

**THE USE OF INTERTIDAL SALT MARSH CREEKS AS FISH NURSERY
AREAS: A SEASONAL SURVEY OF THE FISHES IN NORTH BULL ISLAND,
DUBLIN BAY**

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ABSTRACT

The presence of juveniles of 10 fish species in two salt marsh intertidal creeks in Bull Island, Dublin Bay supports the premise that they serve as nursery areas.

The creeks were sampled from June 2000 till September 2001 to determine the seasonal composition, abundance and distribution of fish species. A 1 m × 1 m trawl net with a 1 cm mesh was used almost every month and the samplings included both ebb and flood phases, so as to reduce sampling bias to a minimum. Water temperature and salinity were measured *in situ* with an ST probe. Water samples were also taken for SPM and Chlorophyll *a* determination.

All fish caught were counted and weighed and their total length was determined. The resident gobies dominated the catches, but also juveniles of exploited and threatened species such as the bass, *Dicentrarchus labrax* and the catadromous *Anguilla anguilla* were hosted. Only one species was taken in October 2000 and the highest number of species at any one time (6) in September 2001.

Four indices were calculated. The Shannon-Wiener species diversity index (H'), the Shannon-Wiener Evenness Proportion (SEP), the “species richness” component (D), and the “Evenness” index of Pielou (J') were used to assess differences between the sampling sites and between seasons. All index values indicated low heterogeneity and diversity within the fish community.

The estuarine fish using the intertidal marsh creeks have rarely been studied in Europe and the role these habitats play for them remains largely uninvestigated. The need for similar research is stressed.

TIDAL, DIEL AND LUNAR CHANGES IN ESTUARINE MARSH NEKTON**Henrietta Hampel and Andre Cattrijsse**

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ABSTRACT

The utilisation of a brackish estuarine marsh by nekton was investigated over a lunar cycle in August 1994. The nekton migrating in and out of the intertidal creeks of the marsh 'Het Verdrongen Land van Saefinghe' in the Westerschelde estuary, SW Netherlands, was sampled passively during 7 complete tidal cycles. Sampling one tidal cycle yielded three consecutive flood samples and four consecutive ebb samples. Sampling occasions, occurring every two to three days, covering all diel and lunar situations, allowed comparing tidal, diel and lunar influences on the composition of the intertidal nekton fauna.

Two different tidal migration modes were observed. The mysid shrimp *Mesopodopsis slabberi* showed maximum abundance around high tide. For the remaining common nekton species: the mysid *Neomysis integer*; the shrimps *Palaemonetes varians*; the amphipod *Corophium volutator*; the crab *Carcinus maenas* and the goby *Pomatoschistus microps*; highest densities were recorded during lower water heights. The fauna assemblage shifts clearly between the different tidal stages. The total amount of detritus was found to be the most important parameter structuring the assemblages.

On two occasions consecutive day and night samples were taken. Total densities were clearly higher during night samples. During full moon a clear difference in community composition was noticed between the night and the day samples. During neap tide, differences between day and night were less clear.

No clear correlation was found between water height and total nekton densities except for the two most abundant species *Mesopodopsis slabberi* and *Neomysis integer*, of which recorded averages were higher during spring tide and lower during neap tide. A clear shift in community composition was observed between the spring tide and the neap tide, with water height as the main environmental factor.

**THE USE OF SEDIMENTARY INTERTIDAL SYSTEM AS RECREATIONAL
HAND FISHING AREA AND ITS IMPACTS ON EELGRASS BEDS (*ZOSTERA
MARINA*) IN WEST BRITTANY (FRANCE)**

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ABSTRACT

Hand fishing on intertidal soft sediments for bivalves on the low-water period of spring tides induces strong perturbations of sediments and associated fauna and flora. This activity has been increasing these last years and the tools used are becoming more and more destructive for the biotope. Many of the sediments sheltering rich populations of Veneridae and other bivalves are often colonised by *Zostera marina* beds. *Zostera* beds are recognised as habitats of high value in term of patrimonial, ecological and economic interests. A study aimed at understanding the consequences of the the hand fishing perturbations on habitat and on community of the *Zostera* beds is carried out in West Brittany in the bay of Brest. The first results show that the impacts on the habitat are both on the the *Zostera* population and on the sediment characteristics. The impacts on the associated community result in a drastic decrease of specific and functional biodiversity, abundance and biomass. Small opportunistic polychaetes became dominant and, according the frequency of the perturbation, the *Zostera* beds community is progressively replaced by a heterogeneous muddy sand community. This human activity can be considered as contributing to the uniformisation and standardization of the soft sediment intertidal system by decreasing the diversity of habitats, ecosystem functions and species. From these results, we suggest that management proposals should be developed to decrease the impacts, while taking in account the sensitivity of the users of the intertidal area towards their traditional fishing activity.

MACROFAUNA ORGANISATION AND VARIABILITY IN INTERTIDAL BOULDER FIELDS

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ABSTRACT

Boulder fields are between hard and soft sediments, and are consequently very heterogeneous habitats. Yet they have received little attention, and the ecology of their associated communities remains largely unknown. Although boulder fields are one of the most diversified habitats of the intertidal area, they are heavily exploited by amateur and tourist hand-fishing activities in western Europe.

Macrofaunal assemblages living in intertidal boulder fields were studied at different spatial scales in western Brittany in terms of distribution, abundance, biomass, species and functional diversities. Five different spatial scales were considered during the study: regional scale (western Brittany), island scale (1 km²), transect scale (500m²), sample scale (m²) and boulder scale (dm²). More than 300 macrobenthic species were identified. Results showed different patterns of spatial variability in the macrofaunal assemblages, that could be explained in part by the study at the finer scale. This latter allowed identification of three distinct biotopes in the boulder field, corresponding to i) an open rock community, ii) a sheltered rock community and iii) an infaunal sediment community. These three communities were, at a smaller scale, composed of different groups of species, each associated with a specific habitat that we termed microbiotopes.

The complex combination of these microbiotopes in the field, depending on the habitat structure (boulders/rock/sediment combinations), defines the observed faunal assemblages at higher spatial scales. Moreover, patterns of unvariability of communities parameters along the scale gradient were also observed, that could be useful in a conservation context of this habitat, for monitoring or assessment of disturbance.

A CHECKLIST, ATLAS AND BIBLIOGRAPHY FOR THE MARINE MOLLUSCA OF IRELAND

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The most recently published checklist for the marine Mollusca of Ireland was in 1900 by A.R. Nichols, former keeper of Natural History at the National Museums of Ireland. In 1992, a project was initiated to update and extend this checklist, and to compile an atlas of the species distribution. Fieldwork for other purposes had been carried out between 1974 and 1991, including Galway Bay (1974–76), north coast of Ireland (1986), Strangford Lough (1986–92), Mulroy Bay (1986–95), and Lough Hyne (1990–97).

The region under study is within 55° 30' N to 50° 30' N and 5° W to 16° W. Each recording 'square' is 6' × 12'. Of the 2303 'squares' for recording Mollusca in the area, 245 include the littoral zone. Since the inception of this project, a further thirteen major surveys have taken place around the coast of Ireland. There is a clear requirement for uniform coverage and recording effort to avoid the impression of relative rarity. 96% of the littoral recording 'squares' of Ireland have been surveyed, and a further 2% are inaccessible except *via* boat. Recording from the sublittoral zone is considerably less comprehensive, being dependent upon availability of diving and/or dredging facilities, and financial support.

Irish molluscan records have also been obtained from museum collections including the Ulster Museum, National Museum of Ireland, National Museum of Scotland and the National Museums & Galleries of Wales. Records from major surveys have also been incorporated (e.g. Northern Ireland Sublittoral and Littoral Surveys; BIOMAR survey (Republic of Ireland), BIOMÔR and SWISS surveys (southern Irish Sea)). Additional records have been supplied by government departments, agencies, universities, consultants, individuals and a comprehensive collection of literature.

Data have been incorporated into a computer database, which will generate the distribution maps. Currently there are 96,400+ records of Mollusca for the island of Ireland stored on the database representing 19,600+ visits to sites. Of these, 39,000+ records were obtained from 1700+ site visits by fieldwork specifically for this project. A bibliography of 1350+ references for marine Mollusca in Ireland has been compiled. From this dataset, a provisional checklist has been compiled of 889 taxa (live/dead, all dates), with an additional 54 species of uncertain status. Many records new to Ireland or to Sea Areas have been observed.

Publication of the atlas and checklist is in the form of a CD.

Title: The marine Mollusca of Ireland: checklist, atlas and bibliography

Authors: Julia Nunn; Shelagh Smith; Bernard Picton; David McGrath

Publication date: summer 2005

Format: CD-ROM with accompanying instructions and notes as a sleeve.

Content: text & distribution map for each species; photographs of marine biotopes in Ireland; photographs for 200+ species; historical background; ecology & description of the coast/sublittoral where relevant to Mollusca etc.

TRUNCATELLA SUBCYLINDRICA (LINNAEUS, 1767) IN IRELAND**Julia D. Nunn¹, Roy Anderson² and Shelagh M. Smith³**¹*Ulster Museum, Botanic Gardens, Belfast BT9 5AB, Northern Ireland*²*School of Agriculture, Queen's University, Newforge Lane, Belfast BT9 5PX, Northern Ireland*³*Woodleigh, Townhead, Hayton, Cumbria CA4 9JH, England*

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ABSTRACT

In July 2000, two colonies of the brackish-water gastropod *Truncatella subcylindrica* (L.) were located in Galway Bay. These were the first live records for Ireland. The only apparent previous record was a shell from Bundoran in the mid 19th century, considered by later workers to be in error. Prior to the discovery in Ireland, the species had only been recorded from the extreme south-west and south of England in Britain. The colonies in Galway are currently the most northerly in the world.

A project was undertaken in 2001, supported by a grant from the Praeger fund of the Royal Irish Academy, to study the ecology and associated fauna and flora of *Truncatella subcylindrica*, and to search for further colonies. A total of 50 site visits was made in August and November to Counties Galway, Clare, Mayo, Kerry and Wexford, with more detailed work undertaken at the two known colonies at Rincarna and Carrowmore.

The presence of *Truncatella subcylindrica* at Rincarna and Carrowmore was confirmed, and the extent of the colonies elucidated. Three shells of *Truncatella subcylindrica* were also found in shell sand from Rine Point, Co. Clare. A search at 47 other sites in the counties listed failed to find new colonies with live shells.

In many invertebrates there is a tendency for habitat preferences to become narrower close to the northern range limits. At Rincarna and Carrowmore, *Truncatella subcylindrica* is confined to muddy gravel near the top of the shore, on shingle spits impounding brackish lagoons, often in gravel under large boulders. The gravelly habitat is probably inundated only at spring tides but is kept constantly moist by the impoundment of the lagoon which leaches through the spit back into the sea. It has been observed on or in *Vaucheria* inside an inundated lagoon, and can stand immersion in fully saline water for some days although it is primarily amphibian or terrestrial. Densities of up to 500 animals.m⁻² were recorded on the *Vaucheria*. From observations, it is clear that that *T. subcylindrica* requires constant moisture, high (near fully marine) salinity, and gravelly or bare rock surfaces which serve to absorb the sun's heat.

The Rincarna and Carrowmore sites are possibly unique in Ireland,

although there is a slight chance that similar sites may exist in Co. Kerry. Both lagoons are small, and very vulnerable to disturbance. There has already been some dumping of rubbish at the western end of Rincarna Lagoon. It is suggested that these two sites be considered for maximum protection under available conservation legislation in Ireland.

A COMPARISON OF THE MACRO-INVERTEBRATE FAUNA OF MUD FLATS VEGETATED BY *SPARTINA ANGLICA* AND *SALICORNIA* SPP. AT NORTH BULL ISLAND, DUBLIN BAY

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ABSTRACT

A *Salicornia* flat, with substantial numbers of *S. anglica* clumps scattered across it, is present at North Bull Island. This study compared the macro-invertebrate fauna and some physical parameters of sediments beneath clumps of *S. anglica* and the surrounding *Salicornia* spp.

The study found that overall, the species assemblage beneath *S. anglica* and *Salicornia* spp was quite similar. The fauna beneath *S. anglica* usually had a greater mean abundance of individuals and a greater mean diversity of species except in a number of cases where samples from *Salicornia* had greater mean abundances and diversity, though there were few statistically significant differences. The sediment beneath *S. anglica* clumps had a much greater root density than beneath *Salicornia*, though the amount of organic detritus collected from the samples of both *S. anglica* and *Salicornia* were quite similar. There were few differences in water content and organic matter content of the sediment (%LOI) between *S. anglica* and *Salicornia*, though bulk density was significantly greater in the sediment samples from *Salicornia*.

It was concluded that even though *S. anglica* forms tussocks with dense stem densities and much greater biomass (reflected by the root density) relative to *Salicornia* spp., it has not substantially affected the macro-invertebrate fauna of the sediments in this area.

FUNGI OF THE BULL ISLAND SALT MARSH SYSTEM: CULTURAL AND MOLECULAR DIVERSITY

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ABSTRACT

Fungi are one of the main biodegradatory groups in salt marsh ecosystems. Their importance lies in their ability to break down and utilise recalcitrant biomolecules, such as lignocellulose, from substrates such as higher plants and algae which are the main primary producers of salt marsh ecosystems. The following study was undertaken to systematically determine the diversity and distribution of fungi on a European temperate salt marsh.

The salt marsh studied was situated at the north lagoon of Bull Island, Co. Dublin. This marsh is divided into three vegetational zones, termed the upper, middle and lower marshes. Each zone possesses a characteristic flora, and is influenced to a different extent by tidal inundation. The lower marsh (mud flats) typically supports *Salicornia* spp., together with *Spartina anglica*, and is most affected by tidal inundation and low soil redox potentials. On the middle marsh *Puccinellia maritima*, *Halimione portulacoides*, *Limonium* spp., *Spartina anglica*, and *Salicornia* spp. dominate, with grasses and *Juncus* spp becoming more frequent on the upper marsh. The marsh also becomes progressively drier, being flooded more infrequently by the tide.

Fungal diversity was studied using two approaches. A more conventional approach involved isolation and culturing fungi from a range of substrates taken across the salt marsh at different times. Pieces of plant tissue were systematically collected from Bull Island, surface sterilised and placed on agar plates to stimulate fungal growth. Fungi were isolated as pure cultures prior to identification on the basis of their sporulating structures. Ninety-four morphologically different strains were isolated from across the salt marsh, of which 58 could be positively identified.

Conventional diversity approaches do not give information about the non-culturable component of fungal diversity. To give a more complete view of fungal diversity at Bull Island, a molecular approach was employed, using the 18S rRNA genes as fungal biomarkers. Using PCR, a population of amplicons can be generated which have specificity to fungal members of the saltmarsh community. Fungal DNA was successfully extracted and PCR-amplified from salt marsh plant substrates. Two methods were used

to analyse and separate mixed amplicon populations; denaturing gradient gel electrophoresis, and terminal restriction fragment length analysis. Both methods gave a fungal community fingerprint of a range of individual substrates harvested from the marsh.