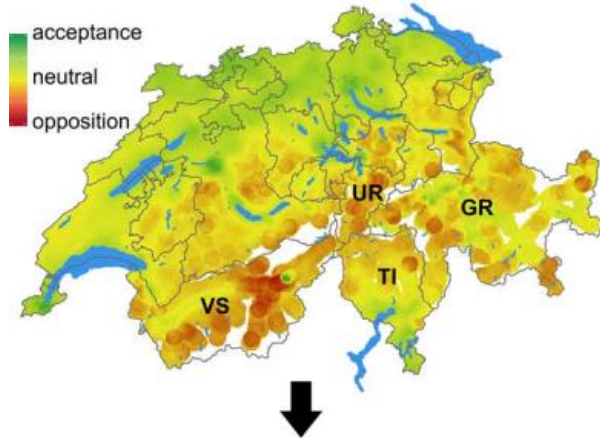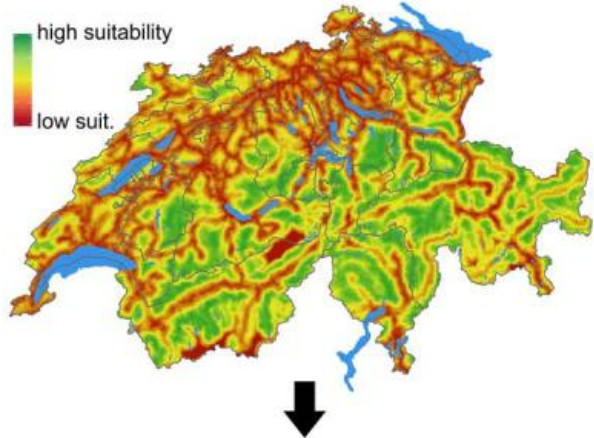# A novel socio-ecological approach to identifying suitable wolf habitats in human-dominated landscapes

February 17 2017
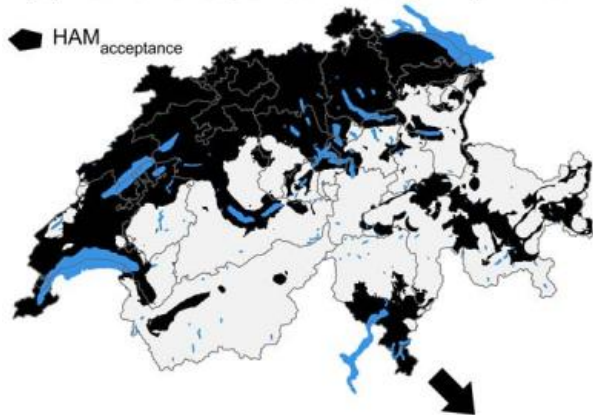
(a) Human acceptance model (HAM) - *continuous*
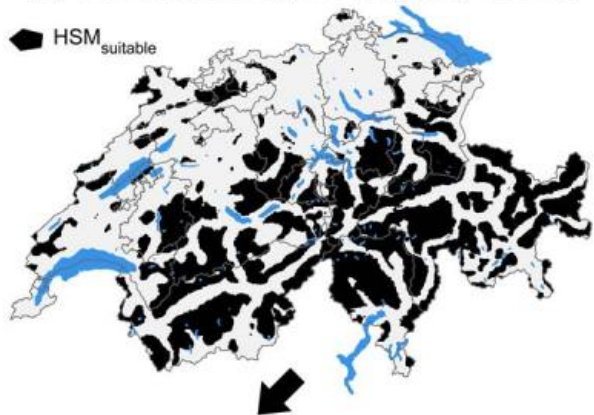
acceptance
neutral
opposition

UR
GR
TI
VS

(b) Habitat suitability model (HSM) - *continuous*

high suitability
low suit.

(c) Human acceptance model (HAM) - *discrete*

HAM$_{acceptance}$

(d) Habitat suitability model (HSM) - *discrete*

HSM$_{suitable}$

(e) Socio-ecological suitability model (SESM)

$$SESM_{suitable} = HAM_{acceptance} \cap HSM_{suitable}$$

overall suitable

Cantonal boundaries

Lakes

0   50   100
Kilometers

N
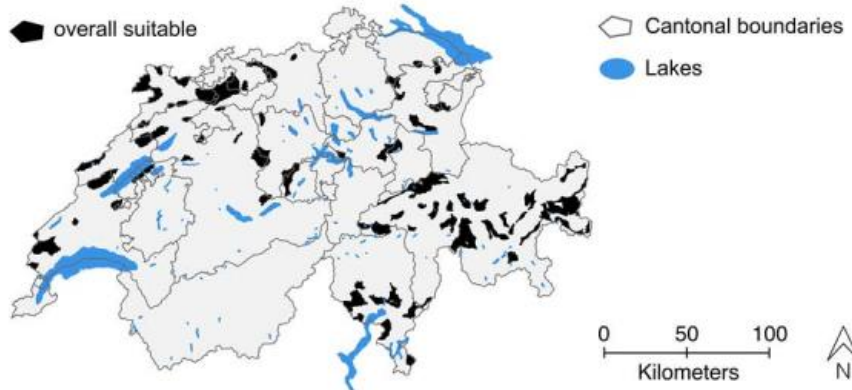
A human acceptance model and a habitat suitability model. Credit: UZH

About one third of the Swiss landscape offers suitable wolf habitat. Nonetheless, there is only a small fraction thereof where the wolf is tolerated by local communities. Those regions – characterized by both favourable environmental conditions and a positive attitude towards the wolf – are identified as candidate regions for the successful short to medium-term wolf expansion, according to a study conducted at the Department of Evolutionary Biology and Environmental Studies of the University of Zurich

The wolf was eradicated in Switzerland and from large parts of continental Europe including France and Germany by the end of the 19th century. Following legal protection, the wolf population started naturally increasing and expanding, and in 1995 its presence was confirmed in Switzerland. Sightings have increased since. Despite 13'800 km2 of Switzerland are characterized by favourable conditions such as large forests with little human pressure and have thus been identified as suitable wolf habitat, wolf expansion in Switzerland has been substantially slower than in other parts of continental Europe. As the wolf is more and more subject to human-dominated landscapes, scientist at the University of Zurich developed a novel method that integrated both ecological and human components to identify regions with favourable environmental conditions and where the wolf was tolerated.

Mapping human acceptance of the wolf to identify suitable socio-ecological areas

About one third of 10,000 randomly selected residents in Switzerland participated in the survey. Combining the response from questionnaires with geographical information, Dominik Behr and his team created a nationwide map of human acceptance. Acceptance decreased with increasing altitude of residency and even more so where high numbers of sheep and goats were held. Acceptance increased with increasing

distance from confirmed wolf presence and in densely populated areas. People who perceived the wolf as dangerous to humans and harmful to livestock and wildlife mainly opposed the wolf. Younger people, and people who believe that the wolf had a positive influence on the ecosystem had a more positive attitude towards the predator.

"When we overlapped our human acceptance map with a habitat suitability map for the wolf, we realized that only about 6% of Switzerland was characterized by both a positive attitude and favourable environment conditions. This was in contrast to results from the habitat suitability map, which returned one third of the Swiss landscape as being suitable for the wolf" said Dominik Behr. "As wildlife biologists, we are good at understanding the ecological factors determining the suitability of a habitat for a wildlife species. Due to ever-increasing overlap between human and wildlife, however, we are obliged to take into consideration how human acceptance modifies our ecological description of habitat suitability. This study demonstrates one effective way to do this." stressed Arpat Ozgul, professor of population ecology at the Department of Evolutionary Biology and Environmental Studies at the University of Zurich, and co-author of the study.

A novel framework to manage wolves and people

The socio-ecological map created by Dominik Behr and his co-authors appears to accurately represent the wolf situation in Switzerland of the past years, including identifications of areas of high, moderate or limited conflict. "By capturing areas characterized by both favourable environmental conditions and a positive acceptance towards the wolf, our approach is a valuable tool to identify overall socio-ecological suitable areas for the wolf. Under given conditions, those regions are good candidates for the successful short to medium-term expansion of the wolf. Additionally, this approach allows to identify key regions where proactive and targeted socio-ecological management plans and a

constructive dialog among different stakeholders are needed" said Dr. Gabriele Cozzi, who coordinated the study.

More information: Dominik M. Behr et al. Combining human acceptance and habitat suitability in a unified socio-ecological suitability model: a case study of the wolf in Switzerland, *Journal of Applied Ecology* (2017). DOI: 10.1111/1365-2664.12880

Provided by University of Zurich