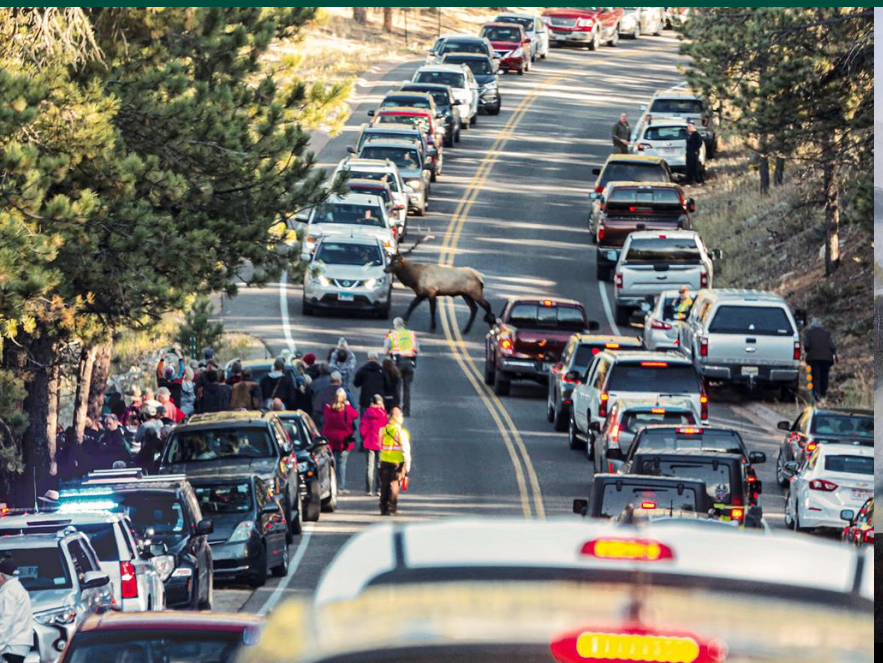
Eberswalde University
for Sustainable
Development

Recreation ecology

Prof. Dr. Erik Aschenbrand



Recreation ecology: aims at understanding impact of recreational/tourist activities on nature in general and subjects of protection more specifically.

HUMAN IMPACTS

The influence of human disturbance on wildlife nocturnality

Kaitlyn M. Gaynor[1*], Cheryl E. Hojnowski[1], Neil H. Carter[2], Justin S. Brashares[1]

Rapid expansion of human activity has driven well-documented shifts in the spatial distribution of wildlife, but the cumulative effect of human disturbance on the temporal dynamics of animals has not been quantified. We examined anthropogenic effects on mammal diel activity patterns, conducting a meta-analysis of 76 studies of 62 species from six continents. Our global study revealed a strong effect of humans on daily patterns of wildlife activity. Animals increased their nocturnality by an average factor of 1.36 in response to human disturbance. This finding was consistent across continents, habitats, taxa, and human activities. As the global human footprint expands, temporal avoidance of humans may facilitate human-wildlife coexistence. However, such responses can result in marked shifts away from natural patterns of activity, with consequences for fitness, population persistence, community interactions, and evolution.

"Human activities of all kinds, including nonlethal pastimes such as hiking, seem to drive animals to make use of hours when we are not around."

Science 2018: https://www.science.org/doi/abs/10.1126/science.aar7121

https://hausboot-werder.de/wp-content/uploads/2019/03/hausboot-werder-ankern-ruhe-entspannung.jpg

Increased houseboat tourism on the Havel River = increased nocturnal activities in sensitive areas

https://www.oxly.de/news/party-auf-dem-tegeler-see/

https://www.nordicfamily.de/paddeln-auf-der-unteren-havel-mit-kindern-inkl-video/

PLOS ONE

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

Human Disturbance during Early Life Impairs Nestling Growth in Birds Inhabiting a Nature Recreation Area

Carolina Remacha, Juan Antonio Delgado, Mateja Bulaic, Javier Pérez-Tris

Published: November 16, 2016 • https://doi.org/10.1371/journal.pone.0166748

Abstract

Nature recreation conflicts with conservation, but its impacts on wildlife are not fully understood. Where **recreation is not regulated, visitors to natural areas may gather in large numbers on weekends and holidays. This may increase variance in fitness in wild populations, if individuals whose critical life cycle stages coincide with periods of high human disturbance are at a disadvantage**. We studied nestling development of blue tits (*Cyanistes caeruleus*) in a natural area where recreation activities intensify during weekends and other public holidays at picnic and leisure facilities, but not in the surrounding woods. In nests located near recreation facilities, blue tit nestlings that hatched during holidays developed slowly, and fledged with low body mass and poor body condition. However, nestlings that hatched outside of holidays and weekends in these nest boxes developed normally, eventually attaining similar phenotypes as those hatching in the surrounding woods. Within-brood variance in body mass was also higher in broods that began growing during holidays in disturbed areas. Our results show that early disturbance events may have negative consequences for wild birds if they overlap with critical stages of development, unveiling otherwise cryptic impacts of human activities. These new findings may help managers better regulate nature recreation.

ECOLOGICAL APPLICATIONS
ECOLOGICAL SOCIETY OF AMERICA

“50% of recreationists felt that recreation was not having a negative effect on wildlife. In general, survey respondents perceived that it was acceptable to approach wildlife more closely than our empirical data indicated wildlife would allow”

Regular Article

WILDLIFE RESPONSES TO RECREATION AND ASSOCIATED VISITOR PERCEPTIONS

Audrey R. Taylor, Richard L. Knight

First published: 01 August 2003 |
https://doi.org/10.1890/1051-0761(2003)13[951:WRTRAA]2.0.CO;2 | Citations: 198

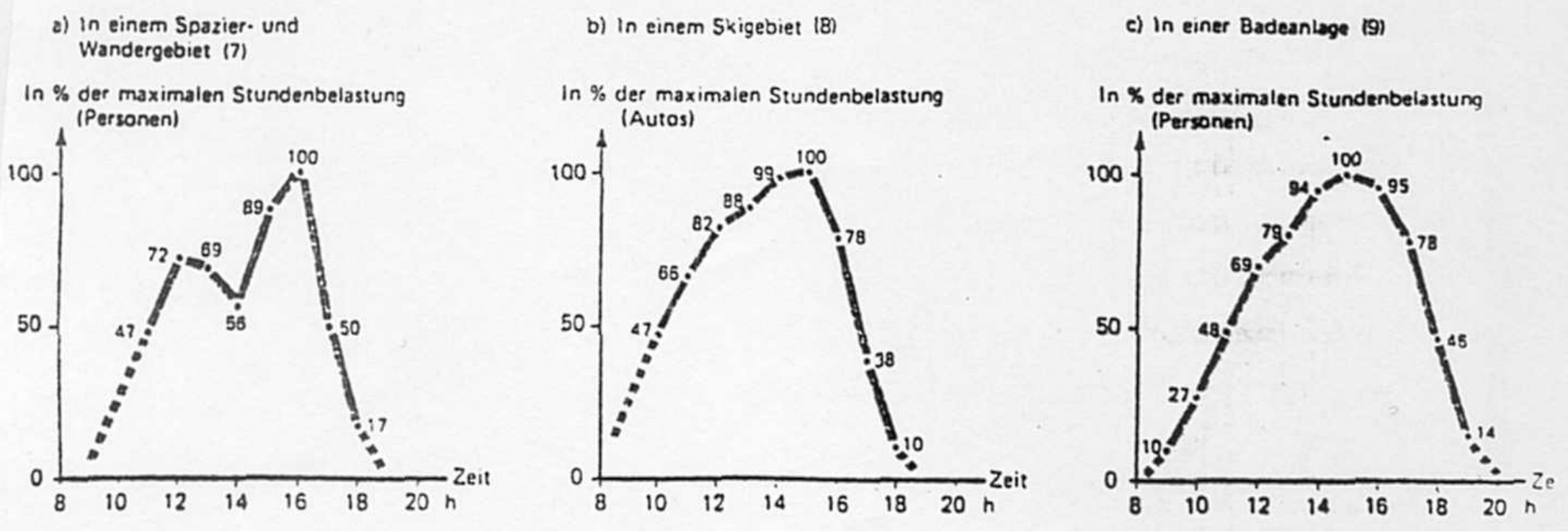
Abstract
[…] We determined the area of influence along trails and off-trail transects by examining each species' probability of flushing as perpendicular distance away from a trail increased. All three species exhibited a 70% probability of flushing from on-trail recreationists within 100 m from trails. Mule deer showed a 96% probability of flushing within 100 m of recreationists located off trails; their probability of flushing did not drop to 70% until perpendicular distance reached 390 m. We calculated the area around existing trails on Antelope Island that may be impacted by recreationists on those trails. Based on a 200-m “area of influence,” 8.0 km (7%) of the island was potentially unsuitable for wildlife due to disturbance from recreation.

Seasonality / temporal fluctuations

daily / weekly / seasonally

Temporal fluctuations in recreational demand

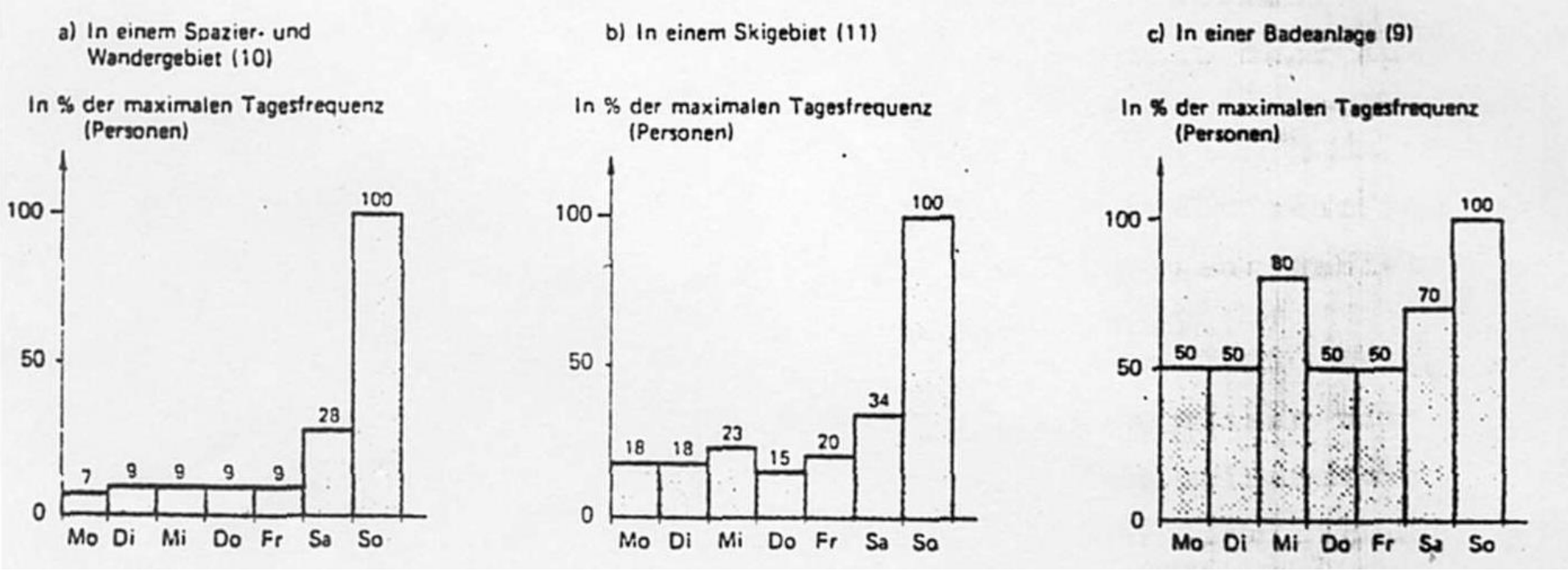
Daily schedule of recreational use



JACSMANN; 1982

Temporal fluctuations in recreational demand

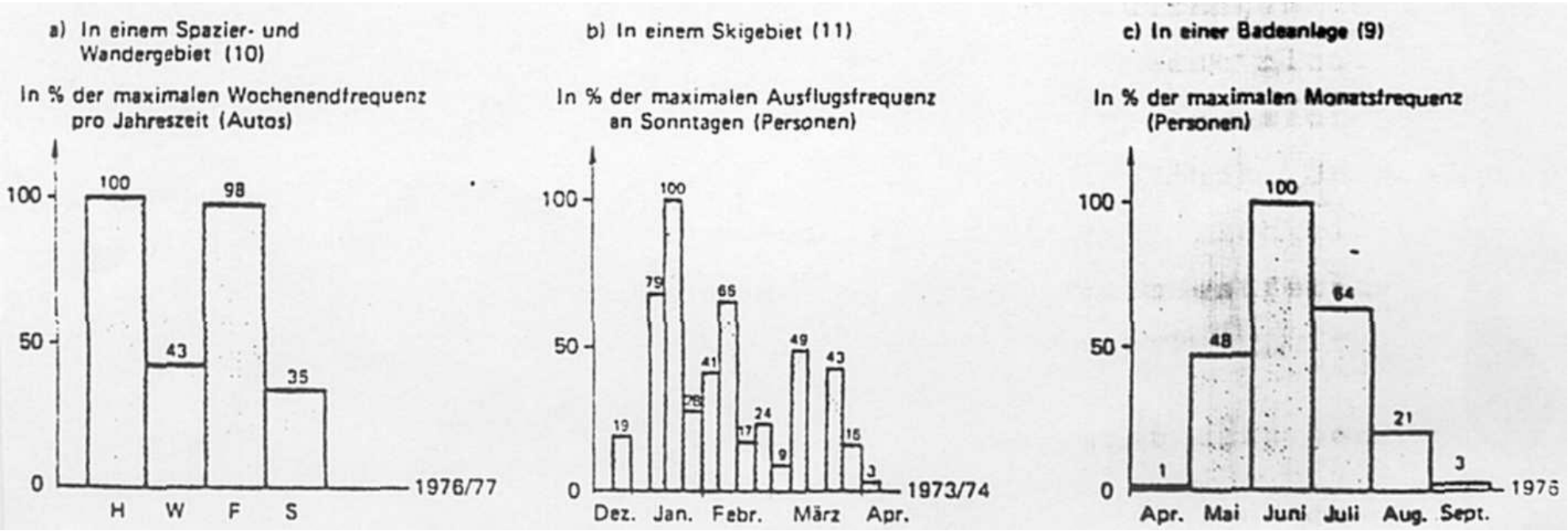
Weekly schedule of recreational use



JACSMANN; 1982

Temporal fluctuations in recreational demand

Annual schedule of recreational use



Collins-Kreiner et al. (2013): Are birders good for birds? Bird conservation through tourism management in the Hula Valley, Israel

Wintering/migration stop-over site: **Visitor group size → Behaviour of birds?**

Fig. 3. The study area: 1a. Pelican east, 1b. Pelican west, 2a. Crane north, 2b. Crane south, 3. Mahanayim; and 4. Control.

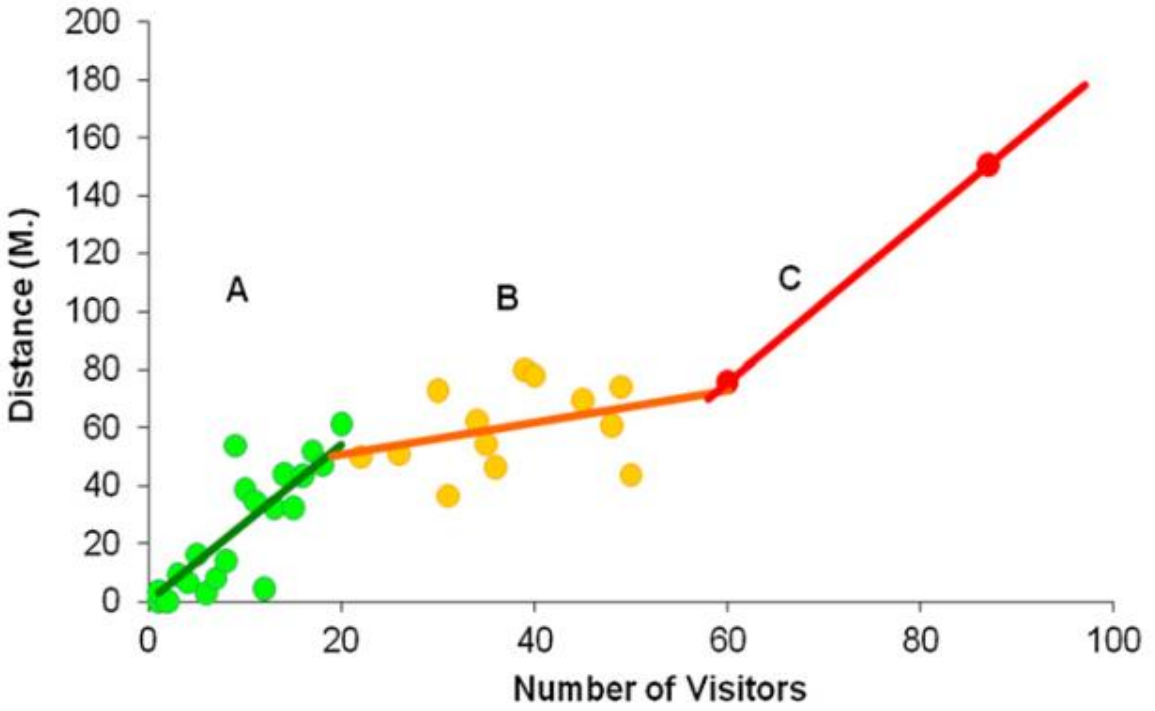


Fig. 8. The relationship between the numbers of visitors on the minimum distance to the birds.

Seasonal vulnerabilities

Journal of Applied Ecology

BRITISH ECOLOGICAL SOCIETY

Free Access

Ski tourism affects habitat use and evokes a physiological stress response in capercaillie *Tetrao urogallus*: a new methodological approach

Dominik Thiel, Susanne Jenni-Eiermann, Veronika Braunisch, Rupert Palme, Lukas Jenni

First published: 03 March 2008 | https://doi.org/10.1111/j.1365-2664.2008.01465.x | Citations: 131

„We are raising our children here – they have to be kept warm all the time! When we have to run away from you they might die“

„Surviving in winter is difficult enough for us“

Impact on animal species

Leaving trails reduces suitable habitat area for wildlife

Breeding Season

Black Tern. Picture from: https://www.lebendige-roehrichte.de/de/lebensraeume-und-arten/trauerseeschwalbe

Breeding Season

Most protected area managers could give
examples from their everyday work

Similar looking species can be very different in their sensitivity to the presence of humans

“A person passing an incubating penguin at 150 m distance already provoked a significant heart rate response. Recovery times were up to half an hour after direct human approach, causing increased energy expenditure without any overt behavioural reaction.” → difficult focal species for ecotourism

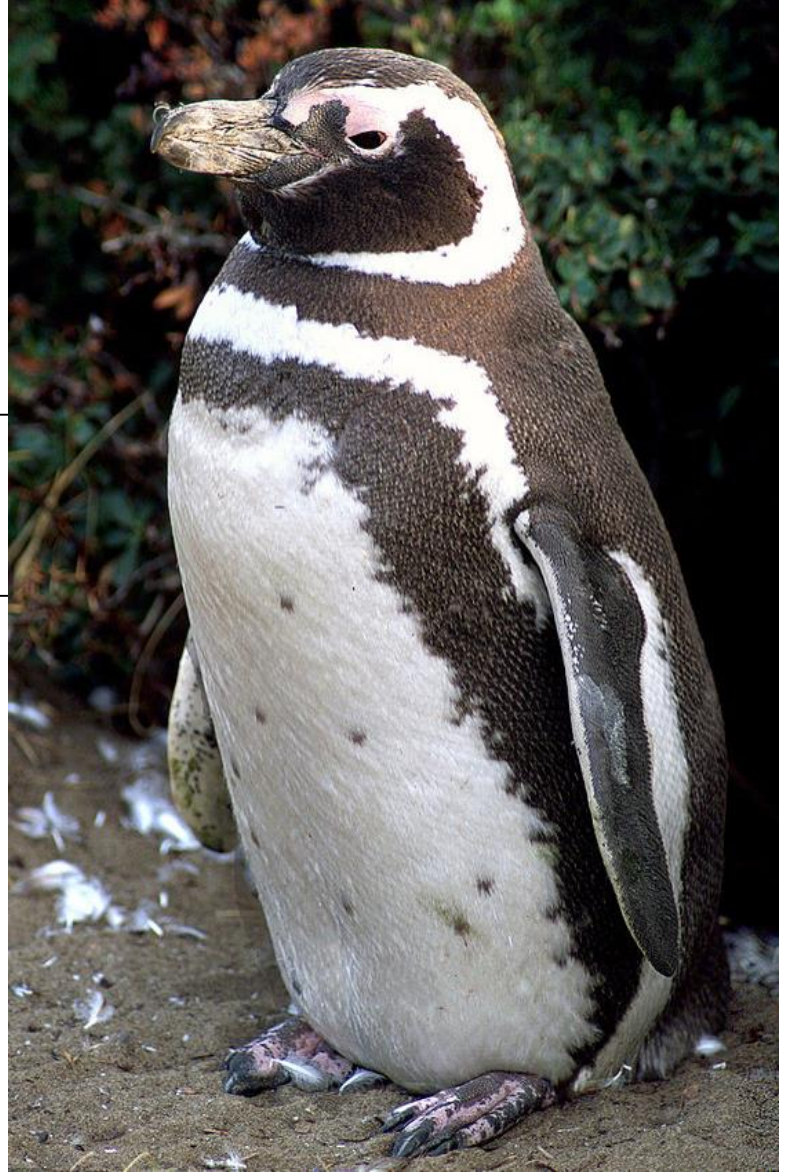
Humboldt Penguin
Spheniscus humboldti

Extremely sensitive to human presence
Little habituation potential

Less sensitive to human presence
Fast habituation

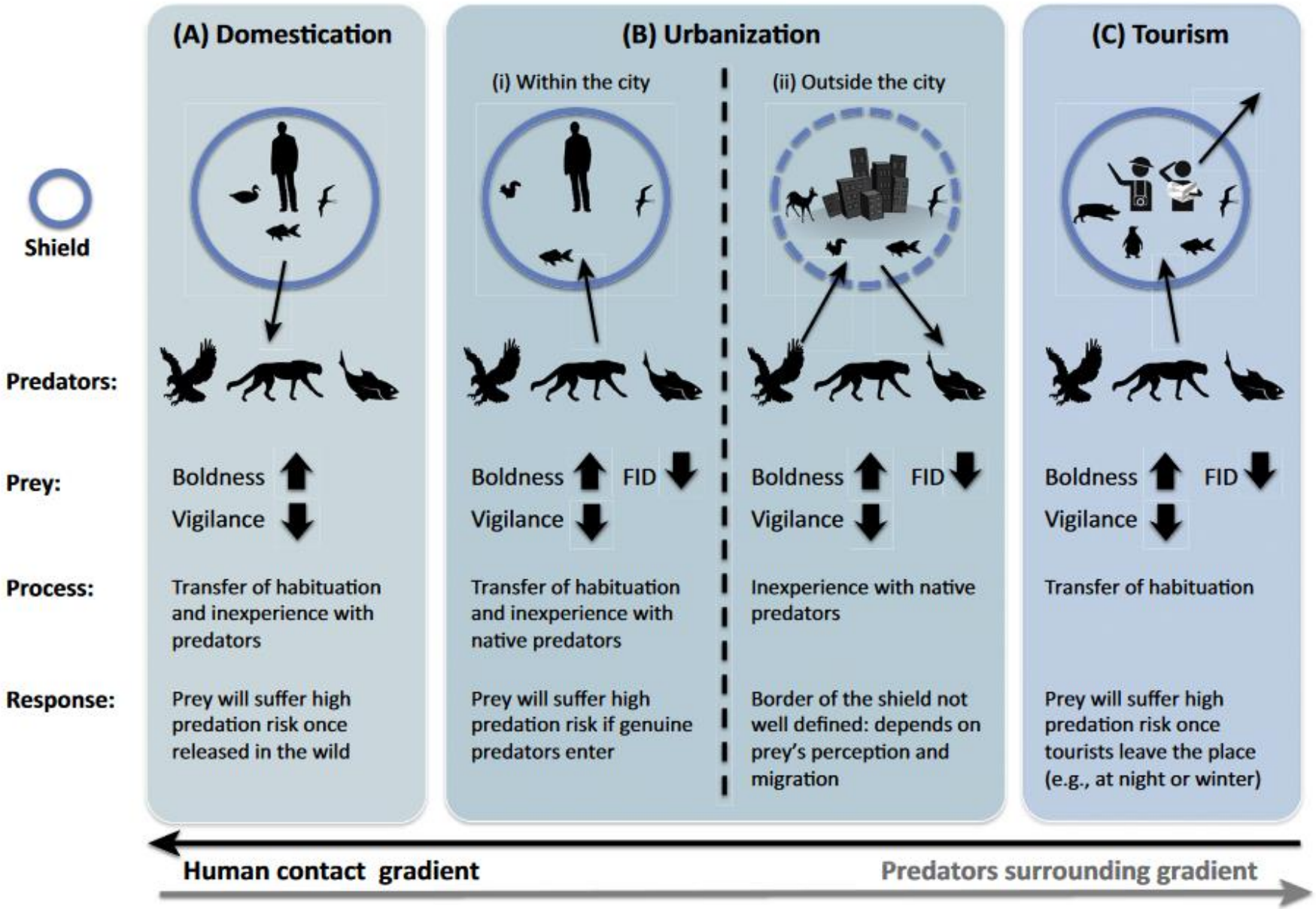
Physiological and reproductive consequences of human disturbance in Humboldt penguins: The **need for species-specific visitor management** (Ellenberg et al. 2006)

“Management guidelines need to acknowledge that even closely related species may react very differently towards human presence”



Magellan Penguin
Sphenicus magellanicus

Ellenberg/Mattern/Seddon/Jorquera (2006): Physiological and reproductive consequences of human disturbance in Humboldt penguins: The need for species-specific visitor management. Biological Conservation, Volume 133, Issue 1. 95-106.



The Human Shield

Habituation to humans may lead to higher boldness and less vigilance towards predators

FID=Flight initiation distance

Figure from: Geffroy et al. (2015): How Nature-Based Tourism Might Increase Prey Vulnerability to Predators. Trends in Ecology and Evolution.

Hentati-Sundberg et al. 2021: **COVID-19 lockdown reveals tourists as seabird guardians.** Biological Conservation.

Download : **Download video (43MB)**

Video 2. Common murres disturbed from their ledges by an actively hunting white-tailed eagle.

"When tourist traffic to an iconic seabird colony closed down due to COVID-19 lockdown, it led to a 7-fold increase in sea eagle presence.

Sea eagles **disturbed breeding** common murres which created the **worst breeding season ever recorded**.

Conservation policies for seabirds may use tourism to minimize disturbance from top-predators." (Hentati-Sundberg et al. 2021).

ABSTAND HALTEN VON SCHILF & SEEROSEN!

Hier leben viele Tiere: Fahren Boote zu dicht und zu schnell, kippt ihr Wellenschlag Nester um. Seerosen und Schilf werden beim Hineinfahren beschädigt. Tiere aufgeschreckt und Vögel beim Brüten gestört.

WWW.NATURSCHUTZFONDS.DE

GRAUREIHER

Vornehm gleitet dieser graue Geselle durch die Luft. Bei der Futtersuche steht er regungslos wie eine Statue im seichten Wasser.

GEMEINE KEILJUNGFER

Sie ist eine der ersten Libellen, die man im Frühjahr zu Gesicht bekommt. Die schwarz-gelbe Zeichnung bietet dem Weibchen Tarnung am Boden und zwischen den Pflanzen.

SCHILFROHRSÄNGER

Im braunen Schilf übersieht man den Schilfrohrsänger und das hineingewebte Nest leicht. Sein mehrstufiger Gesang tönt jedoch weit über das Wasser.

SEEFROSCH

Nach der Verwandlung von der Kaulquappe zum jungen Frosch ist er ab Juli im Schilf auf Nahrungssuche.

TRAUERSEESCHWALBE

Die gefährdeten Vögel bauen ihre Nester auf Seerosen und Brutflößen. Kleinste Störungen lassen sie vom Nest flüchten – Eier kühlen aus oder die Jungtiere werden nicht mehr gefüttert und verhungern.

Oldorff & Kirschey (2017): Benthivorous fishes interaction with submerged vegetation – A simple exclosure experiment

Invisible impacts (from the surface) of recreational fishing / fish stocking

Fig. 7: The impact of large benthivorous fishes on the vegetation outside the exclosures was significant.

Oldorff & Kirschey (2017): Benthivorous fishes interaction with submerged vegetation – A simple exclosure experiment

Fig. 15: Digging damage caused by the common carp (*Cyprinus carpio*) in Lake Stechlin.

Recreational activities promote the distribution of invasive species

Diversity and Distributions
Open Access
A Journal of Conservation Biogeography

BIODIVERSITY RESEARCH

Recreational boating: a large unregulated vector transporting marine invasive species

Cathryn Clarke Murray, Evgeny A. Pakhomov, Thomas W. Therriault

First published: 07 June 2011 | https://doi.org/10.1111/j.1472-4642.2011.00798.x | Citations: 152

Abstract

Aim Recreational boating is arguably the largest unregulated vector for the introduction and spread of marine invasive species. Hull fouling communities have been recognized to harbour non-indigenous species (NIS), but presence should not be equated with transport. In this study, we characterize the presence of NIS in hull fouling communities, determine if host vessels transport these species and evaluate the importance of recreational boating as a vector for introduction and spread.

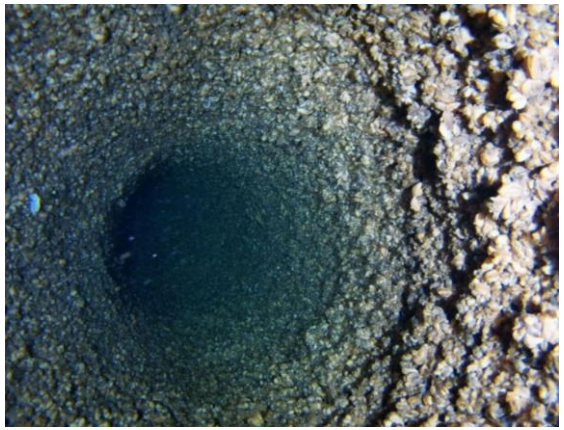
“The quagga mussel *Dreissena rostriformis bugensis*, native to the Dnieper and the northern Black Sea, has become a major invasive species in both the **Volga River** and the **North American Great Lakes since the early 1990s**. Findings in the Netherlands (2006) and Germany (2007) mark the **start of its establishment in Western Europe”** (Imo et al. 2010).

Image: Tersteegen, J.; Oldorff, S., Schill, R. & Brümmer, F. : Quagga Wissen. https://www.yumpu.com/de/document/read/63010416/quagga-wissen

Dreissena polymorpha *Dreissena rostriformis bugensis*

Quagga – additional skills: Sand, greater depth, greater densities (up to 25.000 individuals per m^3)

© Olivier Paschoud



Imo, M., Seitz, A. & Johannsen, J. (2010): Distribution and invasion genetics of the quagga mussel (*Dreissena rostriformis bugensis*) in German rivers. Aquatic Ecology. https://link.springer.com/article/10.1007/s10452-009-9311-2

"The quagga mussel *Dreissena rostriformis bugensis*, native to the Dnieper and the northern Black Sea, has become a major invasive species in both the **Volga River** and the **North American Great Lakes since the early 1990s**. Findings in the Netherlands (2006) and Germany (2007) mark the **start of its establishment in Western Europe"** (Imo et al. 2010).

Image: Tersteegen, J.; Oldorff, S., Schill, R. & Brümmer, F. : Quagga Wissen. https://www.yumpu.com/de/document/read/63010416/quagga-wissen

Dreissena polymorpha *Dreissena rostriformis bugensis*

Quagga: Sipho black and/or orange

Zebra: Sipho black/white/grey

Imo, M., Seitz, A. & Johannsen, J. (2010): Distribution and invasion genetics of the quagga mussel (*Dreissena rostriformis bugensis*) in German rivers. Aquatic Ecology. https://link.springer.com/article/10.1007/s10452-009-9311-2

The distribution and spread of quagga mussels in Lake Constance

(Haltinger et al. 2022)

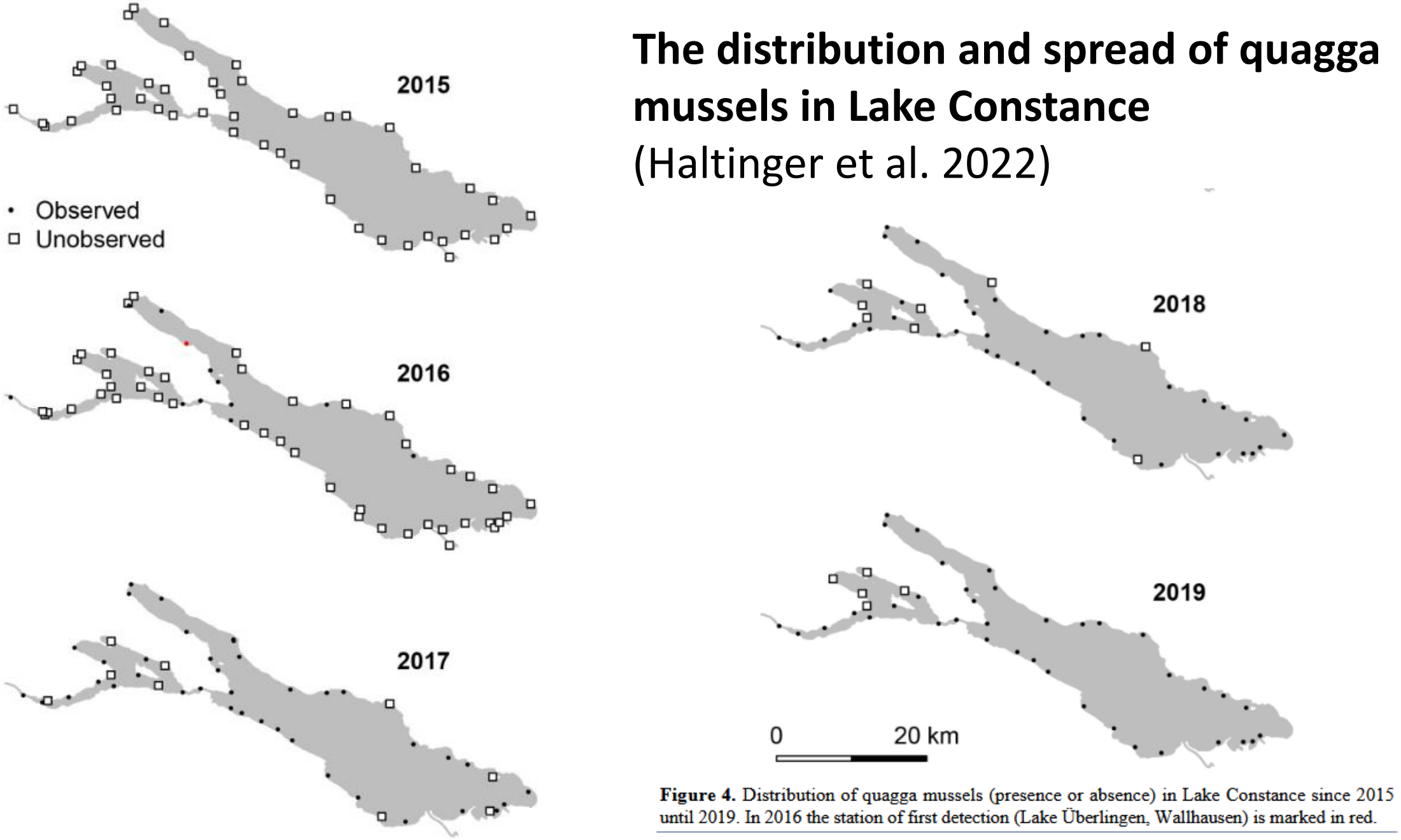
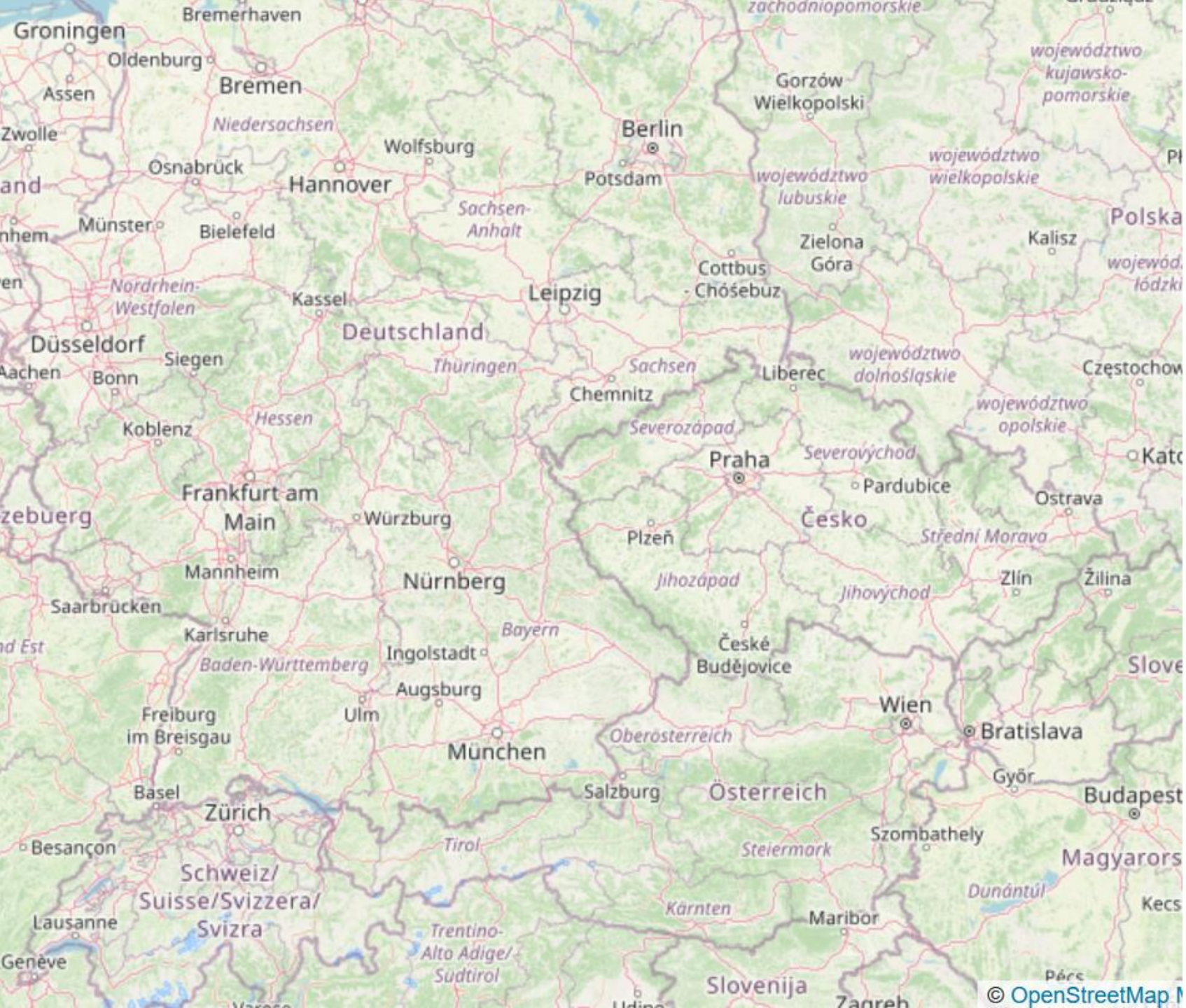


Figure 4. Distribution of quagga mussels (presence or absence) in Lake Constance since 2015 until 2019. In 2016 the station of first detection (Lake Überlingen, Wallhausen) is marked in red.

Haltinger et al. (2022): The distribution and spread of quagga mussels in perialpine lakes north of the Alps. Aquatic invasions. https://www.research-collection.ethz.ch/handle/20.500.11850/587752

Vorderer Langbathsee | © Ferienregion Traunsee-Almtal, Karl Heinz Ruber

Hinterer Langbathsee. Foto: https://de.wikipedia.org/wiki/Hinterer_Langbathsee#/media/Datei:Hinterer_Langbathsee_20070505.jpg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Oldenburg
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Bremen
Zwolle
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Osnabrück
Hannover
Münster
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Sachsen-
Anhalt
Nordrhein-
Westfalen
Kassel
Leipzig
Düsseldorf
Siegen
Aachen
Bonn
Deutschland
Thüringen
Sachsen
Chemnitz
Koblenz
Hessen
Frankfurt am
Main
Würzburg
Mannheim
Nürnberg
Saarbrücken
Karlsruhe
Bayern
Ingolstadt
Baden-Württemberg
Augsburg
Freiburg
im Breisgau
Ulm
München
Basel
Zürich
Besançon
Tirol
Schweiz/
Suisse/Svizzera/
Svizra
Lausanne
Genève
Trentino-
Alto Adige/
Südtirol
Salzburg
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województwo
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pomorskie
województwo
wielkopolskie
województwo
lubuskie
Zielona
Góra
Cottbus
Chóśebuz
Polska
Kalisz
Liberec
województwo
dolnośląskie
Częstochow
województwo
opolskie
Praha
Severozápad
Severovýchod
Pardubice
Ostrava
Česko
Plzeň
Střední Morava
Jihozápad
Jihovýchod
Zlín
Žilina
České
Budějovice
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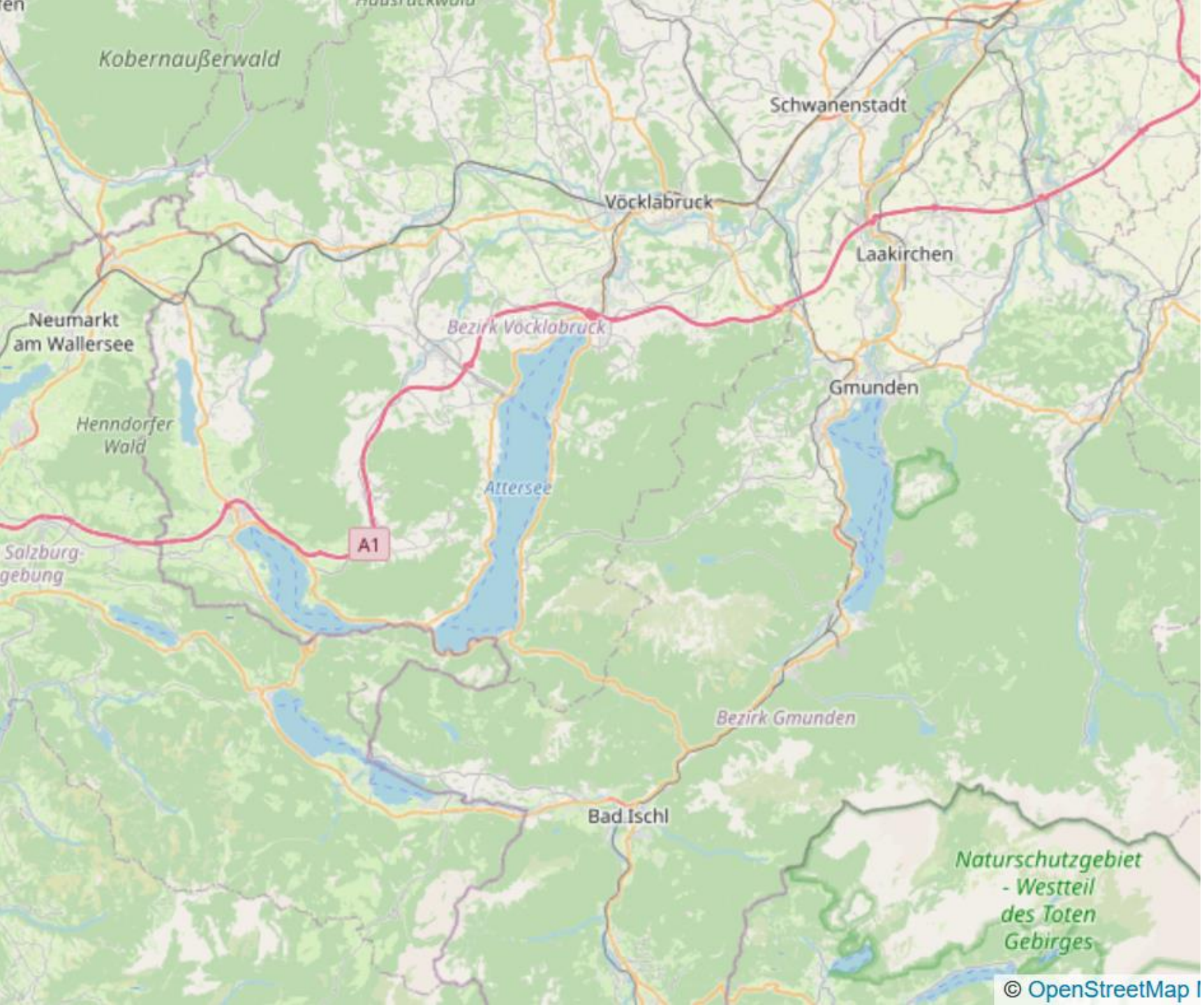
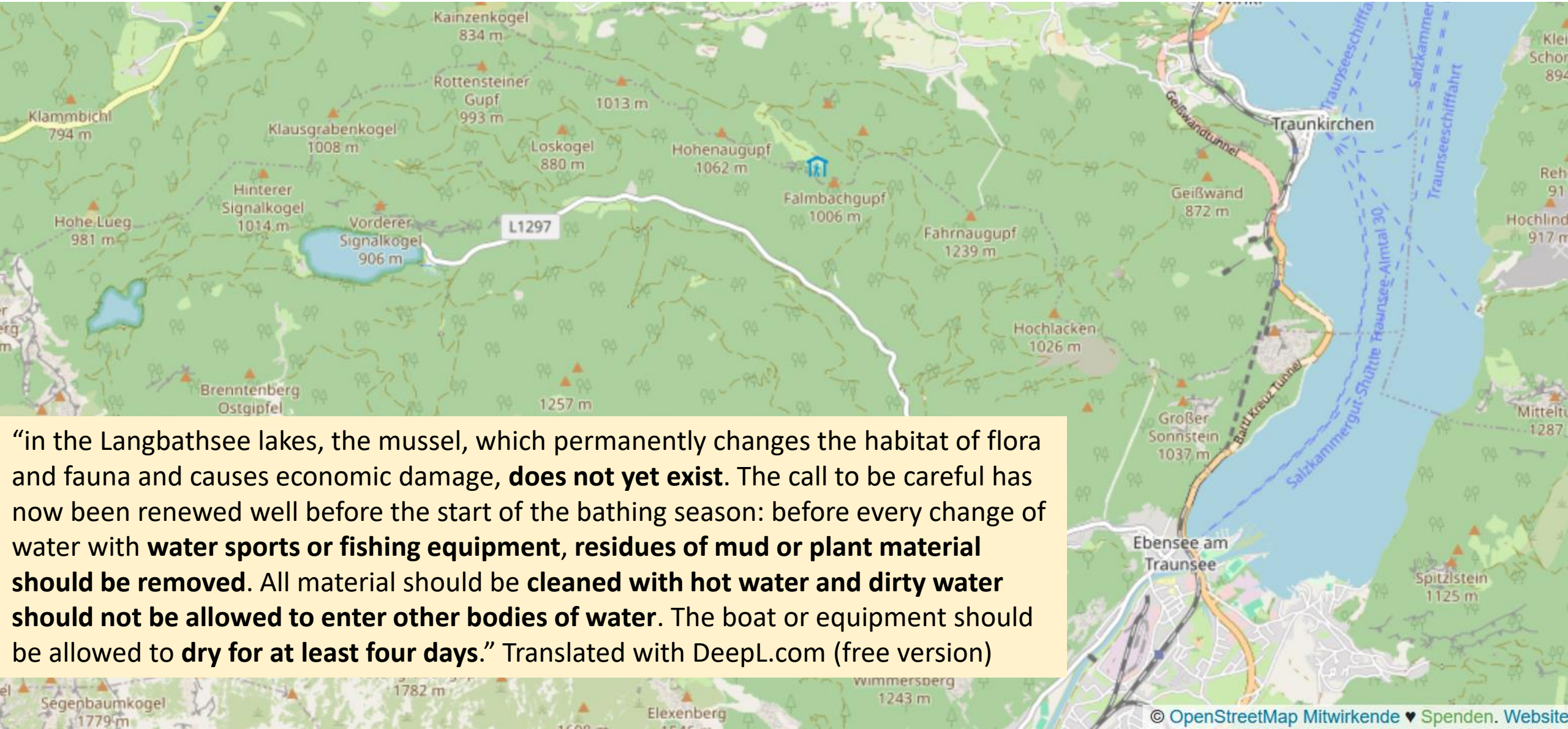

Kobernaußerwald
Schwanenstadt
Vöcklabruck
Laakirchen
Neumarkt
am Wallersee
Bezirk Vöcklabruck
Gmunden
Henndorfer
Wald
Attersee
A1
Salzburg-
gebung
Bezirk Gmunden
Bad Ischl
Naturschutzgebiet
- Westteil
des Toten
Gebirges
© OpenStreetMap

“EBENSEE. The warning has come too late for Lake Traunsee: the introduced quagga mussel, a very persistent mollusc from the Black Sea, has already spread widely there”

OÖ NEWS (April 2024): https://www.nachrichten.at/oberoesterreich/salzkammergut/kampf-gegen-die-quagga-muschel-in-ebensee;art71,3936351



“in the Langbathsee lakes, the mussel, which permanently changes the habitat of flora and fauna and causes economic damage, **does not yet exist**. The call to be careful has now been renewed well before the start of the bathing season: before every change of water with **water sports or fishing equipment**, **residues of mud or plant material should be removed**. All material should be **cleaned with hot water and dirty water should not be allowed to enter other bodies of water**. The boat or equipment should be allowed to **dry for at least four days**.” Translated with DeepL.com (free version)

Eberswalde University
for Sustainable
Development

Recreation ecology

Thank you for your attention!