

## Flock-fishing deep-diving piscivores (Great Crested Grebe *Podiceps cristatus*, Great Cormorant *Phalacrocorax carbo*, Common Merganser *Mergus merganser*) at Lake Vombsjön, southern Sweden, and those that exploit them

*Flockfiskande och djupdykande fiskätare (skäggdopping Podiceps cristatus, storskarv Phalacrocorax carbo, storskrak Mergus merganser) i Vombsjön, Sydsverige, och de som utnyttjar dem*

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### Abstract

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Lake Vombsjön in southern Sweden is visited by large numbers of Great Crested Grebes *Podiceps cristatus* (>2000), Great Cormorants *Phalacrocorax carbo* (sometimes >1000) and Common Mergansers *Mergus merganser* (up to 2000) in late autumn and early winter. Different species exploit them. Great Crested Grebes are used especially by commensal Common Gulls *Larus canus*; the gulls take advantage of fish that flee towards the surface. Common Gulls also use cormorants and mergansers in the same way but also try to kleptoparasitize them. Both Herring Gulls *Larus argentatus* and Great Black-backed Gulls *Larus marinus* kleptoparasitize these two species, while Red Kites *Milvus milvus*, Grey Herons *Ardea cinerea* and Carrion Crows

*Corvus corone* use them commensally. White-tailed Eagles *Haliaeetus albicilla* seem to use both methods to obtain fish. On 50% of one hundred visits during November to March, eagles were seen flying low over the fishing flocks. They would fly a metre or so above the flocks and then accelerate and attack a bird holding a fish. The bird would then either try to escape by a rush or by diving, dropping the fish which the eagle seized. Interestingly, the flock-fishing birds showed no fear reactions towards the eagles but appeared to regard them similarly to large gulls.

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In late autumn and early winter, large numbers of Great Crested Grebes *Podiceps cristatus*, Great Cormorants *Phalacrocorax carbo* and Common Mergansers *Mergus merganser* visit the 12 km<sup>2</sup> large Lake Vombsjön in southern Sweden. Great Crested Grebes often reach high numbers already in October, but usually peak in November when sometimes more than 2000 individuals may be present at the lake. Cormorants are present year-round, but numbers are usually highest in November–December. Being rather variable, these numbers often are around 800 individuals but have occasionally been well above a thousand. Common Mergansers, finally, seem to arrive at somewhat varying times during autumn, probably depending on the timing of ice formation on lakes further to the north. Sometimes a fishing flock of more than 2000 has been recorded. All three species are exploited by several other bird species that try to obtain a share of the fish these species capture or make accessible. Here I will briefly describe these species and

their methods to obtain fish. The data on which this note is based were mainly collected during 2004 to 2017. Often observations were directly talked into a tape recorder and later transcribed.

### Study site

Lake Vombsjön has a maximum depth of c.15 m, 13% are more than 10 m deep, and 55% are between 5 and 10 m deep while 30% are less than 5 m deep. The lake has a rich fish fauna with perch *Perca fluviatilis*, roach *Rutilus rutilus*, bream *Abramis brama*, björkna *Blicca blicca*, rudd *Scardinius erythrophthalmus*, ruffe *Gymnocephalus cernua*, bleak *Alburnus lucidus* and others. Since 1948 the lake is regulated and is acting as a water reservoir for Malmö, Lund and several other cities. The shores are rather low and covered with deciduous trees except in the south where the shores are steeper and border to a large pine plantation,

Vombs Fure. Suitable observation points exist both in the west (including a bird observation tower) and in the north-east (Öveds badstrand) and east. There are embankments along the shore from south-east to north-east, and in north and west.

### The hosts and their exploiters

*Great Crested Grebe, Common Gull, Black-headed Gull and Herring Gull*

Great Crested Grebes were used predominantly by Common Gulls *Larus canus* that circled above fishing grebes, in particular over denser aggregations, and plunge-dived among the grebes. This association with the grebes may be entirely commensal, the gulls looking for small fish that have fled towards the surface in response to the diving activities of the grebes. Attempts at stealing fish held in the grebe's bill were observed occasionally but so far only two successful attacks were recorded despite more than 50 days of observation. This does not preclude that kleptoparasitism could have occurred more often than the observations suggest – distances were often quite long and details difficult to see. What speaks against kleptoparasitism, however, is the observation that dense flocks of Common Gulls occasionally were seen hovering and diving towards the water surface well away from any grebes, which suggests that they had located a shoal of small fish without the aid of grebes. Sometimes it seemed as if Common Gulls saw the grebes through the water and dived towards them when they were surfacing, but in no case did this result in the gull obtaining the fish. Black-headed Gulls *Croicocephalus ridibundus* also sometimes circled together with Common Gulls above fishing flocks of grebes, and on eight occasions Herring Gulls *Larus argentatus* were seen associated with fishing Great Crested Grebes. In contrast to Common and Black-headed Gulls, Herring Gulls were sitting on the water intently watching surfacing grebes. On six occasions they attacked a grebe that surfaced with a fish in its bill, but every time the grebe dived instantly so all kleptoparasitic attempts by Herring Gulls were unsuccessful.

*Great Cormorant, Common Merganser and the large gulls*

Great Cormorants and Common Mergansers share many features in common and are treated together here even though they usually formed monospecific

ic flocks. However, successful dives, signalled by either fish in the bill of a surfacing piscivore or by violent attempts at intraspecific kleptoparasitism often acted as an impetus for the other species to join and form a mixed feeding flock. Sometimes a flock of Common Gulls or Black-headed Gulls hovered over mergansers or cormorants, especially in early autumn, apparently trying to kleptoparasitize them (once a Common Gull managed to steal a fish from a merganser and also negative attacks on cormorants were seen). In winter, these small gulls were usually less common and both mergansers and cormorants mostly had Herring Gulls and Great Black-backed Gulls *Larus marinus* associated with them, the former often being up to ten times more numerous than the latter. These large gulls either circled over the fishing flocks or swam among the diving mergansers or cormorants in an alert posture. Sometimes Great Black-backed Gulls attempted to monopolize fishing flocks by driving away other Black-backs (but usually not Herring Gulls). Cormorants or mergansers surfacing with fish, especially big ones, regularly resulted in kleptoparasitic attacks by Herring and Great Black-backed Gulls and often also by both conspecifics and the other species of diving piscivore. These attacks often led to a turmoil when the attacked bird tried to evade the attacks. Sometimes the fish wandered from one kleptoparasite to another. Quite often when a Herring Gull had stolen a fish and flew off to eat it undisturbed, it was immediately attacked in the air by a Great Black-backed Gull and often lost it. Sometimes there was a tug of war between, usually, a cormorant and a gull with the cormorant sometimes managing to keep its fish. The large gulls sometimes seemed reluctant to attack a cormorant with fish. This is understandable because on numerous occasions cormorants were seen trying to bite gulls that came too near. Nonetheless, kleptoparasitism no doubt was a very important feeding method of the two large species of gull. However, distances were often too long to establish how successful the gulls were at stealing from the two species (cf. Källander 2006).

One of the interesting things to observe in these feeding flocks was how the different species used cues unintentionally given away that indicated their foraging success. Thus, when one or more individuals at either end of the flock surfaced with big fish, other birds immediately flew there and dived (or in case of the gulls, tried to kleptoparasitize). This constant surveying of the fishing success of others was very common among all parties involved (also see under White-tailed Eagle below).

### *Grey Heron and the fishing flocks*

A few times Grey Herons *Ardea cinerea* flew out to a fishing flock and circled above it. Once the heron even landed on the water and stayed there for quite some time intently watching the fishing success of the flock. At other lakes I have several times seen both Grey Herons and Great White Herons *A. alba* associating with flock-fishing Great Cormorants. At Lake Krankesjön, for instance, both species of heron associated with cormorants fishing in shallow water and they even seemed to be able to predict where swimming cormorants would reach vegetation where the herons could settle. These observations are interesting mostly from the question how herons can know that cormorants indicate increased fish availability. Have they seen cormorants surface with fish in the bill and learnt to associate them with fish shoals?

### *Red Kite and the fishing flocks*

Red Kites also appeared above the fishing flocks, usually flying rather high monitoring the flock below. A number of times, they stooped from considerable height and either picked up a small fish or interrupted the stoop. The relatively few times that they obtained fish, it was just picked up close to the flock and appeared to have nothing to do with kleptoparasitism.

### *White-tailed Eagle and the fishing flocks*

The most impressive use of the flock-feeding piscivores involved White-tailed Eagles *Haliaeetus albicilla*. Kleptoparasitism is a well-known feeding method in the genus *Haliaeetus* and has been studied especially in Bald Eagles *H. leucocephalus* (Grubb 1971, Fischer 1985, Jorde & Lingle 1988, Bennetts et al. 1990, Brown 1993). On nearly 50% of about one hundred visits to Lake Vombsjön during November to March, White-tailed Eagles were seen using the fishing flocks of cormorants and mergansers as an aid to obtain fish. The eagles usually circled low over the flock, in windy weather conditions mostly flying against the wind until they reached the end of the flock where they made a wide arc and drifted back to where they had started. From time to time they would rise somewhat in the air, hover and then let themselves sink towards the surface with outstretched legs. Sometimes they landed on the water where they would stay for a moment before rising again with or without a fish

in the talons. Such events may have indicated commensalism where the eagles simply tried to pick up small fish that had swam towards the surface to evade the diving piscivores. Such small fish were regularly eaten in flight.

The eagles would also fly low over the flock and then accelerate towards a cormorant or merganser with fish. Eagle attacks on birds with fish often occurred when a bird tried to evade kleptoparasitic attacks by either conspecifics or gulls. Usually the attacked bird would drop the fish and dive quickly, the eagle picking up the fish. Having secured it, the eagle would immediately head for trees on the shore, sometimes harassed by one or more other eagles. In such situations, surprisingly often the eagle would drop its fish (because of dominance relations between the eagles?) which was then either captured in the air, usually by the pursuer, or (about ten times) was seen falling to the water and thus getting lost for both the owner and the pursuer.

The approach of an eagle from the shore trees was always preceded by all gulls taking to the air; in fact, this reaction of the gulls was a very reliable cue indicating that an eagle was on its way. Usually, the gulls did not return to the fishing flock until the eagles had left, but on a few occasions large gulls settled at the far end of the fishing flock while eagles were still flying over the flock.

The most interesting feature of this association between eagles, cormorants and mergansers was that the latter mostly showed no fear reactions in response to the eagles despite these often passing less than a metre above them. It seemed as if they regarded the eagles in the same way as they regarded the large gulls that were associated with them. Only three or four times did cormorants or mergansers show an escape reaction when eagles were present. On these few occasions, the eagles were flying higher than usual and stooped from a greater height and it seemed that this behaviour elicited the flight response. Since there was often much flying between different parts of a fishing flock, some of these flights may not have been triggered by the eagles.

Often more than one eagle flew simultaneously over the fishing flock (the maximum number recorded at the same time was seven), often without any obvious interactions between them. Adults appeared to have higher success rate than younger eagles when kleptoparasitising cormorants and mergansers. Some 16 successful attempts were recorded for adults versus circa seven for juveniles. In practice, the difference was more pronounced than these figures show: first winter eagles were

seen about three times as often above the fishing flocks as were adults.

### *Hooded Crow and the fishing flocks*

On a few occasions I observed a Hooded Crow *Corvus corone cornix* hovering close to the water surface at the fishing flock more than a hundred metres from the shore and once or twice crows were seen leaving the flock with a fish in the bill. Once a Common Gull and a crow were aiming at the same fish but the gull was faster and got it.

### Discussion

Fish constitutes a valuable food for many species of birds. Individual fish are often quite large and it should come as no surprise that conflicts between various birds over fish are numerous. One such conflict is between actively fishing bird species (hosts) and the species that kleptoparasitize them. In this kind of interaction, one would expect hosts to use one or more tactics to avoid losing prey and kleptoparasites to try and overcome these tactics. As reported in the present note, a number of species try to use flock-fishing deep-diving waterbirds to obtain food that would otherwise be either unavailable to them or difficult to find and capture. Of the species studied here, gulls were the most ubiquitous. Although the commensal exploitation of Great Crested Grebes and also of Great Cormorants and Common Merganser by Common Gulls and less often by Black-headed Gulls probably have a very small impact on any of these species; especially as the success of the gulls at getting fish seemed to be very low. In fact, one could really ask whether spending considerable time circling above flocks of these three deep-diving species, from time to time diving head-long into the water, could be profitable. Sometimes one even gets the impression that the mere sight of fish in the bills of these deep-divers acts as an irresistible signal that food is potentially available.

With the large gull species, Herring and Black-backed Gull, the situation is clearer. Both use cormorants and mergansers as hosts stealing from them when the opportunity arises. The conflict is clear: The hosts try to avoid losing their prey while the kleptoparasite makes efforts at obtaining it. No wonder then that cormorants and also mergansers were seen biting at gulls, which therefore sometimes seemed to be hesitant to attack. Once a cormorant even pursued (in flight) for about one hundred metres a Herring Gull that carried a fish.

The competition for fish was fierce also between the gulls. As reported earlier (Källander 2006), Great Black-backed Gulls regularly robbed Herring Gulls of the fish prey they had stolen. Even Black-backed Gulls themselves were often harassed in the air when they had a fish and both Herring and Great Black-backed Gulls with fish often flew up to a hundred metres before settling on the water to ingest it un-attacked. Also, among both mergansers and cormorants attempts at intra-specific kleptoparasitism were very common as were inter-specific kleptoparasitism in these species. Attacked birds either rushed along the surface or dived to evade their pursuers.

That White-tailed Eagles kleptoparasitize Common Mergansers has been observed at two other localities in Sweden (Lake Åsnen, where huge numbers of Common Mergansers gather in late autumn and early winter (Hallberg 2001) and Lake Hjälmaren (Å. Pettersson in litt.) and it seems likely that the association occurs at many Swedish lakes where cormorants or mergansers gather.

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### Sammanfattning

Senhöst och vinter gästas den 12 km<sup>2</sup> stora Vombsjön av imponerande antal skäggdoppingar (ibland >2000), storskarvar (c.1000) och storskarakar (upp till minst 2000). Alla tre utnyttjas av olika arter som försöker få del av de fiskar dessa dykande fåglar för upp till ytan. Här beskrivs kortfattat dessa arter och de metoder de använder för att komma åt fisk. Data insamlades huvudsak-

ligen under senhöst och vinter 2004–2017 då ett hundratal besök gjordes vid sjön. Vombsjön har en ganska rik fiskfauna, som domineras av abborre, gärs, mörtfiskar och löja. Sjön är som djupast c.15 m men en knapp tredjedel är mindre än 5 m djup. De talrika skäggdoppingarna under senhösten utnyttjas företrädesvis av fiskmåsar, vilka kretsar över ansamlingarna av doppingar och störtar sig huvudstupa ner mellan doppingarna. Det förefaller som om utnyttjandet främst består i att doppingarnas dykande får småfisk att fly mot ytan, där de kan fångas av måsarna. Skarvar och storskrakar däremot är i hög grad utsatta för kleptoparasitism (födostöld) av gråtrut och havstrut. Också fiskstölden inom såväl som mellan dessa båda dykande arter är vanliga och leder ofta till stridigheter. Inte minst i samband med sådana attraheras de båda trutarterna och också havsörnar. De senare verkar ha två olika taktiker att få fisk. Antingen flyger de lågt över fiskeflocken, går upp och spanar, varpå de låter sig sjunka mot ytan med utsträckta ben. I

det fallet förefaller det oftast handla om småfisk som försökt undkomma mot ytan (och som sedan fångas vid ytan innan de åts och i luften). Den andra metoden är att flyga lågt över fiskeflocken för att accelerera mot en skarv eller skrake som fångat en litet större fisk som tar tid att svälja. Den attackerade fågeln försöker antingen rusa över vattenytan eller, oftare, dyka, varvid den släpper fisken som örnen plockar upp. Havsörnar har setts flyga lågt över fiskeflockar under cirka 50% av 100 besök vid Vombsjön under november – mars (som mest sju örnar samtidigt). Det som mest fascinerar åskådaren är att skrakar och skarvar inte visar några skrämselfreaktioner fastän örarna flyger på blott meterhöjd över dem – de verkar betrakta örarna på samma sätt som de betraktar de båda trutarterna. Intressant nog har även både gråhägrar och kråkor setts kretsa över fiskeflockarna, i kråkornas fall lågt över vattnet och så långt som 100 m från land. Kråkor har också setts flyga mot land med en glänsande fisk i näbben.