

What could possibly go wrong??!

Or

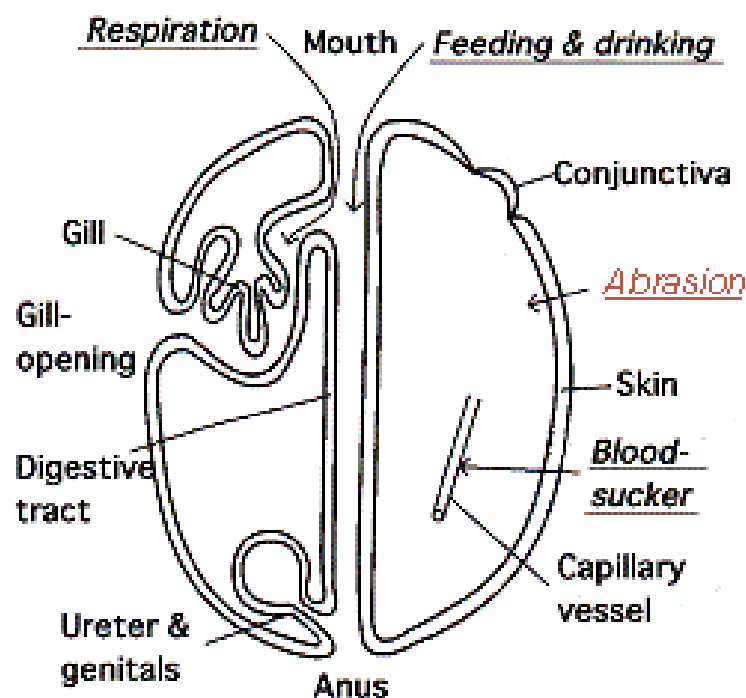
Getting to know how your fish tick when they're sick

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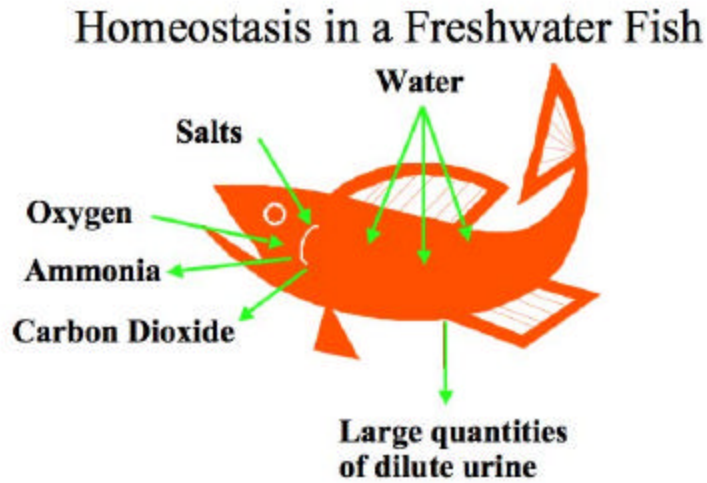
PREVENTION = THE KEY TO KEEPING YOUR FISH HEALTHY

- Knowledge of your animals, their biology and their husbandry requirements
- Excellent husbandry
- System design
- Environment
- Water quality
- Nutrition
- Quarantine
- An ability to recognize and respond to disease

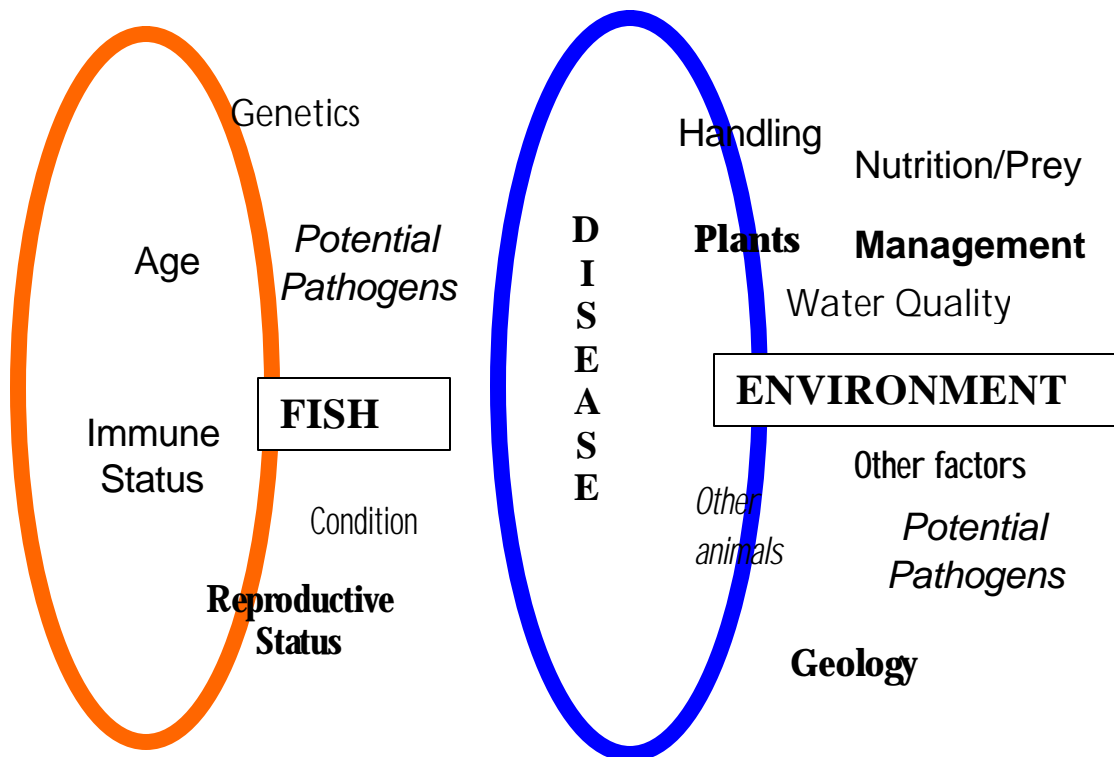
HOW DO MY FISH BECOME DISEASED?



HOMEOSTAIS (MANTAINING AN INTERNAL BALANCE)



THE EPIDEMIOLOGIC DIAD



FISH SKIN

- Epidermis - living and only a few cell layers in thickness
 - First line of defense
 - Mucous/cuticle - reduces drag, waterproofing, immune function
 - Limited blood supply
 - Irritation - increased mucous, hyperplasia (cloudy)
- Dermis - scales originate from the dermis
 - Loss of scale = micro-ulcer
- Ulcers - parasite, bacterial invasion, site of water gain
- Wound Healing - epithelial cells move in from the margins to cover the wound
 - Thinning of the adjacent epithelium
 - Dermis regenerates from below
 - Healing ulcer is fragile

FISH GILL

- Healthy gills - bright red, clear
- Diseased - pale, mottled, increased mucous (cloudy), necrotic areas (black, gray, white), eroded
- Structure:
 - Primary and secondary lamellae
 - Secondary lamellae - where oxygen and salts taken in and ammonia and carbon dioxide released
 - 1 cell layer between water and blood
- Irritated gills respond in 3 ways:
 - Hyperplasia - increase in cell numbers
 - Hypertrophy - increase in cell size
 - Increase mucous production
 - Each of these responses can impede oxygen and salt uptake, ammonia and carbon dioxide release
- Continued irritation can lead to gill erosion and/or necrosis

WHAT IS STRESS?

- A condition in which a fish is unable to maintain a normal physiologic balance because of various factors adversely affecting its well-being.

- Stress is caused by placing a fish in a situation beyond its normal level of tolerance.

Stressors: Husbandry Practices

- Chasing, as with a net
- Confinement in a small space that restricts movement
- Prolonged chasing prior to capture
- Prolonged struggling in a net after capture
- Removal from the water (air exposure)
- Excessive equipment noise

Stressors: Biological Factors

- Intraspecific Aggression
- Interspecific Aggression
- Crowding
- Insufficient Number of shelter spaces
- Poor diet
- Microorganisms-bacteria, viruses, fungi
- Macroorganisms- parasites

Stressors: Environmental Factors

- Exposure to low dissolved oxygen
- Abrupt transfer to higher or lower temperatures
- Abrupt transfer from higher to lower pH
- Abrupt transfer to higher or lower salinity
- Exposure to ammonia, nitrite, copper, formalin, chlorine, ozone, elevated water bacterial loads, elevated microalgae levels, pesticides, herbicides
- Exposure to low pH
- Inadequate water flow or current
- Improper filter system design
- Improper maintenance of filtration systems
- Inadequate and/or irregular cleaning of tanks/ponds

THE PHYSIOLOGICAL STRESS RESPONSE



What happens when a fish is under stress?

- Increased use of stored sugar reserves
- Freshwater fish tend to take on water
 - Increased energy requirements to osmoregulate
- Increased respiration, blood pressure, red blood cells
- Inhibition of the immune response
- Decrease in the effectiveness and/or amount of mucous.
- **INCREASED ENERGY REQUIREMENTS WHICH CAN LEAD TO AN ENERGY DEFICIT**

SIGNS OF STRESS AND/OR DISEASE IN FISH

- Off feed
- Lethargy
- Increased respiratory rate
- Isolation
- Opercular flaring
- Excess mucus production
- Gasping at surface
- Clamped fins
- Reddened/ulcerated areas on fins/body
- Changes in color
- Scale Loss
- Improper buoyancy

RECOGNITION AND RESPONSE TO DISEASE

- Watch the fish closely
- Look signs of disease
- Respond early and quickly
- Try to constantly learn about your fish
- The more the you know about what is normal and abnormal the earlier they may be able to recognize problems

*But if you tame me we shall need each other.
To me, you shall be unique in all the world.
To you, I shall be unique in all the world.
You become responsible, forever, for what you have tamed*

--Antoine de Saint-Exupery (1900-1944)

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