If an elasmobranch species is restricted to fresh water, in general, the biology of freshwater elasmobranchs has not been extensively studied, so basic life history areas of conservation and management plans. Many of the above areas are faced with human disturbances such as over-fishing and pollution (Compagno and Cook, 1995).

Compared to bony fish (teleosts), elasmobranchs are known as elasmobranchs, which includes all species of sharks, skates, and rays. Elasmobranchs are primarily restricted to their freshwater environment?). It would be under a greater threat of extinction than a stenohaline species (D. sabina) from fresh and sea water have been established.

The results presented are the first to demonstrate such distinct features of the euryhaline gill associated with environmental salinity.

Relative to marine D. sabina, freshwater individuals are characterized by a strong expression of Na,K-ATPase (Fig. 4) in the gills of the euryhaline species (D. sabina) from fresh water, while the filamentous cells were involved with ion uptake from fresh water, while the filamentous cells were involved with ion excretion in a marine environment.

Current Results
(The Euryhaline Model)

Goals of Study
(1) Develop a physiological index to determine whether a given freshwater stingray species is euryhaline (not salinity restricted) or stenohaline (salinity restricted), without conducting long term acclimation experiments.

(2) Determine which physiological factors limit stenohaline freshwater stingrays from inhabiting environments of varying salinity.

1.00
2.73
•
•
Comparing euryhaline and stenohaline environments, we have established that the euryhaline gill epithelium associated with salinity confined. In FW, GTPase-rich cells are involved with ion uptake from fresh water, while the filamentous cells were involved with ion excretion in a marine environment.

Current Results
(The Euryhaline Model)

Approach

• Two stingray species will be used as model for this study: (1) the euryhaline Atlantic stingray (Dasyatis sabina) and (2) the stenohaline freshwater, Amazon River stingray (Potamotrygon irrorata).

• Morphological and biochemical changes of the gill epithelium in teleosts are known to be critical for successful adaptation to varying environmental salinities (see McCormick, 1995, Evans et al., 1999 for reviews).

• For example, certain changes in the ultrastructure of ion transporting cells and expression of key ion regulatory enzymes (e.g., Na,K-ATPase) are characteristic of fresh vs. sea water life.

Rationale

• Stingrays belong to a sub-class of cartilaginous fish known as elasmobranchs, which includes all species of sharks, skates, and rays. Elasmobranchs are primarily known as elasmobranchs, which includes All species of sharks, skates, and rays. Elasmobranchs are primarily restricted to their freshwater environment?

• Freshwater elasmobranchs are important to many countries of South America, Southeast Asia, and West Africa as an export for the aquarium trade and a fishery.

• Many of the above areas are faced with human populations and they are suffering from pollution problems along rivers and lakes inhabited by freshwater elasmobranchs (Compagno and Cook, 1995).

• Compared to bony fish (teleosts), elasmobranchs are more susceptible to human induced environmental disturbances such as over-fishing and pollution due to their relatively: (1) low fecundity, (2) slow sexual maturation, and (3) long gestational periods.

• In freshwater environments, an additional constraint of physical space is imposed, which enhances the detrimental effects of fishing and pollution (Compagno and Cook, 1995).

• In general, the biology of freshwater elasmobranchs has not been extensively studied, so basic life history information is unknown (e.g., Are they physiologically restricted to their freshwater environment?).

• If an elasmobranch species is restricted to fresh water, it would be under a greater threat of extinction than a species that can readily move out of this habitat.

• Therefore, in conjunction with other biological data, knowledge of their salinity tolerance would be useful for determining which species are in more immediate need of conservation and management plans.

Future Directions

• Similar techniques will be performed on the gills of the stenohaline freshwater model species, P. irrorata.

• The morphological and biochemical features associated with gills of P. irrorata can be directly compared to those of freshwater D. sabina.

• If the Na,K-ATPase-rich cells found on the filament of D. sabina are involved with ion excretion in sea water, then the cells may no longer exist in P. irrorata. This may also result in an overall lower expression of Na,K-ATPase compared to freshwater D. sabina.

• Once the characteristics of euryhaline and stenohaline freshwater stingrays are established, species of concern can be investigated to assist conservation and management programs.

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Conclusion

• Currently, morphological characteristics (Fig. 2) and biochemical expression of Na,K-ATPase (Figs. 3 & 4) in the gills of the euryhaline species (D. sabina) from fresh and sea water have been established.

• The results presented are the first to demonstrate such distinct features of the euryhaline gill associated with environmental salinity.

• Relative to marine D. sabina, freshwater individuals are characterized by a strong expression of Na,K-ATPase (Fig. 4) in the gills of the euryhaline species (D. sabina) from fresh and sea water have been established.

• The results presented are the first to demonstrate such distinct features of the euryhaline gill associated with environmental salinity.