

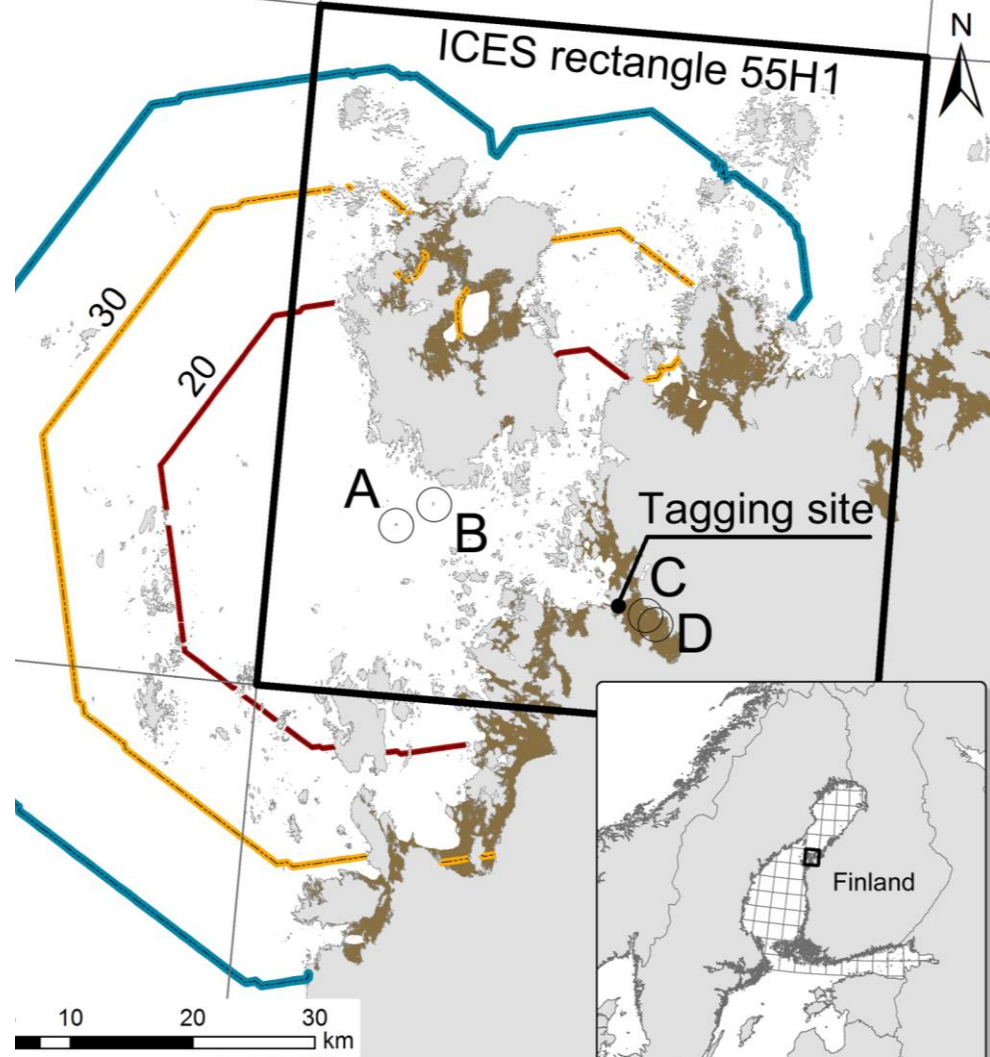
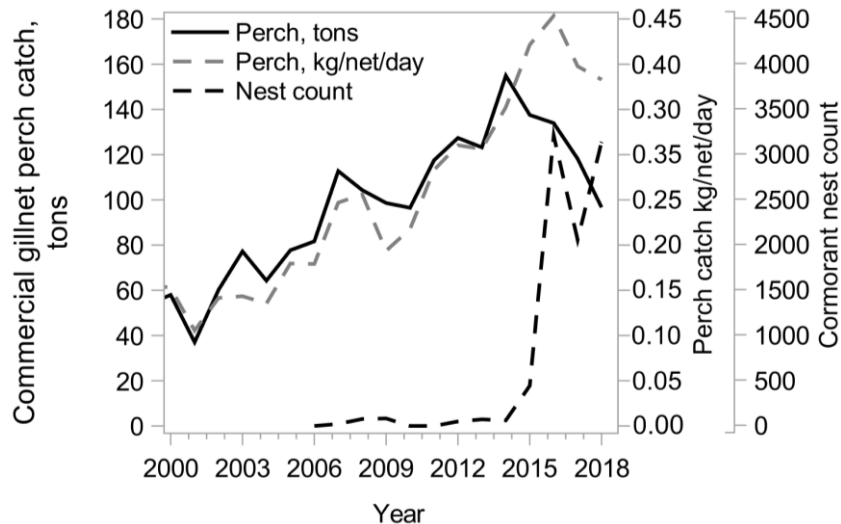
Case study – effect of cormorant predation on perch stocks in a shallow coastal area

Nordic Cormorant meeting 11th Nov 2020
Lari Veneranta
Natural Resources Institute Finland



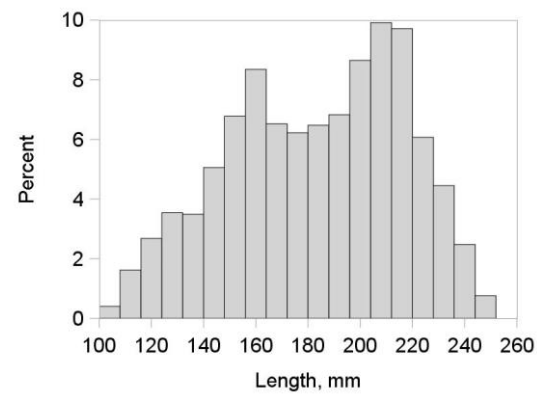
Study area, catch rectangle 55H1

- Important perch fishing area
- Perch reproduction areas, brown
- Colonies A-D
- Nest count 3140 in 2018
- Predation range 20-40 km at maximum





PIT tagging of perch



- Perch were sampled with a fyke net and wire traps
- In total 1977 individuals were tagged
- 12 mm PIT tag in the muscle under dorsal fin
- Tagging mortality 2 %
- Length distribution follows the diet length distribution reported in Salmi et al. 2015

PIT tags in colonies

GPS - location

Detection transect

Antenna

21.1.2021



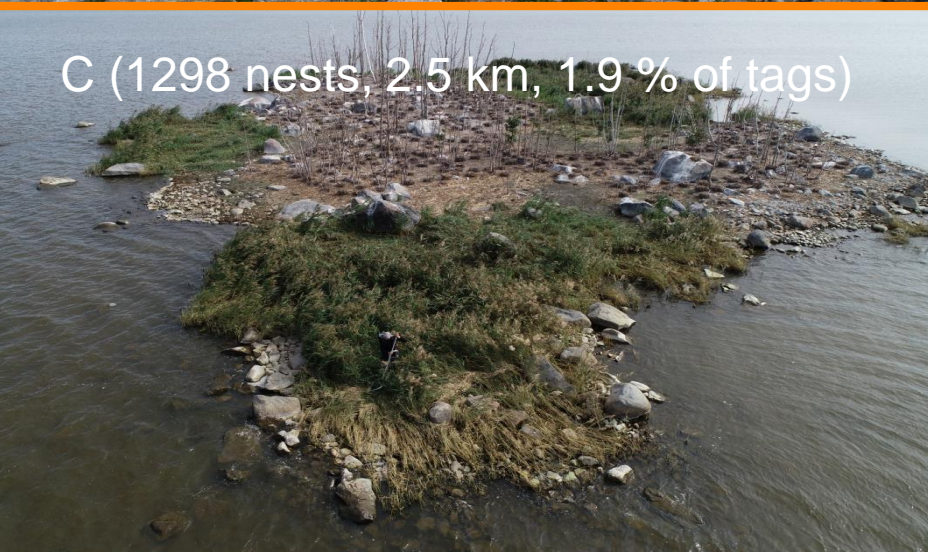
A (503 nests, 19 km, 3.3 % of tags)



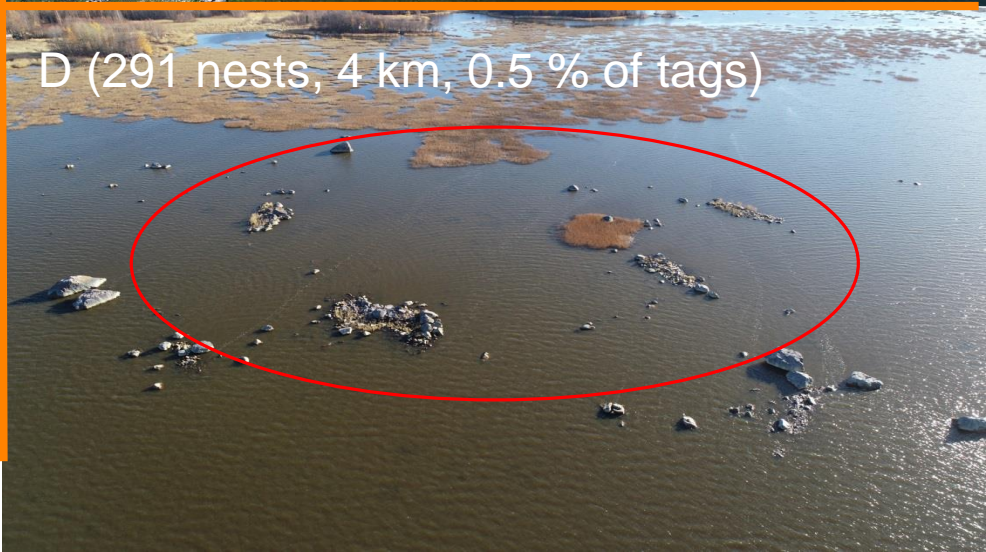
B (1048 nests, 17 km, 4.4 % of tags)



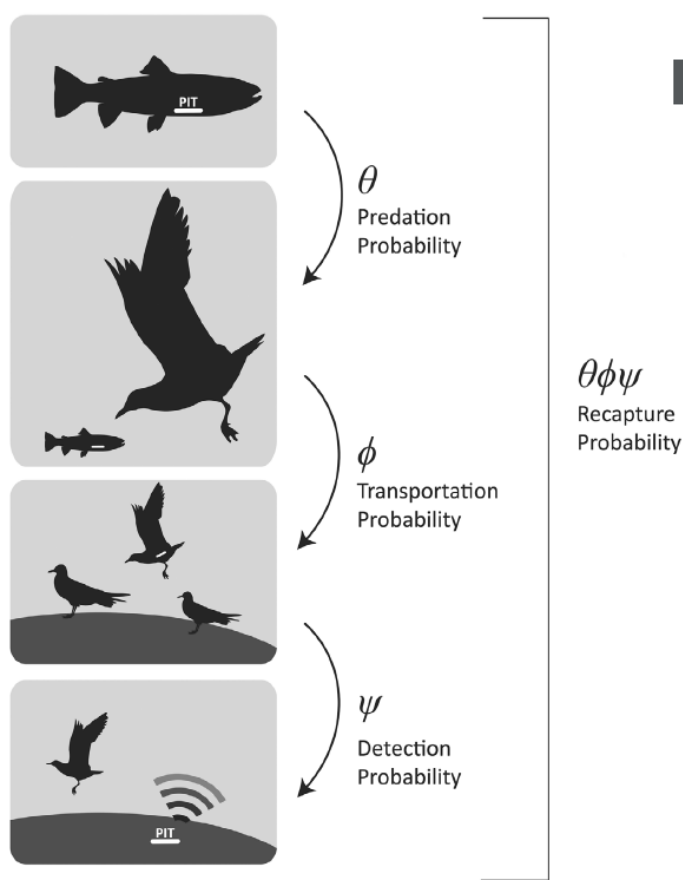
C (1298 nests, 2.5 km, 1.9 % of tags)



D (291 nests, 4 km, 0.5 % of tags)



Factors affecting to the PIT recovery



- Literature derived deposition values
 $x = \mathbf{0.51}$ (CRI 0.34 – 0.7)
(Hostetter et al. 2015)
- Detection values tested in field
 $x = \mathbf{0.93}$ (min 0.76- max 1.0)

Osterback, A. M. K., Frechette, D. M., Shelton, A. O., Hayes, S. A., Bond, M. H., Shaffer, S. A., & Moore, J. W. (2013). High predation on small populations: avian predation on imperiled salmonids. *Ecosphere*, 4(9), 1-21.

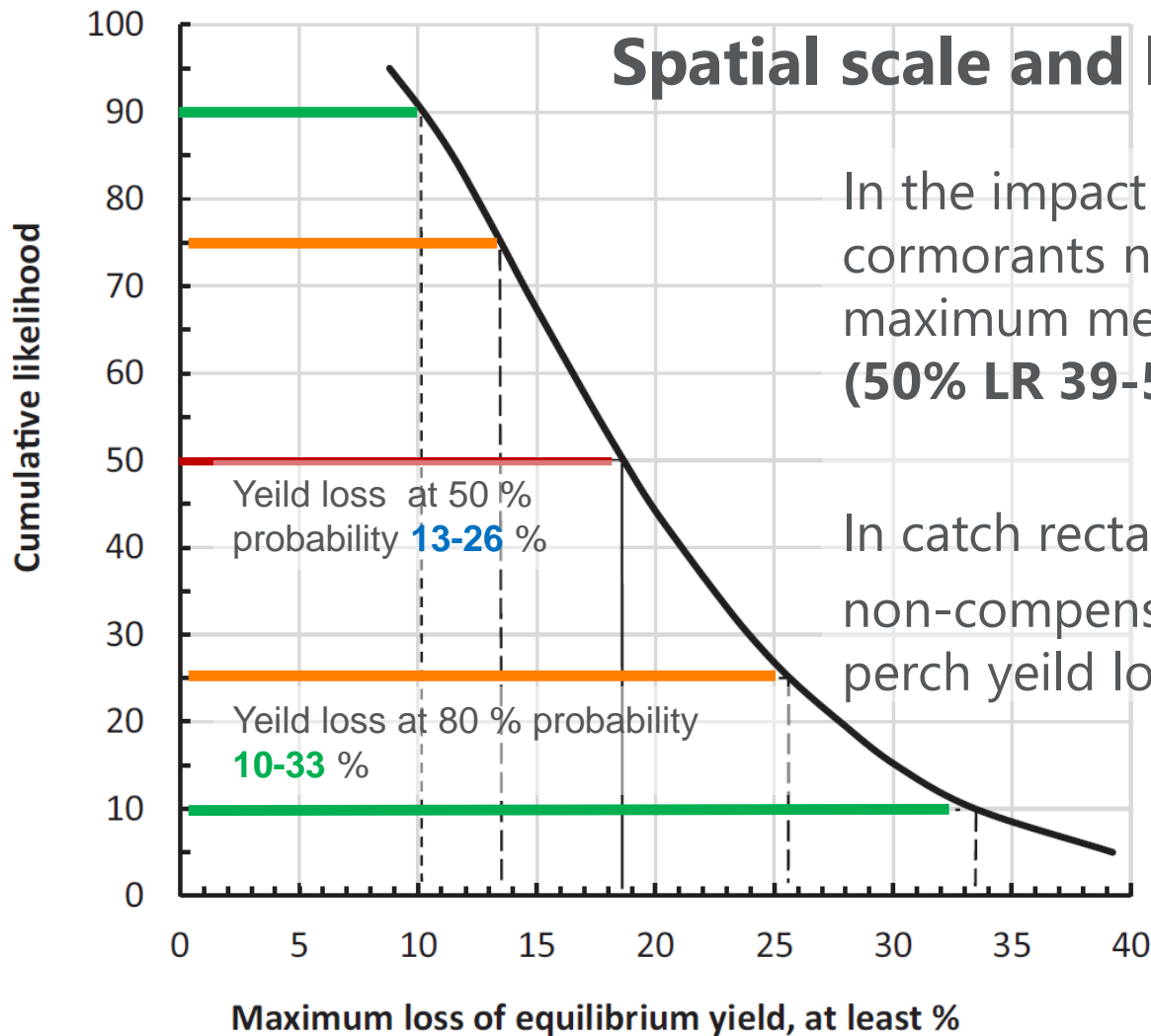
Tagged perch were vulnerable for predation

- **9.2 % of tags recovered**
- **With detection correction, 9.9 % of tags found** in breeding colonies
 - Minimum estimate of consumption
- Considering tag detection and deposition, **16-26 %** of tagged perch are consumed by breeding population
- **With non-breeding population, 20-33 % of tagged perch are consumed**
- Cormorants breeding in the northern Gulf of Bothnia (>3000 pairs) were not taken into account

Perch consumption – yeild model assumptions

- Cormorant population and abundance of 2-year old perch are constant
- Both, fast and slow growing part of perch population included
- Breeding period, migration periods and period without cormorants noted
- Instantaneous predation mortality esteimated with Baranov's catch equation
- Effect of cormorant predation on the fishing yield assessed with Ricker's Y/R model
- The results were extrapolated to catch rectangle 55H1 with catch statistics data

Spatial scale and loss of perch yield



In the impact area of breeding cormorants non-compensated maximum median perch yeild loss **49 %**
(**50% LR 39-59 %**, **80% LR 32-67 %**)

In catch rectangle 55H1 non-compensated maximum median perch yeild loss **19 %**

Cormorant perch consumption based on biomass

Based on catch statistics, perch size age-samples and tagging data, **in 55H1** cormorants eat 8% of ≥ 2 year perch biomass, share of natural mortality 63 % and fishery 29 %

- The biomass of ≥ 2 year perch could decrease up to 17 % based on median results in the 55H1
- If calculated in situation without cormorants, the perch catches could be 27 % higher

NOTE! Close to colonies the effects would likely be stronger

Possible causes of uncertainty

Calculations are affected by literature derived values

- Deposition probability
- Level of natural mortality
- Catch statistics, feeding ranges, extension of results to 55H1

Possible problems in calculations

- Perch density effect on predation efficiency
- Perch density effect on growth of perch, reproduction or mortality

Perch biomass estimation is based on statistics – recreational data inaccurate

The effect of cormorants breeding in north and migrating through 55H1 (?)

Cormorants can have negative impact on perch stocks and fishery

Perch is considered particularly vulnerable species

- Several sub-populations, feeding area in 10 km range from reproduction area

High density of cormorants can cause yield losses in perch fishery

Other factors, like year-class fluctuations, density dependence of growth and mortality may counteract the cormorant predation – not well known

Depends on spatial scale, distance from colonies decreases the potential impact

Problems close to large colonies!

Thank you!

