Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

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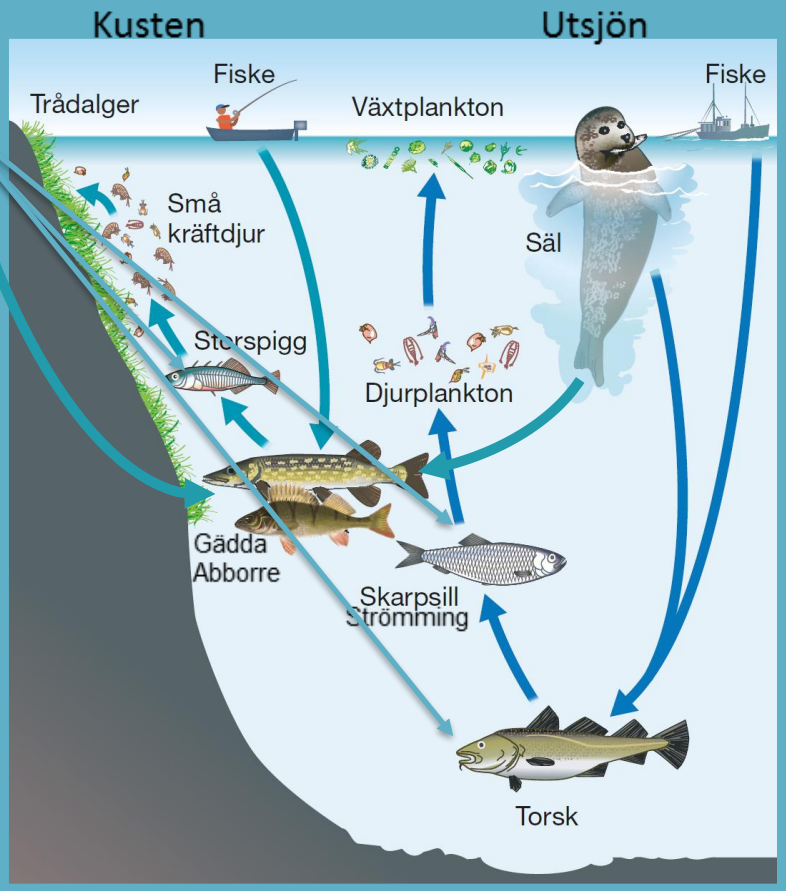
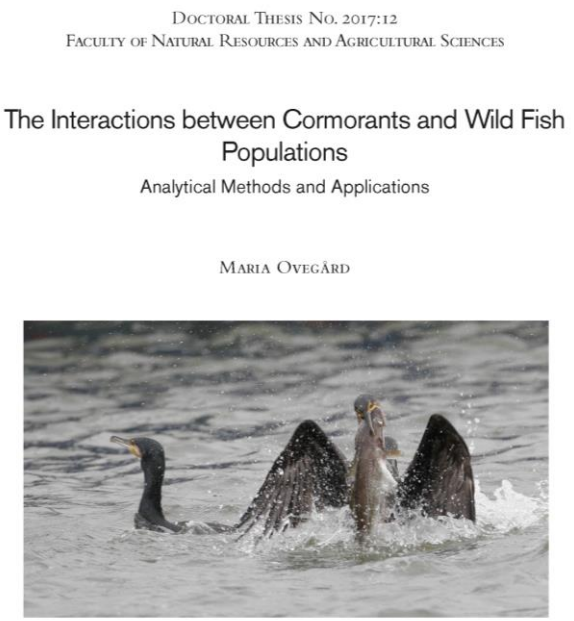
Nordic Cormorant meeting 2020

Newest/Update in Swedish Cormorant Research



- Conclusions so far
- What's going on 2020

Can cormorant predation affect fish populations and/or fishery catch?



Supervisors and super heros;
Erik Petersson,
Niels Jepsen and
Mikaela Bergenius

Ovegård, M., Jepsen, N., Bergenius, M. and Petersson, E. Cormorant predation effects on fish populations: a global meta-analysis *Under revision for Fish and Fisheries*

Hansson, S., Bergström, U., Bonsdorff, E., Härkönen, T., Jepsen, N., Kautsky, L., Lundström, K., Lunneryd, S-G., Ovegård, M., Salmi, J., Sendek, D. and Vetemaa, M. (2018) Competition for the fish - fish extraction from the Baltic Sea by humans, aquatic mammals and birds. ICES Journal of Marine Science. ICES Journal of Marine Science, 75 (3): 999–1008.

Ovegård, M., Öhman, K., Mikkelsen, J.S. and Jepsen, N. (2017) Cormorant predation overlaps with fish communities and commercial-fishery interest in a Swedish lake. Marine and Freshwater research. 68(9): 1677-1685. Page2

Östman, Ö., Boström, M.K., Bergström, U., Andersson, J. and Lunneryd, S-G. (2013) Estimating Competition between Wildlife and Humans-A Case of Cormorants and Coastal Fisheries in the Baltic Sea. PLoS ONE, 8 (12): 1-8.

Boström, M.K, Lunneryd, S-G., Hanssen, H., Karlsson, L. and Ragnarsson, B. (2012) Diet of the Great Cormorant (Phalacrocorax carbo sinensis) at two areas in the Bay Lövstabukten, South Bothnian Sea, Sweden, based on otolith size-correction factors. Ornis Fennica, 89.

Boström, M.K., Östman, Ö., Bergenius, M.A.J. and Lunneryd, S.G. (2012) Cormorant diet in relation to temporal changes in fish communities. ICES Journal of Marine Sciences 69(2): 175-183.

Östman, Ö., Bergenius, M., Boström M.K. and Lunneryd, S-G. (2012) Do cormorant colonies affect local fish communities in the Baltic Sea? Canadian Journal of Fisheries and Aquatic Sciences 69: 1047-1055.

Boström, M.K, Lunneryd, S-G., Karlsson L., Ragnarsson, B. (2009) Cormorant impact on trout (Salmo trutta) and salmon (Salmo salar) migrating from the river Dalälven emerging in the Baltic Sea. Fisheries Research 98: 16-21.

ALSO don´t forget secundary effects by dispersal of plants/animals with pellets and spread of fish parasites + avoidance behaviour in fish, possibly affecting fisheries.

Van Leeuwen, C.H.A., Lovas-Kiss, Á., Ovegård. M., and Green, A.J. (2017) Secondary dispersal of plants and invertebrates by a piscivorous water bird. Biology Letters, 13:20170406. DOI: 10.1098/rsbl.2017.0406

The Research Question

Can cormorant predation affect
fish populations and/or fishery catch?

General answer:
YES

BUT
Cormorant predatory
effects on fish and fishery vary:

- between **areas**; due to differences in fish community structures

- between **time** periods; due to fish migration and cormorant energetic demand

- and for fishery it depends on **overlap** in targeted fish

Percidae and Cyprinidae are particularly vulnerable species

Global Meta-analysis on the effects of cormorants on fish

Maria Ovegård, Niels Jepsen,
Mikaela Bergenius, Erik Petersson

- > 4000 titles and abstracts were read
  (some copies as using several search terms and databases)
- 603 abstracts identified whereof, 537 were read in full and considered
  (some not found and some due to language limits)
- 27 articles from which **effect sizes** could be extracted
  (fish variables vs cormorant abundance/predation)
- 22 articles could be included in analyses = 135 data points (effect sizes)

Effect size was defined negative in cases when cormorant numbers or presence reduced fish numbers or biomasses, or when individual fish sizes decreased, and vice versa for a positive effect.

Hierarchical dependence model

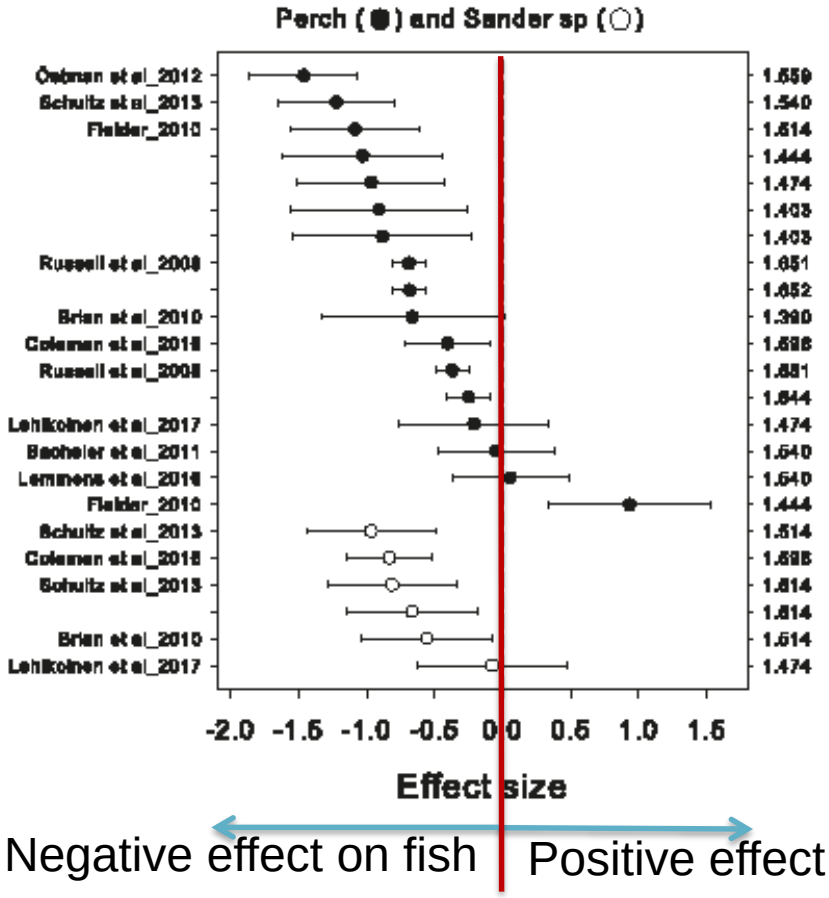
The combined effect size of cormorant predation on fish was negative, but not significantly.

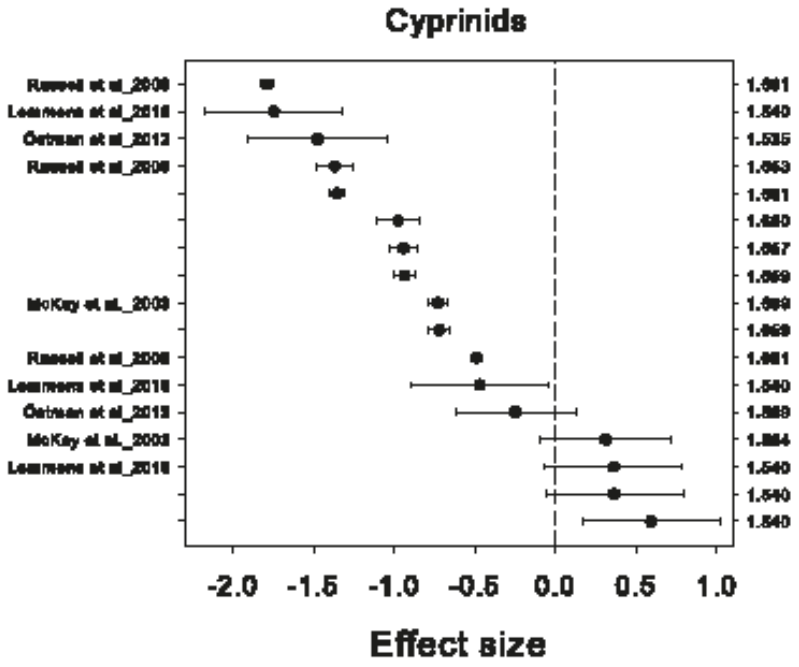
A covariate analysis revealed a difference in predatory effects between fish prey species ($p = 0.024$, $df = 5.66$)

(no difference in effect sizes between study type, foraging habitat or response variable measured)

Percidae and Cyprinae are particularly vulnerable

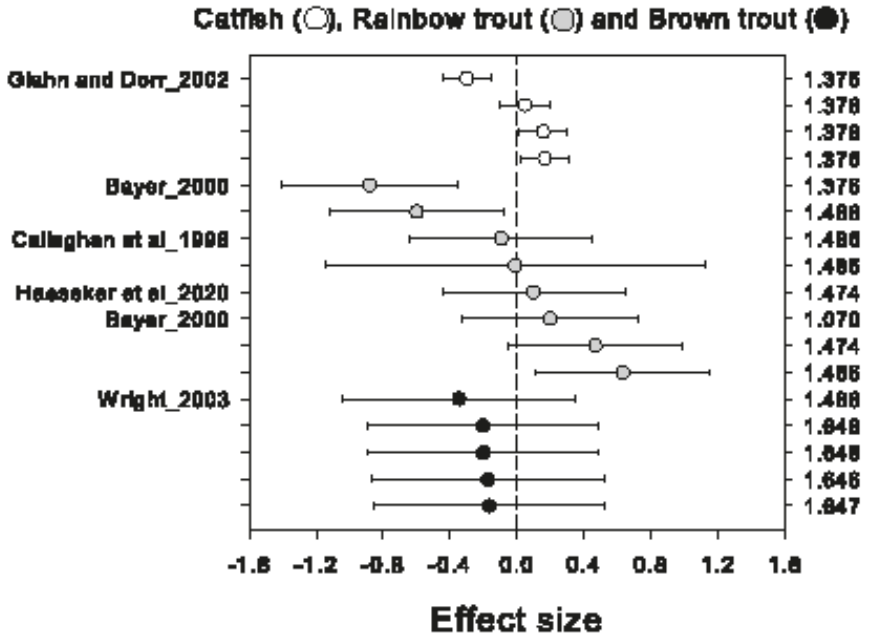
Global Meta-analysis on the effects of cormorants on fish

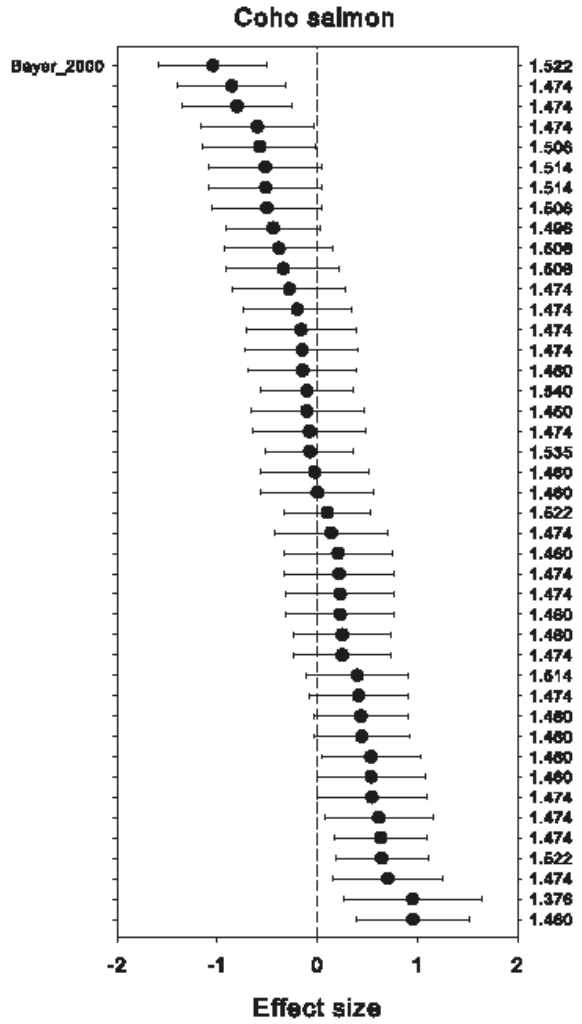




Negative effect on fish | Positive effect on fish

Global Meta-analysis on the effects of cormorants on fish





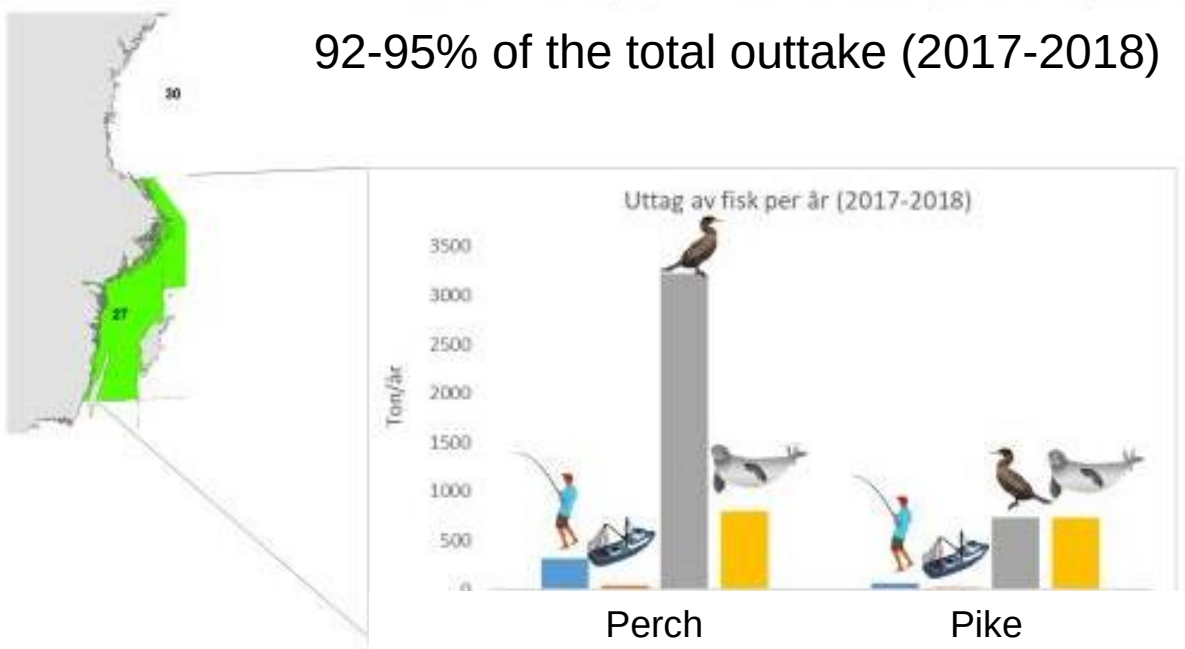
Perch and Pike populations are decreasing in some areas along the Swedish coast and we look into causes and mortality factors, such as predation from sticklebacks and habitat loss.
Extensive work on recreational fisheries regulaitons BUT the question is if it will work with cormorants and seals eating the fish.

Hansson et al. (2018) Competition for the fish - Fish extraction from the Baltic Sea by humans, aquatic mammals, and birds. ICES Journal of Marine Science 75(3) ICES Journal of Marine Science 75(3): 999-1008.

Update on the numbers in Hansson et al. including data from 2017 and 2018 (only Sweden).

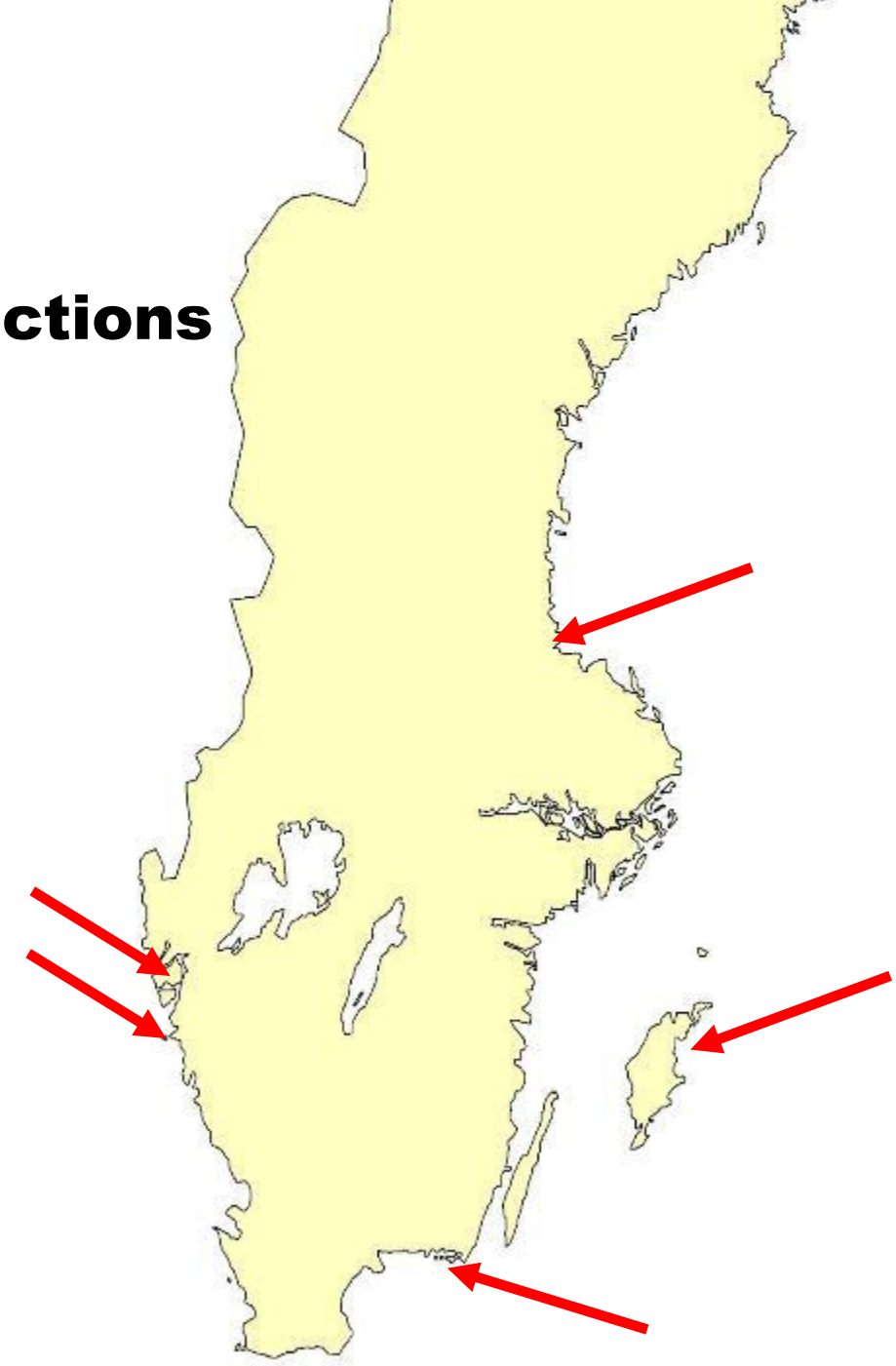
Outtake of perch and pike in SD 27-29

92-95% of the total outtake (2017-2018)



Source: Ulf Bergström

Ongoing data collections

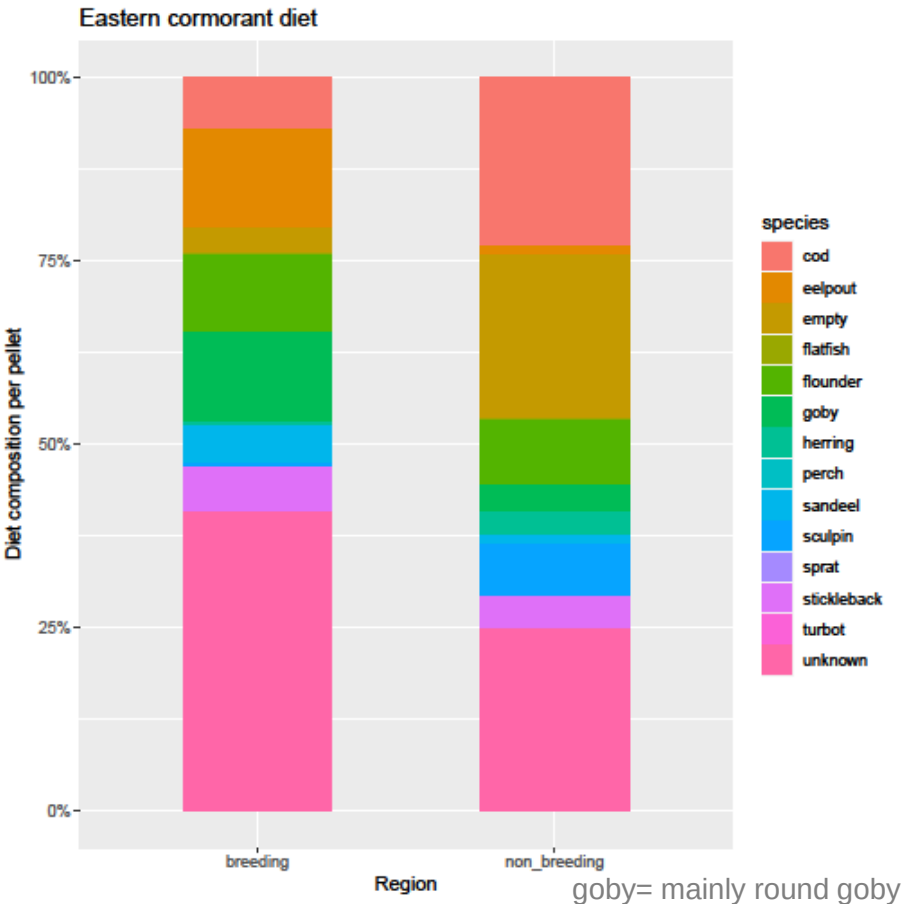


Predation on smolt, Dalälven

- PIT-tag scanning in colonies
- Substantial outtake of trout and salmon smolts today, compared to 2005-2006

Monitoring of diet, Gotland

- One-year survey of cormorant diet on the east coast of Gotland



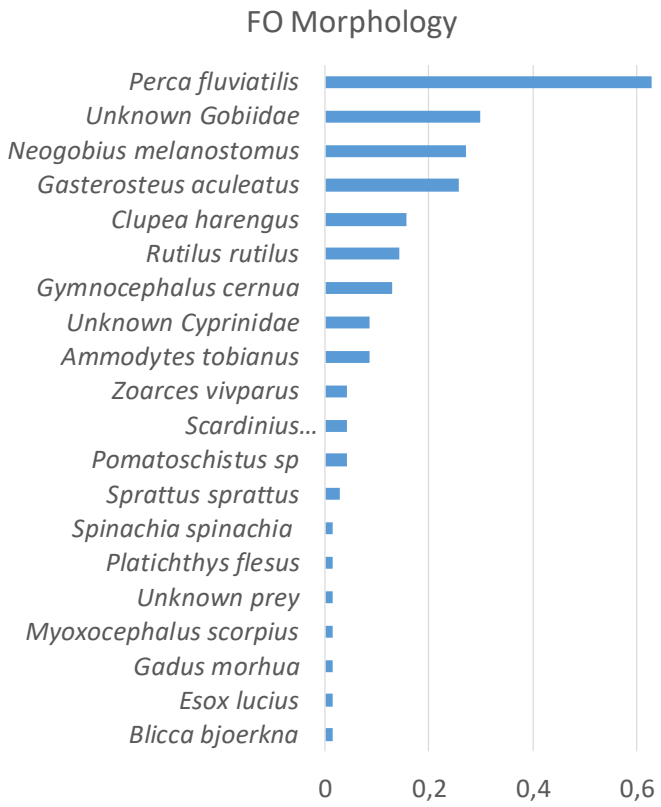
Source: Karl Lundström

goby= mainly round goby

Monitoring, Karlskrona archipelago

Preliminary results (2015 only)

- Monitoring
  - Diet
  - Abundance
- Several years
- Ecological effects of round goby in focus, for the later years data collections



Source: Karl Lundström

No-take zones, Skagerrak

- No-take zones (cod, haddock, pollack),

  (are cormorants the problem?)
- Monitoring cormorant
  - Abundance
  - Diet

Source: Karl Lundström

Monitoring, west coast

- Arial count in all coastal colonies in Västra Götaland county (Skagerrak), which works as they are nesting on the ground.
- 20 colonies
- >5000 nests
- Initiated and financed by SLU (as managing authorities did not show any interest).

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Thank you for listening