



Long Nanny Transitional and Coastal Waters Surveys

March 2016 – February 2017



Report prepared by: Natalie Wallace

Northumberland Inshore Fisheries and Conservation Authority

8 Ennerdale Road

Blyth

NE24 4RT

Tel: 01670 797676

Email: nifca@nifca.gov.uk

Website: www.nifca.gov.uk

Abstract

The purpose of this report is to assess the state of Transitional and Coastal Waters (TrAC) fish species in the Long Nanny river to evaluate the importance of the site as feeding grounds for tern species and for small/juvenile fish. Estuarine seine nets were deployed at 4 locations, all fish were identified to species level and total length was measured for a sub-sample of each species.

A total of 10 fish species were identified. The most common species were Lesser Sandeel (*Ammodytes tobianus*), Goby spp., Flounder (*Pleuronectes flesus*) and 3-Spined Stickleback (*Gasterosteus aculeatus*). Mean length was below size at maturity values obtained for several species (including herring (*Clupea harengus*), lesser sandeel, pollack (*Pollachius pollachius*), turbot (*Scophthalmus maxima*) and Flounder suggesting a high number of juveniles occurring at the site.

This report is intended to provide baseline information relating to which species and life stages of fish occur at Long Nanny, in order to inform future management of the site.

Introduction

The Little Tern (*sterna albifrons*) is second rarest seabird to breed in the UK (RSPB, 2015). Food availability is a major factor regulating populations (Furness and Hislop, 1981). Therefore, it is important to understand the relationship between prey stocks and seabird populations (Furness and Nettleship, 1991). Little terns are opportunistic, foraging closer to breeding colonies than other tern species in shallow fresh, brackish and marine waters targeting small fish, crustaceans and insects (Cramp, 1985).

The Northumberland Inshore Fisheries and Conservation Authority (NIFCA) were approached by Jane Lancaster (the National Trust Warden for the Low Nanny Little Tern site) who was keen to establish levels of tern food species within the area (mainly sandeel, juvenile sprat and herring). As a result, NIFCA carried out monthly surveys (subject to sea conditions and outside little tern breeding season) of juvenile and small fish species at the Long Nanny River.

Methods

A series of TrAC (Transitional and Coastal Monitoring) fish surveys were conducted at Beadnell Bay. The surveys were carried out on a monthly basis (subject to sea conditions and outside of tern breeding season) between March 2016 and February 2017 by NIFCA officers, members and volunteers from Newcastle University, the Environment Agency, Northumberland Wildlife Trust and the National Trust. A series of TrAC (Transitional and Coastal Monitoring) fish surveys were conducted at the Long Nanny river. The surveys were carried out monthly (subject to sea conditions) between March 2016 and March 2017 by NIFCA officers, members and volunteers from Newcastle University, the Environment Agency, Northumberland Wildlife Trust and the National Trust.

Study Site

The Long Nanny River is located approximately halfway along Beadnell Bay, a 3.2km sandy bay, located between the small coastal villages of Beadnell and Newton-by-the-Sea in Northumberland (Figure 1). Beadnell Bay is a large shallow inlet and bay and is therefore one of the designated features of the Berwickshire and North Northumberland Coast Special Area of Conservation (BNNC SAC). The study site also falls within the Northumbria Coast Special Protection Area (SPA) and the Northumberland Shore Site of Special Scientific Interest (SSSI) due its importance for a variety of bird species. The Long Nanny is a nationally important site for Little terns (approximately 2% of the British breeding population) and Arctic terns (*Sterna paradisaea*) (home to the largest mainland UK breeding colony) (National Trust, 2017).

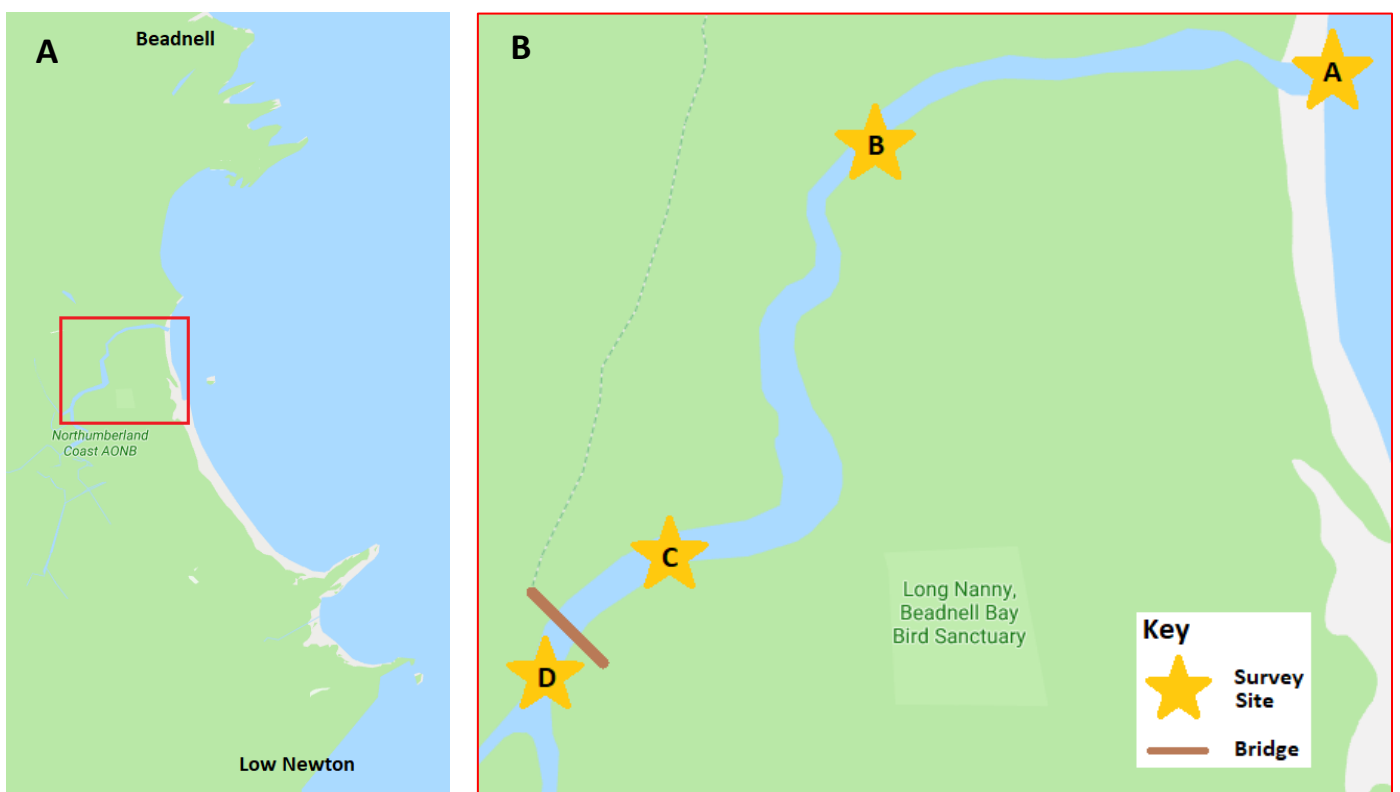


Figure 1. A] Location of the Long Nanny river between Beadnell and Low Newton. B] Location of the surveys sites.

Survey methods

Data relating to the fish species present in the Long Nanny River were collected using an estuary seine net at four locations. The surveys were conducted monthly (weather permitting) on a rising tide (flood).



An estuary survey seine net 43m in length and 4m in depth (210/12 with 6.5mm and 14mm mesh size), complete with lead weights on the footrope and floats on the head rope was deployed from the shore. The first tow line was fastened ashore and the net was walked out in a wide arc returning to the beach (FAO, 2013). The headrope (with floats) was on the surface, the footrope was in permanent contact with the bottom and the seine acted as a barrier which prevents the fish escaping from the area enclosed by the net (FAO, 2013). The seine net was then pulled ashore by a number of individuals (Environment Agency, 2011) with the ground rope reaching the beach first, herding the fish towards the shore and into the net (FAO, 2013).

The species caught were then removed from the net and placed into buckets of water (collected at each survey location). Fish species were identified using the Environment Agency 2009 manual “Key to the marine and freshwater fishes of Britain and Ireland” and measured to the nearest millimetre using a fish measuring board.



Results

Comparison of the Survey Sites.

A total of 945 fish were caught during the Long Nanny Surveys. Survey site A yielded the lowest overall catch of 61 individual fish during the course of the survey, compared to 241, 389 and 254 fish for sites B, C and D respectively. A more diverse range of species were recorded for Site C with 9 species recorded (7 species site A, 3 species site B and 8 species site D).

Species Caught and Presence of Juveniles

A total of 10 fish species were identified during the course of the study. Tables 1 and 2 provide details of the species caught and data pertaining to mean length (mm). Table 1 also includes size at maturity values for the commercially important species caught. Lesser sandeel were the most abundant species with 474 individuals caught. The four most abundant species as a proportion of total catch can be seen in figure 2.

Table 1. Total catch, mean length and size at maturity for the commercially important species caught during the Beadnell Bay surveys. Pink cells indicate where mean length was smaller than size at maturity for that species.

| Species | Total no. caught | Mean Length (mm) | Size at maturity (mm) | References |
|--|------------------|------------------|--------------------------------------|---|
| Atlantic Herring (<i>Clupea harengus</i>) | 2 | 47.5 | 175 | Ellis <i>et al.</i> (2012); ICES (2009) |
| Lesser Sandeel (<i>Ammodytes tobianus</i>) | 474 | 88.6 | 130 | Ellis <i>et al.</i> (2012); ICES (2009) |
| Trout (<i>Salmo trutta</i>) | 15 | 492.9 | 160-400 | Jonsson <i>et al.</i> (2001) |
| Pollack (<i>Pollachius pollachius</i>) | 6 | 109.7 | 580 (males) 625 (females) | Cargnelli <i>et al.</i> , (1999) |
| Flounder (<i>Pleuronectes flesus</i>) | 82 | 65.1 | 300 | MSEP (2014) |
| Turbot (<i>Scophthalmus maxima</i>) | 3 | 51.3 | 340-400 (females) 400-450 (males) | Caputo <i>et al.</i> , (2001) |
| European Eel | 1 | 270.0 | Unknown | MSEP (2014) |

Table 2. Total catch and mean length for the non-commercially important species caught during the Beadnell Bay surveys.

| Species | Total no. caught | Mean Length (mm) |
|--|------------------|------------------|
| Goby Sp. | 135 | 37.9 |
| 3-Spined Stickleback (<i>Gasterosteus aculeatus</i>) | 40 | 41.1 |
| 15-Spined Stickleback (<i>Spinachia spinachia</i>) | 9 | 82.3 |

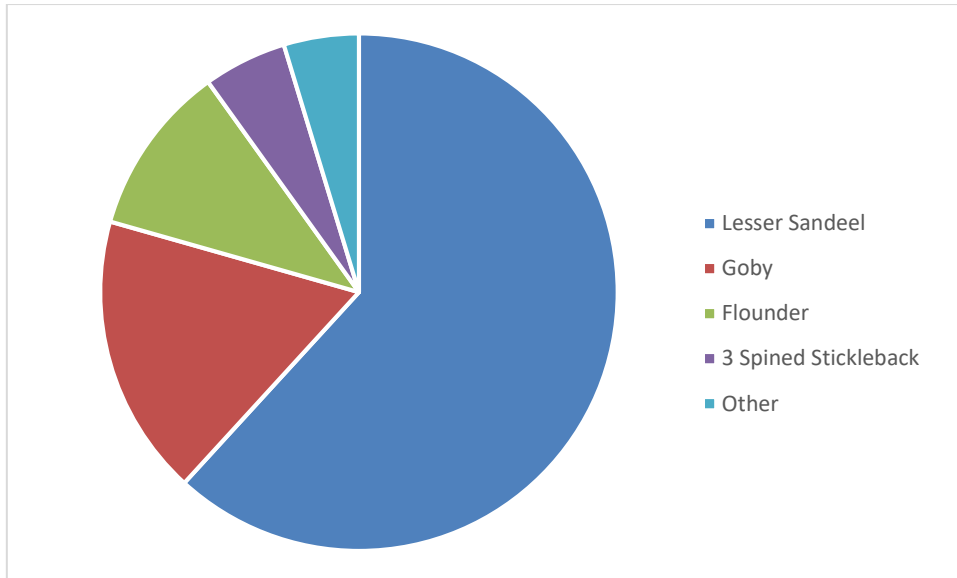


Figure 1. Four most abundant species as a proportion of total catch

Seasonality

The highest number of fish caught during any survey was in October (157 fish, Figure 3), this (tied with August) was also the most diverse month with 7 species recorded (Figure 4). Although there is no apparent relationship between month and number of species, there appears to be a seasonal trend associated with fish abundance, with number of fish caught greater in the summer.

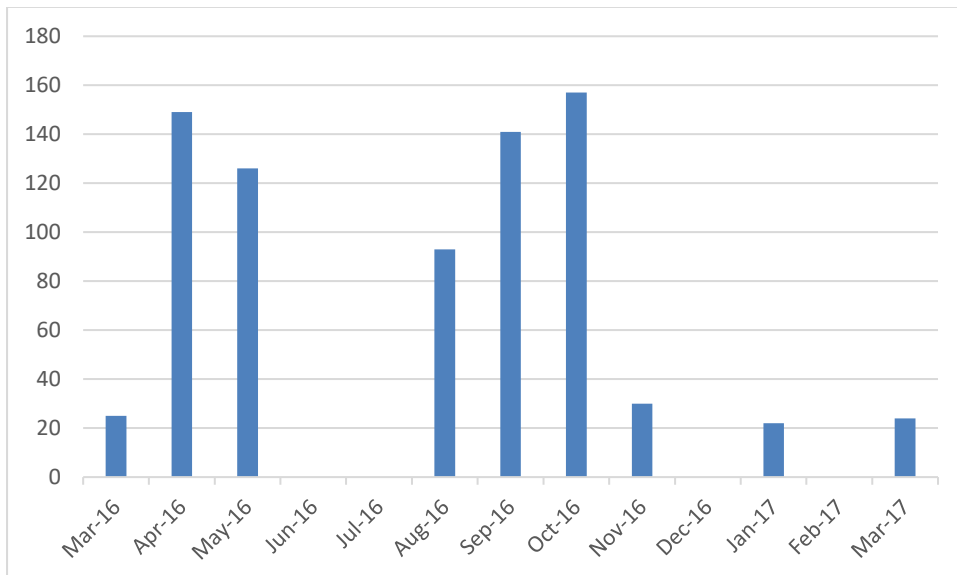


Figure 3. Number of fish caught per month.

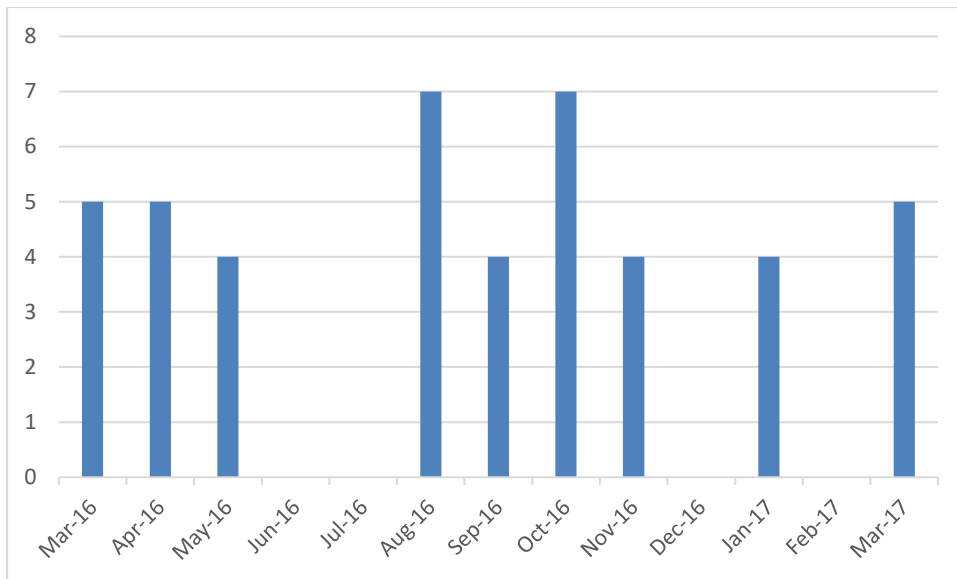


Figure 4. Number of species caught per month.

Discussion

Comparison of the Survey Sites.

Both the highest overall catch and greatest species diversity were observed at site C. This site is typically submerged even at low tide unlike sites A and B. Habitat complexity is also greater at site C due to large quantities of weed which provide cover/protection.

Species Caught and Presence of Juveniles

Beach seine nets are highly unselective, catching a high diversity of fish species (Hillman, 2011), therefore it is assumed that the catch is representative of the species present at the time of each survey. Of the 10 species caught the four most abundant were lesser sandeels, goby spp., flounder, and 3-spined stickleback).



Lesser Sandeel

Mean length was below the corresponding Size at Maturity for the commercially important species listed in Figure 1 (except for European Eel and Sea Trout), suggesting a) a high proportion of the individuals caught were juveniles, b) Long Nanny is an important site for juvenile fish. It is important to note that the size at maturity values obtained (Table 1) are approximations and may not be accurate for Beadnell Bay/Long Nanny. Size at maturity values are not available for the species in Table 2.

Seasonality

Populations of small fish species increase throughout summer reaching a maximum in August corresponding with the availability of resources (Thorman and Wiederholm, 1983). Figure 3 clearly shows that the number of fish caught in summer is higher than winter. The

highest number of fish caught during any of the Long Nanny surveys was in October (157 fish, Figure 3). No survey was conducted in June or July therefore we cannot be sure exactly when the peak in fish abundance occurred, but it can be inferred that fish (sandeel in particular) are in abundance during tern nesting season and therefore an available food source. The number of species caught per month remained relatively constant throughout the year, the greatest number of species recorded was 7 in August and October (Figure 4).

Future Study

The data collected by NIFCA during the Long Nanny Surveys will be used to inform a larger project looking at the factors driving food provisioning in Little Tern (*Sternula albifrons*) (Nick Brodin, in progress).

Conclusions

The purpose of this report is to assess the state of Transitional and Coastal Waters (TrAC) fish species in the Long Nanny to evaluate the importance of the site for small/juvenile fish and as feeding grounds for tern species. This study has provided an initial assessment of what fish species occur in the Long Nanny, with 10 species identified and a significant proportion of the fish caught were juveniles. The results here indicate that there is a higher abundance of fish at the site during the summer months corresponding with tern breeding season, however further research is needed to determine whether the site is a significant feeding area for terns.

Acknowledgements

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