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MRV *Alba na Mara*

Survey 0223A

REPORT

26 January – 10 February 2023

Loading: 21 January 2023, Fraserburgh
Sailing: 26 January 2023
Unloading: 10 February 2023
Fishing Gear: Scallop dredges
Project: 16 days, SCALOP

Personnel

S Kinnear (SIC)
J Turriff
P Gibson

Objectives

1. To carry out a survey of scallop stocks around Shetland.
2. To age, measure and assess shell damage on all scallops caught.
3. To identify, quantify and damage assess by-catch.
4. To collect whole scallops for heavy metal and organic contaminants testing.
5. To collect scallops for genetic and shell isotope analysis to assess connectivity among scallop grounds in Shetland.
6. To record and retain marine litter obtained during the dredging process for UK Marine Strategy.

Introduction

Scallops are bivalve molluscs that live in the coastal waters around Scotland and the wider north-east Atlantic. They can be found on the seabed anywhere from just below the low water mark to depths exceeding 100 m, preferring sediments comprising sand, gravel and mud, sometimes interspersed with stones, rocks or boulders. The king scallop is the second most valuable shellfish species in Scotland with landings by Scottish vessels in 2021 over 17,000 tonnes and worth almost £30 million (Sea Fisheries Statistics, 2021 Scottish Sea Fisheries Statistics 2021 - gov.scot (www.gov.scot)).

Dredge surveys of the scallop grounds around Scotland have been carried out by Marine Scotland Science (MSS) since the mid-1990's (partial surveys of the west coast began in the late 1980's). There are currently four surveys each year which collectively cover the major scallop fishing grounds to the west of Scotland (including Clyde), the North Sea (Scottish coast) and around Shetland.

MSS has carried out 26 surveys around Shetland with the first one being carried out in 1995. Thereafter, surveys were done on an annual basis with 1997, 2014 and 2015 the only years where they did not take place due to bad weather. Three vessels have been used to conduct the surveys, *Cornucopia* in 1995 and 1996, *Clupea* from 1998 to 2008 and Marine Research Vessel (MRV) *Alba na Mara* from 2009 to the present day.

The main aim of the survey is to collect standardised catch rate data for king scallops for use in stock assessment.

Method

The surveys have a fixed station design. The station locations were originally determined with reference to British Geological Survey charts to locate sediments suitable for scallops and also using knowledge of the fishing grounds contributed by skippers fishing at the time when the surveys first took place. There are around 90 fixed stations which have been historically fished around Shetland, however, these are not all carried out every year as the survey can be affected by time constraints, bad weather, aquaculture activity and closed areas. The west of Shetland is not covered on a regular basis due to the prevailing westerly winds limiting access by a small research vessel. An average Shetland survey of this duration with favourable weather conditions would aim to fish 40 to 50 of the stations.

Two dredge arrays are fished (one either side of the vessel). One array consists of standard commercial spring-loaded Newhaven type dredges (2.5' wide, 9 tooth bar, with 80 mm internal diameter belly rings, Type A, referred to as S9 fished from the starboard side). The second array consists of smaller configuration sampling dredges with 11 teeth and smaller diameter belly rings (Type B), more similar to commercial gear for queen scallops (*Aequipecten opercularis*) (2.5' wide, 11 tooth bar, with 60 mm internal diameter belly rings, referred as P11 fished from the port side). This side of gear is configured to catch smaller scallops compared to the commercial dredges.

At each station the dredges are towed at a speed of about 2.5 knots for approximately 30 minutes with both sides of dredges on the seabed. All king scallops caught are aged and measured (length to the 0.5 cm below) in accordance with the MSS Scallop aging standard operating procedure and damage assessed in accordance with the damage index**Error! Bookmark not defined.**. The total width of dredges used in the survey has changed over the survey time series. Catch rate data are, therefore, further standardised and expressed as numbers caught per hour per metre dredge width (N hr-1 m-1).

Bycatch, including starfish, are collected, identified, measured, sexed and damage assessed, with the same damage index referenced for the scallops, where appropriate.

Any additional requests are also carried out if there is scope to do so.

Results

A total of 41 stations were fished, covering five ICES statistical rectangles around Shetland (Figure 1). Bad weather was the cause of the loss of five days fishing and limited the suitability of areas to fish. A total of 7985 scallops were caught (4732 port side and 3253 starboard) which were all measured, aged and assessed for shell damage. This compares to 8096 scallops caught in 40 hauls on the 2022 survey (Table 1).

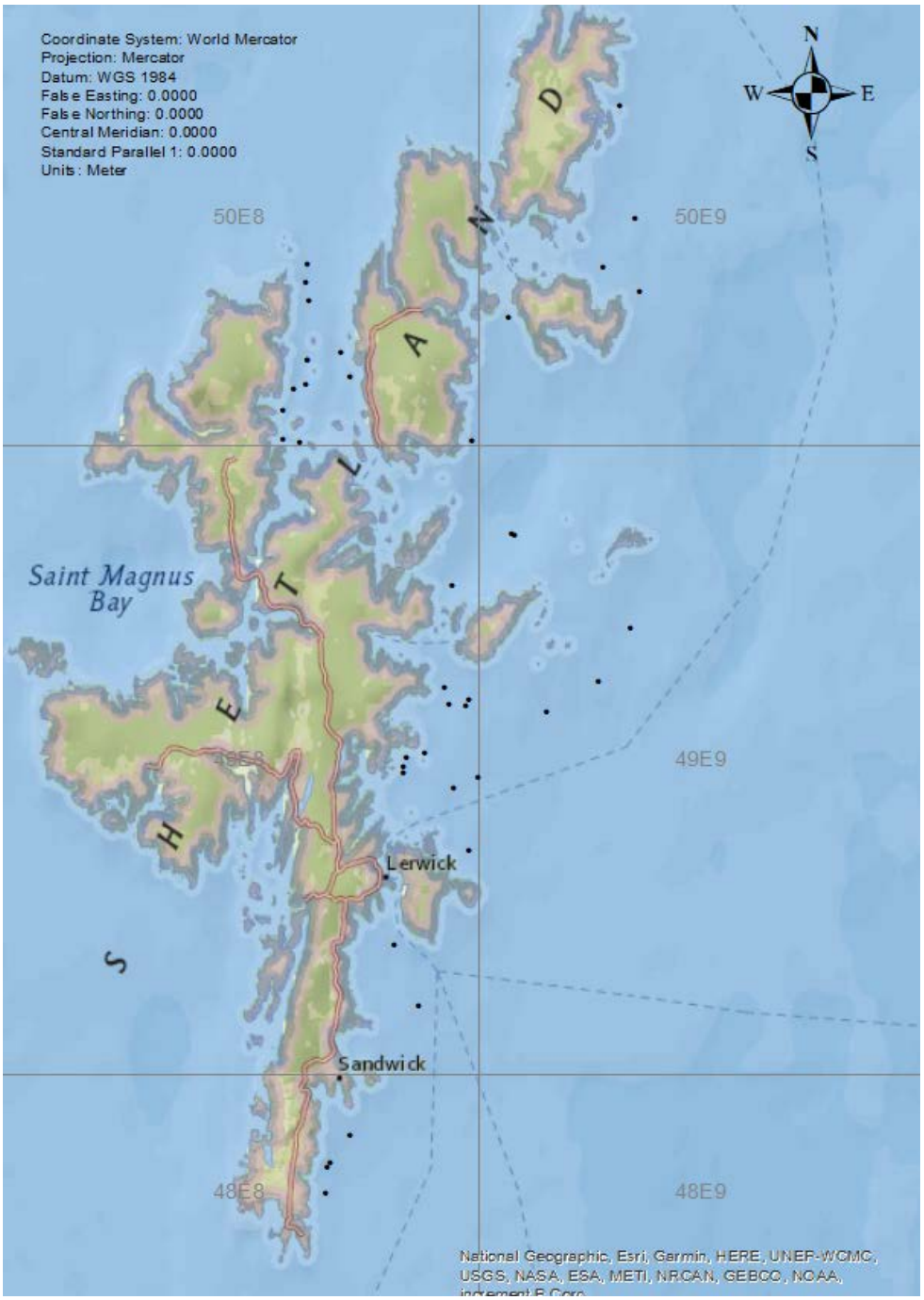

Figure 1: Station start positions for 2023 MSS Shetland scallop dredge survey.

Table 1: MSS Shetland scallop dredge survey stations, 2009-2023, with number of stations sampled and total number of king scallops caught. Note that the number of stations includes foul hauls in brackets.

Cruise	Vessel	Year	Start date	End date	No. stations	No. scallops
0223A	Alba na Mara	2023	26-Jan-23	10-Feb-23	41	7985
0222A	Alba na Mara	2022	26-Jan-22	13-Feb-22	40	8096
0221A	Alba na Mara	2021	25-Jan-20	10-Feb-21	37(1)	7441
0220A	Alba na Mara	2020	25-Jan-20	09-Feb-20	52(1)	14744
0219A	Alba na Mara	2019	24-Jan-19	06-Feb-19	65(5)	12040
0218A	Alba na Mara	2018	25-Jan-18	07-Feb-18	43(6)	7547
0217A	Alba na Mara	2017	23-Jan-17	04-Feb-17	27	5033
0216A	Alba na Mara	2016	26-Jan-16	08-Feb-16	19	2260
0113A	Alba na Mara	2013	08-Jan-13	19-Jan- 13	75	6977
0212A	Alba na Mara	2012	23-Jan-12	06-Feb-12	64	6200
0211A	Alba na Mara	2011	31-Jan-11	14-Feb-11	68(3)	11219
0310A	Alba na Mara	2010	15-Mar-10	29-Mar-10	87(2)	12870
0309A	Alba na Mara	2009	17-Feb-09	03-Mar-09	53(5)	6432

King scallop lengths ranged from 3.5 to 16.5 cm with the highest number of scallops recorded between 11 and 12 cm (Figure 2). King scallops were aged between two and ten years old (note that age ten is a plus group (meaning >10) as it is difficult to identify annual age rings in scallops older than age ten) with the highest number of scallops aged six (Figure 3). Two year olds were reported at seven stations and three year olds were reported at 37 stations. Standardised indices will be worked up as part of the next stock assessment.

All scallops were assessed for damage. Approximately 95% of the scallops caught had a damage index of two; meaning that the edge of the shell was chipped but that the scallop is highly likely to survive. The remainder were assessed as damage level three or four, meaning that the hinge was broken, or the scallop was crushed or dead.

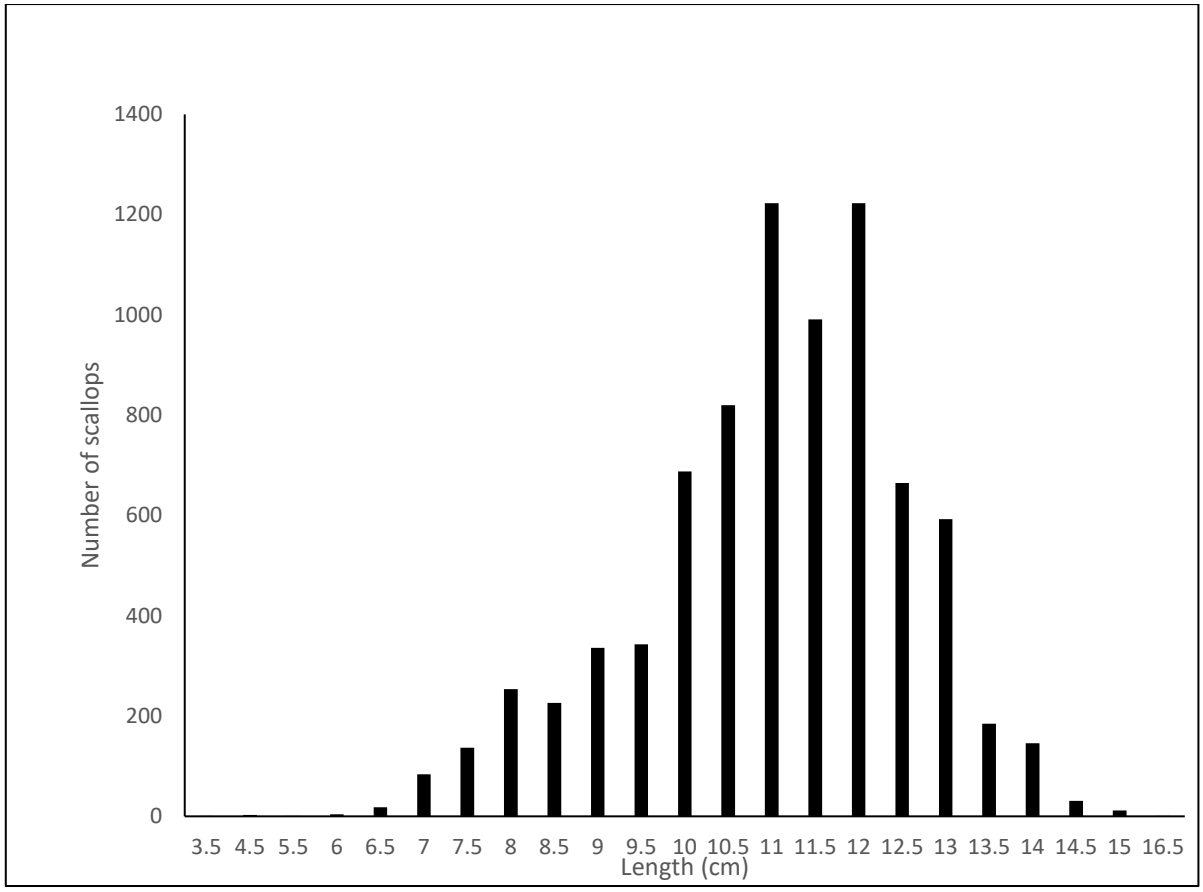

Figure 2: MSS Shetland scallop survey. Total number of king scallops at length caught on the 2023 survey.

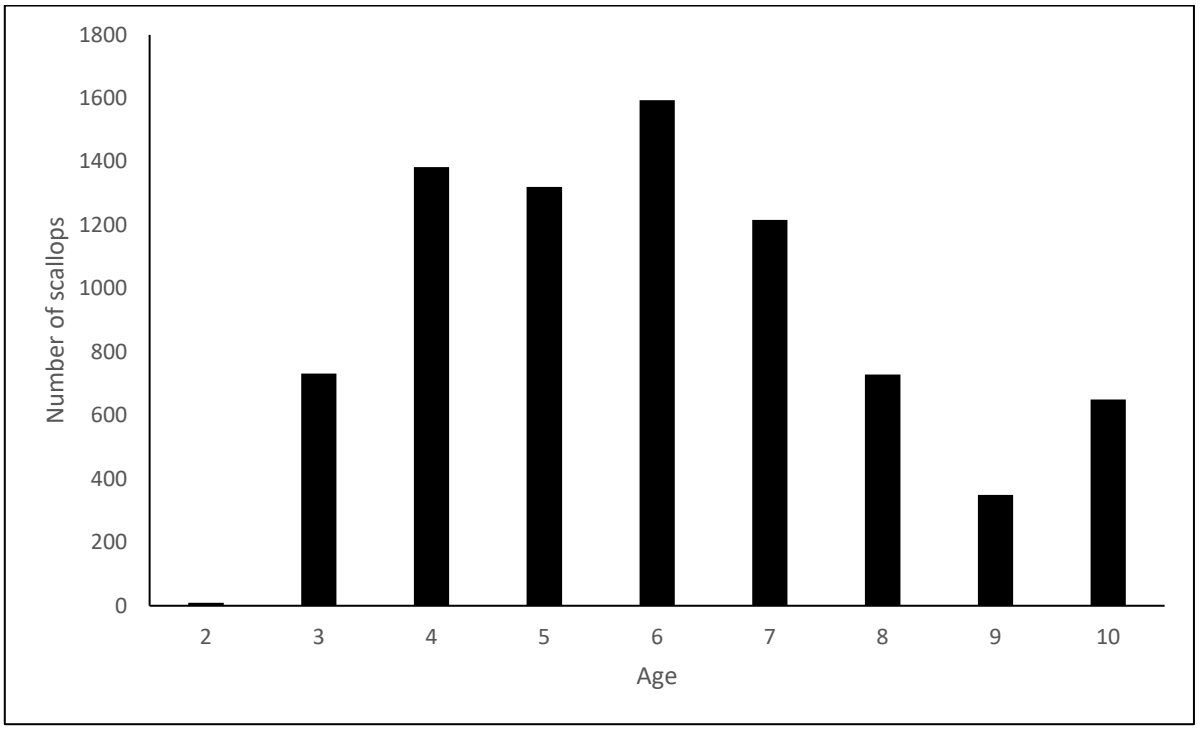

Figure 3: MSS Shetland scallop survey. Total number of king scallops at age caught on the 2023 survey (note scallops aged ten include the 10+ category).

Bycatch

In addition to king scallops, 565 other bycatch individuals (excluding starfish) were identified, measured and assessed for damage (Table 2). The most numerous by-catch species were red whelk (205 individuals), queen scallops (129 individuals), and common whelk (91 individuals). A total of 3401 starfish were also identified to species level and assessed for damage with the common starfish (1905 individuals), common sun star (319 individuals) and bloody henry (293 individuals) the most commonly caught (Table 3).

Table 2: MSS Shetland scallop survey 2023. Total number of bycatch individuals by species (excluding starfish) and average damage index**Error! Bookmark not defined.**.

Common name	Scientific Name	Total	Average of Damage
Red whelk	*Neptunea antiqua*	205	2
Queen scallop	*Aequipecten opercularis*	129	2
Common whelk	*Buccinum undatum*	91	2
Cuckoo ray	*Raja naevus*	40	2
Brown crab	*Cancer pagurus*	39	3
Monkfish	*Lophius piscatorius*	36	3
Thornback ray	*Raja clavata*	8	3
Lemon sole	*Microstomus kitt*	5	3
Arctica	*Arctica islandica*	3	3
Lesser spotted dogfish	*Scyliorhinus canicula*	3	2
Plaice	*Pleuronectes platessa*	2	3
Common dab	*Limanda limanda*	1	4
Common dragonet	*Callionymus lyra*	1	1
Norwegian stone crab	*Lithodes maja*	1	3
Starry ray	*Amblyraja radiata*	1	2
Grand Total		565	2

Table 3: MSS Shetland scallop survey 2023. Total number of starfish species caught and average damage index**Error! Bookmark not defined.**.

Common name	Scientific Name	Total	Average of Damage
Common starfish	*Asterias rubens*	1905	1
Seven armed starfish	*Luidia ciliaris*	477	2
Common sun star	*Crossaster papposus*	319	1
Bloody henry starfish	*Henricia sanguinolenta*	293	1
Sand star	*Astropecten irregularis*	217	2
Purple sun star	*Solaster endeca*	92	1
Starlet cushion star	*Asterina gibbosa*	75	1
Cushion starfish	*Porania pulvillus*	11	1
Goose foot starfish	*Anseropoda placenta*	7	2
Spiny starfish	*Marthasterias glacialis*	4	1
Brittlestar	*Ophiura ophiura*	Present- no count available	2
Grand Total		3401	1

Scallop collection for chemical analysis

Forty scallops from four ICES statistical squares were collected and frozen for heavy metal and organic contaminants testing – results will be used to assess scallop tissues can potentially be used to improve the spatial coverage of regional status and trends of contaminants in biota as part of the UK annual monitoring programme.

Scallop collection for genetic and shell isotope analysis

Scallops from six stations were collected for genetic material to assess connectivity among scallop grounds in Shetland.

Marine litter

Marine litter was recorded and retained during dredging process at every station. This is done routinely as part of monitoring for the UK Marine Strategy). On this survey 85 items of litter were recorded and retained from 20 stations on this survey, with plastics and fishing items most common.

Conclusion

The survey was completed successfully, as far as weather and time constraints allowed. On return all data were checked and uploaded to the relevant databases.

The latest stock assessment report is available at:

https://data.marine.gov.scot/dataset/scottish-scallop-stocks-results-2016-stock-assessments

The survey data also support Scotland's National Marine Plan and latest marine assessments can be found:

Scotland's Marine Assessment 2020 | Scotland's Marine Assessment 2020

A big thank you to all staff involved in contributing to the survey.

Shona Kinnear

Date submitted: 27/03/23

Iain Gibb

Error! Bookmark not defined. Veale, L.O., Hill, A. S., Hawkins, S. J. and Brand, A. R. 2001. Distribution and damage to the by-catch assemblages of the northern Irish Sea scallop dredge fisheries. Journal of the Marine Biological Association of the United Kingdom, 81: 85-96.