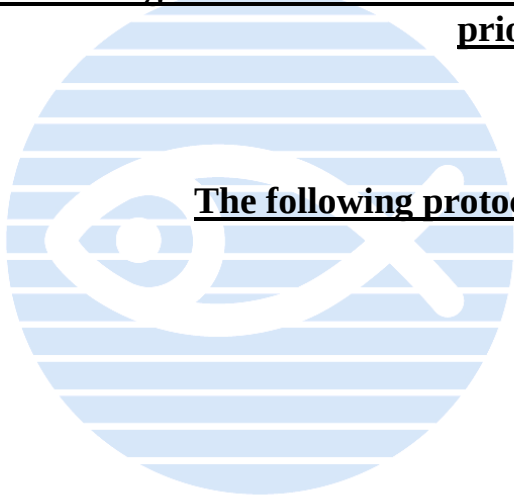


New England Aquarium
2019 General Protocol on Sea Turtle Treatment

Anyone doing clinical work with sea turtles is required to read and understand this protocol prior to starting treatment.

The following protocol is for when we are in TIER I (Green)



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COMMUNICATIONS

All communication should follow the Incident Command System ICS (unless otherwise specified)

VETERINARIANS:

CONSULTS:

- Contact the veterinarian on duty when turtles are coming in.
- Veterinarian on duty: fluid plan and diagnostics.
- Meet w/ veterinarian in AM to go over blood results & get fluid plans so enough time is allotted for PM treatments.
 - Identify POC for departments.
 - Verify if veterinary assistance will be in Boston.

EXAMS:

- Contact the veterinarian on duty and coordinate a time for turtle exams.

AHD STAFF:

- Prioritize blood samples to allow ample time for veterinarians to review results.
- Rescue contact AHD staff person in charge in the morning to schedule blood and radiograph timing.

Standard Operating Procedure (SOP) Binder

SOP Binder can be found in last cabinet in clinic on shelf above Doppler or on Rescue server (see rescue staff member for access)

Tracks INTAKE

Rescue:

- Assign accession numbers
- Assign 70F day tasks
- Assign Exam tasks
- Assign Intake Bloodwork (NOVA/PCV/TS/Archive)
- Assign Two Week CBC/Chem
- Input weights
 - ASAP if available from WBWS
 - Upon intake of turtles at Intake station when arriving in Quincy

Veterinarians/AHD:

- Prescribe all meds
- Oxytetracycline (Lk's and Cm's)
- Vitamin B Complex
- +/- Other meds as indicated

CLINICAL

BLOOD:

See Blood Draw SOP

DIAGNOSTICS: [Basic schedule for turtle blood sampling]

- Could be altered on a case-by-case basis depending on the individual animal.
- Nova: run all on whole blood directly from the syringe, NOT on plasma.

On Admission:

- Draw 2.3 ml of whole blood: run a Nova, Total Solids (T.S.), and PCV, then Archive the remaining plasma into two cryotubes if able (0.5ml minimum preferred in each; if less than 1ml of plasma put full sample into one cryotube).

On day that turtle is raised to 70 degrees (in a.m. turtle will be ~62F)

- Draw appropriate volume of whole blood for archive. Nova if directed by veterinary staff.

Two weeks post admission:

- Draw appropriate volume of whole blood for CBC/Chem (and Nova if directed by veterinary staff).

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One month post admission:

- Draw appropriate volume of whole blood for archive. After first month archive then start every other month archives.

Prior to transport/Release:

- Within two weeks of transport or release draw appropriate volume of whole blood for final archive.

➤ NOVA's will continue to be drawn with CBC/Chem as specified above until otherwise directed by a Veterinarian.

Reminders:

- Ordered bloodwork should state exactly what is requested.
- If NOVA/PCV/TS is required then NOVA/PCV/TS needs to be specified in the Subject in the Task Editor through Tracks.

Preparing Blood Samples:

- Use **heparinized syringe**, consistency of amount drawn is a priority. (No heparin should be visible within syringe) See "Heparinizing syringe for blood draw SOP"
- Blood Draw Amounts:

Daily Nova/PCV/TS runs:

0.5 ml whole blood

For cbc/chem only:

1.3 ml whole blood:

0.3 ml for CBC

1.0 ml spun down for plasma for chemistry

Blood Culture:

Approx. 0.2-1.0 ml whole blood (If no other test being performed use unheparinized syringe)

- Label each syringe with the following:
 - Date
 - Time
 - Accession Number (always include species)
 - Body Temperature (temp of water or air)
 - Tests being requested
- Laminated bloodwork sheet will accompany blood syringe to lab.

In conjunction with AHD Rescue staff will run Istat cartridges if needed at select times

Notify an AHD staff member "in person" in the morning if blood needs preparation or analysis.

Some results are affected if the sample is not processed immediately. If this is not possible – refrigerate the sample to slow the process down. Record the sample information on the lab sample white board located on the freezer door in AHD.

NOVA Samples:

- Blood values will automatically be downloaded by AHD staff from Nova blood analyzer to electronic archive and also recorded in Tracks.

BANKING:

- One box will be set up in the Rescue Freezer for all blood going to –80 Freezer (labeled Cold-Stun YEAR Archive).
- Rescue will transport blood to –80 Freezer once/week and log in manually.

Tracks Blood:

Rescue:

- Intake Exam will require a lab request for Nova/PCV/TS/Archive prior to beginning of exam.
- When submitting lab request abnormal should always be checked unless cleared for release.
- Rescue will schedule Archive bloods (Ideally to coincide with other bloodwork requested)
 - Rescue will schedule measurements (SNT & SCW) to align with archive bloods

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Veterinarians/AHD:

- Will interpret blood as soon as possible and order appropriate Tasks
 - Fluid Plans
 - Follow up Bloodwork Tasks (excludes Archive)

RADIOGRAPHS:

Rescue Staff

- Radiographs should be arranged verbally with AHD staff. They will prepare the equipment in advance.
- Sedation may be used in some cases to ensure accurate radiographs (only vets will administer).
- AHD staff to take radiographs.

On day that turtle is raised to 70 degrees (in a.m. turtle will be ~62F):

- DV, AP, Skull (if needed) and all 4 Flippers

Two Weeks from initial radiographs:

- DV, AP, Flippers as needed.

As directed by Veterinarians:

- DV, AP, Flippers as needed.

Reminders:

- Radiograph flippers and any wounds, swellings or lameness issues.
- Highlight known wounds or handling cautions on diagnostic sheet.
- Make sure to radiograph the head of all turtles
- Insure that all of the body is visible on the first radiograph.
- Smaller Lk's can have whole body in one image

Tracks Radiographs:

Veterinarians:

- Will create Tasks for follow up radiographs.

Rescue:

- Will align radiographs to match up with scheduled exams when appropriate.

WOUNDS:

TREATMENT:

- Includes debridement of easily sloughed necrotic tissue when present.
- Clean with dilute Betadine or Nolvasan (dilute 5ml in 1L sterile water). Triple antibiotic ointment and silvadene may be applied topically on a case-by-case basis.
 - Please use silvadene sparingly. A thin coat is enough to treat the wound. Copious amounts of silvadene can easily be removed and possibly have a detrimental effect on good bacteria that inhabit our LSS.
- Lesions should be treated on a case-by-case basis depending upon severity and frequency of when the animal will be removed from the water.
- If wounds are severe at BFF shoulder/proximal flipper then turtle should not receive a flipper band.

Tracks Wounds:

Veterinarians:

- Will create Tasks for wound care with appropriate recurrence.
- Will create a Task for a veterinarian recheck.
- Will create Extreme Medical Alert as appropriate.

Rescue:

- Will align exams to match up with wound care when appropriate.
- Will create Extreme Medical Alert as appropriate.

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MEDICATION:

On admission all Kemp's ridley and Green turtles will receive:

- Oxytetracycline 42 mg/kg SC q6d (given diluted in prescribed fluid therapy or 0.5% BW LRS)
 - For 21 days or case by case
 - Please notify vets after 21 days for a complete reassessment.

Case-by-Case:

- Loggerhead sea turtles will receive Oxytetracycline 42 mg/kg SC q6d (given diluted in prescribed fluid therapy or 0.5% BW LRS)
- Other antimicrobials will be determined on a case-by-case basis.
 - See Sea Turtle Formulary 2019 for list of medications
- **Anti-parasitic:**
May be considered on a case-by-case basis.

Switching medication:

- **Injectable to Oral**
When rescue staff change from an injectable form of medication to oral AHD should be notified verbally. If there is back and forth between PO and inj. due to inappetance AHD should be notified of that as well.
- Veterinarians will need to create a new Rx for oral medication and discontinue injectable form.

Veterinarians:

- Will create all new Prescriptions.
- Will create a Task for a veterinarian recheck.
- Will discontinue medications when appropriate.

Rescue:

- Will align exams to match up with prescriptions when appropriate.

Tracks Medication:

Fluid Therapy:

- IV or SC given at between 0.5% -2.0 % body weight initially depending on the condition of the animal.
- **Type of Fluid**
 - RRS (1 part LRS to 2 parts 2.5%Dex/0.45%NaCl)
 - LRS
 - 0.9% NaCl
 - 2.5% Dextrose/0.45% NaCl
 - Normosol

Warm fluids before administering to be as close to the turtle's temperature as possible.

DRUG STORAGE:

- Solution bags and blood tubes that have expired **should be discarded appropriately.**
- Solutions containing sugars should only be used for **three days** after opening.
- Solutions without sugars should only be used for **seven days** after opening.
- All opened solutions should be refrigerated.
- Labeling of syringes:
 - Use stickers on syringes.
 - Label with Accession number, Date drawn, Name of Drug and Dose.
- Only draw up medications the night before if the number of turtles exceeds a reasonable number.

DRUG DISPOSAL:

- All medications that have expired should be sent to AHD.
- Solution bags:

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- o LRS, NaCl, Normasol, Dextrose/Sodium Chloride mixtures can be disposed of down the drain
- o Dispose of empty bags in regular trash receptacles or recycle when possible

DIET:

SOLID FOOD:

Only start offering food once turtle is at 75 degrees and swimming in pool for 24 hours straight. Initial feeding does not include any hard parts i.e. shells, bones, beaks, etc.

If a turtle has a full GI on admission radiographs (e.g. sand, crab parts, etc.) animal should be cleared by a second set of radiographs before starting any hard parts. For turtles with clear GI on initial radiograph and turtle has been witnessed defecating the turtle can start getting any hard parts. Veterinarians will notify Rescue staff if there are any dietary restrictions for individual turtles.

- Fillets
Head & tail removed from fish. Slice longitudinally along spine, removing skin and muscle (no bones).
- Steaks
Head & tail removed from fish. Cut slices ¼ to ½ inch in width.
- Squid
De-pen by pinching the top of the pen at the front of the mantle and gently pull out. The beak is located under the arms, and can be popped out by pinching the head. The head is cut off and the mantle is sliced ½ to 1 inch.
- Greens
During rehabilitation of Green sea turtles, begin offering dark leafy green vegetables as an alternative diet source as animals' approach food limits.
- Turtle Gel may be offered on a case- by- case basis.

TUBE FEEDING:

If a turtle continues to be anorexic, tube feeding of fish gruel may be offered. Decisions to tube feed will be made between veterinarians and rescue staff.

Food Limits:

Once turtle has been cleared for hard parts they can be fed ad libitum (no restriction).

If a turtle requires calorie restriction (as directed by Veterinarian or Rescue staff):

Using minimum energy cost (MEC) formula to determine the caloric intake of each sea turtle.

$$MEC = K(W_{kg}^{0.75})$$

Where K is a taxonomically based constant dependent upon average core body temperature. In reptiles at preferred temp K=10

Degree of illness will determine a maintenance energy variable (Factor) to be multiplied by the MEC.

MF Group	Factor
Sleep or cage rest	1.25
Limited Activity	1.5
Limited activity of young growing animal or moderately injured adult	2
Severely injured adult	3

Example: 5kg turtle with carapace injury
 $MEC = 10(5^{0.75})$
 Factor = 2
 turtle needs 66.87Kcal/day

Herring and capelin Kcals can be obtained from Mammals Dept. other feed items have kcals listed on the packaging.

MEC calculations and factors came from the Tufts Wildlife Clinic Student Handbook. Article: Finding the Dietetic Needs of Captive Native Wildlife and Zoo Animals by Allometric Scaling

VITAMINS:

All Turtles: All turtles receive the following vitamins and doses indicated in Tracks.

- **Vitamin B COMPLEX** (5mg B1/kg of sea turtle)
 - Injectable IM Q6 or 7D until eating
- **Multivitamin** (25 mg of B1/kg fish fed)
 - Sea Tabs PO SID.
- **Calcium Carbonate** (25mg/kg of turtle weight)

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- PO SID

Tracks Diet:

- All turtles will have food consumption and vitamin supplementation documented via Tracks.

WEIGHT AND LENGTHS

- Animals will be weighed at all clinical exams or at least once per week.
- Animals will be measured during the bimonthly blood archives. Measurements will include straight carapace length (notch to tip) and straight carapace width (widest point).
- These morphometrics will be entered into the Measurement field in Tracks.

TAGGING

- Prior to release, each turtle will receive two Inconel tags and a PIT tag.
- Inconel tags will be placed in both hind limbs of turtle unless there is a clinical concern. Turtles whose SCL $\geq$ 30cm will receive larger tags whereas turtles whose SCL $<$ 30cm will receive smaller tags. See Inconel Tag SOP.
- A PIT tag will be placed in the left triceps muscle. The right triceps may be used on a case by case basis. See PIT Tag SOP.
- Some turtles may need to be sedated for tagging. EMLA cream will be applied to site and will have a contact time of no less than 5mins prior to tagging.
- If a satellite tag is available and its use will advance our clinical research, then a turtle may be satellite tagged.

ENVIRONMENT

WATER QUALITY: [Environmental Quality Lab will perform]

Water samples from each tank should be brought to AHD as soon as possible each morning (8:30 AM at the latest)
 Samples will be brought down in Nalgene bottles which are supplied by water quality.

Quincy RR tank testing schedule

Tank	Salinity [ppt]	pH	NH ₃ [ppm]	NO ₂ ⁻ [mg/L]	NO ₃ ⁻ [mg/L]	Br ₂ [mg/L]	Total Coliforms [mpn]	Ecoli [mpn]
	{28 - 35}	{7.8-8.3}	{<1.00}	{1.000}		{<0.21}	{<1000}	{<1000}
RR24	Tue/Thu/Sat	Daily	Tue/Thu/Sat	Tue	Tue	Daily	At least monthly	At least monthly
RR15	Tue/Thu/Sat	Daily	Tue/Thu/Sat	Tue	Tue	Daily	At least monthly	At least monthly

Bacteria samples of all tanks will be tested at least monthly during turtle season. Samples that are high will be retested as soon as possible. Additional testing will depend on biomass and food input changes, bromine readings, veterinary concerns and will be decided on by the environmental quality manager in consultation with the veterinarians.

Water Quality data will be added to Tracks daily:

*****Please stress keeping food and fecal matter out of the tanks is of upmost importance in maintaining a healthy life support system. *****

ENRICHMENT:

- Linda Lory will supervise turtle enrichment program. Please notify Linda every time the enrichment is changed.
- Once animals are eating well introduce hide-a-ways to tanks.
- Make every effort to provide additional enrichment such as hide-a-ways, lettuce trays, and fake kelp.

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TEMPERATURE:

- ICU: If a turtle arrives to NEAq with an internal body temp below 55°F, it needs to be raised to 55°F as soon as possible.
- Large ICU sometimes runs lower than digital readout. As a general rule set the ICU 2-3°F above where you want the ICU temp to actually be (set at 63°F to be at 60°F).
- Turtles should be raised an appropriate temperature increment each day, and should be raised this entire amount at one time.
- Please write down temperature adjustments on the treatment chart.
 - Example: “3:45 pm ICU set at 65°F, turtle should be at 62°F”
 - If ICU air too dry use ICU humidifier attachment to increase humidity.

Tracks:

- Actual temperatures will be collected through the physiological module.
- Until turtles are swimming in large Rescue tanks temperatures will be recorded daily.
 - Large groups will receive daily batched temperature increases through Vet Journals

TRANSPORT

- All transport/release decisions will be e-mailed to rescue@neaq.org.
- Lk's and Cm's will receive 1%BW LRS fluids unless otherwise specified by veterinarians.
- Cc's will receive 0.5% BW LRS fluids unless otherwise specified by veterinarians.

RELEASE

- In-state turtle releases do not need fluids unless we foresee an issue with a timely arrival to beach.
- Out of state releases follow the transport schedule as described above.

NECROPSY / SAMPLES

DEAD TURTLES:

- Any questionable turtle should receive a cardiac ultrasound exam prior to being removed to the necropsy room.
- Any turtle that arrives with a possible HR and ultimately dies should be given a **Time of Death** (T.O.D.) by the veterinarian on duty.
 - T.O.D. should be recorded in the Vet Journal through Tracks.

DEATH STATUS:

- **Dead-on-arrival (DOA):** This implies that the turtle is dead (i.e. cannot be resuscitated because it is DEAD) when it enters our facility. In many cases, this is clear (rigor mortis and no heart activity with echo). If a turtle arrives with detectable cardiac activity, but has no cloacal, palpebral, or corneal reflex, no voluntary respiration, and no meaningful response to treatment, and dies within several days or less, it will be classified as DOA. For such cases, we are assuming that the turtle was dead on admission but had residual cardiac activity.
- **Mortality natural:** This implies that the turtle was not dead when it arrived to us, and that it later died in our care (even if “later” is on the same day as admission). In many cases, it is clear that a turtle is alive (e.g. voluntary breathing, voluntary movement). We will define a turtle as being alive if it has detectable cardiac activity, and any detectable reflex response (indicating at least some neurologic function). If this turtle later dies without euthanasia, it is considered “mortality natural”.
- **Mortality euthanasia:** This implies that we used a euthanasia method to end the life of a turtle that was alive. This category will not be used for turtles that are defined as DOA above, but for which potassium chloride or other methods are used to end cardiac function.
 - The veterinarian on duty is ultimately responsible for categorizing the case for purposes of the medical record. If there is disagreement over the category, the final determination will be made by Dr. Innis after discussion with the involved staff. In most cases, the category is clear, and it is expected that these guidelines will be used for only a small percentage of cases.

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NECROPSY:

- Inform veterinarians of necropsies to be performed.
- Prioritize
 - Cm's
 - Cc's
 - Turtles that have been clinically treated for ≥ 1 week.
 - Turtles at veterinary discretion
- All dead turtles moved to the necropsy room should be labeled with a tyvek tag secured around a front flipper prior to placing in the carcass freezer.
 - Tag should be labeled with Accession #, ST #, and date of death.
 - Log all carcasses on the turtle carcass inventory sheet posted on the inside of the necropsy door.
- Contact vet w/ interesting findings @ the time of necropsy.
- Ridleys should receive full gross necropsy however histo will not be collected unless unusual lesions are found. Please see Charlie, Kathy, Melissa, Connie or Linda with lesion questions (Hybrids should be treated as Ridley's).
- Additional species specific sampling request are posted in the necropsy lab



Research

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