Understanding the Invasive Species Threat

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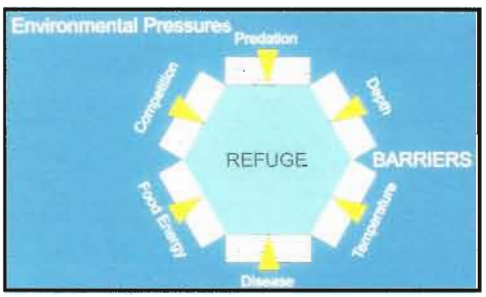
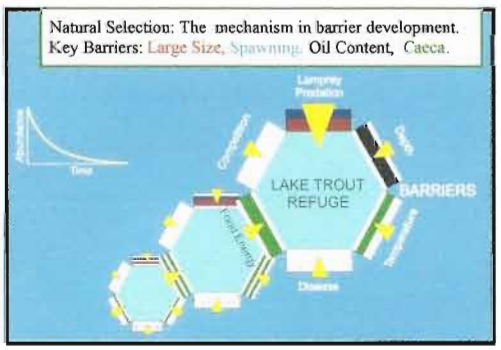
Viewing Life Through the Refuge Concept



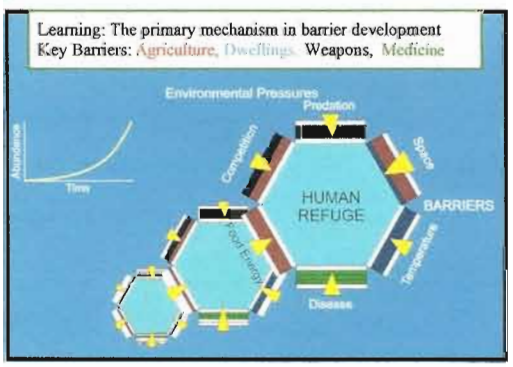
The Refuge Concept is key to understanding the invasive species threat. It is the idea that for a population to survive it must develop a place of protection; a refuge. We can visualize this as a place protected by barriers that populations erect to defend themselves from those environmental forces that could reduce survival including hunger, competition, disease, predation and climate. To succeed the barriers must be strong enough so survival is equal to or greater than mortality.

The Role of Natural Selection



Natural Selection is the mechanism the vast majority of species employ in designing the barriers for their population refuges. **Natural Selection is an extremely slow process requiring genetic selection over generations and one that designs the barriers only to defend against the conditions that exist within the system they live within.** The Refuges of Great Lakes Lake Trout populations will serve as an example. Their primary defense against predators was to grow fast and attain large size. Throughout history, larger fish preyed on small fish. Lake Trout abundance remained high until Sea Lamprey invaded the lakes. Lake Trout were almost completely exterminated within a decade. Sea Lamprey are a primitive slow swimming species. The problem was for the first time, something smaller than Lake Trout could eat them. Lamprey were a new condition for which large size offered no defense. Although we spend millions annually on Lamprey control and Lake Trout rehabilitation, Sea Lamprey kill more Lake Trout than the sport and commercial fisheries combined. The high costs are not expected to decline.

Humans, Learning and Language



Natural Selection is a mechanism that all species employ in developing the barriers that protect their refuges. **Several species are capable of learning. Humans are unique in that we also developed complex communications that allow rapid transfer of information over time and space.** Modern Agriculture, Dwellings, Weapons and Medicine are the result and can all be viewed as strong barriers that protect human population refuges. As these barriers were strengthened human populations rapidly expanded. We now number 7.5 billion and abundance is doubling about every 50 years. At that rate, there will be 30 billion people on the planet by 2110. **Learning and language also provide a unique opportunity for humans to understand the differences between us and other species and how changes we cause will impact other populations, our abundance and our quality of life.**

Conclusions

1. **We do not appreciate the impacts that even small environmental changes can have on the vast majority of species because we can redesign the barriers that protect our refuges so quickly.**
2. **Planting things has become second nature to humans because agriculture has served so effectively in strengthened human population refuges.**
3. **Historically the introduction (planting) of new plant and animal species has been viewed positively. Changing accepted practices is difficult and requires intensive and effective education.**
4. **Preventing species introductions is vastly less expensive than the cost of the damage they cause and control efforts. Human populations that ignore implementing effective prevention suffer.**