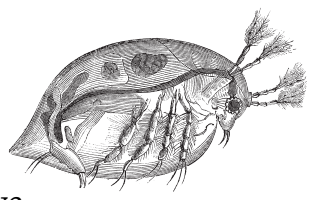
Species Survival in a New Environment

Connecting to Invasive Species

Study: Sinclair, J. S., & Arnott, S. E. (2017). Relative importance of colonist quantity, quality, and arrival frequency to the extinction of two zooplankton species. Oecologia, 184, 441-452.



Introduction

What happens when a species enters a new environment? How does it achieve successful establishment in a new place, and how does it interact with new species? These are just some of the questions that need to be considered when looking at how an introduced species interacts in a new environment and determining if it will be invasive or not. In this study, the researchers called species that were new to an area 'colonist', and in particular, they were interested in understanding how 3 factors, and the interactions between the factors, affect how a species survives when it enters a new environment. These 3 factors were:

1. Colonist Quantity: How many individuals came into the new environment at a time
2. Colonist Quality: How healthy the individuals that came into the new environment were
3. Colonist Arrival Frequency: How often new individuals were coming into the new environment or the number of occurrences to which a new individual arrived to the new environment

They chose to do their experiment with zooplankton species, which are very small, aquatic microorganisms. They subjected these species, under ethical policies, to different conditions in order to vary the quantity, quality, and frequency of their arrival in new environments.

Results

They indeed find that these factors effected how successful a species is in a new place, and they even found interactions between these factors themselves. The most important takeaway of this study was that it emphasized the importance of understanding these 3 factors, along with how different traits of species will differ in regards to these factors, to which all of this information is important in predicting how a species will succeed in an environment.

Sinclair & Arnott (2017) state that their "experimental design and results are relevant to applied ecological problems that seek to understand the properties controlling extinction. Efforts to restore anthropogenically disturbed habitats, control invasive species, conserve declining populations, and introduce biocontrol organisms all benefit from knowing which properties are responsible for determining whether small populations succeed or fail." The researchers also imply that many management practices focus on altering the size of the populations of species that need to be managed, but their findings, which do support a broader body of knowledge, suggest that factors such as where the species is coming from, and their transportation to the new place, should also be focused on in management. This leads us to into an understanding that effective invasive species management practices should include preventing the transportation of invasive species into new areas. Have you seen any signs in natural areas telling people to wash off their shoes or boats? These are invasive species practices that aim to reduce the spreading and impact of invasive species in unaffected areas.

For example, the Invasive Species Centre shares that one of the management tactics to reducing the impact of Dutch Elm Disease, is to avoid moving firewood that may have the disease inside it. Moving it to other areas may cause the disease to spread to new locations, further damaging more ecosystems. The Invasive Species Centre provides more information about other factors that cause an invasive species to be invasive:

Do you know of other preventative actions that can be taken?

- ✓ Fast growing/ fast reproducing
- ✓ Lack of other competing species
- ✓ Other native species not having appropriate defense mechanisms

Therefore, there are many factors that need to be considered when determining if a species is invasive, and when determining how to manage their spread!