NSERC Canadian Network for Aquatic Ecosystem Services

Theme 2, Project 2.4./2.5

"KEYSTONE" WETLANDS FOR MAINTENANCE OF VULNERABLE SPECIES IN LANDSCAPES WITH DIFFERENT WETLAND NETWORK CONFIGURATIONS

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Abstract

Geographical Isolated Wetlands (GIWs) are surrounded by uplands, lack persistent surface water connections and are characterized by slow or episodic organism exchange. While considered isolated, GIWs are important components of wetland networks. We used a theoretical modelling approach to analyze different wetland network configurations and to identify the "keystone" wetlands of the network, defined as those wetlands that experience highest rates of species loss due to either loss of wetland habitat or loss of biological connectivity. Wetland networks were virtually generated and represented using graph theory, including nodes (wetlands) and links (flows of organisms between wetlands). Graphs were coupled with a model of population dynamics that simulated the evolution of amphibian species. Geometrical properties of the network were correlated with species density within the network. We found that the number of wetland connections was related with amphibian density. Removal of any wetland results in population decline, but removal of keystone wetlands results in the highest rates of decline. Our theoretical modelling approach enabled identification of "keystone" GIWs that are strategic for the resilience of the network, as well as "thresholds" in wetland removal that place at risk the vulnerable species.

Keywords: wetland networks connectivity keystone

Geographic Location:

Nose Creek watershed, Alberta, Canada

How does your project link to Canadian aquatic ecosystem services?

My project links to ecosystem services provided by wetlands, and in particular on the biodiversity. It aims to assess the relationships between the population dynamics and the wetland landscape.