Stable isotope approach for trophic relationships among some waterbirds on the Baltic Sea Lithuanian coast

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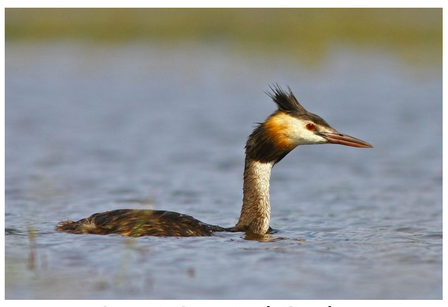
ABSTRACT AND CONCLUSIONS

The stable isotopes of nitrogen ($\delta^{15}N$) and carbon ($\delta^{13}C$) were analysed in feathers of Great Cormorant (*Phalacrocorax carbo*), Grey Heron (*Ardea cinerea)*, Great Crested Grebe (*Podiceps cristatus*) and Long-tailed Duck (*Clangula hyemalis*) staying in the different seasons at the Lithuanian Baltic seacoast. The stable isotopes composition in bird feathers indicated differences in feeding areas and diet. Adult cormorants feed juveniles by smaller fish at the beginning of fledging than later (Signed rank test, $p<0,05$).

Long tailed Duck

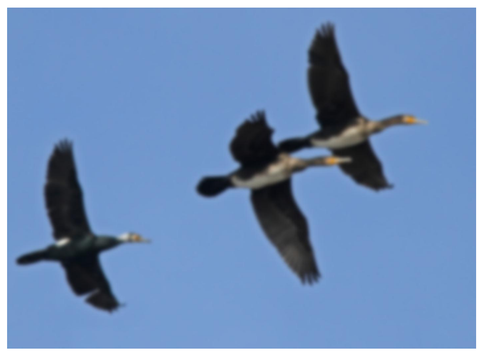


Great Crested Grebe

WINTERING LONG TAILED DUCK AND GREAT CRESTED GREBE

Long-tailed Duck is the second most abundant wintering species on the Lithuanian nearshore zone (300-500 individuals in 2009/2010). It is opportunistic feeder mainly feeds on bivalve *Mytilus edulis* and crustaceans during wintering period[1].

Great Crested Grebe is a regular wintering species (500-700 ind. in 2009/2010). Its diet consists mainly of smelt (*Osperus eperlanus*) and Baltic Herrings (*Clupea harengus*) (by frequency of occurrence 82,3% and by weight 95,2%)[2].



Great cormorants

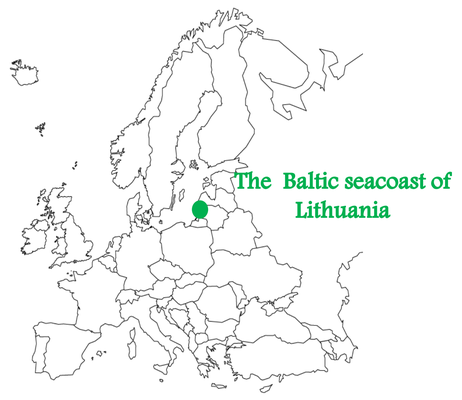
Grey Heron

BREEDING GREAT CORMORANT AND GREY HERON

A colony of the Great cormorant and Grey Heron is present at the seacoast of Lithuania (approx. 2900 and 290 nests, respectively). The birds nest 1 km from the sea and 0,3 km from the Curonian lagoon.

Ruff (*Gymnocephalus cernuus*), Perch (*Perca fluviatilis*) ir Roach (*Rutilus rutilus*) are dominant in the Great Cormorant diet both by frequency of occurrence (82,9%) and by weight (73,6%). The mean total length of fish prey is 9.5 cm and the mean weight is 16.8 g)[3].

The most important component of Grey heron diet during breeding season is fish (at least 90,0%). Other diet components are insects, frogs, small mammals)[4]. Also Grey Herons forage on food regurgitated by Great Cormorants[5].



Stable isotope analysis may be used to determine birds diet and it has several advantages over traditional methods:

- Integrate diet information over space and time;
- Assessments of autumn, winter, and spring diets can be possible, depending on the species' moulting chronology.

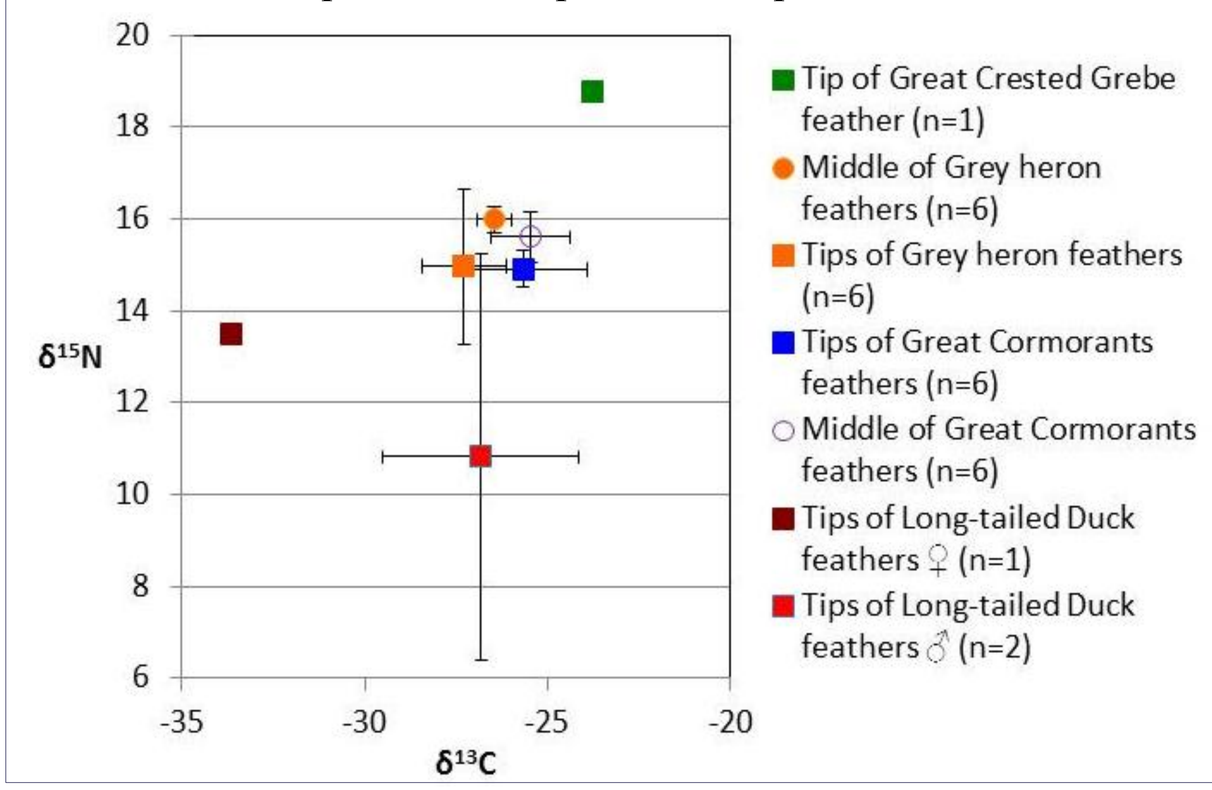
METHODS

The study was conducted at the Lithuanian seacoast. Feathers of Great Cormorants and Grey Herons were taken 2010 June-July at the colony on the Baltic sea coast. Feathers of Great Crested Grebe individual and Long-tailed Ducks were taken from birds drowned in fishing gillnets in 2010 March and December.

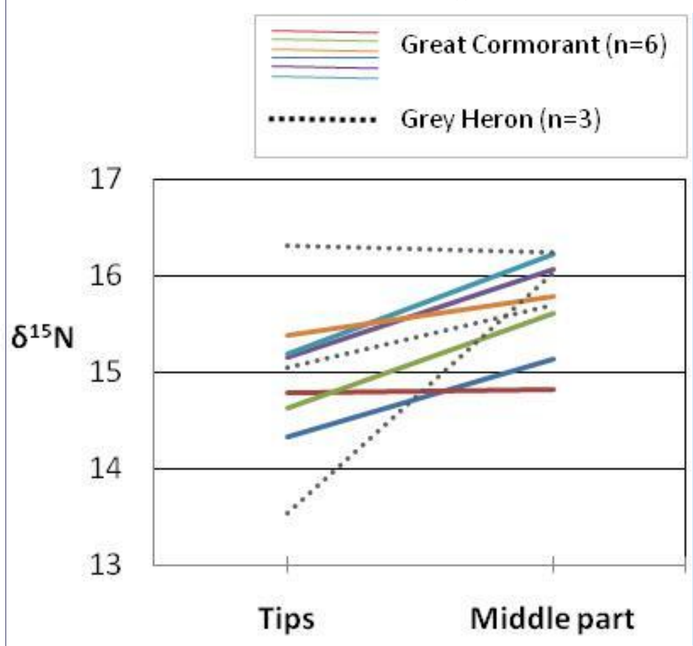
Prior to analysis feathers were cleaned of surface contamination and cut into small pieces. Approximately 0,5 mg of dried feather was loaded into a tin capsule and analyzed for $\delta^{15}N$ and $\delta^{13}C$ with mass spectrometer at the Leibniz Institute for Baltic Sea Research, Germany. Means were reported ±SD. Signed rank test was provided for $\delta^{15}N$ values of Great cormorants feathers.

RESULTS

Mean isotopic values of tip and middle portions of birds feathers



$\delta^{15}N$ values in different parts of cormorants and grey herons feather



The isotopic signatures in feathers of cormorants and grey herons represent dietary variation during the feather growth period. Tips of the feathers indicated diet during their growth, and middle parts of feathers indicated diet during few weeks later. Statistically significant differences were found in $\delta^{15}N$ of tips and middle parts portions sampled from the same cormorant feathers (Signed rank test, $p<0,05$). Analysis of grey heron feather did not show observed isotopic shift in $\delta^{15}N$.

Cited literature:

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3 Putys Z., Zarankaite J., 2010. Diet of the Great Cormorant (Phalacrocorax carbo sinansis) at the Juodkrante colony, Lithuania. Acta Zoologica Lituanica 20 (3), P. 179-189.
4 Jakubas D., Mioduszewska A., 2005. Diet composition and food consumption of the grey heron from breeding colonies in Northern Poland. Eur. J Wild Res 51, P. 191-198.
5 Wojczslanis K., Jakubas D., Stempnewicz L., 2005. Exploitation by the Grey Herons of fish regurgitated by cormorants. Waterbirds, 28 (2), P. 225-229.

Photo. J.Morkūnas