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Protocol status: Working
 We use this protocol and it's working. Current protocols are subject to change in the future as testing continues and improvements are made.

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🌐 Sea Star Illness Treatment Protocol

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DISCLAIMER

This has been tested and successful on cold water Pacific Northwest sea stars exhibiting signs of mechanical injury, stress related illness, and sea star wasting. This treatment has not been tested on any warm water species at this time.

If treatment begins when the animal has already reached severe wasting stages, the likelihood of successful recovery is highly reduced.

Results may vary depending on the animal species and severity of the illness at the start of treatment. All steps and components of the treatment must be utilized in order to achieve the best possible results.

ABSTRACT

Sea Star Wasting Syndrome (SSWS) events of 2014 had a significant impact on the aquarium industry's health management and medical treatment protocols for sick/injured sea stars. The subsequent prescription involved 30ppm TMP-S baths (4-6 hr/day) to manage secondary bacterial infections associated with the unidentified root cause for illness. In recent years, the use of TMP-S became ineffective for several of Oregon Coast Aquarium's sea star medical cases. We observed several animals worsen during TMP-S treatment, sometimes dropping additional arms within one day.

An alternative approach was investigated and adopted.

The Oregon Coast Aquarium's new methodology is outlined below and describes an experimental alternative to current industry practices, developed by Aquarist Staff and approved by OCAQ's Veterinary Staff. Successful response has been observed in several species of Pacific Northwest sea stars (10-13 degrees C) and early detection/intervention provided the best prognosis. The dosages and treatment duration are still in a trial phase and may change over time. Many of the steps are performed concurrently to manage variables such as water quality, spawning activity and body condition.

"By placing the sea star in a perfect environment that provides all necessary parameters to exist without environmental stressors, while also preventing opportunistic bacterial, fungal, and ciliate infestation, the stress symptoms that the star is exhibiting will be halted and the star will be free to utilize its immune system to recover." – Tiffany Rudek

ATTACHMENTS

[Sea Star Treatment Protocol finished.docx](#)

MATERIALS

Seachem Reef Buffer
Seachem Reef Dip
Ziegler Rescue Probiotic
Selco food enrichment additive - any brand

BEFORE START INSTRUCTIONS

Stars exhibiting the following signs should be moved to isolated systems and treated:

- mechanical injury
- lost arms
- excessive limb torsion
- excessive “flushing” behavior and deflation
- excessive mucus on skin, skin melting, or lesions at the limb joints

The animals remain submerged throughout transfer process and are handled via a large container/bin. Water Quality numbers for source and destination systems should match.

Protocol

1 **Step 1, Removal of external bacteria, fungus, ciliates (ex: *Uronema*):**

- Seachem Reef Dip dosed at 10ml/gallon of sea water in the transport container for 10-15 minutes, without aeration (product may become foamy/sudsy under aeration).
- Some limb torsion is normal. However, signs of distress are reasons to terminate treatment and include sudden increase in activity (travelling around the container), curling arms up to cover dorsum, and dropping limbs.
- At end of bath, change out most of water to dilute majority of Reef Dip before the treatment bin is placed in the medical tank. Let the animal walk out of the container.

Internal system of the star is not affected because the animal is not in the bath long enough to flush its water vascular system.

Product is historically used to remove fungus from corals and can be dosed up to 30 minutes at 10ml/gallon. To date, OCAQ treatments have been effective at shorter duration (up to 15 minutes).

2 **Step 2, Life Support Considerations:**

- Decrease the water temperature 1 degree per day. Goal = 50 to 51 degrees F (10 degrees C)
- Bypass or turn off protein skimmers and UV sterilizers

3 **Step 3, Probiotic to reduce harmful bacteria and promote healthy internal flora:**

- Zeigler Rescue Probiotic dosed daily at 15ppm Day 1. Stars have frequently spawned at time of injury or upon transfer, requiring continuous system flushing (OCAQ uses natural seawater drawn at high tide in adjacent bay). If sea water/water change is limited, Probiotic can be added after the water change. If doing partial water changes, calculate the amount removed so Probiotic is added back to maintain therapeutic levels.
- “Activate” probiotic in dechlorinated fresh water for 5 minutes before adding to system. Manufacturer

recommends fresh water to “bloom” the probiotic, akin to dissolving yeast in a salt-free solution.

- Reduce to 10ppm for 30 days

If any limbs drop, increase the ppm back to 15 until the star stabilizes, then decrease back to 10ppm again. Always re-dose after a water change.

4 **Step 4, pH Management:**

- Because OCAQ uses natural sea water and pH fluctuates seasonally, system is buffered with Seachem Complete Reef Buffer to raise the pH by no more than 0.2 daily until the tank reaches pH 8.1. Begin this process when spawning has stopped.
- Wait at least 30 minutes after Probiotic dosing so each additive is thoroughly distributed in the system without competition. Dissolve Reef Buffer fully in dechlorinated fresh water then add to system at supply point to facilitate mixing.
- Perform 25% water changes daily or every other day (depends on animal condition) and re-dose buffer.

This product provides calcium, strontium, magnesium, and many other trace elements that are critical for homeostasis during wound healing.

(Please note: traditional method of buffering the pH and alkalinity with sodium bicarb and soda ash will NOT work for this!! pH adjustment alone is not effective and the trace elements found in coral buffer are critical for success)

5 **Step 5, Monitoring:**

Decline can be multifactorial. A sick animal typically exhibits weak attachment and limb torsion. There should be a noticeable relaxation/reduction of torsion after the probiotic and buffer is dosed.

- If a wound is exposed, perform skin scrapes using a glass slide twice a week, check for ciliates. Stars typically position the wound directly under the water flow as their health improves.
- Reef Dip can be repeated up to twice a week for severe skin cases. Reef Dip contains iodine which will kill the probiotic. Always flush *in situ* treatments thoroughly before re-dosing probiotic and buffer.
- Daily tank cleaning is mandatory (siphoning and surface swipes with a melamine sponge pad). Debris provides substrate for harmful bacteria and *Uronema*.


6 **Step 6, Feeding or Food Refusal:**

- Some animals had injured mouth parts or actively refused food. If animal is unable to feed for up to 4 weeks, offer an emulsion of sea water and Selco by lightly positioning a feeding tube at the mouth of the star. Do not insert the tube into the stomach. Any excess that doesn't enter the body will seep into the surrounding water. Offer emulsion once or twice a week until the star begins eating again.
- Turn off water flow to the tank can so animal sits in the fat liquid for an hour. Perform full water change and subsequent re-dosing of the buffer and probiotic.

7 **Step 7, Medical Clearance:**

- Wound site is sealed, body condition relaxed, tube feet active when lifted, no contortion, strong hold on the tank sides, reactive to touch, eating, no deflation.

Recovery time depends on illness/wound severity and the star's immune system, ranging from one week (minor wound) to one year (severe limb loss). Stability is typically observed within a 30 day period and



maintenance shifts to routine water changes that include Reef Buffer.