A close-up photograph of a tree frog with bright yellow skin and black spots, perched on a green leaf. The frog's large, dark eye is prominent. The background is a soft-focus green.

ASSOCIATION
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Welfare Webinar Wednesdays: Water Quality

Presented on behalf of AZA Animal Welfare Committee

AZA | Learn

Monthly series- Welcome!

- Welfare Webinar Wednesdays: Defining Welfare and Wellbeing
 - Webinars will explore compelling and relevant topics in Animal Welfare and Wellbeing, feature subject matter and species experts, offer varied industry perspectives, and time for conversation in the community
- Second Wednesday of the month
 - Follow up the conversation the next day at Animal Welfare Committee virtual “Office Hours” which are the second Thursday of the month at 1pm EST (ongoing since 2022)
 - The Zoom link is <https://us06web.zoom.us/j/82093090810?pwd=BVWrYSn29R8yCc5oaI0sSSyz1DeR8o.1>
 - Meeting ID: 820 9309 0810
 - Passcode: 855950

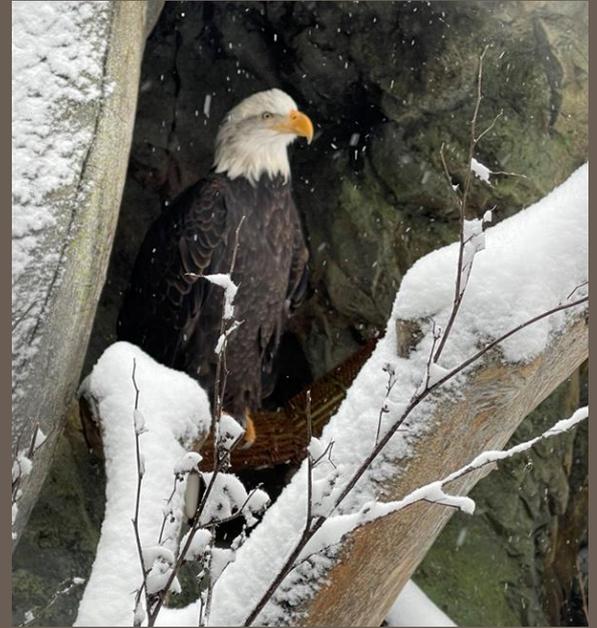


Preview of upcoming webinars

| Month | Topic |
|-----------------|--|
| all past topics | https://www.pathlms.com/aza-learn/courses/56110/sections/119622 |
| Feb 25, 2026 | Animal welfare assessment types https://www.pathlms.com/aza-learn/courses/56110/sections/119622/webinars/89562 |
| Mar 11, 2026 | Exhibit Design https://www.pathlms.com/aza-learn/courses/56110/sections/119622/webinars/84100 |
| Apr 2, 2026 | Weaponizing welfare, link TBD |
| Apr 8, 2026 | Underrepresented taxa assessments https://www.pathlms.com/aza-learn/courses/56110/sections/119622/webinars/84101 |
| May 13, 2026 | Mitigating undesirable behaviors https://www.pathlms.com/aza-learn/courses/56110/sections/119622/webinars/84102 |

Webinar Objectives

This webinar will feature experts in water quality who will explain some of the complexities of working with different aquatic elements to achieve good welfare. This includes setting up mixed species exhibits while keeping welfare in mind, designing life support systems, ammonia testing, and an overview of ozone use. Presenters will also touch on regulatory influences on water quality, discussing AZA accreditation and testing for USDA.



1

Water Quality, AZA
Accreditation
Standards



Caitlin Hadfield, MA
VetMB MRCVS DipIAZCM
DipIECZM
Director of Animal Health
Seattle Aquarium

2

TAN vs UIA: to water
change or not to
water change



Hannah Mewhirter
Water Quality Manager
Seattle Aquarium

3

Ozone



Joshua Moline
Life Support Operator
Minnesota Zoo

4

Invertebrate LSS
Design



Jeffrey Keaffaber, PhD
Corporate Director
Environmental & Habitat
Design
United Parks and Resorts

5

USDA marine mammal
testing



Michelle Davis, DVM,
ACZM, ECZM (ZHM)
Head, Aquatic Health
Department
Wildlife Conservation
Society New York
Aquarium



Mark Kessel
Water Quality Manager
Wildlife Conservation
Society New York
Aquarium



Water Quality and AZA Accreditation Standards

Caitlin Hadfield, MA VetMB MRCVS DiplAZCM DiplECZM

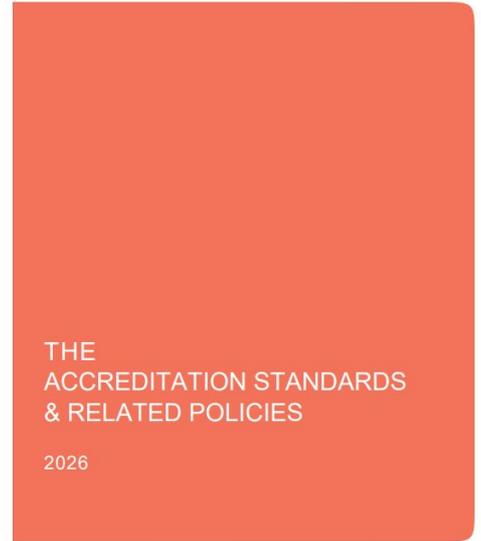
Director of Animal Health

Seattle Aquarium

Accreditation

- Accreditation Standards
- Inspector's Handbook
- Available to everyone, aza.org
- Updated annually - please review annually
- Performance vs engineering standards

- Referenced docs, e.g. ACM, OSHA, AWA

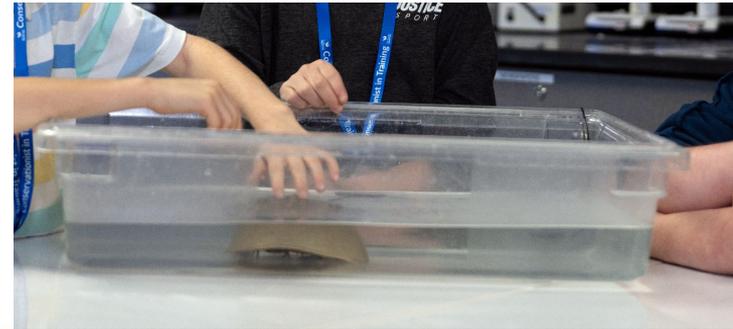


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Accreditation - Animal Care

- Should be species-appropriate water quality (1.5.7)
- Should pay special attention to climate-mismatches
- Should be protected from excessive noise and vibration
- Must be applied during presentations and programs outside of habitat

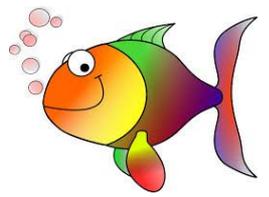
References?



Accreditation - Animal Care

- Must have a regular program of monitoring WQ to confirm operation of filtration and disinfection and for animal health (1.5.9)
- Written record must be maintained for long-term WQ results and chemical additions
- Must be monitored during programs





Accreditation - Physical Facilities

- Critical LSS must have a warning mechanism to alert staff about failures in a timely manner and available emergency back-up systems (10.2.1 and subparts)
 - Automated or by qualified paid or unpaid staff
 - Automated ‘preferred but not mandatory’
 - If monitoring is intermittent/manual, frequency must allow for LSS failures to be identified before deleterious effects occur / must be less than the survival time for inhabitants in case of an LSS failure
 - Mentions water flow, O₂, temperature
- Warning mechanisms and back-up systems must be tested at least annually
- Staff must be trained to recognize and mitigate LSS anomalies
- Risk assessment should be performed for each enclosure to ID critical parameters

Accreditation - Safety/Security

- Must be in compliance with all applicable laws/regs regarding employee and volunteer safety training (11.1.1)
- Paid and unpaid staff working with hazardous materials must be trained in handling, labelling, and storage (11.1.4)
- Institution must follow an available written policy on these procedures (11.1.4)



Accreditation - Safety/Security

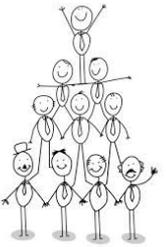
- If using ozone, chlorine, or other oxidizing agents, must have facilities and protocols for safe usage (production, storage, application) (11.1.4.1)
- Staff working in the vicinity must be properly trained for releases or spills
- Should monitor for exposure limits where ozone is produced/applied
- Must have alarms to detect high ozone in confined spaces
- Must have mechanisms/protocol to stop production if dangerous levels are detected





Accreditation - Cetaceans

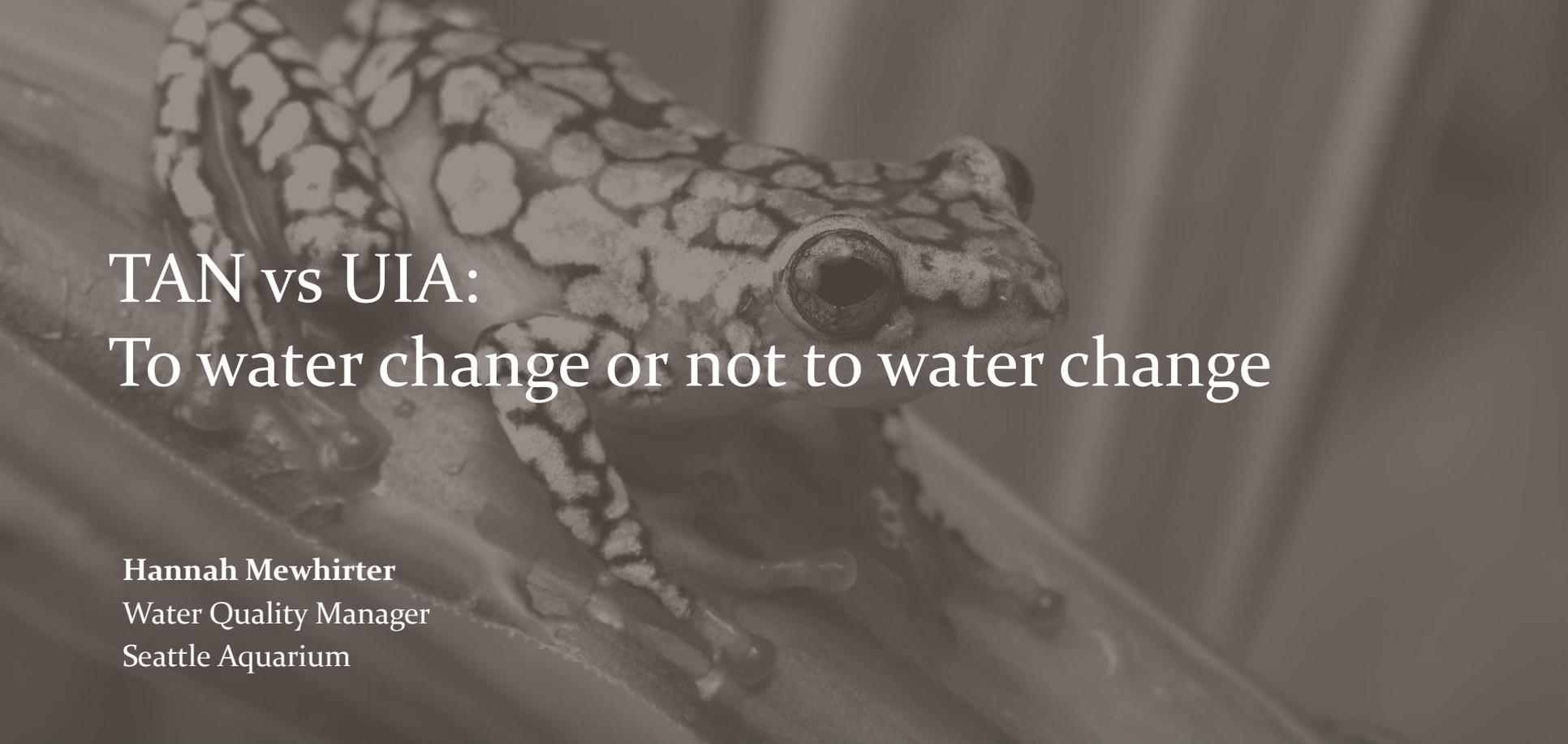
- Environmental conditions must be designed, constructed, and managed to promote wellbeing (C.7.2.1)
- WQ parameters and acceptable variances must be established by qualified senior curatorial and vet staff (C.7.3.2/4)
- Parameters and variances should be routinely monitored (C.7.3.2/4)
- Water temperature must be appropriate for species (C.7.2.2)
- Source water should be adjusted as needed to meet the physiological needs of the species (C.7.3.3)



What if you don't meet these?

- Review the standards, handbook, questionnaire, supporting documents
- Get together, build, and implement!
- Don't leave a blank or a fake policy/procedures for the accreditation cycle
- If you have concerns about meeting them
 - Risk assessment
 - Documentation of efforts
- Be honest on challenges, steps taken, plans

We are all in this process to support each other's growth and the care we provide

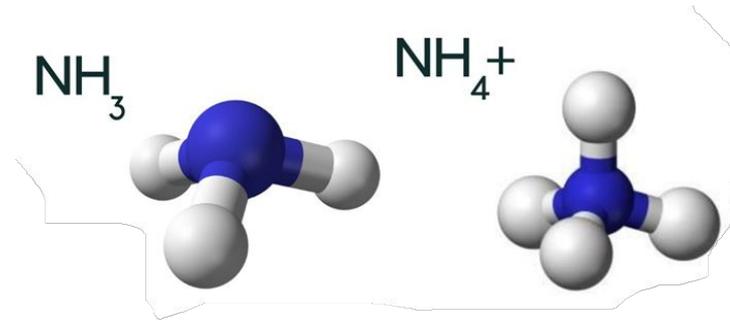


TAN vs UIA: To water change or not to water change

Hannah Mewhirter
Water Quality Manager
Seattle Aquarium

Ammonia in Aquatic Habitats

- Aquatic animals excrete ammonia as their primary metabolic waste
- Majority of ammonia is eliminated by diffusion through the gills into water
- Ammonia exists in two chemical forms in water:
 - Ammonium (NH_4^+)
 - Ammonia (NH_3)



Demystifying Ammonia Terms

Ammonium (NH_4^+)



- Ionized
 - Positive charge = not easily passed through tissues and membranes
 - Relatively harmless
- Largest proportion of total ammonia in our aquatic habitats
- Converts to ammonia based on pH, temperature, and salinity

Ammonia (NH_3)

Demystifying Ammonia Terms

Ammonium (NH_4^+)

- Ionized
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 - Relatively harmless
- Largest proportion of total ammonia in our aquatic habitats
- Converts to ammonia based on pH, temperature, and salinity

Ammonia (NH_3)

- Un-ionized
 - Absence of charge = easily passed through tissues and membranes
 - Toxic to our animals
- Aliases:
 - Free ammonia
 - Gaseous ammonia
 - Un-ionized ammonia (UIA)
- Derived from measuring TAN, pH, temp, salinity

Demystifying Ammonia Terms

Ammonium (NH_4^+)

- Ionized
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Ammonia (NH_3)

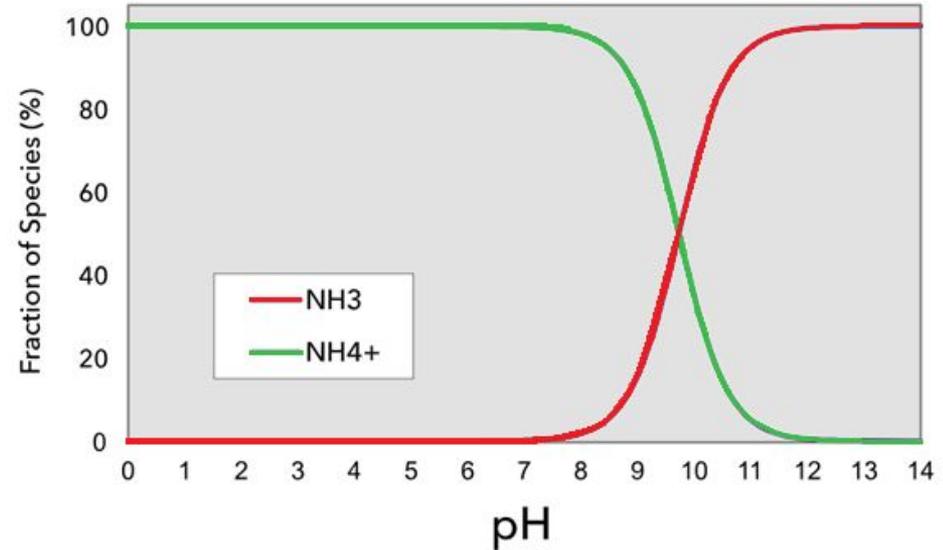
- Un-ionized
 - Absence of charge = easily passed through tissues and membranes
 - Toxic to our animals
- Aliases:
 - Free ammonia
 - Gaseous ammonia
 - Un-ionized ammonia (UIA)
- Derived from measuring TAN, pH, temp, salinity

TAN (total ammonia nitrogen) = Ammonium (NH_4^+) + Ammonia (NH_3)

UIA and TAN

- UIA represents a proportion of TAN
- UIA increases with pH and temperature
- Pair physical measurements with TAN measurement to derive UIA

Distribution of Ammonia Species in Water (10°C)



$$\text{TAN (total ammonia nitrogen)} = \text{Ammonium (NH}_4^+) + \text{UIA (NH}_3)$$

[Source](#)

Calculating UIA

- Measure TAN
- Measure pH and temperature to determine %UIA
- Use %UIA to determine UIA concentration

| % Un-ionized Ammonia (NH ₃) existing in Seawater (salinity=34ppt) | | | | | | |
|---|------|------|------|------|------|-------|
| Using Equations from Spotte, 1992 | | | | | | |
| Temp | | pH | | | | |
| (°C) | (°F) | 5.00 | 6.00 | 7.00 | 8.00 | 9.00 |
| 10 | 50 | 0.00 | 0.01 | 0.13 | 1.28 | 11.50 |
| 15 | 59 | 0.00 | 0.02 | 0.19 | 1.88 | 16.08 |
| 20 | 68 | 0.00 | 0.03 | 0.28 | 2.71 | 21.79 |
| 25 | 77 | 0.00 | 0.04 | 0.40 | 3.85 | 28.59 |
| 30 | 86 | 0.01 | 0.06 | 0.57 | 5.38 | 36.24 |

| UIA Concentration in Water (salinity=0-35ppt) | | | | | | | |
|--|--|-------|-------|-------|-------|-------|-------|
| Using Equations from Spotte, 1992. Captive Seawater Fishes | | | | | | | |
| Seattle Aquarium flags UIA ≥ 0.01 mg/L | | | | | | | |
| % UIA | TAN Concentration (NH ₄ + NH ₃ mg/L) | | | | | | |
| | 0.05 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 1 |
| 0.01 | | | | | | | |
| 0.05 | | | | | | | |
| 0.5 | | | | | | | 0.005 |
| 0.6 | | | | | | | 0.006 |
| 1.5 | | | | | 0.006 | 0.008 | 0.015 |
| 2.0 | | | | 0.006 | 0.008 | 0.010 | 0.020 |
| 3.5 | | | 0.007 | 0.011 | 0.014 | 0.018 | 0.035 |
| 5.0 | | 0.005 | 0.010 | 0.015 | 0.020 | 0.025 | 0.050 |
| 10 | 0.005 | 0.010 | 0.020 | 0.030 | 0.040 | 0.050 | 0.100 |
| 15 | 0.008 | 0.015 | 0.030 | 0.045 | 0.060 | 0.075 | 0.150 |
| 20 | 0.010 | 0.020 | 0.040 | 0.060 | 0.080 | 0.100 | 0.200 |
| 25 | 0.013 | 0.025 | 0.050 | 0.075 | 0.100 | 0.125 | 0.250 |
| 30 | 0.015 | 0.030 | 0.060 | 0.090 | 0.120 | 0.150 | 0.300 |
| 35 | 0.018 | 0.035 | 0.070 | 0.105 | 0.140 | 0.175 | 0.350 |
| 40 | 0.020 | 0.040 | 0.080 | 0.120 | 0.160 | 0.200 | 0.400 |

Calculating UIA

- Measure TAN
 - 0.4 mg/L
- Measure pH and temperature to determine %UIA
 - pH = 8.00
 - Temp = 77F
- Use %UIA to determine UIA concentration

% Un-ionized Ammonia (NH3) existing in Seawater (salinity=34ppt)

Using Equations from Spotte, 1992

| Temp | | pH | | | | |
|------|------|------|------|------|------|-------|
| (°C) | (°F) | 5.00 | 6.00 | 7.00 | 8.00 | 9.00 |
| 10 | 50 | 0.00 | 0.01 | 0.13 | 1.28 | 11.50 |
| 15 | 59 | 0.00 | 0.02 | 0.19 | 1.88 | 16.08 |
| 20 | 68 | 0.00 | 0.03 | 0.28 | 2.71 | 21.79 |
| 25 | 77 | 0.00 | 0.04 | 0.40 | 3.85 | 28.59 |
| 30 | 86 | 0.01 | 0.06 | 0.57 | 5.38 | 36.24 |

UIA Concentration in Water (salinity=0-35ppt)

Using Equations from Spotte, 1992. Captive Seawater Fishes

Seattle Aquarium flags UIA ≥ 0.01 mg/L

| % UIA | TAN Concentration (NH4 + NH3 mg/L) | | | | | | |
|-------|------------------------------------|-------|-------|-------|-------|-------|-------|
| | 0.05 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 1 |
| 0.01 | | | | | | | |
| 0.05 | | | | | | | |
| 0.5 | | | | | | | 0.005 |
| 0.6 | | | | | | | 0.006 |
| 1.5 | | | | | 0.006 | 0.008 | 0.015 |
| 2.0 | | | | 0.006 | 0.008 | 0.010 | 0.020 |
| 3.5 | | | 0.007 | 0.011 | 0.014 | 0.018 | 0.035 |
| 5.0 | | 0.005 | 0.010 | 0.015 | 0.020 | 0.025 | 0.050 |
| 10 | 0.005 | 0.010 | 0.020 | 0.030 | 0.040 | 0.050 | 0.100 |
| 15 | 0.008 | 0.015 | 0.030 | 0.045 | 0.060 | 0.075 | 0.150 |
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| 25 | 0.013 | 0.025 | 0.050 | 0.075 | 0.100 | 0.125 | 0.250 |
| 30 | 0.015 | 0.030 | 0.060 | 0.090 | 0.120 | 0.150 | 0.300 |
| 35 | 0.018 | 0.035 | 0.070 | 0.105 | 0.140 | 0.175 | 0.350 |
| 40 | 0.020 | 0.040 | 0.080 | 0.120 | 0.160 | 0.200 | 0.400 |

Calculating UIA

- Measure TAN
 - 0.4 mg/L
- Measure pH and temperature to determine %UIA
 - pH = 8.00
 - Temp = 77F
 - %UIA = 3.85
- Use %UIA to determine UIA concentration

% Un-ionized Ammonia (NH3) existing in Seawater (salinity=34ppt)

Using Equations from Spotte, 1992

| Temp | | pH | | | | |
|------|------|------|------|------|------|-------|
| (°C) | (°F) | 5.00 | 6.00 | 7.00 | 8.00 | 9.00 |
| 10 | 50 | 0.00 | 0.01 | 0.13 | 1.28 | 11.50 |
| 15 | 59 | 0.00 | 0.02 | 0.19 | 1.88 | 16.08 |
| 20 | 68 | 0.00 | 0.03 | 0.28 | 2.71 | 21.79 |
| 25 | 77 | 0.00 | 0.04 | 0.40 | 3.85 | 28.59 |
| 30 | 86 | 0.01 | 0.06 | 0.57 | 5.38 | 36.24 |

UIA Concentration in Water (salinity=0-35ppt)

Using Equations from Spotte, 1992. Captive Seawater Fishes

Seattle Aquarium flags UIA ≥ 0.01 mg/L

| % UIA | TAN Concentration (NH4 + NH3 mg/L) | | | | | | |
|-------|------------------------------------|-------|-------|-------|-------|-------|-------|
| | 0.05 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 1.0 |
| 0.01 | | | | | | | |
| 0.05 | | | | | | | |
| 0.5 | | | | | | | 0.005 |
| 0.6 | | | | | | | 0.006 |
| 1.5 | | | | | 0.006 | 0.008 | 0.015 |
| 2.0 | | | | 0.006 | 0.008 | 0.010 | 0.020 |
| 3.5 | | | 0.007 | 0.011 | 0.014 | 0.018 | 0.035 |
| 5.0 | | 0.005 | 0.010 | 0.015 | 0.020 | 0.025 | 0.050 |
| 10 | 0.005 | 0.010 | 0.020 | 0.030 | 0.040 | 0.050 | 0.100 |
| 15 | 0.008 | 0.015 | 0.030 | 0.045 | 0.060 | 0.075 | 0.150 |
| 20 | 0.010 | 0.020 | 0.040 | 0.060 | 0.080 | 0.100 | 0.200 |
| 25 | 0.013 | 0.025 | 0.050 | 0.075 | 0.100 | 0.125 | 0.250 |
| 30 | 0.015 | 0.030 | 0.060 | 0.090 | 0.120 | 0.150 | 0.300 |
| 35 | 0.018 | 0.035 | 0.070 | 0.105 | 0.140 | 0.175 | 0.350 |
| 40 | 0.020 | 0.040 | 0.080 | 0.120 | 0.160 | 0.200 | 0.400 |

Calculating UIA

- Measure TAN
 - 0.4 mg/L
- Measure pH and temperature to determine %UIA
 - pH = 8.00
 - Temp = 77F
 - %UIA = 3.85
- Use %UIA to determine UIA concentration
 - UIA = 0.014 mg/L

% Unionized Ammonia (NH₃) existing in Seawater (salinity=34ppt)
Using Equations from Spotte, 1992

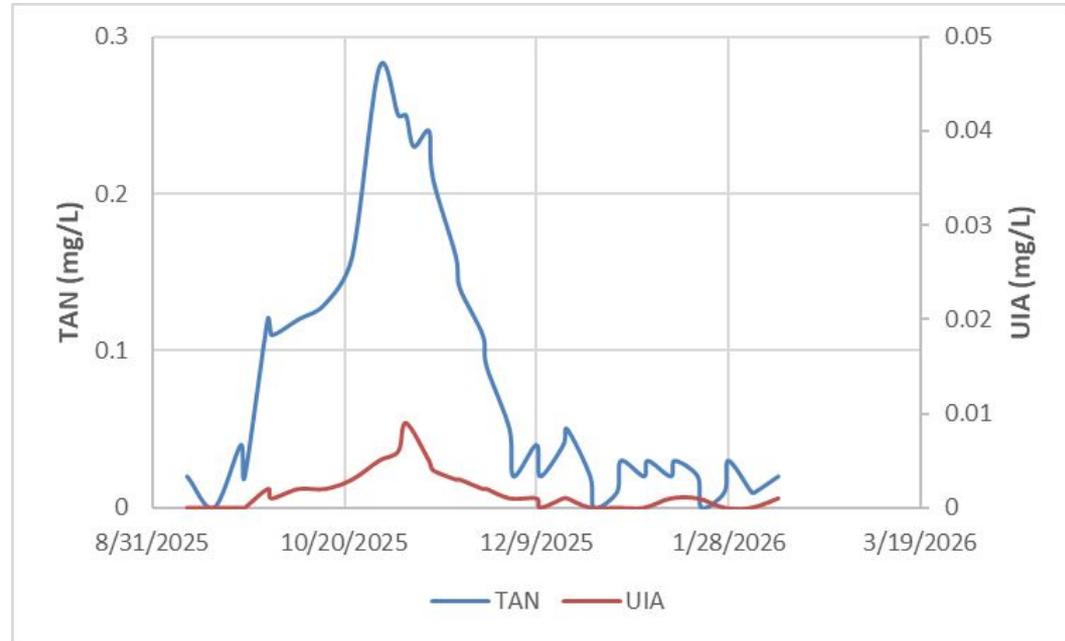
| Temp | | pH | | | | |
|------|------|------|------|------|------|-------|
| (°C) | (°F) | 5.00 | 6.00 | 7.00 | 8.00 | 9.00 |
| 10 | 50 | 0.00 | 0.01 | 0.13 | 1.28 | 11.50 |
| 15 | 59 | 0.00 | 0.02 | 0.19 | 1.88 | 16.08 |
| 20 | 68 | 0.00 | 0.03 | 0.28 | 2.71 | 21.79 |
| 25 | 77 | 0.00 | 0.04 | 0.40 | 3.85 | 28.59 |
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UIA Concentration in Water (salinity=0-35ppt)
Using Equations from Spotte, 1992. Captive Seawater Fishes
Seattle Aquarium flags UIA ≥ 0.01 mg/L

| % UIA | TAN Concentration (NH ₄ + NH ₃ mg/L) | | | | | | |
|-------|--|-----|-----|-----|-----|-----|-------|
| | 0.05 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 1 |
| 0.01 | | | | | | | |
| 0.05 | | | | | | | |
| 0.5 | | | | | | | |
| 0.6 | | | | | | | |
| 1.5 | | | | | | | 0.005 |
| 2.0 | | | | | | | 0.006 |
| 3.5 | | | | | | | 0.011 |
| 5.0 | | | | | | | 0.007 |
| 10 | | | | | | | 0.006 |
| 15 | | | | | | | 0.005 |
| 20 | | | | | | | 0.008 |
| 25 | | | | | | | 0.005 |
| 30 | | | | | | | 0.010 |
| 35 | | | | | | | 0.008 |
| 40 | | | | | | | 0.013 |
| | | | | | | | 0.010 |
| | | | | | | | 0.015 |
| | | | | | | | 0.013 |
| | | | | | | | 0.018 |
| | | | | | | | 0.015 |
| | | | | | | | 0.020 |
| | | | | | | | 0.018 |
| | | | | | | | 0.020 |
| | | | | | | | 0.020 |
| | | | | | | | 0.020 |
| | | | | | | | 0.020 |

Responding to UIA over TAN

- TAN used as parameter to *monitor and trend*
 - TAN buildup triggers an investigation into biofiltration, DO, and alkalinity checks
- UIA dictates wellbeing response
 - Water changes, assess feeding, etc





Ozone

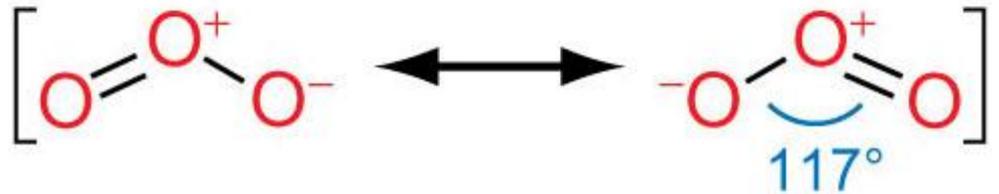
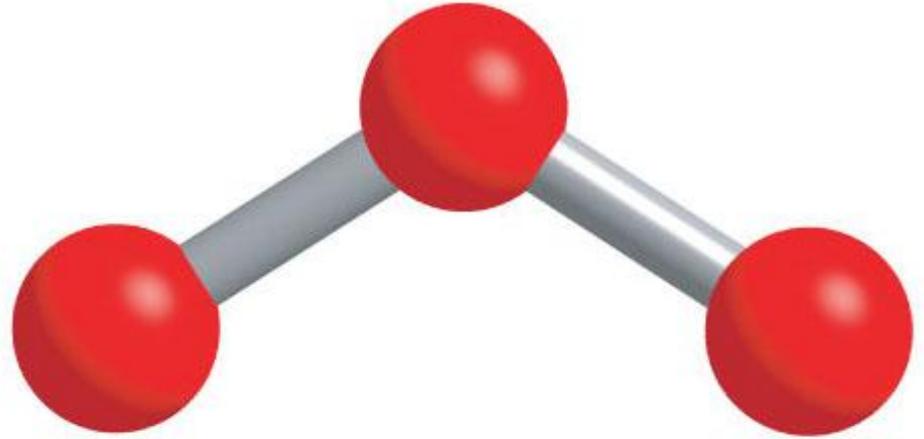
Joshua Moline
Life Support Operator
Minnesota Zoo

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What Is Ozone?

- O₃ Molecule, Oxygen (O₂, O=O) with another “O” atom added on
- Highly unstable/reactive
 - Powerful Oxidizer
 - Attacks lipids, fatty acids, and cell membranes



Why Do Zoos/Aquariums Use Ozone?



1. Disinfection
 - a. Fecal Coliforms
2. Improve water clarity
3. Help facilitate nitrogen cycle
4. Decomposes back into oxygen

Risks

- Over ozonation can quickly lead to harmful effects for animals
 - Damage to gills in fish species
 - Irritation to eyes, mouth, nose
 - Disruption of oil production in mammals
- Elevated levels of Ozone can also be harmful to humans
- May react with other contaminants/medical treatments in the water



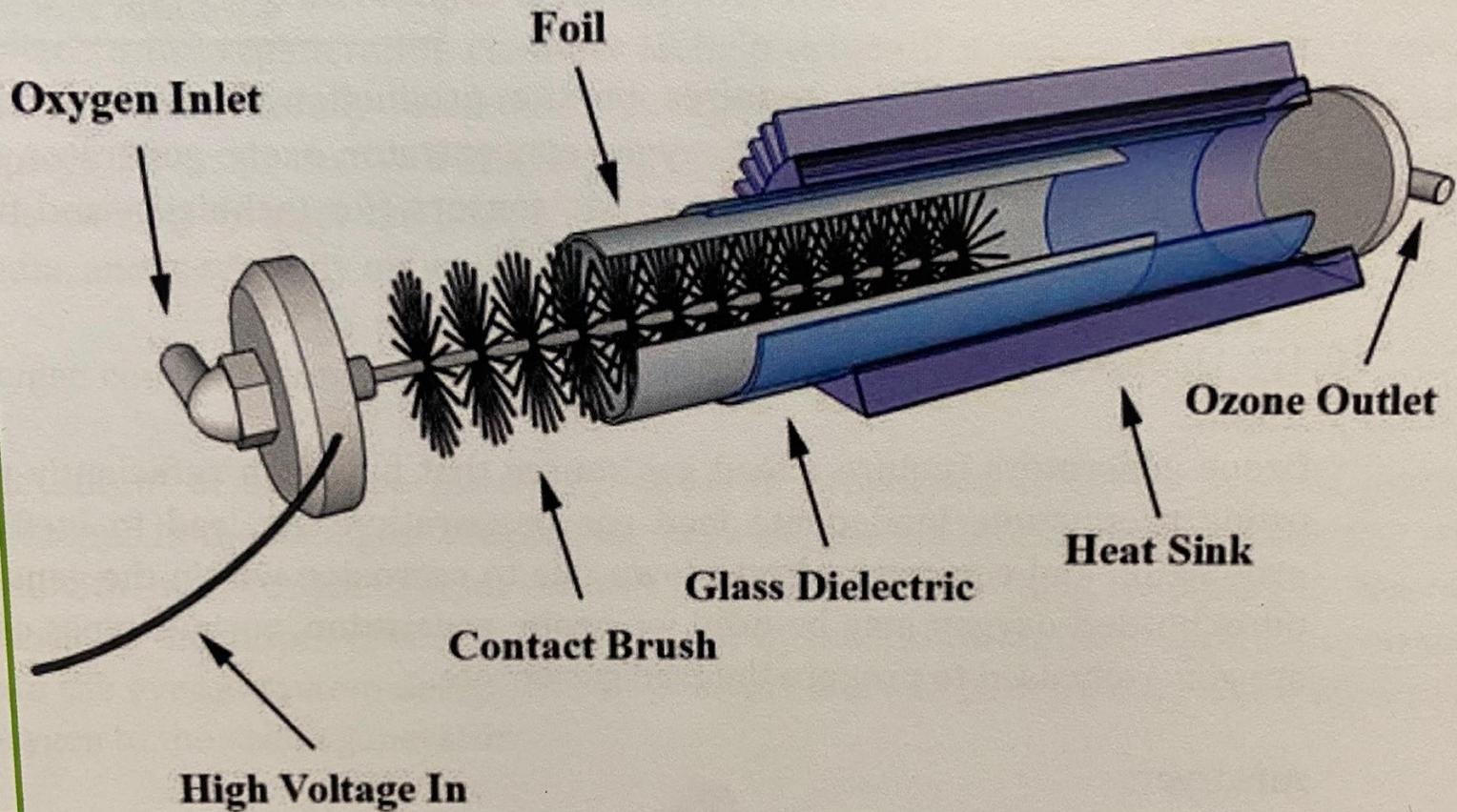


Figure 10.2 - Corona Tube Ozone Generator

Monitoring

- ORP is typically measured at Contact, Degas, and exhibit
 - ORP (mV) at Contact > Degas > Exhibit
 - Programming/automation can automatically shut off production if O₃ levels reach a high limit
- TRO is measured in the Lab via DPD test
- Ambient ozone levels are monitored for human safety



Monitoring

- ORP is typically
 - ORP (mV) a
- TRO is measure
- Ambient ozone l



hibit



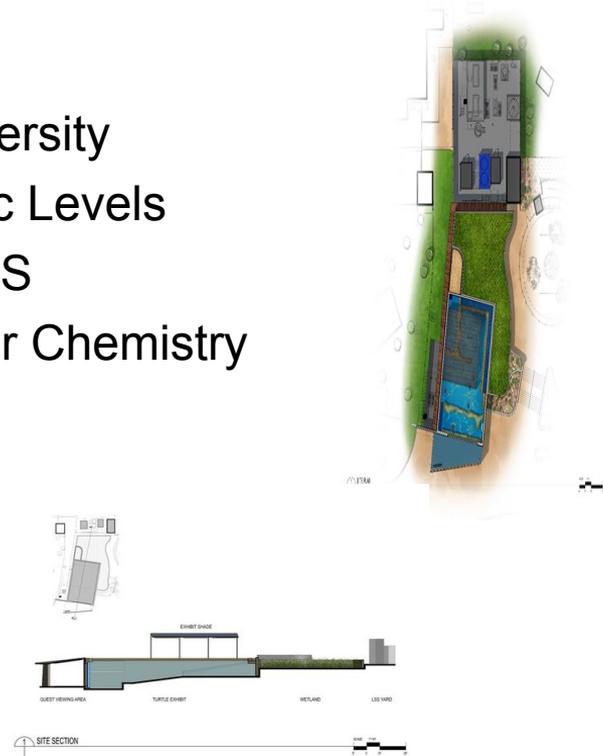
Invertebrate LSS Design

Jeffrey Keaffaber, PhD
Corporate Director
Environmental & Habitat Design
United Parks and Resorts

Dynamic Habitats



- Ecosystem Diversity
- Multiple Trophic Levels
- Sustainable LSS
- Balanced Water Chemistry
 - Nutrients
 - Oxidants
 - Organics
 - Metals



Multi-species Diversity



Reimagined Filtration



Habitat Comparison

| | Traditional LSS | Next-gen LSS |
|-------------------|-----------------|--------------|
| Nitrogen (mg/L) | 100 | 1 |
| Phosphorus (mg/L) | 10 | 1 |
| Energy (kWh) | 390K | 180K |
| Opex (\$/gallon) | 0.42 | 0.18 |

Engineered Salt Marsh, Drum Screens, Ozo-Fractionators







USDA Marine Mammal Water Quality Testing

Mark Kessel

Water Quality Manager

Michelle Davis, DVM, ACZM, ECZM (ZHM)

Head, Aquatic Health Department

Wildlife Conservation Society New York Aquarium

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AQUARIUMS**

USDA Animal Care Part 3, Subpart E, 3.106- Water Quality

- “The primary enclosure shall not contain water which would be detrimental to the health of the marine mammals contained therein.”
- Specifically addresses:
 - Bacterial Standards
 - Coliforms - weekly testing required
 - Chemical additions - daily testing
 - Daily pH testing unless natural seawater
 - Salinity
 - Filtration and water flow

USDA - Bacterial Standards

- Coliforms not to exceed 1,000 counts per 100ml water
 - *Report counts as Most Probable Number (MPN) for liquid media*
 - *Report colony forming units (CFU) for solid media*
 - If the initial result is greater than 1000 counts, you must take two subsequent samples 48-hours apart and average these results with first sample.
 - If the “3-Day” average is not below 1,000 counts, water is deemed unsatisfactory, condition must be corrected immediately

USDA - Bacterial Standards - Coliform Testing

- Reasoning behind testing: what do elevated coliform counts tell us about the conditions of the water?
- Various testing methodologies
 - Idexx Colilert based tests (liquid substrate media)
 - **Pros:** easy to use/read, **Cons:** pricey, excess waste
 - MacConkey/Lactose agars
 - **Pros:** accurate, affordable, less waste **Cons:** prep time, hard to count
 - Microsnap, pen-style, IDEXX Tecta rapid test (food, drinking water)
 - **Pros:** rapid, easy to read, **Cons:** pricey, food/drinking water-centric, excess waste, validated?

USDA - Bacterial Standards - Coliform Testing

- Corrective Actions:
 - Variable based on assessment, current challenges. Is something obvious driving the excursion?
 - Is there historical precedent? Repeat of a past event?
 - Can the mitigations be done safely with animals and staff in mind?
- Impact on Animal Welfare:
 - Does the “mitigation” involve more risk to the animal(s) than the “initial concern”?
 - Will the solution to the problem place the animal in a stressful environment for extended time?

USDA - Bacterial Standards - Chemical Treatment

- “When the water is chemically treated, the chemicals shall be added so as not to cause harm or discomfort to the marine mammals.”
- Daily testing of any chemical additives required
- Oxidants
 - Chlorine, bromine, Ozone - what is TRO?
 - DPD test
 - Pros: widely used, fairly accurate, lots of options, cheap
 - Cons: interferences
 - Ionic Selective Electrode (ISE)
 - Pros: can be very accurate, free of interferences
 - Cons: not widely used, expensive, more technical
 - Corrective Actions: water change, thiosulfate, animal haul out
 - Impact on Animal Welfare: eyes and membranes, byproducts, respiratory, degrees of risk

USDA - Salinity

- “Primary enclosure pools of water shall be salinized for marine cetaceans as well as for other marine mammals which require salinized water for their good health and well-being. The salinity of the pools shall be maintained within a range of 15-36 parts per thousand.”
- Impact on Animal Welfare
 - If using freshwater for marine mammals, will eyes need treatments?
 - If using “city or potable water”, can contain elevated chloramines, and/or exceed recommended limit for chlorine of 1.0 ppm.

USDA - Filtration and Water Flow

- “Water quality must be maintained by filtration, chemical treatment, or other means so as to comply with the water quality standards specified in this section.”

Q&A

NEXT STEPS

- Follow up the conversation tomorrow at Animal Welfare Committee virtual “Office Hours” which are the second Thursday of the month, 1pm EST (ongoing since 2022)
 - The Zoom link is
<https://us06web.zoom.us/j/82093090810?pwd=BVWrYSn29R8yCc5oa10sSSyz1DeR8o.1>
 - Meeting ID: 820 9309 0810
 - Passcode: 855950
- Download the resources on the AZA Learn page (bibliography, links, etc)
- Please join us again on February 25 (assessment types) and March 11 (exhibit design)

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