

Group feeding of Northern Fulmars *Fulmarus glacialis* on the hydrozoan *Sarsia princeps* on Svalbard

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Northern Fulmars *Fulmarus glacialis* are considered generalist feeders, eating whatever the ocean surface offers. Their prey includes (but is not restricted to) fish, squid, fisheries offal, discard and bait, polychaetes, small crustaceans, carcasses floating on the water surface (Mallory *et al.* 2012) and debris such as plastics (Kühn *et al.* 2022). Most diet studies in seabirds rely on stomach content analyses and are biased towards hard prey items, such as fish otoliths, eye lenses and bones, squid beaks, crustacean carapaces, bird feathers and polychaete jaws (Barrett *et al.* 2007). Soft prey digests often too quickly to be recognised in stomach contents and may therefore be underreported in most studies. The ingestion of soft prey may therefore be common, but is difficult to prove in traditional diet studies, although e.g., Phillips *et al.* (1999), Byers *et al.* (2010) and Mallory *et al.* (2010) report the occasional uptake of soft-bodied pteropods by Fulmars from Arctic Canada and Greenland. On Svalbard, Fulmar stomachs mainly contained hard prey remains of fish (e.g., Polar Cod *Boreogadus saida*, Redfish *Sebastes marinus* and Capelin *Mallotus villosus*), squid (e.g., *Gonatus fabricii*), polychaete (e.g., *Nereis irrorate*), crustaceans (e.g., amphipods, gammarids, euphausiids, etc.), but also here, pteropods were described (Lydersen *et al.* 1989; Erikstad 1990; Mehlum & Gabrielsen 1993). This current study provides evidence for the ingestion of hydrozoans by Fulmars on Svalbard, extending their known broad prey spectrum by another invertebrate group.

In July 2022, photographs of foraging Fulmars were taken during the SEES.NL/2022 expedition (Scientific Expedition Edgeøya Svalbard) onboard the vessel M/S Ortelius, operated by Oceanwide Expeditions. The expedition aimed to study consequences of human-related activities, such as climate change and pollution around the island of Edgeøya and compare data with earlier Dutch scientific expeditions from the 1960s onwards. On 14 July 2022, 20 nm north-east of the southern tip of Svalbard (76°44 N 017°38 E, see Figure 1), about 16 Fulmars were observed actively foraging behind the ship, occasionally competing for prey items just below the water surface. The prey seemed gelatinous, but could not be further identified at that moment.



Figure 1. Map of southern Svalbard with black circle representing the location of feeding Northern fulmars *Fulmarus glacialis*

Studying the available photographs, the prey species was later identified as a *Sarsia* species most likely *S. princeps*

(Haeckel, 1879) based on the more pointy exumbrella and pink colouration, compared with other *Sarsia* species, such as *S. tubulosa* (Brinckmann-Voss 1985; Brinckmann-Voss 2000; Dvoretzky & Dvoretzky 2010). *S. princeps* is a marine, meroplanktonic, neretic hydrozoan species (Dvoretzky & Dvoretzky 2010), that reproduces both asexually (through budding as hydroid) and sexually (through gamete release as medusa; Prudkovsky *et al.* 2023). It has a circumpolar Arctic distribution, including the wider Barents Sea region (Dvoretzky & Dvoretzky 2010), reaching as far south as Newfoundland in the Atlantic Ocean and the Strait of Georgia in the Pacific Ocean (Brinckmann-Voss, 1985). Based on environmental DNA metabarcoding, it was recently confirmed to occur in Kongsfjorden, at the northwestern coast of Svalbard (Murray *et al.* 2025), and a living specimen was collected in Ny-Ålesund harbour on 8 July 2025 (Figure 4). Diet consists of copepods and invertebrate larvae (Matsakis & Conover 1991). Arctic gelatinous zooplankton can have relatively high lipid levels, compared with zooplankton from lower latitudes. *S. princeps* has reported lipid levels of 7.8-9.1% of dry weight (Percy & Fife 1981), and has been observed to show visible lipid droplets within the stomach, and to a smaller extent in the radial canal, as a consequence of feeding on lipid-rich *Calanus* ssp. (Larson & Harbison 1989). Figure 2 shows a Fulmar catching *S. princeps*. Figure 3 shows different Fulmars with *S. princeps* prey remains in their bill, competing for the same prey individual. Most Fulmars within this group were of the dark colour phases, indicating local origin (Van Franker & Wattel 1982).



Figure 2. A

Northern Fulmar *Fulmarus glacialis*, which successfully caught an individual of *S. princeps* (2022). Photo: S. Kühn.



Figure 3.

Three Northern Fulmars *Fulmarus glacialis* competing for (the remains of) *S. princeps*. Photo: S. Kühn.

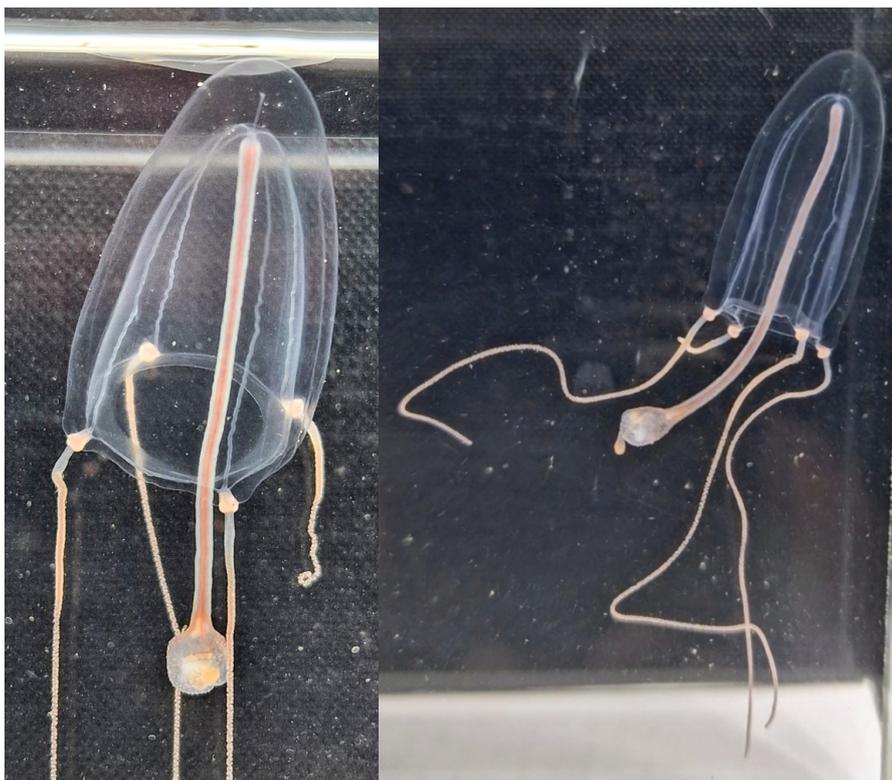


Figure 4. The hydrozoan *Sarsia princeps* caught on July 2025 in Ny-Ålesund harbour, Kongsfjorden, at western coast of

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the Svalbard. Photo's: F. Steenhuisen.

Soft prey materials are quickly digested and traditional diet studies usually rely on hard prey remains. Therefore, gelatinous zooplankton has rarely been described in seabirds such as the Fulmar (but see the record of *Veillela veillela* remains in Fulmar regurgitates from St. Kilda by Camphuysen & Van Franeker (1996)). The nutritious value of gelatinous zooplankton has been considered low in comparison with other prey species in the Antarctic region (Schaafsma *et al.* 2018), but may be higher in the Arctic (Larson & Harbison 1989). Beside the somewhat energy-rich gonads and stored lipids from prey (Larson & Harbison 1989), ingestion by predators was often related to crustaceans or juvenile fish, living in close association with some hydrozoan species (Harrison 1994; Camphuysen & Van Franeker 1996; Camphuysen 1998). However, once present in high densities, these animals may present an easy catch for surface-feeding seabirds (see e.g., Hamner & Schneider 1986). In the future, applying novel methods such as eDNA in stomach analysis, may further expand the list of prey species in seabirds, particularly for those species underrepresented in traditional stomach content analyses (Evans *et al.* 2025). Until then, photographs, such as used for the current study, can help to extend our knowledge on diet preferences and invertebrate prey spectra of seabirds such as Fulmars.

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Samenvatting

Noordse stormvogels (*Fulmarus glacialis*) worden beschouwd als generalistische foerageerders. Dieetonderzoek bij zeevogels is doorgaans gebaseerd op analyses van maaginhoud, waarbij resten van harde prooien, zoals vis, goed kunnen worden geïdentificeerd. Zachte prooi-soorten worden echter vaak snel verteerd en zijn daardoor niet meer herkenbaar, wat leidt tot een onderschatting van hun aandeel in dieetstudies. Tijdens de SEES.NL/2022-expeditie werd in het zuidoosten van Spitsbergen een collectieve foerageeractiviteit van *F. glacialis* waargenomen. Analyse van fotomateriaal maakte het mogelijk om de hydroïdpoliep *Sarsia princeps* (Hydrozoa) te identificeren als prooi-soort tijdens deze groepsactiviteit. Deze studie levert het eerste bewijs voor *S. princeps* als prooi van stormvogels op Spitsbergen en breidt de bekende diversiteit aan prooi-soorten van deze soort verder uit.

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