FACTSHEET: Research surveys shellfish Wadden Sea (MOSKOK)

Version: [v1, 30/03/2023]

Sampling protocol: MOSKOK

Sampling objective(s): stock size estimates and time series for commercial bivalve species on the intertidal flats of the Dutch Wadden Sea

Start of sampling: 1990

Sampling ongoing: yes

Data use

Primary: Annual stock assessments of commercially exploited bivalve species are used by the Dutch ministry of agriculture, nature and food quality (LNV) to manage permits for fishery on cockles *(Cerastoderma edule*) blue mussels *(Mytilus edulis)* and Pacific oysters *(Crassostrea gigas).*

Secondary: Annual stock assessments and time-series are used for evaluations of changes in fishery policy (LNV), changes in nature policy and management (LNV, the Dutch ministry of infrastructure and water management - through their executive agency Rijkswaterstaat), and are also used for various environmental impact studies (Rijkswaterstaat, fishery industry and other industries e.g. electricity grid operators) and fundamental scientific research (universities and research institutes e.g. Royal NIOZ), also in a trilateral framework (Common Wadden Sea Secretariat, TMAP).

Sampling design and method

The research area is the intertidal part of the Dutch Wadden Sea. Approximately 1100 stations are sampled annually in spring (April-June) in a stratified setup where the density of stations is increased (and the distance between stations reduced) in areas with an elevated encounter chance of target species. Four different strata are distinguished. Every sampling station is representative for a certain surface area, that differs between the strata. Stock sizes are estimated based on the spring survey results. For the cockle fishery permits, the spring stock size is extrapolated to the stock size expected to be present on September 1st because of the importance of the species as a staple food source especially during winter for shellfish-eating birds such as the oystercatcher. The extrapolation is made based on the spring stock assessment and average values for growth and mortality during summer. Starting in 2023 an annual resampling of 300 stations is carried out in September, to assess the actual summer mortality, which may have implications for the fisheries quota if the deviation is considered too high.

Sampling protocol and data capture

In the field: The survey is performed with a former cockle-fishery-vessel, the YE42 “Anna Elizabeth” that is still equipped with a much-needed suction installation. Bottom samples are taken using four devices, all of which sample the seafloor to a depth of 7 cm:

1. Suction grab: a mechanical suction dredge that was modified for research.The sample is sieved in the suction and flushing installation, and if needed sieved further manually.
2. Hydraulic grab: a large hydraulic grab, with a surface area sampled of 1.06 m2, is used to sample dense oyster beds. The sample is deposited in a large sieve on deck where it is flushed and sieved.
3. Cockle dredge: a small dredge on a stick, operated manually from a small boat to a water depth of ca. 3.0 m. Three samples are pooled per station, with a total surface area of 0.1 m2. The samples are sieved manually, put in labelled bags and processed further in the lab on board.
4. Ring: stations that are located at relatively high elevations need to be sampled on foot using a PVC ring that is pushed into the sediment. All sediment is scooped out in a sieve. Per station two rings are taken, totalling a surface area of 0.1 m2.

Dense oyster and mussel beds are only sampled using either the suction grab or the hydraulic grab. These devices cannot be operated within the boundaries of cable areas. All samples, regardless of the device used, are sieved over a mesh of 5 mm. Data are entered in an Access database. Backups are

made daily. All practical work is completed on board. Approximately 200 sampling stations are sampled by employees of the Wadden Unit, part of LNV. The Wadden Unit only uses the cockle dredge and the ring. Samples are sieved, sorted in the appropriate species and classes, sealed in labelled plastic bags, frozen and sent to the WMR laboratory in Yerseke using cooled transport. The 300 samples in September to assess summer mortality are all taken by the Wadden Unit in the same manner as in spring, except this time cockles are sorted exclusively, no other species.

In the lab: Samples taken by the Wadden Unit are processed in the same manner as on board of the YE42, except that all animals have deceased and consequently have lost seawater from the shell cavity. A correction is made for the water loss, from the total weight of the animals in- and excluding the excess water from the sealed bag.

At the office, the data are used to calculate stock sizes for the primary target species. Stock sizes are calculated as the total number of individuals and as the total biomass (fresh weight including the shell), by multiplying the number or biomass per square meter per station with the total surface area represented by that station and summing up the values of all stations. The cockle stock is extrapolated to the stock present on September 1st using average growth and mortality values derived from earlier research.

Data quality

Quality checks are conducted upon processing at the institute, and before entry into the database. Standardized checks include checks for outliers in numerical data (e.g., sampled surface area, subsampling factor, number of individuals, biomass and/or length measurements) This is done either by plotting or by providing minimum, mean, and maximum values. Text variables are checked for consistency (e.g., station coding, crew members, gear type, grid information). Checks for missing values are performed. In addition, coordinates are checked on a map and compared to planned locations plus planned sampling-grid information.

Data storage

National database: CSO shellfish database

International database: -

Data availability

Institutional availability: data is available for reporting about a month after the survey ends.
Internal availability is described in Proc_databases

Public availability: data is made available once a year in the first quarter
https://www.wur.nl/nl/artikel/Schelpdiermonitor.htm

Reference to full documentation:

Troost, K., M. van Asch, E. Brummelhuis, D. van den Ende, J. Perdon, C. van Zweeden, J. van Zwol, J. van der Pool & Y. van Es, 2023. Handboek bestandsopnames schelpdieren WOT Versie 4, januari 2023. Internal CVO report: 22.017 (CVO_h002).

Review frequency full documentation: annually or biennially

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