

**Project:** AFI 6/16

**GENE FLOW IN ANTARCTIC FISHES: THE ROLE OF OCEANOGRAPHY AND LIFE HISTORY**

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This research examines the influence of oceanographic processes, bathymetry and life history variation on dispersal and gene flow in two Antarctic fishes (*Champscephalus gunnari*, *Notothenia rossii*). Molecular markers (microsatellites and mtDNA) are being used to characterise population structure at both circumpolar and regional geographic scales; these will then be compared with predictions from oceanographic models.

### **Field objectives**

To acquire adequate sample sizes for genetic analysis, 60-100 adult individuals of each species were required from each of several locations including: Elephant Island, Deception Island and the South Orkney Islands. Sampling from these regions allows us to test the influence of local hydrology/currents around Antarctic Peninsula as well as that of larger systems within the Scotia Sea (via comparisons with samples already collected from Shag Rocks and South Georgia).

To collect adult fish of both species, two types of fishing gear were used: trammel nets and a rough ground otter trawl.

**Trammel nets:** To target *N. rossii*, we deployed trammel nets in shallow inshore waters of three islands including Deception (inner caldera), King George (Potter Cove) and Signy (Borge Bay). Trammel nets were typically left to fish over night, with an average fishing time of 16 hours (range of 4-6 deployments at each site). These nets are fitted with a lead line and anchored to the bottom, catching fish during times of benthic activity. A total of 151 *N. rossii* were collected in this manner.

**Otter trawls:** To target *C. gunnari* we deployed a rough ground otter trawl at four sites including Deception, King George, South Orkney Islands and Elephant Islands. Trawling sites were selected based on several factors including previous record of successful *C. gunnari* bottom trawling; in those sites without record of previous fishing, suitable bottom topography (assessed by swathe bathymetry) and depth; and the density of icebergs. A total of 12 successful trawls were completed, in waters of approximately 90-330 m depth (typically in range of 100-200 m). These included 1 NW of Deception, 1 E of King George, 8 W of Elephant, and 3 S of Signy. *C. gunnari* were caught at Elephant (n= 28) and Signy Islands (n=117).

### **Preliminary results**

For all target species, morphometric data was recorded including body length, mass, sex and reproductive condition. A tissue sample (either fin or muscle) was preserved in 95% ethanol, and otoliths were collected from each individual. Morphometric data will be analysed at the University of Wales, Bangor (UWB), as will otolith data once structural and compositional analyses are complete (via collaborators at University of Hull). DNA will be extracted from tissues, and molecular analyses using mitochondrial and microsatellite markers will be conducted at the UWB. Life history and phylo-genetic/geographic data will be combined with oceanographic data over the next two years to test models of population structuring by oceanographic processes.

Various photos (credits to Alastair Newton, Tony North, Jan Strugnell, Peter Enderlein)



Deploying the trammel net,  
Deception Island



First notothenioid catch, Deception Island



Trammel net buoys and marker, South Orkneys



Releasing the cod-end of the otter trawl



Sorting the trawl



Female *N. rossii* from South Orkneys



*C. gunnari*