

**UNIVERSIDAD DE LA FRONTERA**

Facultad de Ingeniería y Ciencias

Doctorado en Ciencias de Recursos Naturales



**DAPHNIA PULEX LEYDIG, 1860 (CLADOCERA:  
DAPHNIIDAE) EVALUATION OF A THREATENED  
ZOOGENETIC RESOURCE AS BIOINDICATOR SPECIES IN  
CHILEAN NORTH PATAGONIAN LAKES**

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**DOCTORAL THESIS IN FULFILLMENT OF  
THE REQUIREMENTS FOR THE DEGREE  
DOCTOR OF SCIENCES IN NATURAL  
RESOURCES**

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**“Daphnia pulex Leydig, 1860 (Cladocera: Daphniidae) evaluation of a threatened zoogenetic resource as bioindicator species in Chilean North Patagonian lakes”**

Esta tesis fue realizada bajo la supervisión del director de tesis, Dr. Jorge Farías del Departamento de Agroindustria de la Universidad de la Frontera y ha sido aprobada por los miembros de la comisión examinadora.

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## Thesis summary

Currently in the Chilean Norpatagonia, there has been a significant development of agricultural, livestock, forestry and aquaculture activities, altering the balance and development of native species. This anthropogenic impact can be observed in lakes Villarrica and Llanquihue, previously oligotrophic, but currently showing signs of eutrophication. In contrast, other lakes such as Icalma show less impact. Environmental differences between these lakes provide an opportunity to study how eutrophication affects zooplankton abundance and diversity, including at the molecular level. This study proposes that anthropization affects the zooplankton community, especially in *Daphnia pulex*, a key zooplanktonic crustacean in the food chain, reflected at the ecological, genetic (genetic divergence in COI and NAD5 genes) and molecular (proteome) levels. This raises the objective of evaluating the effect of anthropization at the ecological level in zooplankton and at the genetic and molecular level in *D. pulex* in lakes Icalma and Llanquihue, in order to develop a monitoring tool to help preserve diversity. The study covers zooplankton diversity, water quality, gene diversity and proteomics. In addition to informing on the impact of eutrophication on key species, the study contributes to value *D. pulex* as a bioindicator to monitor the health of Chilean aquatic ecosystems.

