm)) WAVMA is well on track to having over 100 applicants this year alone. If you have fulfilled the requirements of CertAqV your name and country will be listed on this page. This is an easy way for clients and colleagues to check who is certified as you are automatically delisted if you have failed to renew your WAVMA membership or not complied with the requirements of CertAqV. For those thinking of signing up, it is a good place to find out about what the CertAqV requirements are and potential mentors. It is recommended that you identify and talk to a potential mentor prior to signing up for the CertAqV, to discuss what you might need to do to complete it, and whether this is feasible within the timeframe allowed.

The Credentialing Committee is currently looking at some changes to this page and to the CertAqV handbook, so look out for these coming soon. Any changes will not be applied to candidates retrospectively.

WebCEPD – ([www.wavma.org/WebCEPD](http://www.wavma.org/WebCEPD)) there are now over 70 hours of webinar recordings providing CEPD certificates that are available free to all members. To access the video recording, click on the "Training Materials and credits" button. If you have not logged in to your membership, then you will be asked to do so at this point. If you cannot see a video recording, then you will need to click on the "sign up for the

quiz" box. As WAVMA charges non-members \$15 to view recordings or the quiz for CEPD, rather confusingly for members you need to "pay" \$0. We are working on changing the language to make this clearer but unfortunately there is nothing WAVMA can do about the programming requirements.

Vet Student Externships – ([www.wavma.org/Externships](http://www.wavma.org/Externships)) it is possible for anyone to add an externship to or edit an existing externship on this page. Any new or edited externships go through a review process prior to going live. The page is divided in to two sections, current externships and archived externships. The archived externships serve two purposes, firstly so if a provider needs to update a previous post (that is out of date) they do not need to start from scratch, secondly so students can see where potential externships may be available so they can contact the providers in good time. Once again, the success of this page depends on people adding information and using it.

Video Library – the library currently contains seven sections with over 70 video recordings only available to WAVMA members. Topics range across conference proceedings, Koiprax, Procedures and other topics. There are no CEPD certificates provided for these videos, as the time length may be only a few minutes, but there is a wealth of information available here. It is well worth exploring.

Aquadocs – With around 40 podcasts to listen to, this is an exciting partnership for WAVMA. Listen to some of the world's experts on diverse aquatic topics.

Updates yet to be completed are in the Publications tab (WAVMA e-News) and the Communications tab (Blogs). Both these systems are linked and need to be trialed before being open to all who subscribe to them. Most of the changes are of an administrative nature to ensure that whomever runs them can be confident they have something to say on a regular basis and that the e-news is easy to edit. Currently you can browse past postings in both.

A potential next step is a replacement system to the listservs. This is somewhat problematic due to the cost of either developing a brand-new system or finding a suitable system for WAVMA to subscribe to.

The Website administrators would welcome any comments or suggestions regarding any area of the website, "as familiarity can mean you do not spot obvious errors or how difficult a process might be for a member". The administrators can be contacted directly through the Contact Us form on the website (top Right Hand Side of the banner) or via email [administrators@wavma.org](mailto:administrators@wavma.org).

Morag Clinton  
 WAVMA Secretary  
[Secretary@wavma.org](mailto:Secretary@wavma.org)

**Treasurer’s Report**

Members are the life-blood of any professional Association. Please join us in welcoming the following new WAVMA members:

**New Members—Second Quarter 2021**

**Veterinarians**

Sonja Saksida	Canada
Laura Sitter	Canada
Manuel Salas Wiedmaier	Chile
Ladislav Novotny	Czech Republic
Citanyaning Kirana	Indonesia
Marcello Balzaretto	Italy
Braam Steyn	South Africa
Roberto Guijarro de la Cal	Spain
Johanna Baily	United Kingdom
J. Gustavo Ramirez Paredes	United Kingdom
Angela Ashby	United Kingdom
Brian Quinn	United Kingdom
Stephen St. Pierre	United States
Tamara Colebank	United States
John Thomas	United States
Jamie Torres	United States
Janette Alvarez	United States
shayne ballou	United States
Dr David Ellefson	United States
Michael Dutton	United States
Evan Emmel	United States

**Veterinarian—New Graduate**

Katrina MacNeill	Canada
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**Vet Student Members (enrolled in Vet Curriculum)**

Abdulsalam Isiaku	Australia
Mostafa Rakhshani Nejad	Belgium
Ashton Nietzke	Saint Kitts and Nevis
A. Isobel Pribil	Saint Kitts and Nevis
stephanie valencia	Saint Kitts and Nevis
Natalie Arenas	Saint Kitts and Nevis
Ikhida Ehimiyein	United Kingdom
Maria Semidey	United Kingdom
Noemi Lorenzo-Vidaña	United Kingdom
Netta Ohayon	United States
Ava Mastrostefano	United States
Jessica Elbert	United States
Nicole Copeland	United States
Danielle Arnold	United States
Olivia Pleasanton	United States
Taylor Abraham	United States
Dauida Johnson	United States
Hannah Dadah	United States
Anneka Christie	United States
Christopher Lopresto	United States
Christina Garcia-Rovetta	United States
Madeleine Vanderwall	United States
Madison Wilinsky	United States
Maygan Reeves	United States
Austin Coull	United States

Lauren Wylie	United States
Karla Fuentes	United States
Julia Pecora	United States
Jennifer Guerrero	United States
Christy Daugherty	United States
Jessie Vanadia	United States
Brittany Torchia	United States
Brenda Rivera	United States
Maria Kogarova	United States
Elizabeth Serrano	United States
Rachel Garrett	United States
Emma Smith	United States
Abigail Dial	United States
Maya Cardona	United States
Mikaela Daoud	United States
Kaitlynn Hicks	United States

**Affiliate Members (Non-veterinarian)**

Louise von Gersdorff Jørgensen	Denmark
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**Veterinary Technician/Nurse**

Karen Hetherington	United Kingdom
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Welcome to WAVMA!

Wes Baumgartner  
WAVMA Treasurer  
[Treasurer@WAVMA.org](mailto:Treasurer@WAVMA.org)

**Discover core knowledge, skills & experience needed to become a WAVMA Certified Aquatic Veterinarian (CertAqV)**

Did you know that WAVMA's *CertAqV Program* offers members the opportunity to become recognized and certified as having competency in 9 core areas deemed necessary to practice aquatic veterinary medicine? Find out more information online at: <http://www.wavma.org/CertAqV-Pgm>.

**TO SUPPORT FUTURE STUDENT SCHOLARSHIPS, PLEASE MAKE A DONATION TODAY TO THE SCHOLARSHIP FUND!**

[WWW.WAVMA.ORG/SCHOLARSHIPS](http://WWW.WAVMA.ORG/SCHOLARSHIPS)



### Instructions for Authors and Contributors

While any information relevant to aquatic veterinary medicine might be published, we particularly invite contributions for the following regular columns in THE AQUATIC VETERINARIAN:

#### Colleague's Connection

An article explaining why and how a veterinarian became interested in aquatic veterinary medicine and what that veterinarian has done in their aquatic veterinary career.

#### Peer-Reviewed Articles

Original research or review of any aquatic veterinary topic. Articles will be reviewed by 3 veterinarians and comments and changes referred back to the author prior to publication. The text for an article begins with an introductory section and then is organized under the following headings:

- Materials and Methods
- Results
- Discussion (conclusions and clinical relevance)
- References (cited in the text by superscript numbers in order of citation).

#### Clinical Cases

Clear description of a distinct clinical case or situation and how it was resolved. These may be submitted for peer-review. Begin with the signalment (species, age, sex, body weight or length) of the animal or animals, followed by a chronologic description of pertinent aspects of the diagnostic examination, treatment, and outcome, and end with a brief discussion.

#### Book Reviews

Brief review of a published book, including an overview and critique of the contents and where to obtain the book.

#### Publication Abstracts

Abstracts of published veterinary and scientific journals with full citation/reference (authors, date, title, and journal volume and page numbers – ½-1 page length).

#### News and Views

Brief synopsis or information about aquatic veterinary news published elsewhere. List original source of information.

### Legislative & Regulatory Issues

Synopsis or description of emerging legislation or regulations with information on how to access further detailed information or a link to website.

### Meetings and Continuing Education and Professional Development (CE&PD) Opportunities

Description or synopsis of upcoming aquatic veterinary or (veterinarian-relevant) non-veterinary in-person or on-line educational meetings noting the meeting title, dates, location, and contact person or website.

### Jobs, Internships, Externships or Residencies

Description with specific contact information for veterinary student externships and post-graduate internships or residencies at private practices, institutions, universities or organizations. Description of available full or part-time employment for aquatic veterinarians, with contact information.

### Advertising

See advertising rates on page 4.

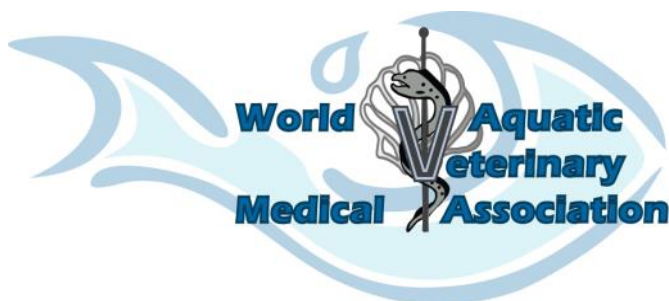
### Please send articles, clinical reports, or news items to the editor by the following submission dates:

- Issue 1 – February 15 (published in March)
- Issue 2 – May 15 (published in June)
- Issue 3 – August 15 (published in September)
- Issue 4 – November 15 (published in December)

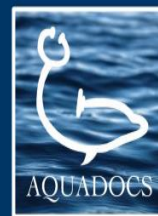
All submissions should be in 10-point Arial font, single spaced. Submissions may be edited to fit the space available.

We can also use editors to proof-read submissions or review articles. Please contact the Editor if you are interested in assisting.

The World Aquatic Veterinary Medical Association also has opportunities for members to assist with committees. Contact any member of the Executive Board to volunteer to help.



WAVMA is excited to partner with Aquadocs Podcast



Looking for new and on-the-go ways to learn about aquatic medicine? Check out Aquadocs podcast hosted by Michelle Greenfield where aquatic animal health experts share their research, clinical cases, stories, and more.

Find episodes on Spotify and Apple/Google Podcasts and at [www.aquadocspodcast.com](http://www.aquadocspodcast.com)  
Follow us on Instagram and Facebook @aquadocspodcast



### Join A WAVMA Committee

All of the great programs and features you get from WAVMA membership are provided by volunteers. We are always looking for more helpers, whether veterinarians, veterinary students or veterinary nurses, to join us on the committees. If you are not interested in running for office, but would like to provide your input and guide the future of WAVMA, join one of our committees (no previous experience necessary!). See a list of our committees on page 12. Contact our Secretary or the committee chair for more information about the committee and the dates of the next meeting (also done via web conference). All are Welcome!

Join a WAVMA Committee today!

### Executive Board Responsibilities

The Executive Board has the responsibility for charting the course of WAVMA, fiduciary oversight of all issues, and, with input of committees, provides the oversight and approval for all WAVMA programs and services that fulfill the Mission and Objectives of the organization. The Board generally meets once a month through teleconferences, to discuss and approve WAVMA programs, services, and policies that drive the organization and issues that affect aquatic veterinary medicine. Members may submit items for discussion at the next Executive Board meeting by contacting the [WAVMA Secretary](#).

**TO SUPPORT FUTURE STUDENT  
SCHOLARSHIPS, PLEASE MAKE  
A DONATION TODAY  
TO THE SCHOLARSHIP FUND!**  
[WWW.WAVMA.ORG/  
SCHOLARSHIPS.](http://WWW.WAVMA.ORG/SCHOLARSHIPS)

*The Aquatic Veterinarian* is meant to be read as a 2-page spread (like a paper magazine!). To view it this way on your computer, open the pdf document using Adobe Acrobat or Adobe Reader, then go to the menu bar at the top of the computer screen and click on View, then Page Display, then Two Page View. That will allow you to scroll thorough the issue seeing the cover page by itself first, followed by two pages side by side for the rest of the issue. Doing this, you will be able to see the Centerfold picture in all its ginormous glory!

### WAVMA Committees

As a member-driven organization, WAVMA relies on volunteers to help implement programs useful for all members. Any WAVMA member can volunteer on a Committee to help shape the direction of the Association, meet new colleagues, forge valuable and lasting relationships, and help address key issues affecting aquatic veterinary medicine today. To find out more about serving on a Committee, please contact the Committee Chair or the WAVMA Secretary.

#### Budget and Finance Committee

This Committee develops and regularly revises the Association's annual budget and assists the Treasurer, as necessary, in developing the Association's annual financial reports and tax materials.

This Committee shall consist of the Treasurer (Chair); the President-Elect; and one other member of the Executive Board who will volunteer to serve a one-year renewable term.

Chair: Wes Baumgartner, [Treasurer@wavma.org](mailto:Treasurer@wavma.org)

#### Communications Committee

This Committee manages the communications among members and others involved with aquatic veterinary medicine. It oversees the listservs, membership lists, publication of WAVMA's quarterly journal *The Aquatic Veterinarian*, e-News, Facebook, Twitter, LinkedIn and other social media accounts.

Chair: Morag Clinton, [Secretary@wavma.org](mailto:Secretary@wavma.org)

#### Credentialing Committee

This Committee oversees and administers the Cert-AqV Program for credentialing aquatic veterinary practitioners, and evaluates aquatic veterinary educational programs useful to members.

Chair: Matthijs Metselaar [CertAqV-Admin@wavma.org](mailto:CertAqV-Admin@wavma.org)

#### Meetings Committee

This Committee oversees and coordinates logistics for WAVMA-organized or sponsored aquatic veterinary educational meetings, including the Annual General Meeting.

Chair: Julius Tepper, [cypcarpio@aol.com](mailto:cypcarpio@aol.com)

#### Membership Committee

This Committee oversees membership issues to optimally serve members and the organization.

Chair: Chris Walster, [Administrators@WAVMA.org](mailto:Administrators@WAVMA.org)

#### Education & Student Committee

This Committee facilitates networking between student members and helps development of educational programs and services.

Chair: Bartolomeo Gorgoglione, [BartGorg@msu.edu](mailto:BartGorg@msu.edu)

### Fellows Advisory Council

The Fellows Advisory Council has reviewed the nominations submitted for Fellowship for 2021 and we will make an announcement at the WAVMA Annual General Meeting to be held in October in Madeira, Portugal, during the European Aquaculture Society Conference.

Thank you for all those who submitted nominations and for the Fellows subcommittee that reviewed the nominees applications. The members of the subcommittee rated the attributes of the nominees and forwarded scoring to the Fellows for review and selections. Those who were not selected for Fellowship this year will be retained for consideration in 2022.

I am pleased to be able to confirm the first Fellows in-person meeting, to be held on Sunday, October 3rd, in Funchal, Madeira Island, Portugal, in conjunction with the WAVMA AGM 2021 and under the auspices of the [Aquaculture Europe 2021](https://www.aquaeas.org/Meeting/AE2021) meeting. All Fellows are cordially invited to attend the event. Additional information about this meeting will be provided as it becomes available. At this stage, please mark the date in your agenda.

As WAVMA Distinguished Fellows, we are tasked to support the WAVMA Executive Board and offer advice and recommendations to the Board on advancing the Missions and Objectives (See page 2 of this issue) of WAVMA. The fellows meeting will occur the night before the Annual General Meeting, where we will report on the Fellows activities for the year. Hope to see as many of you as possible on this occasion!

**Laura Urdes**, DVM PgDip PhD CertAqV  
Fellows Advisory Council Chair  
[FellowsChair@wavma.org](mailto:FellowsChair@wavma.org)

### Meetings Committee

The meetings schedule for 2021 continues to be very limited due to the concern for Covid-19 transmission. Many countries continue to have restrictions on travel, and many organizations are reluctant to commit to an in-person meeting under these circumstances. Never-the-less, as of this point, we still plan to have representation and a booth at Aquaculture America 2021. This event will take place August 11-14 in San Antonio, TX. <https://www.was.org/meeting/code/AA2021>.

Both the AVMA convention <https://www.avma.org/events/avma-convention> and the WSAVA Congress <https://wsava2021.com> will be held virtually this year, so we won't have any in-person presence at either event.

We are still hopeful that our joint conference with the European Aquaculture Society, to take place October 4- 7, 2021 in Funchal, Madeira, Portugal, will continue to be an in-person meeting: <https://www.aquaeas.org/Meeting/AE2021>. As it will be the location of our AGM this year, we plan to stream our AGM virtually. If you would like to present a talk, WAVMA may have some support for your registration. Contact me immediately if you are interested. As it will be our first return to Europe in several years, we are looking forward to a great turnout from our European members. Check the EAS website for the latest COVID information:

[http://www.visitmadeira.pt/en-gb/useful-info/corona-virus-\(covid-19\)/information-to-visitors-\(covid-19\)](http://www.visitmadeira.pt/en-gb/useful-info/corona-virus-(covid-19)/information-to-visitors-(covid-19))

**Julius M. Tepper**, DVM, CertAqV  
Meetings Committee Chair

## WAVMA Shop

A number of WAVMA branded items  
(including shirts, mugs, caps) are available  
at the WAVMA Store. Get yours today!



Go to: <http://www.wavma.org/Shop>



**Credentialing Committee**

The WAVMA Aquatic Veterinarian Certification Program identifies the core competency or subject matter areas needed to practice aquatic veterinary medicine, and recognizes those veterinarians who have acquired the necessary knowledge, skills and experience (KSE) from a variety of sources, in the following 9 core subject matter areas:

1. Aquatic Environment and Life Support Systems
2. Taxonomy, Anatomy and Physiology
3. Husbandry and Industries
4. Pathobiology and Epidemiology of Aquatic Animal Diseases
5. Diagnostics and Treatment of Aquatic Animal Diseases
6. Clinical Veterinary Experience and Client Communications
7. Public Health, Zoonotics and Seafood Safety
8. Legislation, Regulations, and Policies
9. Principles of Aquatic Animal Welfare

For CertAqV Program Description [Click here](#) to download, or go to [WAVMA.org/CertAqV-Pgm](http://WAVMA.org/CertAqV-Pgm).

Individuals who desire to participate in the WAVMA CertAqV Credentialing Program will first need to register and pay the US\$250 administrative fee. When registering you will select a mentor to assist and guide you through the requirements. After you have registered, you will receive an e-mail on how to download a document to record where you have obtained sufficient KSEs (knowledge, skills and experience/education) in each of the 9 modules or subject areas. You have up to 2 years to complete these.

When your mentor is satisfied you have sufficient KSE credits, he/she will request the WAVMA Credentialing Committee to evaluate these. Once the Committee and the WAVMA Executive Board have evaluated these and are satisfied you meet all requirements, you will be notified and mailed a certificate suitable for framing and display.

If you have questions about the Certification process, please send me an email.

**Dr. Matthijs Metselaar** DVM PhD CertAqV MRCVS  
Credentialing Committee Chair  
[CertAqV-Admin@wavma.org](mailto:CertAqV-Admin@wavma.org)



**Certified Aquatic Veterinarians**

Jessica Allen	USA
June Ang	Singapore
Nimrod Arad	USA
Brenda Arras	USA
Farah Gonul Aydin	Turkey
Sarah Balik	USA
Madison Barnes	St. Kitts & Nevis
Michelle Barnett	USA
Christa Barrett	USA
Heather Barron	USA
Giana Bastos-Gomes	Hong Kong
Mariah Beck	USA
Jenice Bell	USA
Heather Bjornebo	USA
James Bogan	USA
Pierre-Marie Boitard	France
Serena Brenner	USA
Tessa Brown	USA
Erika Brigante	St. Kitts & Nevis
Todd Cecil	USA
Bryony Chetwynd-Glover	UK
Prakan Chiarahkhongman	Thailand
Dondrae Coble	USA
Michael Corcoran	USA
Emily Cornwell	USA
Rebecca Crawford	St. Kitts & Nevis
Rubén López Crespo	Mexico
Charles Cummings	USA
Nadav Davidovich	Israel
Manuel De la Riva Fraga	Spain
Darren Docherty	UK
Simon Doherty	UK
Devon Dublin	Japan
Jacqueline Elliott	USA
Ashley Emanuele	USA
Azureen Erdman	USA
Antonella Fabrissin	Italy
Mohamed Faisal	USA
Erika First	USA
Ari Fustukjian	USA
Danielle Godard	USA
Giana Gomes	Hong Kong
Christopher Good	USA
Bartolomeo Gorgoglione	USA
Krystan Grant	USA
John Griffioen	USA
Miguel Grilo	Portugal
Stephanie Grimmett	UK
Katharina Hagen-Frei	Switzerland
Katharine Haussman	USA
Orachun Hayakijkosol	Australia
Eileen Henderson	USA
Chelsea Hester	USA
Nora Hickey	USA
Karlee Hirakis	Australia
Kelsey Hoag	USA
John Howe	USA

**Certified Aquatic Veterinarians**

Kerryn Illes	New Zealand
Leslie Jarrell	USA
Jimmy Johnson	USA
Kelsey Johnson	
Sharmie Johnson	USA
Kasper Jorgensen	Denmark
Brian Joseph	Canada
Hali Jungers	USA
Parinda Kamchum	Thailand
Fritz Karbe	Germany
Sherri Kasper	USA
Elizabeth Kaufman	Israel
Denyse Khor	Singapore
Amy Kizer	USA
Jessica Koppien-Fox	USA
Jack Kottwitz	USA
Elizabeth Leuchte	UK
Jan Linkenhoker	USA
Eric Littman	USA
Richard Lloyd	UK
Richmond Loh	Australia
Ruben Arturo Lopez Crespo	Mexico
Jordi Lopez Ramon	Spain
Adolf Maas	USA
Raphael Malbrue	USA
Paul Manensis	Canada
David Marancik	Grenada
Victoria Maroun	St. Kitts & Nevis
Robert Martinez	USA
Alexandra Mason	USA
Colin McDermott	USA
Matthijs Metselaar	UK
Sonja Miles	UK
Tim Miller-Morgan	USA
Haitham Mohammed	Egypt
Alissa Mones	USA
Danny Morick	Israel
Lucie Nedved	Australia
Ross Neethling	UK
Jenifer Nix	USA
Sally Nofs	USA
Ladislav Novotny	Czech
Massimo Orioles	Italy
Dušan Palić	Germany
Brian Palmeiro	USA
Christine Parker-Graham	USA
Lily Parkinson	USA
Chris Payne	
Ayanna Phillips	Trinidad & Tobago
Ashley Powell	
Jena Questen	USA
Eva Quijano Cardé	USA
Janis Raines	USA
Atisara Ranglichol	Thailand
Zachary Ready	USA
Aimee Reed	USA
Stephen Reichley	USA

Nuno Ribeiro	Portugal
Julianne Richard	USA
Patinan Rookkachard	Thailand
Komsin Sahatrakul	Singapore
Nick Saint-Erne	USA
Jessie Sanders	USA
Sasha Saugh	South Africa
David Scarfe	USA
Khalid Shahin	UK
Galit Sharon	Israel
John Shelley	USA
Chris Shirkey	USA
Constance Silbernagel	USA
Melissa Singletary	USA
Esteban Soto	USA
Brandon Spolander	South Africa
Elizabeth St. Germaine	USA
Brittany Stevens	USA
Chairat Sumgorthong	Thailand
Win Surachetpong	Thailand
Gillian Taylor	South Africa
Julius Tepper	USA
Sharon Tiberio	USA
Miranda Torkelson	USA
Norrapat Towanabut	Thailand
Laura Urdes	Romania
Greta Van de Sompel	Belgium
Claudia Venegas	Chile
Zachary Waddington	Canada
Sarah Wahlstrom	USA
Chris Walster	UK
Scott Weber	USA
Marcus Webster	USA
Trista Welsh	USA
Michael Wenninger	USA
Peter Werkman*	Holland
David Wilbur	USA
Howard Wong	Hong Kong
Sarah Wright	USA
Taylor Yaw	USA
Irene Yen	St. Kitts & Nevis



**To initiate a new Student Chapter, download the [WAVMA Student Chapter Guidelines](#)**

A Spanish version of the Student Chapter Guidelines can be [downloaded from the WAVMA website](#).

**PROGRAMS AVAILABLE TO STUDENT CHAPTERS:**

- Assistance in organizing and promoting Chapter programs and activities.
- Access to recorded webinars and live web-based presentations from experts around the world.
- Low annual WAVMA Student Membership (\$25) - 50% Chapter member's dues may be available to support Chapter-organized activities.
- Reduced rate (50% off) WAVMA Full Membership the year after graduation.
- John L. Pitts Aquatic Veterinary Education Awards Program
- Access to WAVMA member-only programs.
- Aquatic veterinary externship and job listings.
- WAVMA promotional flyers, brochures and other materials for distribution to other students.
- Free or discounted registration for WAVMA meetings, conferences or educational webinars.
- Participation in the WAVMA Certified Aquatic Veterinarian (CertAqV) Credentialing Program.
- Access to WAVMA e-mail listservs, including Members-L, and Student-L.

A list of all current WAVMA Student Chapters is available on the website:

<https://www.wavma.org/WAVMA-Student-Chapters>

Consider joining the [WAVMA Chapter Facebook Group](#) to find out what's happening in other Chapters.

**Education and Students Committee**

The WAVMA Education and Students Committee met virtually on 30<sup>th</sup> May to redefine subcommittees and their priority tasks. The ESC Core committee was dissolved, and members placed into subcommittees. As a committee we are working to update the "WAVMA Education & Students Committee" leaflet, to include more about our mission and rules. Vivian Lee, USA became the new leader of the ESC Student Chapter Support subcommittee, actively working on updating the information of WAVMA Student Chapters on the webpage, updating any ESC-related flyer, and supporting the ESC Chair with the evaluation of documents submitted for the establishment of new Student Chapters.

New WAVMA Student Chapters are expected to be established in several universities around the world. In 2021, new WAVMA Student Chapters have been established at the Royal Veterinary College, London, UK, and at the Michigan State University, in East Lansing, Michigan-USA. Work is in still progress in other veterinary universities, such as at Perdue University, USA, Ankara University, Turkey, and Makerere University, Uganda. We welcome further applications from veterinary students in other universities around the world, thus we made detailed information available through the WAVMA website in multiple languages. The Student Chapters Support Subcommittee is working to set up small grant applications for student chapters to support the development of new aquatic activities at their schools.

Our Students and Resources subcommittee, led by Eva Marie Quijano Cardé, USA is planning to organize a Student Panel initiative in the fall of 2021, thus still looking for new panelists. This should foster networking and discussion about externships and other learning opportunities for WAVMA students. Sharing your experience will be extremely helpful during this difficult time to help students get involved in experiences with aquatic animals. In the meantime, the subcommittee is planning a series of wet labs for WAVMA student chapters that do not have an aquatic veterinarian in their staff. Finally, we are also working to provide students with a variety of opportunities for externship and other experiences and are looking for suggestions to add to the student resources and opportunities webpage. There are many great opportunities listed, but we aim at having a comprehensive list of educational opportunities. We solicit suggestions for world-wide educational opportunities, including externships, internships, residencies, training visits, etc.

With the continuation of the COVID-19 pandemic, the ESC Chair and the WebCEPD subcommittee have been extremely successful in offering high quality virtual contributions from an array of international speakers. Leading the ESC WebCEPD subcommittee, Dr. Claudia Venegas, Chile is currently working to hold one WebCEPD webinar each month. We are grateful to all



speakers for their contribution, managing to engage a considerable number of attendees during each event. Dr. Marc le Groumellec, Madagascar gave a 1-Continuing-Education credit webinar on 18<sup>th</sup> May, focusing on the impacts of infectious diseases in development of aquaculture in the Indian Ocean, gathering an audience of 52 live attendees and up to 104 registered. On 25<sup>th</sup> June, we held the first official WAVMA event in collaboration with the Thai Aquatic Veterinarian Association (TAVA). Dr. Prakan Chiarahkhongman from Thailand illustrated mitigation and management practices in shrimp diseases. This WebCEDP worth 1.5 CE was jointly moderated by Dr. Gorgoglione and by Dr. Win Surachetpong, attended by 106 people, with 225 registered. The latest webinar was held on 15<sup>th</sup> July. Dr. Fernando Mardones, Chile discussed enhancing aquatic disease surveillance towards One Health, during a 1 CE webinar attended live by 136 people with 239 registered.

The next webinar is scheduled on 24<sup>th</sup> August. A fascinating lecture will be offered by Dr. Verena Jung-Schroers, Germany focusing on the application of radiology and sonography in the aquatic practice. So far, all webinar contributors received a 1-year complementary WAVMA membership, but during the last ESC meeting we decided to implement an honorarium for the equivalent of \$100/hour of webinar delivered, this can be redeemed as free regular membership (worth \$100) or as cash (e.g. students may receive \$100 cash).

We continue to work on the organization of further WebCEPD events, and several upcoming WebCEPD events are already planned, including Dr. Ruth Zadoks, Australia scheduled in September to talk about group B Streptococcus in aquatic species. All Webinars remain available on our website, free for all WAVMA members, both for re-watching and for obtaining CE credits after completing the knowledge and skills assessment. We invite all WAVMA members to actively participate in WebCEPD events and to contact us if wishing to contribute by delivering a lecture reaching colleagues from all around the world.

Finally, we would like to invite more WAVMA members to actively join our vibrant committee. ESC will continue to work intensively to increase educational opportunities offered or facilitated through WAVMA to the aquatic veterinarians and pathologists around the world, but we do need the support of further volunteers to improve our organization capacities. If you are interested in joining the committee, please email Dr. Gorgoglione ([BartGorg@msu.edu](mailto:BartGorg@msu.edu)) or Dr. Jones ([drjones01@vt.edu](mailto:drjones01@vt.edu)).

We hope to see you at our next ESC meeting!

Dr. Bartolomeo Gorgoglione, Chair of ESC  
[BartGorg@msu.edu](mailto:BartGorg@msu.edu)

Dr. Darbi Jones, Vice Chair of ESC

- To recognize the main gross and histological lesions associated to Tilapia diseases
- To understand economic and public health implications of Tilapia diseases
- To learn management strategies to prevent and control Tilapia diseases



**Pitts Aquatic Education Award Recipient Report**  
**By Jessira Amesquita Sosa**

National University of San Marcos, Peru  
College of Veterinary Medicine

My name is Jessira Amesquita Sosa, an internship student at the Faculty of Veterinary Medicine of the Universidad Nacional Mayor de San Marcos, Peru. First of all, I would like to thank John L. Pitts Aquatic Education Award for the scholarship I was granted to be able to carry out the internship in the Institute for Development and Amazon Peace (IDPA) in the San Martín region (Peru), and secondly to the Institute for having accepted to carry out the internship.

From the first day I attended the center, many activities began to be carried out, such as learning sanitary management in fish farms, which gave me the opportunity to apply my knowledge acquired at the university and thus be able to diagnose some diseases that were affecting some fishes. In IDPA Aquaculture, Amazonian species are cultivated, such as paco (*Piaractus brachypomus*), gamitana (*Colossoma macropomum*), tilapia (*Oreochromis niloticus*), boquichico (*Prochilodus nigricans*) and there are exhibition specimens such as maiden (*Pseudoplatystoma fasciatum*), acarahuasu (*Astronotus ocellatus*) and carachama (*Pseudorinelepis genibarbis*).



*Photo 1.*  
*Amazonian*  
*Gamitana fish*  
*(Colossoma*  
*macropo-*  
*mum)*

As these fish are raised in captivity, they must be given an optimal environment for their growth, in such a way that the growth is fast, at a minimum cost, both in resources and capital, so proper management has to be done. For example, the quality of the water is constantly monitored so that the parameters are the same.

The reproductive cycle begins with the selection of breeders, the males are evaluated by means of a slight abdominal pressure and if there is presence of very whitish seminal fluid, they are suitable for reproduction. The females are selected for the good characteristics of the ovule, such as having the nucleus with more



*Photo 2. Amazon fish shipment.*

than 50% in a state of migration from the center toward the polar zone. These fish are then transferred in hammocks to the hormonal treatment pools. One male is transferred for each female, optional is adding an additional male. In the pools they are induced with hormones to wait for spawning between  $230 \pm 20$  HG° for gamitana and  $250 \pm 20$  HG° for paco, or after approximately 6-8 hours of applying the second dose of the hormone. Females will spawn and the eggs will be fertilized by the sperm released by the males.



*Photo 3. Collection of samples*



These fertilized eggs will be taken to the incubation room for between 12-18 hours, depending on the species and the temperature of the environment (25°C), during this phase a small sampling is carried out to determine the hatching percentage. The larvae will be transferred to the pre-lift room for approximately 3 days. At this stage, management is crucial, since the larvae are susceptible to sudden changes in temperature and increased organic matter residues, so cleaning must be carried out constantly. One of the most interesting things for me was visualizing the growth from egg to fingerling stage under the microscope.



*Photo 4. Post-larva of Paco.*

After three days, the larvae start feeding on micro algae. Subsequently, the post-larvae will be sown in their respective ponds until they are alevins of an average size of 2 cm. The preparation of ponds with nutrients for the soil must be done in advance since the fry will be sown in these for later sale.



*Photo 5. Preventive treatment in breeding Gamitana after spawning.*

The final phase of this production of Amazonian fish is the sale of it, where the correct handling must also be carried out so that the fish arrive in optimal conditions at their final destination.



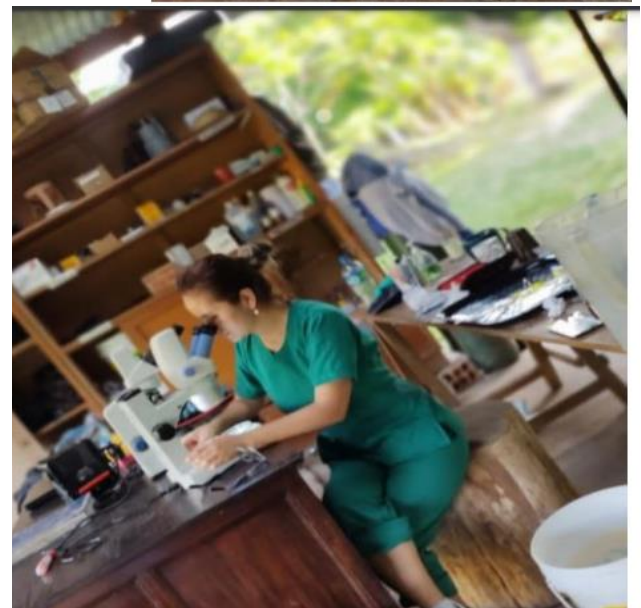
*Photo 6. Visit to the fish farms in the Research Institute of the Peruvian Amazon.*

In IDPA there are traditional ponds, but currently intensive recirculation systems are being implemented, since they have the great advantage of being able to control the environment and all the water quality parameters easily (temperature, oxygen, pH, carbon dioxide, ammonia, nitrite, nitrate, alkalinity, etc.); thus, obtaining optimal growth of the animals and avoiding the entry of pathogens that cause problems for the fish. Aquaculture IDPA has a basic laboratory, which allowed me to identify parasitic agents that cause deadly diseases.

*Photo 7. Materials for the necropsy.*



*Photo 8. Field Laboratory*





*Photo 9. Examination of necropsy samples.*

Likewise, the Institute has a live food laboratory, where Phytoplankton (*Scenedesmus acutus*, *Chlorella vulgaris*, *Nanochloris oculata* and *Artrospira platensis*) and Zooplankton (Rotifers and *Artemia*) are produced, for the post-larvae and fry stages of fish.



*Photo 10. Live food laboratory*

Thanks to the station coordinators, it was possible to make visits to research centers such as the Peruvian Amazon Research Institute (IIAP) and fish farms (El Gran Paso, Las Palmas, etc.)

*Photo 11. Visit of our team to the Research Institute of the Peruvian Amazon (IIAP)*





The team was made up of director Laly Lilian Pinedo Tafur, Coord. Roberlo Lay, Blgo. Carlos Fonseca, Mr. James Bond Velásquez and interns from different careers in Peru with whom it was possible to do a good job that encouraged me to be able to develop and cope in the different cases that arose.



Instituto Para el Desarrollo y la Paz Amazónica  
Acuícola IDPA



**Certificado**

Otorgado a:

**Jessira Betzabet Amesquita Sosa**

Con DNI: 76999512

Por haber culminado con éxito su práctica en reproducción inducida, larvicultura y sanidad de peces amazónicos, con énfasis en: "Observación y profilaxis de enfermedades concurrentes en todas las etapas de producción; Larvaje, alevinaje y engorde de Gamitana, *Colossoma macropomum* y Paco *Piaractus brachipomus*", desarrollado en nuestro Centro de Producción Acuícola IDPA del sector Ahuashiyacu, La Banda del Shilcayo, San Martín, del 01 de febrero del 2021 al 31 de marzo del 2021

*[Signature]*  
Módulo Laboratorio de Reproducción Inducida de Peces Amazónicos  
Laly Lilian Pinedo Tafur  
Directora

*[Signature]*  
Blgo. Carlos Amador Fonseca Castro  
Responsable de Producción de Acuícola IDPA

*[Signature]*  
Roberlo Lay Ruiz  
Intendente Acuícola IDPA



AQUAVET 2021 Directors and Students





**From Rags to Fishes**  
**Ericka Johnson, DVM**

When I was asked to contribute an article for *The Aquatic Veterinarian*, my first thought was that I was not qualified to be a representative for aquatic animal medicine. However, the more I thought about it, I came to realize that not everyone follows a traditional path and there may be other veterinarians or veterinary students I could inspire and encourage to pursue their dreams - despite seemingly insurmountable obstacles.



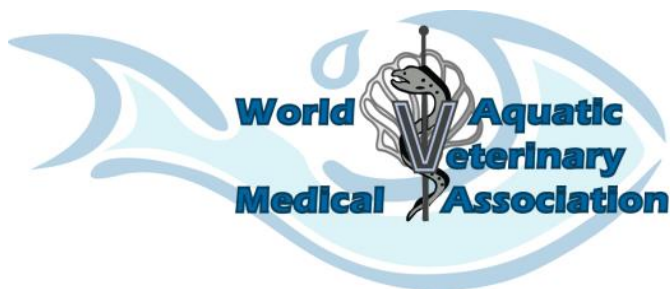
I did not always know I wanted to be a veterinarian. In fact, growing up I did not realize college was even an option for me given my socioeconomic background. My delayed aspiration of becoming a veterinarian did not start to blossom until my twenties. Suddenly, all those childhood years of scooping up tadpoles in ponds and seeing what snake, lizard or tarantula was under the next rock made perfect sense. I was always supposed to be an exotic animal veterinarian, it just took me a while to recognize this as a career option for me.

Nobody in my family had attended college so the prospect of tackling not only an undergraduate program but a professional school as well felt daunting and foreign. At the age of 27, and as a single mom to a toddler, I enrolled at The University of Arizona. After earning a bachelor's degree in veterinary science, I attended Colorado State University College of Veterinary Medicine and Biomedical Science and graduated in 2016. Upon graduation, I knew I still had a lot to learn, however, I also felt very accomplished. I don't think it's possible to prepare a person for the rigors of vet school as a single parent, but I knew if I could make it through vet school on my own while making sure the needs of a young child are met, I could do anything I was truly passionate about.

Following graduation, I worked at a busy dog/cat/exotic practice, and while I love dog and cat medicine, exotic animal medicine has always been my true passion. I knew that working exclusively with exotics would be the best way to refine my exotic animal medicine. A couple years after graduation I joined Arizona Exotic Animal Hospital (AZEAH), an exotics exclusive private practice. I thoroughly enjoy working with exotic species and wildlife. A few years after joining AZEAH, I desired to expand not only my contribution to the hospital but also my repertoire and I joined the ownership team. While the administrative aspects are vastly different from clinical medicine, I find it enjoyable and rewarding on a personal and professional level.

Despite these advances in my career, my experience with aquatic animal medicine was minimal. It was only when aquatic cases started showing up in the hospital that my interest really piqued and it sparked a desire to make sure I was being the best aquatics doctor I could be. To expand my knowledge of aquatic animal medicine, I joined WAVMA and started watching the online Webinars on the WAVMA website.

This summer, I attended AQUAVET® I, a world leader in aquatic medicine education. AQUAVET® was a fantastic experience not only for the quality of education provided but also for the networking opportunities and the lifelong friends made at what we endearingly call "fish camp." While this month-long summer course is traditionally promoted to veterinary students, this is absolutely a great course for practicing veterinarians who are interested in refining their clinical skills in aquatic medicine. This course included about 150 hours of lectures and 44 hours of hands-on laboratory work. Lectures and labs were presented by many of the well-known greats in aquatic medicine including Doctors Corcoran, Innis, Khoo, Rhyne, Saint-Erne,





Stremme, Smolowitz, Yanong and many, many more. Doctors Maze and Landau do an excellent job coordinating, educating students, and making sure everyone is well taken care of. Many of the educators for the program were once AQUAVET® students themselves, evidence that is a wise step in an aquatic medical education. If you have considered applying for AQUAVET®, but for some reason have not, I highly recommend it.

In addition to improving my aquatic clinical proficiency in private practice, my attendance at AQUAVET® was to augment my clinical position at The Arizona-Sonora Desert Museum, which is the home to War-

den Aquarium's Rivers to the Sea. This aquarium has aquatic species that are native to the Sonoran Desert, which includes the Sea of Cortez. This is home to many great freshwater desert species facing extreme challenges including Sonoyta pupfish, roundtail, bonytail and Yaqui chub, Colorado pikeminnows, Gila topminnows and many more. The saltwater species include Pacific seahorses, Mexican Lookdowns, scrawled filefish, cow nose rays and spotted garden eels, just to name a few. Many of the efforts here are directed toward repatriation of native species including Mexican garter snakes, Tarahumara frogs and Sonoyta mud turtles. This living museum is a wonderful combination of conservation, exotics, wildlife, aquatics and public education. Here, I am very fortunate to work with and learn from Dr. Nick Saint-Erne. Anyone who has worked with him can attest to his zeal and talent for aquatic veterinary medicine and teaching. Here we get to work with not only with aquatic species, but also work with Gila monsters, raptors, javelina and more native wildlife. While these species are amazing, the best part is working with the museum's wildlife staff. Their knowledge, care and compassion for the animals they maintain are phenomenal.

So, how does a person from an impoverished family without college aspirations vet hundreds of aquatic species in the middle of the Sonoran Desert? Well, it certainly was not easy, but it definitely has been an adventure! I am thankful for my experiences and have learned much along the way. Not just about medicine, but also invaluable life lessons. This is where I am to conclude with sage advice. I have spent quite a bit of time with vet students lately so I will direct my wisdom toward them: You can follow your dreams; even if you don't know what they are yet. Follow your heart one step at a time. There is no point in feeling like you need to have every detail of your career path planned out because it certainly will not happen just as you plan it. Unexpected things will happen along the way and chances are, you will one day find yourself doing exactly what you never knew was your dream job.

Remember: "A (wo)man is not old until regrets take the place of dreams"  
 -John Barrymore

*Photo of Ericka Johnson, Megan Bradley and Darbi Jones at AQUAVET.*



**AQUAVET 2021**

A Photo Essay by Nick Saint-Erne

Attending the AQUAVET Program in 1982, when it was held at the Marine Biological Laboratory in Woods Hole, Massachusetts, was one of the pivotal factors for me to decide on a career in Aquatic Veterinary Medicine. Working with pet fish, especially koi, as a veterinarian has been a joy and supplemented my work with dogs, cats, exotic pets and zoo animals throughout my career. Now, being a lecturer at the AQUAVET program for the last 5 years has brought my career back to the beginning. For more information about AQUAVET, contact Dr. Donald Stremme:

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<https://www.vet.cornell.edu/education/other-educational-opportunities/aquavet>

AQUAVET®  
May 29-June 25, 2021  
A Program in Aquatic Veterinary Medicine  
Roger Williams University  
Bristol, Rhode Island

*The Marine and Natural Sciences Building  
where AQUAVET Lectures are held at  
Roger Williams University*

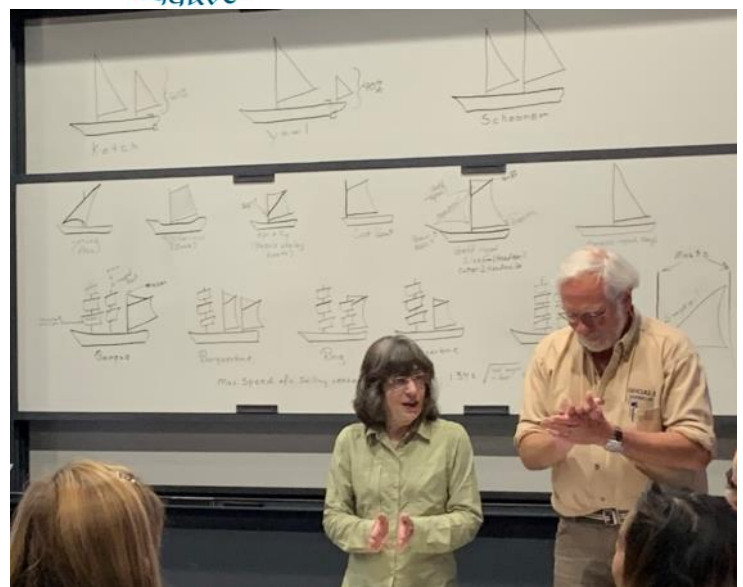


*Below:  
Dr. Laurie Landeau and  
Dr. Robert Maze  
presenting awards at the  
AQUAVET  
Graduation Ceremony.  
On the whiteboard behind  
them are the drawings from  
the lecture on sailing ship  
identification.*



*Above:  
The author with  
Dr. Donald Abt,  
founder of  
AQUAVET, and his  
wife at the  
40th Anniversary  
event in 2016.*

*Left: Lobster dinner  
on last night of  
AQUAVET*







Above: Robbie Hudson, Roger Williams University Shellfish Hatchery Manager, giving students a tour of the shellfish hatchery, including the tanks for raising algae cultures used to feed the shellfish.

Dr. Jessie Sanders (above left) from California Aquatic Veterinary Services and Dr. Shane Boylan (below left) Chief Veterinarian at South Carolina Aquarium supervising the students during live striped bass fish surgery.

Below: Algae cultures and the oysters grown using them.



**Questions & Answers from the WAVMA Listserv**  
[WAVMA Members-L@wavma.org](mailto:WAVMA_Members-L@wavma.org)

**Goldfish Skin Tumors**

Dear Colleagues,

Hoping someone can help me help this goldfish (*Carassius auratus*). This fish was donated to me as multiple at-home treatments didn't help. I have done everything I can think of except bacterial culture, possibly of the intraocular fluid? Treated with Baytil injections, salt, heat, water changes; found flukes once and did Praziquantel treatment; now cytology is negative for flukes. I believe there is a viral etiology causing the pink reactive masses, with possibly a bacterial infection as well.

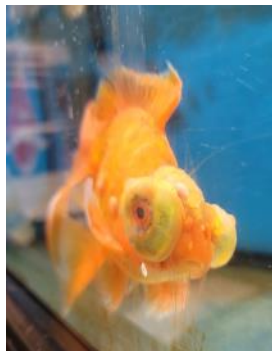


Looking for best bets on possible treatments to try and best bang for the buck for further diagnostics (culture, histopathology). I'm also considering enucleation. This poor little thing is miserable and not getting much better despite my best efforts.

The clear vesicles which are on the eye surface just popped up today. The yellow crusting on the forehead has been there, with the pink raised masses and hyperemic fins and they don't seem to improve or worsen no matter what we try to do.

Any thoughts, suggestions appreciated. Thanks in advance for your help,

**Jena Questen, DVM CertAqV**  
[Fish@drquesten.com](mailto:Fish@drquesten.com)



Hi Jena,

Did you take any lesions off and submit for histopath? Have you ruled out Lymphocystis virus infection? Raising or lowering the temperature can help with most viral infections as you bring them outside the growth temp for the virus.

Disinfection like Virasure koi (or Virkon) can help lower bacterial loading. They are reporting good effect with this in some of the Koi infections (even viral)

**MATTHIJS METSELAAR, DVM PHD CERTAQV**  
 MIFM MRCVS  
 Aquatic veterinary surgeon  
 Email: [matt@aquaticvets.com](mailto:matt@aquaticvets.com)

Hi Jena,

If you decide to biopsy, as Matt suggested, it might be worth saving a sample of tissue in ethanol (RNA testing later may not be a bad idea too if you have it). It doesn't have to be much tissue and it may let you confirm an etiology by PCR if the histopathology takes you down the viral route or if Lymphocystis or another pathogen is only suggested by the tissue changes.

More often than not, if I skip preserving in ethanol I end up kicking myself because I need something for confirmation molecularly.

**DAVE MARANCIK, DVM, PHD, CERTAQVET**  
 Associate Professor of Aquatic Animal Medicine  
 Director, Aquatic Animal Medicine Research Lab  
 Department of Pathobiology  
 School of Veterinary Medicine  
 St. George's University  
 True Blue, Grenada, West Indies  
 Email: [dmaranci@sgu.edu](mailto:dmaranci@sgu.edu)

Hi Jena,

This is not an unusual finding in goldfish and the masses are often identified as a Fibrosarcoma. They can be surgically removed with good success. It is still uncertain as to the etiology.

This is a problem that has been seen in goldfish for years, as here is a report from 1922 of a goldfish with skin tumors:

**FIBROSARCOMA OF THE SKIN IN A GOLDFISH**  
*The Journal of Cancer Research*, Vol. VII, No. 2, 1922:  
<https://cancerres.aacrjournals.org/content/jcanres/7/2/151.full.pdf>

A more recent paper from 2017 has color histopathology photos: Fibrosarcoma in a Goldfish (*Carassius auratus*): a Case report.

[https://www.researchgate.net/publication/320057265\\_Fibrosarcoma\\_in\\_a\\_Goldfish\\_Carassius\\_auratus\\_a\\_Case\\_report](https://www.researchgate.net/publication/320057265_Fibrosarcoma_in_a_Goldfish_Carassius_auratus_a_Case_report)

**Nick Saint-Erne, DVM CertAqV**  
[nsainterne@gmail.com](mailto:nsainterne@gmail.com)

## The OIE Aquatic Animals Commission furthers aquatic animal health globally

The members of the [Aquatic Animal Health Standards Commission](#) (AAHSC) that held office during 2018-2021 made substantial progress in strengthening aquatic animal health worldwide. This progress is a testament to the hard work and commitment of the Commission members and to the work of *ad hoc* Groups, OIE Reference Centres, experts from Member Countries, and the OIE Secretariat that provided valuable input and support which enabled the Commission's achievements.

These achievements, significant in themselves, must be considered even more so when realizing they were delivered despite the unexpected challenges posed by the Covid-19 pandemic and the need to rapidly move to the virtual modality. While the Commission made many significant achievements during its three-year term, some key accomplishments deserve highlighting, as they will assist Members in improving aquatic animal health and ensuring safe trade.

### Important additions to the *Aquatic Animal Health Code* and the *Manual of Diagnostic Tests for Aquatic Animals*

The adoption of the new *Aquatic Animal Health Code* (*Aquatic Code*) Chapter 4.1. on **Biosecurity for aquaculture establishments**, provides essential information on planning and implementing biosecurity. This is much needed information for Members as it will help them to prevent disease introductions and thereby support sustainable aquaculture development.

The completion of assessments that determined the *list of susceptible species for seven OIE-listed diseases* and the consequential updates to both the *Aquatic Code* and the *Manual of Diagnostic Tests for Aquatic Animals* (*Aquatic Manual*) was a great achievement. Determining the species susceptible to each OIE-listed disease is complex given that the number of aquaculture and wild aquatic animal species traded internationally is increasing every year and requires scientific evidence to determine susceptibility. This work is critical to facilitating safe trade. Assessing which species are susceptible to OIE-listed diseases provides science-based guidance to Members on which species sanitary measures can be applied to for trade purposes. This will directly assist Members in trade negotiations, support international trade and decrease transboundary spread of aquatic animal diseases.

The Commission has also strengthened the diagnostic standards in the *Aquatic Manual* through the application of a *new chapter template to five of the fish-disease-specific chapters* and developed a new disease-specific chapter for an amphibian disease, *Infection with *Bactrachochytrium salamandrivorans**. These revised chapters provide Members with better guidance on diagnostic methods and case definitions that can be applied to their national diagnostic labs and

surveillance programmes which will also support disease reporting.

The *Aquatic Code* and *Manual* chapters for Infection with *Bactrachochytrium salamandrivorans* are particularly important for Members to reduce the spread of this pathogen which has already resulted in population extinction and decreased biodiversity in salamander populations.

### The new OIE Aquatic Animal Health Strategy

Another high-profile achievement was the Commission's contribution to the development of the [Aquatic Animal Health Strategy](#) which was launched at the 88th General Session this year. This strategy provides a road map for the next five years to improve aquatic animal health and welfare worldwide.

These accomplishments build on the work of previous Commissions, the leadership and support of the OIE Director General, and the engagement of Members. However, it was the dedication and commitment of these Commission members and the support of the Secretariat that together resulted in significant progress in their work. These are meaningful achievements that will result in lasting improvements for aquatic animal health and welfare around the world.

### New Fish Health Forum website

OSLO, NORWAY (March 9, 2021)

[Fish Health Forum](#), a new website fully focused on fish health, was launched today to bring the global aquaculture industry the latest news and insights on fish health management, welfare, performance and sustainability. Fish Health Forum will also soon launch a [free e-newsletter](#) to inform the industry about new and noteworthy articles on the website.

"Fish producers and veterinarians around the world have told us they need more practical information on disease management and other important fish health topics. *Fish Health Forum* helps to meet this need," said Morten Nordstad, president of PHARMAQ, part of Zoetis, the website's exclusive sponsor.

Visitors to Fish Health Forum will find a diverse and frequently updated mix of news articles and research updates covering various fish species produced around the world. The colorful, engaging site also features interviews with industry opinion leaders and practical articles written by fish health experts.

To view the latest news on Fish Health Forum, visit [www.fishhealthforum.com](http://www.fishhealthforum.com).

### Contact:

Meghan Feeks  
Editor  
Fish Health Forum  
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+39 351 536 5915

**Europe's largest native oyster restocking launched to coincide with World Oyster Day.**

Oyster farmer and marine biologist Dr Andy Woolmer of [Mumbles Oyster Company](#) has teamed up with Kelsey Thompson of [Morecambe Bay Oysters](#)' shellfish hatchery to restock historic oyster beds off Mumbles in Swansea Bay with 4 million juvenile native oysters. Dr Woolmer read a Tweet by Kelsey a week ago, explaining that he had produced 4 million small oysters, which were rapidly outgrowing their home at the hatchery but had no place to go, and so offered his oyster bed off Mumbles in Swansea Bay and its sister farm at Atlantic Edge Oysters in Angle Bay, Pembrokeshire. A quick phone call established a plan of action and, with the help local fisherman Barry Thomas, the first batch of 125,000 oysters were released today, while further batches have been scheduled for the rest of the summer and autumn.

Native oyster (*Ostrea edulis*) populations have declined by 95 percent in the UK since the mid-19th Century, which makes native oyster beds one of the most endangered marine habitats in Europe. European oyster populations collapsed in the early-20th century due to a perfect storm of overfishing, pollution, disease and habitat loss. In the mid-1800s the oyster industry around Swansea Bay employed hundreds of people, with the oyster beds stretching from Porthcawl and along Gower coast. More than 200 oyster boats were used to transport their catch back to Mumbles until the decline of the fishery. The loss of employment brought serious consequences for local families and an end to many cultural traditions too.

Native oyster beds play an important role in maintaining a healthy marine environment by providing a range of ecosystem service benefits to humans including food, carbon storage and sequestration, and improving water quality, as well as wider biodiversity benefits. A single oyster can filter 200 litres per day – if all these oysters survive to become adults that is an astounding 800 million litres of water per day. If successful, the restored oyster beds off Mumbles will play a key role in improving the environment in Swansea Bay.

Supporting local oyster producers helps the environment as well as support local jobs. A recent study report by [The Nature Conservancy](#) found that: "Oyster farms proved to be the most effective for increasing species diversity; 30% more species were found to inhabit these farms than areas near the farm. These benefits were the result of providing a structured habitat, food and places to forage, and reproductive grounds for fish."

Andy Woolmer said: "Native oyster restoration is a long-term proposition akin to planting a forest. To enable this to happen the reseeded and husbandry needs to happen over a period of years. We think that a private sector approach with sustainable harvesting of adult oysters is the key to making restoration viable over the long-term." For full article, go to:

<https://thefishsite.com/articles/the-tweet-that-saved-4-million-oysters>



The Aquarium Vet is very pleased to announce the launch of Aquarium School (be one of the first to visit [www.aquariumschool.com](http://www.aquariumschool.com)). The vision of The Aquarium Vet is "To Advance the Health and Welfare of Aquatic Animals in Aquariums and Zoos Globally." Aquarium School is aimed at improving animal welfare in home and hobbyist aquariums. There is massive potential to educate and advise people with a home aquarium and in doing so, improve the health and welfare of these fish and aquatic invertebrates within their homes.

The series of free starter videos available at the Aquarium School website covers the Nitrogen Cycle in easy-to-understand detail. Even if you are an experienced aquarist, it is worth watching these to refresh your memory and you may even learn something new. Please feel free to share the link with any colleagues and friends you think may be interested. Whilst there is currently a single series of lectures, this will be constantly updated with new content in various formats presented in a very easy to follow and understandable manner.

We are also proud to announce that the E-quarist course was first released over a decade ago, it is now internationally recognized in the public aquarium industry and veterinary field. For the second year, due to COVID, the Veterinary Department of the Utrecht University in the Netherlands has reached out to us to assist with the education of their veterinary student elective in aquatic medicine. We are delighted to be associated with such an esteemed University, which was established in 1636.

For the home aquariums and hobbyists, we now have an eConsult available: [www.aquariumschool.com](http://www.aquariumschool.com). For public aquariums and professional aquarists, please reach out to [rob@theaquariumvet.com](mailto:rob@theaquariumvet.com) to discuss your requirements. Finally, we have been a proud AZA Recognized Learning Partner for the past six years and continue to see increases in our student numbers every year.

**The Aquarium Vet Team**

PO Box 2327  
Moorabbin, Victoria 3189 Australia  
[www.theaquariumvet.com](http://www.theaquariumvet.com)

### USDA Releases National Aquaculture Health Plan and Standards 2021-2023

Washington, D.C.

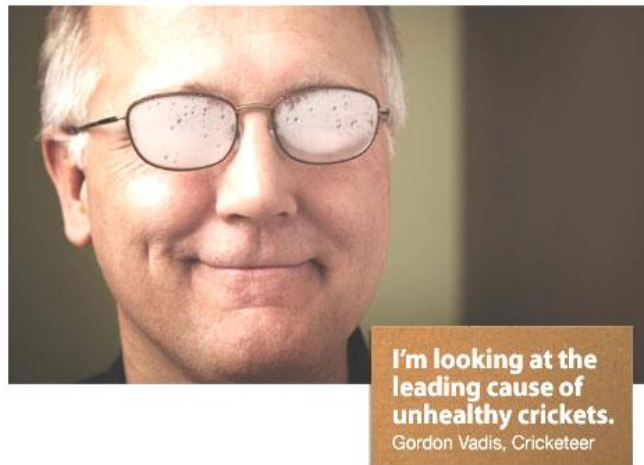
The United States Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) is releasing the [National Aquaculture Health Plan and Standards \(NAHPS\)](#). The plan details how USDA will provide oversight of the health certification, movement and trade of aquatic livestock raised in land-based, inshore, and offshore facilities. These actions will support the overall health of the aquaculture industry, which will provide protection and assurance for producers of farm-raised aquatic animals in the United States.

The NAHPS establishes guidance for national disease reporting, laboratory and testing standardization, surveillance, response, biosecurity, data management as well as education and training to protect aquaculture health. It also outlines health inspection options to provide consistent and verifiable ways to establish, maintain and certify the health and safety of aquatic livestock, and lists the actions USDA will take in each of these areas to implement the plan.

"As we've seen increasing growth in aquaculture in this country, it is essential that we have clear standards for our nation's producers to follow," said Dr. Burke Healey, USDA Chief Veterinarian. "These recommendations will facilitate aquatic animal movement, protect the health of aquatic animals, and minimize the impacts of disease events when they occur."

With the release of this plan, USDA is taking a lead role in providing guidance for aquatic animal health. USDA will continue to collaborate with the National Oceanic and Atmospheric Association (NOAA) and the United States Fish and Wildlife Service (USFWS), as well as other Federal, State, and Tribal entities to ensure the health of all aquatic animals in the United States.

USDA developed this plan in consultation with other aquaculture entities following the 2020 issuance of Executive Order 13921, Promoting American Seafood Competitiveness and Economic Growth, through the National Science and Technology Council of the White House and the subcommittee on aquaculture and with State, Federal, and industry agriculture stakeholders. The new [National Aquaculture Health Plan and Standards](#) replaces the 2008 National Aquatic Animal Health Plan. The new plan covers 2021-2023, and it will be updated every 2 years by USDA and its partners.



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**Book Review: Part 2**

**Fowler's Zoo and Wild Animal Medicine; 9 Volumes**  
Reviewed by Nick Saint-Erne, DVM, CertAqV

The second edition of *Zoo and Wild Animal Medicine*, published by W.B. Saunders in 1986 and edited by Murray E. Fowler DVM, is a revised edition of the first, which was published in 1978. The third edition, however, is labeled "Current Therapy 3" under the title and is all new material from the first and second editions and, "the material printed in this third edition is not simply an update of the second edition and does not supplant it," states Dr. Fowler in the Preface of Volume 3.

W.B. Saunders Company published volume 3 in 1993 and it is 617 pages long, which is considerably smaller than the 951 pages of Volume 1 and 1127 pages of Volume 2. This third volume has all new articles, divided into the following sections:

- Part I—General Topics
- Part II—Amphibians and Reptiles
- Part III—Birds
- Part IV—Mammals
- Appendices

The first part has a chapter on Animal and Human Welfare, including the articles The Humane Care of Captive Wild Animals and Humane Considerations In Immobilization and Study of Free-Ranging Wildlife. The first two volumes did not directly address the topic of humane handling of zoo animals and wildlife.

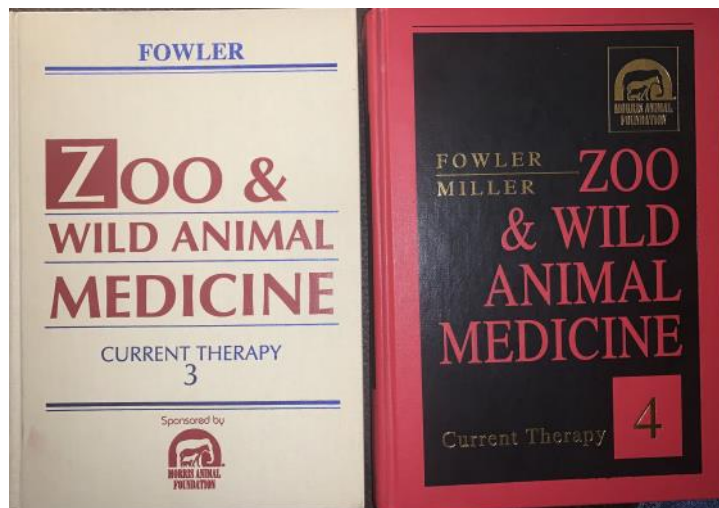
Part II of this volume contains four chapters: 18. Amphibian Medicine; 19. Current Reptilian Anesthesia Procedures; 20. Blood Collection Techniques in Reptiles; 21. Viral Diseases of Reptiles.

The Avian section includes Chapter 24. Diseases of Bird Groups, which discusses select bird orders and diseases of those species. Penguins and Cranes are the only aquatic bird groups addressed in this chapter. The mammal section includes Chapter 33. Marine Mammals and includes articles on Pinniped Anesthesia, Hand Rearing Pinnipeds, Cetacean Strandings, Blood Sampling in Marine Mammals, Captive Marine Mammal Reproduction, and Rehabilitation of Sea Otters.

The Appendices include Legislation of Importance to Wildlife Species, a listing of contact information for US Federal and State Departments of Wildlife, and a list of organizations that monitor wildlife trade.

The only mention of fish in the third edition is that "Amphibians and fish require general anesthesia" for endoscopy, found in Chapter 7. Flexible Endoscopy in Zoo and Wild Animal Medicine.

Not to be discouraged, Volume 4 (Current Therapy 4), published in 1999 and containing 747 pages, finally brings in a chapter on fish! This tome was edited by Murray E. Fowler, along with R. Eric Miller from the Saint Louis Zoo. The editors write in the Preface, "*Zoo and Wild Animal Medicine* serves a vital function by bridging the gap between captive and free-ranging wild



animal medicine and by fostering a conservation biology ethic." There are 110 contributors to the chapters in this volume, which starts with Part I, containing the General Topics and articles about Zoonoses. Chapter 4. Quarantine: A Necessity for Zoo and Aquarium Animals presents recommended protocols from the American Zoo and Aquarium Association. Chapter 8. Use of Ultrasonography in Zoo Animals has an ultrasound image of an active ovary from a female arowana (*Osteoglossum bicirrhosum*) on page 43.

Part II starts on page 158 with a section on Fish, containing Chapter 23. Anesthesia in Fish; 24. Preventive Medicine Programs for Fish; and 25. Fish Pharmacotherapeutics. These three chapters are well-written overviews of their subjects and include information on the drugs administered for anesthesia, anesthesia recovery, euthanasia, record keeping, quarantine, water quality, nutrition, zoonotic diseases from fish, disease surveillance, and medications for use with fish.

The Reptiles section includes these chapters directly relating to aquatic species: Chapter 26. Use of Antimicrobial Drugs in Reptiles; Chapter 28. Crocodilian Anesthesia; Chapter 29. Medical Management of Sea Turtles in Aquaria; Chapter 30. Health Assessment of Chelonians and Release into the Wild. This last chapter has an algorithm for determining the best disposition for captive wild chelonians (or any animal): whether they be maintained in captivity, returned to the wild, or euthanized.

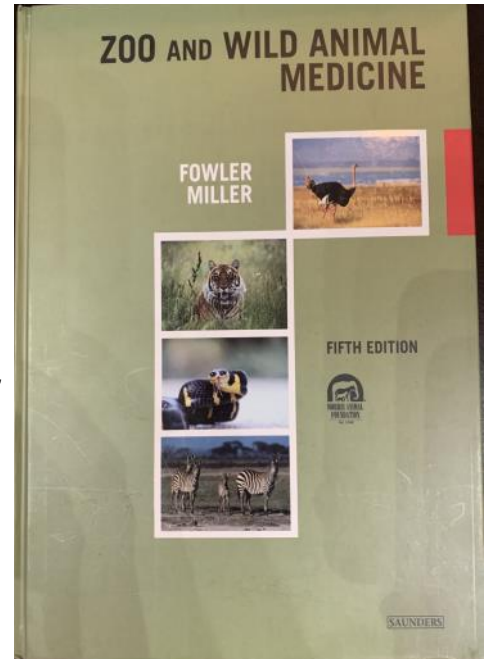
Part III starts on page 260 with Avian Medicine. Of great interest for aquatic veterinarians are Chapter 37. Water Quality for a Waterfowl Collection, and Chapter 38. Caring for Oiled Birds,

Part IV on Mammals, starting on page 316, has Chapter 59. Otter Anesthesia; Chapter 60. Health Assessment, Medical Management and Prerelease Conditioning of Translocated North American River Otters; Chapter 64. Diagnostic Cytology in Marine Mammal Medicine; Chapter 65. Leptospirosis in Marine Mammals; Chapter 66. Toxicology in Marine Mammals; Chapter 67. Diagnosis and Treatment of Fungal Infec-

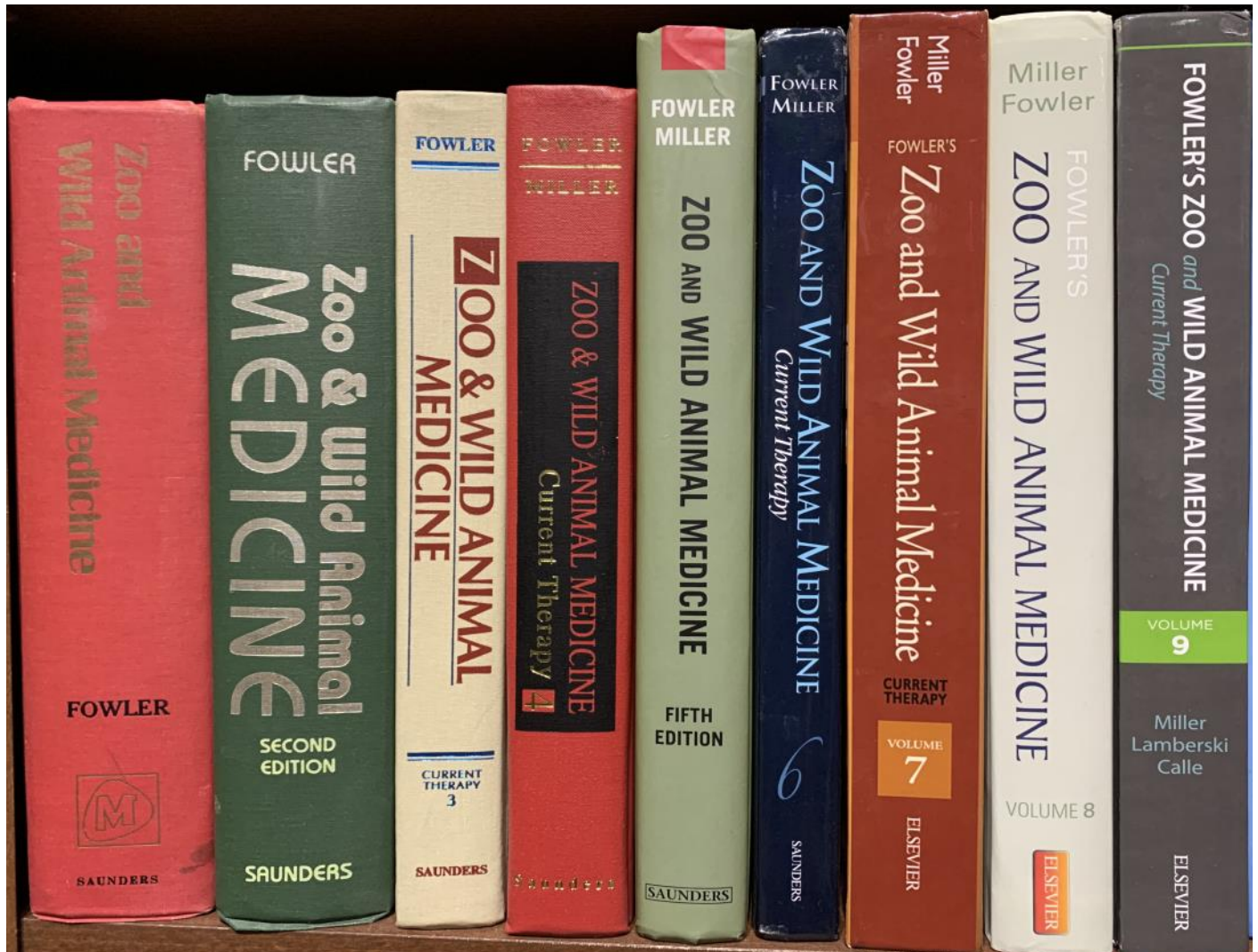
tions in Marine Mammals; Chapter 68. Medical Management of Stranded Small Cetaceans; Chapter 69. Hand-Rearing Techniques for Neonate Cetaceans; Chapter 70. Morbillivirus Infections of Marine Mammals; Chapter 71. Fetal Ultrasonography in Dolphins with Emphasis on Gestational Aging; and Chapter 72 Manatee Medicine. Altogether this volume has 65 pages of information about aquatic mammals.

There are no Appendices to Volume 4. Each volume does contain a thorough index. Together with volume 3, there is sufficient information for aquatic veterinarians interested in marine mammals or water fowl to add these books to your reference shelf. The information on amphibians and reptiles is good, but limited, and fish only begin to be included in volume 4. Still, with so much information about other animal species, these are all very informative books that I recommend owning. In the next issue will be presented the contents of further volumes in this series.

*In the next issue, we will review Volume 5, which has a whole chapter on Fish Medicine, written by Dr. Craig Harms.*



*The author's collection of the tomes in this series.*



### Abstracts from Scientific Literature: Oysters

#### Seeking the perfect oyster shell: a brief review of current knowledge

Darien Danielle Mizuta, Gary H. Wikfors

*Reviews in Aquaculture*

First published: 25 March 2018

<https://doi.org/10.1111/raq.12247>

#### Abstract

Current trends in the seafood market indicate increased demand for within-shell oysters, associated with increasing popularity of oyster bars. As this specialized, demanding market increases globally, there is strong incentive to improve quality. In this context, the manipulation of oyster shell traits through aquaculture as a means of improving oyster quality is timely and promising in terms of marketing. Several oyster shell characteristics, most especially shape, measured as length (L), width (W) and depth (D), result from a combination of three factors: genetics, environmental condition to which the oyster is exposed and husbandry practices. Although breeding programmes have targeted several important commercial traits, selection for shell traits has not been widely performed. Additionally, accumulated knowledge of the effects of environmental conditions and farming methods on shell characteristics exists at a local level, but as such, it is not always validated with scientific data.

The existing local knowledge and practices, however, are of extreme importance for the improvement and adaptation of the farming sector to market demands. Current knowledge about the genetic, environmental and husbandry effects on shell and related aquaculture practices for manipulation of shell appearance and robustness in commercially important oysters of the Genus *Crassostrea* is compiled here. As the topic has not been well documented in the academic field, information from scientific articles was complemented by technical reports and commercial sources. A combination of aquaculture practices is needed to produce oysters of acceptable shape, thickness, cleanliness and colour, although suitable shell characteristics may vary with different markets.

#### A global review of the ecosystem services provided by bivalve aquaculture

Andrew van der Schatte Olivier, Laurence Jones,

Lewis Le Vay, Michael Christie,

James Wilson, Shelagh K. Malham

*Reviews in Aquaculture*

First published: 12 November 2018

<https://doi.org/10.1111/raq.12301>

#### Abstract

Bivalve shellfish aquaculture provides many benefits to society, beyond their traditional market value. This study collates the evidence available on the provisioning, regulating and cultural ecosystem services

provided by the bivalve species commonly used in aquaculture. For the first time, it synthesises this evidence to provide a global assessment of the potential market and non-market economic value of bivalve aquaculture. Bivalves are filter feeders, filtering water and particulates, creating substrates which provide habitat to act as nursery grounds for other species.

Goods from provisioning services include meat, worth an estimated \$23.9 billion as well as, pearls, shell and poultry grit, with oyster shell being the most important, with a global potential worth of \$5.2 billion. The most important regulating services are nutrient remediation. Cultivated bivalves remove 49,000 tonnes of nitrogen and 6,000 tonnes of phosphorus, worth a potential \$1.20 billion. Currently, there is little evidence on the cultural services per year of bivalve aquaculture, but we argue that these cultural values are broad ranging, although difficult to quantify. Our assessment indicates that the global, non-food bivalve aquaculture services are worth \$6.47 billion (\$2.95 billion–9.99 billion) per annum. However, this is likely to be an underestimate of the true value of bivalve aquaculture as there are significant gaps in evidence of the value for a number of key services. The analysis presented here can be used to indicate the likely scale of payments for ecosystem services provided by bivalve aquaculture, prior to more detailed assessments.

#### Current Status and Potential of Tropical Rock Oyster Aquaculture

Samantha J. Nowland, Wayne A. O'Connor,  
Matthew W. J. Osborne & Paul C. Southgate

*Reviews in Fisheries Science & Aquaculture*

Volume 28, Issue 1; 2020

<https://doi.org/10.1080/23308249.2019.1670134>

#### Abstract

This review summarizes existing literature of tropical rock oyster aquaculture, investigates constraints to industry expansion and provides recommendations for the further development of a contemporary industry. Barriers to development of this industry are varied and complex, and include: a research and development deficit, under-reporting of research projects, lack of species-specific biological and taxonomic knowledge, and poor shellfish food safety reputation. These issues can be linked to the tropics being comprised of many developing economies and the associated challenges of a lack of resources and investment opportunities. Current global interest remains high despite this and tropical oyster aquaculture is considered as a valuable prospective industry. With appropriate support and a collaborative approach, there is an opportunity for developing oyster culture industries to support economic development in some of the poorest regions on Earth.

This review provides five key recommendations towards further developing the tropical oyster aquaculture sector: (1) to invest in foundational knowledge to understand the biology of target species and adapt



existing culture methods accordingly; (2) to utilize molecular tools to clarify taxonomic ambiguity and apply novel technologies; (3) to establish a stable spat supply by progressing hatchery production; (4) to promote collaboration and widespread dissemination of information; and (5) to improve industry reputation through research, education, and quality control.

#### **Ecological Consequences of Oysters Culture: A Review**

Ogunola Oluniyi Solomon, Onada Olawale Ahmed  
*International Journal of Fisheries and Aquatic Studies*  
2016; 4(3): 01-06  
<https://www.fisheriesjournal.com/archives/2016/vol4issue3/PartA/4-2-105.pdf>

#### **Abstract**

The oyster culture is a profitable and operationally diverse aquaculture industry that has prevailed worldwide. Different culture techniques have been employed from farm to farm, with growers using either, the rack and rail method, longlines, or a combination of two or more methods to grow oysters. They are grown in either intertidal or subtidal marine zones, with post-harvest activities taking place predominantly at land-based facilities. There are number of environmental issues that are relevant to the growing of oysters in the coastal waters. These are typically associated with the operation of the farm or the land-based service facility. If the farm is designed or managed inappropriately, there is a potential for ecological harm. Therefore, this paper reviewed some of the ecological damage associated with oyster culture and proffered possible solutions to the problems.

#### **Effects of extensive bottom cultivation of tropical oyster *Crassostrea belcheri* on benthic invertebrate community structure in Ban Don Bay, Suratthani Province, Southern Thailand**

Sirusa Kritsanapuntu & Nilnaj Chaitanawisuti  
*Aquaculture International* Volume 26, (2018)

#### **Abstract**

The diversity, distribution, and species richness of benthic invertebrates were examined under extensive bottom cultivation of the tropical oyster during the summer of 2015 at Ban Don Bay, Suratthani Province, Thailand. Oyster farms that had been operating for 25 years were selected for the study, and four sampling sites were allocated along each transect as (i) at the center of the farm, (ii) inside the farm, (iii) at the farm boundary, and (iv) a reference site.

Results indicated that a total of 23 families and 28 species of benthic invertebrate taxa were recorded from the four sampling sites, and the macrobenthic invertebrates inhabiting all study sites consisted mainly of gastropods (11 species), polychaetes (11 species), and bivalves (8 species). No significant differences in total density, diversity index, evenness index, and species richness index of benthic invertebrates were found among each sampling site ( $P > 0.05$ ). Significant differences in total nitrogen, nitrate, nitrite, total ammonia, sulfide, total phosphorus, organic matter, and grain sizes of sediment were found among each sampling site, but no significant differences in pH and total nitrogen were found. There were no clear patterns of differences in the detrimental environmental effects between sampling site locations, which indicated a minimal ecological impact of oyster cultivation.

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**MEETINGS OF INTEREST TO  
AQUATIC VETERINARIANS**

Veterinarians attending these meetings may be awarded veterinary CE/CPD credit towards annual re-licensure or re-registration to practice veterinary medicine. Individuals should check with the organizers to see if CE/CPD certificates are provided.

**Many Veterinary Conferences being held in 2021 have been canceled or postponed. Please check websites to ensure conferences are still being held before making travel plans.**



**46th WSAVA World Congress**

Dates: 13-16 November 2021

Hyderabad, India - Presented online virtually

Presentations include:

- A Betta Solution - Exploring Siamese Fighting Fish Medicine. Saint-Erne,
- Winter Woes - Cold Weather Koi Pond Problems. Questen,
- The ABC's of Koi Practice - Getting Started. Saint-Erne,
- Food and Feeding Behavior in Koi. Tepper,

[Visit the website here:](https://wsava2021.com/) <https://wsava2021.com/>

**47th WSAVA World Congress - 2022**

Dates: 29-31 October 2022

Lima, Peru

See: [WSAVA](https://www.wsava.org/)

**48th WSAVA World Congress - 2023**

Lisbon, Portugal

**49th WSAVA World Congress - 2024**

Shanghai, China



**Call for Papers**

**A special Issue on *Viruses of Aquatic Animals***

Dr. James R. Winton of the United States Geological Service Western Fisheries Research Center has recently retired after a remarkable career in aquatic animals' health research and management that focused on fish viruses. We, his friends, colleagues, and collaborators are assembling a special issue on aquatic animal viruses and viral infections as a tribute to his outstanding career.

This special issue of the Aquatic Animals Section of *Animals* is expected to be completed by the end of 2021. *Animals* (ISSN 2076-2615) is an international peer-reviewed open access journal devoted entirely to animals, including zoology and veterinary sciences, published monthly online by MDPI.

The manuscripts are peer-reviewed, and a first decision provided to authors approximately 15 days after submission; with accepted paper posted online within a week with full-text archived in PubMed Central.

We would like to invite you to contribute to Winton's special issue by submitting a research paper, review article, or short communication that further our understanding of aquatic animals' viruses' pathogenicity, immunology, epidemiology, improved diagnostics, newly developed vaccines, taxonomy, and host susceptibility.

We are hoping that you will join our efforts in assembling an issue embodying emerging information in a field that Dr. Winton's led us through.

For further information please contact:

Professor Mohamed Faisal  
Faisal@cvm.msu.edu



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**Aquaculture America 2021**

San Antonio, Texas  
 August 11-14, 2021

AQUACULTURE AMERICA 2021 returns to one of the favorite tourist spots in the world for the only major national aquaculture conference and exposition held in the U.S. The U.S. Aquaculture Society (formerly U.S. Chapter of WAS) joins with National Aquaculture Association and the Aquaculture Suppliers Association to produce the annual Aquaculture America meetings. These sponsors are joined by the annual meetings of Aquacultural Engineering Society, US Trout Farmers Association and many more associations to make Aquaculture America 2021 the one meeting in the U.S. that you don't want to miss!

A CRITICAL TRADE SHOW FOR AQUACULTURISTS! AQUACULTURE AMERICA 2021 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 AMERICA 2021 is the place to do it!

Conference Hotel:  
 San Antonio Marriott Rivercenter  
 101 Bowie Street  
 San Antonio, TX 78205-3901

For more information and to register, go to:  
[Aquaculture America 2021 | San Antonio Texas](#)  
[| World Aquaculture Society Meetings \(was.org\)](#)

**Aquaculture Europe 2021**

Madeira, Portugal

**Monday, 4th October**

Registration open 12.00-18.00  
 EAS Board Meeting 09.00-14.00  
 Opening Ceremony & EAS Awards 18.00-19.00

**Tuesday, 5th October**

Registration open 7.30-18.00 Daily  
 Plenary Session 9.00-10.00  
 Trade Show open 10.00-19.00  
 Educational Sessions 10.30-12.50  
 Industry Forum 10.30-17.30  
 EAS General Assembly 13.00-14.00  
 Educational Sessions 14.00-17.20  
 Eposter Session/Happy Hour 17.20-19.00  
 Student Reception 19.00-21.00

**Wednesday, 6th October**

Plenary Session 9.00-10.00  
 Educational Sessions 10.30-12.50  
 Innovation Forum 10.30-17.30  
 Trade Show open 10.00-19.00  
 Educational Sessions 14.00-17.20  
 Eposter Session/Happy Hour 17.20-19.00  
 President's Reception 19.00-22.00

**Thursday, 7th October**

Educational Sessions 9.00-11.00  
 EATiP/EU Day 9.00-12.50  
 Plenary Session & Poster Awards 11.30-12.50  
 Trade Show open 10.00-16.30  
 Sessions 14.00-17.20

Conference information: [ae2021@aquaes.eu](mailto:ae2021@aquaes.eu)  
 Registration: [worldaqua@was.org](mailto:worldaqua@was.org)

**American Association of Fish Veterinarians**

2021 Virtual Conference

[Call for Abstracts](#)

The AAFV Board and Conference Committee will once more be offering a two-day online conference. Sessions will be live on October 21 & 22, 2021. We are reaching out to both veterinarians and veterinary students to consider submitting abstracts for presentations.

In an effort to increase the diversity of talks that range the breadth of fish medicine, we are soliciting speakers from all clinically relevant topics to the fish veterinarian including, but not limited to: Clinical Pathology; Radiology; Surgery, Anesthesia & Analgesia; Diagnostics & Therapeutics; Economics; Ornamental/Pet Fish; Aquaculture; Public Aquaria; Unique Cases.

We welcome your submission for any of these focus areas, or any other topics you feel would be of great interest for fish veterinarians.

Please contact the Executive Secretary at:  
[americanfishvets@gmail.com](mailto:americanfishvets@gmail.com).

**Discover core knowledge, skills & experience needed to become a WAVMA Certified Aquatic Veterinarian (CertAqV)**

Did you know that WAVMA's **CertAqV Program** offers members the opportunity to become recognized and certified as having competency in 9 core areas deemed necessary to practice aquatic veterinary medicine? Find out more information online at: <http://www.wavma.org/CertAqV-Pgm>.

*The Aquatic Veterinarian* is meant to be read as a 2-page spread (like a paper magazine!). To view it this way on your computer, open the pdf document using Adobe Acrobat or Adobe Reader, then go to the menu bar at the top of the computer screen and click on View, then Page Display, then Two Page View. That will allow you to scroll thorough the issue seeing the cover page by itself first, followed by two pages side by side for the rest of the issue. Doing this, you will be able to see the Centerfold picture in all its ginormous glory!

### The Aquarium Vet E-conferences

In 2020, The Aquarium Vet commenced holding E-conferences to fill the gap left by the cancellation of aquarium and zoo conferences globally. Recordings of all our E-Conferences are available to purchase from our website (see: <http://www.theaquariumvet.com/conference/>)

The second E-lasmo Conference was held recently in March 2021. The E-lasmo Conference is the only conference in the world, that is solely dedicated to elasmobranchs in professional care in aquariums and zoos. We were delighted that more than 20 speakers presented over the four days with some amazing topics covered. Recordings of the entire E-lasmo Conference 2021 are now available for purchase.

This year we have decided to combine the E-Aquarium Conference and the E-Reef Conference into one massive fun filled week. Keep the week commencing October 18th 2021 available for what will be an amazing E-conference with world class speakers on a variety of topics. If you are interested in presenting at the E-Aquarium Conference later this year, we encourage you to submit an abstract to:

[rob@theaquariumvet.com](mailto:rob@theaquariumvet.com).

### AFS-FHS Summer Seminar Series

The seminars are free and open to the public. The seminar calendar and Zoom access information is now available.

#### Important links:

[AFS-FHS Student Seminar Series Listserv](#)  
[Seminar calendar and Zoom access information](#)

#### New this year!

- Five plenary presentations from world renowned fish health professionals
- Best student presentation awards
- Sponsorship opportunities to support future student travel awards

If you missed last year's series, the presentations have been archived here:

<http://z.umn.edu/fishhealthseminar>.

If you have any questions, please don't hesitate to contact us. We hope to see you this summer!

Matt Griffin ([matt.griffin@msstate.edu](mailto:matt.griffin@msstate.edu))  
 Megan Shavaliier ([shavali1@msu.edu](mailto:shavali1@msu.edu))  
 Nick Phelps ([pHELP083@umn.edu](mailto:pHELP083@umn.edu))

### 20th INTERNATIONAL CONFERENCE ON DISEASES OF FISH AND SHELLFISH

Aberdeen, Scotland, UK

29th August - 2nd September 2021

Depending on the status of the COVID-19 epidemiological situation for the appointed period, the 20th International Conference on Diseases of Fish and Shellfish (<https://www.delegate-reg.co.uk/eafp-2021/>) is currently planned to be held in-person at Aberdeen's newest events and exhibition space, TECA. Scientific and technical sessions consisting of poster presentations, invited talks, keynotes, oral presentations, workshops and an EAFP General Assembly will take place during the Conference. Planned social events such as, the Welcome Cocktail, Civic Reception and the traditional Conference Banquet, will be held in accordance with required epidemiological 'social distancing' measures in place.

In order to ensure that appropriate topics are covered, including emerging areas, we are very interested in hearing any suggestions for potential topics for scientific sessions and workshops at the conference. EAFP members and non-members are encouraged to submit proposals. More information will be available on the EAFP website and a 2nd announcement will provide more updates.

We look forward to seeing you at the 20th International Conference on Diseases of Fish and Shellfish organised by the EAFP. Feel free to contact our Meetings Secretary if you have any questions or need additional information, see below for contact information.

Ivona Mladineo,  
 EAFP Meeting Secretary,  
 e-mail: [ivona.mladineo@paru.cas.cz](mailto:ivona.mladineo@paru.cas.cz)  
 or [eafp@kc-jones.co.uk](mailto:eafp@kc-jones.co.uk)

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