DOCTORAL CANDIDATE:	Chloé Rebecca Nater
DEGREE:	Philosophiae Doctor
FACULTY:	Faculty of Mathematics and Natural Sciences
DEPARTMENT:	Department of Biosciences
AREA OF EXPERTISE:	Quantitative Ecology
SUPERVISORS:	Yngvild Vindenes, Øystein Langangen, Torbjørn Ergon, Asbjørn Vøllestad
DATE OF DISPUTATION:	28th of June 2019
DISSERTATION TITLE:	*Impacts of harvesting, hydropower, and stocking on a size-structured population of brown trout*

SUMMARY:

With the world population approaching eight billion, human impacts have become a critical challenge for most ecosystems. Managing those ecosystems and preserving them for the future thus requires that we understand how different kinds of human activities affect nature both at the level of individuals and at the level of populations.

Within this PhD thesis, Chloé Nater and colleagues assessed the impacts of harvesting, hydropower production, and stocking on Norway's largest trout, the "Hunder" trout. The trout's life history is tightly linked to body size and human activity, and Nater's new results suggest that restoring heavily stocked fish populations, such as this one, to a self-sustaining state requires mitigation of negative human impacts at multiple levels. The work further highlights the importance of long-term data collection and evidence-based management for such restoration endeavors.

Due to its large body size the "Hunder" trout plays a key role as a top predator in the ecosystem and has been highly coveted by fishers for decades. With individuals able to reach sizes beyond 1 meter lenght and 10 kg weight, the differences between the smallest and largest trout can be enormous Using quantitative models and data collected over 50 years, Nater and colleagues revealed how body size and variation in it determine the entire lives of individual trout through their effects on life history parameters (e.g. survival and reproduction). As for many species, large individuals tend to be better off than small ones: they mature faster, have higher reproductive output, and are less likely to die from harvest and when passing the hydropower dam on their spawning migration.
Despite this, Nater found that persistence of the Hunder trout population throughout the last half century has not depended on the reproduction of large fish, but on the annual releases of stocked fish. Consequently, scenario-based model projections showed that to ensure population persistence, currently planned reductions of stocking need to be compensated by restricting harvest and mitigating hydropower impacts.

Beyond quantitative study of trout population dynamics, the works collected in Nater's thesis also advanced general theory and practical implementation of survival models and promoted open access ecological science by facilitating access to valuable long-term data.