



MERC Consultants
environmental and conservation services



Comhshaol, Oidhreachta agus Rialtas Áitiúil
Environment, Heritage and Local Government

Survey of the distribution of the anemone *Edwardsia delapiae* (Carlgren and Stephenson, 1928) in Valentia Harbour and Portmagee Channel SAC, Co Kerry



National Parks and Wildlife Service,
Department of the Environment, Heritage and Local Government,
Plaza Offices,
Headford Road,
Galway

November 2007

CONTENTS

1. INTRODUCTION.....	3
2. STUDY AREA.....	4
2.1 VALENTIA HARBOUR AND PORTMAGEE CHANNEL SAC.....	4
2.2 EXISTING INFORMATION ON VALENTIA HARBOUR AND PORTMAGEE CHANNEL SAC.....	5
3. SURVEY METHODOLOGY	11
4. RESULTS	14
5. SUMMARY AND DISCUSSION	22
6. REFERENCES.....	25
APPENDIX I SITE SYNOPSIS.....	26
SITE NAME: VALENTIA HARBOUR AD PORTMAGEE CHANNEL SAC	26
APPENDIX II SPECIES LISTS.....	29

1. Introduction

The burrowing worm anemone *Edwardsia delapiae* (Order Actiniaria Suborder Nyantheae Family Edwardsiidae) was originally discovered during the 1920's within intertidal dredge samples collected at Knightstown in Valentia Harbour Co Kerry by the Delap sisters. The initial specimens are believed to have been collected from an area of foreshore west of the present day location of the lifeboat slipway.

The first full taxonomic description for the species was provided by Carlgren and Stephenson (1928). In all, eight species of Edwardsiidae have been recorded from the coasts of Ireland and Great Britain. Most of these are small and very difficult to see, some being nocturnal and all retracting quickly into the sediment if disturbed.

Edwardsia delapiae has only ever been recorded from Valentia Harbour and the present known range for this species is therefore extremely limited.

Since it was first described, *E. delapiae* has received comparatively little attention and it was not until 1995, when the BioMar group visited the Valentia Harbour and Portmagee Channel area during the course of the national survey of benthic habitats, that *E. delapiae* was once again recorded. The new records were for an area of subtidal seabed southeast of Knightstown harbour. A further series of dives conducted during 2002 confirmed the presence of *E. delapiae* in the same general area as the 1995 records, however no georeferenced data were available for this site (B. Picton, pers. comm.).

During 2007, National Parks and Wildlife Service commissioned a survey of *E. delapiae* in Valentia Harbour and Portmagee Channel. The objectives of the survey were:

- to confirm the continued presence of *E. delapiae* within the SAC
- to characterise the seabed habitat and community from which *E. delapiae* is recorded
- to map the distribution of *E. delapiae* within the site
- to estimate the abundance of *E. delapiae*

The survey was completed during ten days of fieldwork conducted between September 10th and 21st 2007.

2. Study Area

2.1 Valentia Harbour and Portmagee Channel SAC

Valentia Harbour and the Portmagee Channel cSAC is an inlet located on the southwest coast of Ireland in the lee of Valentia Island. It is predominantly sheltered and shallow and contains a variety of sediments, which range from a mixture of cobbles, pebbles and gravel to very soft mud. Valentia Harbour is sheltered by Beginish Island, which sits to the north between Valentia Island and the mainland. The harbour is connected to a broad west-facing bay, Doulus Bay, via a channel between Valentia and Beginish Islands. The entrance to Doulus Bay stretches from Doulus Head on the mainland to Reenadrolaun Point on Valentia Island. The Valentia River empties into the harbour from the northeast. Lough Kay, a shallow bay, is situated between Beginish Island and the mainland.

Valentia Island in its location just a short distance from the mainland forms the northern side of Portmagee Channel. This sheltered channel stretches from Reenard Point to Reencaheragh Point on the mainland. The shallow upper reaches of this channel open into Lough Mask. The channel remains quite shallow throughout its length, however from Reencaheragh Point to its exposed western entrance at Bray Head the depth increases considerably.

Valencia Harbour and Portmagee Channel contain important examples of three habitats listed on Annex I of the EU Habitats Directive:

- Large shallow inlets and bays (1160)
- Reefs (1170)
- Sandflats and mudflats not covered by seawater at low-tide (1140)

The reefs support an excellent range of communities from those that are typical of areas very exposed to wave action to those typical of areas sheltered from wave action but with some tidal stream present. The area also has an excellent range of sediment communities present including maërl beds. Areas of soft mud or muddy sand are characterised by the sea pen *Virgularia mirabilis* and a range of burrowing anemones including the very rare species, *Edwardsia delapiae* which has not been recorded since it was originally found and described from this area in 1928, and *Scolanthus callimorphus*, otherwise known only from Kilkieran Bay, Co Galway within Ireland. The phoronid *Phoronis psammophila* occurs in this community and has not been recorded elsewhere in Ireland or Britain.

A fishery for the scallop *Pecten maximus* has been operated in Valentia Harbour and Portmagee Channel site since the early 1900's. There is also a well-developed pot fishery, the main target species being shrimp. Aquaculture in the form of suspended cultivation of scallop spat is occasionally carried out by a local co-operative with the objective of enhancing the natural stock of the scallop

2.2 Existing Information on Valentia Harbour and Portmagee Channel SAC

The benthos of Valentia Harbour, Co. Kerry was initially surveyed during the late 1890's by W. I. Beaumont (1899) as part of a more extensive study of the area that included the pelagic environment (Browne, 1899). Beaumont's work, which involved shore work and dredging, was concentrated on sheltered areas around Valentia Harbour and Portmagee Channel. Beaumont (1899) presented an extensive list of marine invertebrates most of which were collected from soft sedimentary habitats. The list of nemerteans and nudibranchs is extensive as Beaumont specialised in these groups. Species were recorded from nine different habitats, *Zostera marina* beds, shallow soft muds, ascidian grounds on firm mud, shell beds, fine slate gravel, gravel and sand, gravel, sand and maërl beds.

His extensive shore work revealed the area to be bounded for the main part by slate rocks with scattered areas covered by loose stones, boulders, spits of sand and gravel, sand-banks and *Zostera* beds. Beaumont (1899) located seagrass beds in Beginish Bay, along the eastern margin of Beginish Spit, west of the Foot near Knight's Town and at Reenglass Spit. Anemones, including *Cereus*, *Anemone* and *Cerianthus* were recorded as being very common in these areas.

The substrate in Valentia Harbour was recorded to be mostly a muddy bottom, with the deeper portion of the harbour near Knight's Town mainly compact mud with scattered shell. The characterising and dominant species in the area was the ascidian *Ascidiella aspera*, which appeared to be slightly embedded in the muddy bottom. This was shown to be an extensive habitat in Valentia Harbour and also occurred in the sound between Valentia Island and Reenard Point. In the channel between Knight's Town and Reenard Point and off Beginish Island, Beaumont (1899) recorded considerable accumulations of shells of *Cardium*, *Mya* and *Pecten maximus*. *A. aspera* was absent to rare on this habitat which was referred to as the Shell-beds.

The habitat of Lough Kay, situated between Beginish Island and the mainland, was noted as being mainly tide-swept clean gravels with a limited fauna. Beaumont (1899) described Glanleam Bay as clean sand with very poor fauna, but it is noted that this observation may be due in part to the method of sampling employed at the time. Gravel and sand were recorded at the mouth of Valentia Harbour, south west of Beginish Island.

The shallower parts of the harbour namely the Cahir River and most of the Portmagee Channel were floored by soft black mud. The seaslug *Philine aperta* was seen to be a prominent species on this ground and similar ground elsewhere. Farther down the Portmagee Channel below Portmagee Village, Beaumont (1899) recorded an extensive maërl bed with the species *Lithothamnion corallioides* present. The associated fauna was similar to that found on the shell-beds, but with additional species.

The Delap sisters, Constance and Maud Jane, who lived in the area, had a keen interest in the marine fauna of the harbour. Although the sister's work concentrated almost exclusively on plankton, they also participated in the Browne (1899)

investigation of the flora and fauna of the area. In the mid 1920's the area was visited by T.A. Stephenson who collected some *Edwardsia* material, and from this described the rare anemone *Edwardsia delapiae* (Carlgren & Stephenson) in recognition of the work carried out by the Delaps.

Minchin (1979) carried out a preliminary assessment of the potential of Valentia Harbour for mariculture. This study revealed the area of Valentia Harbour as coarse sand and shell with the ascidian *Ascidiella* sp. attached to small stones and shell. This was within the area referred to as the 'Ascidian grounds' by Beaumont (1899). Off Beginish Island and close to Knight's Town they relocated the seagrass beds as described by Beaumont (1899). The Portmagee Channel was found to be shallow with a soft mud bottom with algae and many sea slugs. The maërl beds close to Portmagee were also relocated thus confirming the findings of Beaumont (1899).

No other significant benthic work was carried out in the area until 1995 when the BioMar group visited the Valentia Harbour and Portmagee Channel area during the course of the national survey of benthic habitats (Picton and Costello, 1997). This survey included littoral and sublittoral habitats. In all 28 dives were carried out around Valentia Island which produced extensive faunal and floral lists that greatly added to the previous information of Beaumont (1899).

The BioMar survey recorded seagrass beds on the muddy gravel spit known as The Foot at Knightstown Harbour, thereby confirming the seagrass beds first recorded by Beaumont (1899) and subsequently by Minchin (1979). Close to the Foot Buoy, west of Reenard Point, BioMar recorded sloping gravel with a large number of dead shells and areas of consolidated muddy sand with shell debris. This was stated as 'likely to be an extensive habitat within the study area', and was seen to support diverse anthozoans and bivalves. This habitat was in the same area as the shell-beds recorded by Beaumont (1899).

In the area south east of Knightstown, BioMar recorded soft mud with the seaslug *Philine aperta* and the seapen *Virgularia mirabilis*. Beaumont (1899) and Minchin (1979) also recorded *P. aperta* in the muds of this area. BioMar recorded this habitat south of the Foot Buoy to an area southwest of Reenaloughan Point in the Portmagee Channel. In the area southeast of Knightstown a population of the rare anemone *Edwardsia delapiae* was relocated. Valentia Harbour is the only known population of this species anywhere. Another rare anemone *Scolanthus callimorphus*, which was previously only known from Weymouth Bay (Dorset, U.K.) and Kilkieran Bay (Galway Ireland) was also recorded in this area during BioMar.

BioMar recorded maërl beds in the seaward reaches of the Portmagee Channel confirming the findings of some earlier studies. The maërl in this area varied from dense maërl bed to a thin veneer overlying a sandy and in some areas, muddy, seabed. The uncommon anemone *Halcapa chrysanthellum* was recorded from this habitat. The BioMar survey revealed the rocky habitat at the periphery of Doulus Bay to be a mixture of steep vertical bedrock and large boulders. The sedimentary substrate in Doulus Bay was rippled sand with occasional cobbles going to duned coarse sand. The only visible fauna on the sands was the sand mason *Lanice conchilega*, while the cobbles and rocky outcrops within this habitat supported kelp and foliose red seaweeds. Kelp communities were also recorded on the rocky substrate of Valentia

Island and the Portmagee Channel. The exposed rocky habitats of Douulus Head and Valentia Island were dominated by the seaweed *Delesseria sanguinea* and *Dictyota dichotoma*. The deeper exposed rock surveyed by BioMar was characterised by a robust faunal community comprising the jewel anemone *Corynactis viridis*, the cup coral *Caryophyllia smithii* and various sponges.

The Valentia Harbour and Portmagee Channel broadscale mapping project (NPWS, 2003) successfully collected large amounts of scientific data in relation to biological and physical characteristics of seabed habitats within the site. Data in relation to seabed composition were collected using RoxAnn™ Acoustic Ground Discrimination System (ADGS), while grab survey, diver survey and video survey techniques provided extensive ground truthing of AGDS data. The results enabled the most prominent biological and physical characteristics of the seabed to be mapped and the combined results of the three ground truthing surveys confirm the site to be high in both species and community diversity. The project also collected detailed data on the bathymetry of the site, facilitating the development of a detailed bathymetric map of the site.

During the grab sampling survey, a total of 33 sites were analysed for sediment composition while the faunal content of grab samples from 39 was examined. Sediments recorded ranged from fine mud to coarse sand, while maërl was recorded at 5 sites. A total of 374 species were identified from the grab samples and these were divided into three main groups – bivalves and snails (*molluscs*) (61 live and 23 dead species), crabs, lobsters etc (*crustaceans*) (77 species) and segmented worms (*annelids*) (152 species). A fourth group, other fauna (99 species) represented a diverse range of other less frequently occurring organisms.

The video survey sampled 65 locations with the SAC. In total, 16 different habitat types were recorded by the video survey. These varied from rock to sandy mud. These habitats supported 16 main biological community types.

During the dive survey of 15 sites within Valentia Harbour and Portmagee Channel SAC, six seabed habitats were recorded along with seven main community and five sub-community types. Seabed habitats varied from bedrock and boulders to muddy sediments.

The study recorded twelve subtidal sedimentary and four rocky habitat types within Valentia Harbour and Portmagee Channel SAC.

The subtidal sedimentary habitats were:

- Maërl mixed sediment
- Sandy mixed sediment
- Shelly gravelly mixed sediment (with sparse maërl)
- Muddy sand mixed sediment
- Shelly gravel mixed sediment
- Pebbles on mixed sediment with shell
- Gravelly sand
- Coarse gravelly sand
- Coarse gravelly sand with boulders and cobbles

- Sand
- Sandy mud
- Muddy sand

The subtidal rocky habitats recorded were:

- Bedrock
- Bedrock and boulders
- Boulders, cobbles and pebbles
- Boulder and cobble field

The most extensively predicted sedimentary habitats were muddy sand and sandy mud, which was the predominant seabed habitat of Portmagee Channel. In the area between Knightstown and Renard Point there were additional smaller areas of muddy sand mixed sediment. A number of large areas of pebbles on mixed sediments with shell were also prevalent in Valentia Harbour south of Beginish Island and these extended into the Fertha River estuary.

Sand occurred to a significant extent around Scugaphort Reef, which lies east of Bray Head in the southern part of the site. Further areas of sand were predicted in the western part of Valentia Harbour, in Lough Kay and south of Beginish Island. An extensive habitat of maërl mixed sediment occurred in Portmagee Channel close to Portmagee village. This habitat extended from Quay Brack to Reenarea Point. To the west of this area was an area of shelly gravelly mixed sediment. Coarse gravelly sand and gravelly sand predominated in the most western part of the channel.

The four rocky habitats, bedrock, bedrock and boulders, boulders, cobbles and pebbles and boulder and cobble field, recorded within the northern section of the site were confined in the main to Lough Kay and areas west of Beginish Island. A number of smaller areas of bedrock occurred south of Beginish Island. An extensive boulder and cobble field was predicted west and south west of Dolus Head whereas boulders cobbles and pebbles predominated in Lough Key. Patches of coarse gravelly sand with boulders and cobble were found amongst the Boulders and cobble field. Bedrock was the predominant rocky habitat recorded from the southern part of the site.

The ground truthing survey described a total of eighteen main biological communities that were found to occur amongst the sixteen seabed habitats recorded in areas of Valentia Harbour and Portmagee Channel.

The communities recorded were:

- Sparse infauna of polychaetes, crustaceans and bivalves in sand
- Rich robust infauna in sand and gravelly sand
- Sparse algae with rich infauna in shelly gravelly mixed sediment (with sparse maërl)
- Shelly gravelly mixed sediment with the sand mason *Lanice conchilega*
- Maërl bed

- Algae with fauna on mixed sediments
- Sugar kelp with red, green and brown seaweeds on sandy mixed sediments
- Sandy mixed sediments with sparse algae
- Muddy sand with rich infauna
- Sandy mud with sparse infauna
- Sandy mud with rich infauna
- Sandy mud with rich infauna (and seapens)
- Sandy mud with burrowing polychaetes, algal mat and scattered seaweeds
- Kelp
- Algal Turf
- Faunal and algal crusts (sparse cushion fauna)
- Faunal and algal crusts (sparse cushion fauna) on boulders and cobbles in coarse gravelly sand
- Coarse gravelly sand

Overall the site was characterised by a mix of sedimentary and rocky habitat communities and the biological communities recorded in association with the habitats reflect this. The rocky habitat communities were most prevalent in the northwestern and southwestern areas of the site out from Doulus Head and Bray Head. The sedimentary communities were predominantly located in Portmagee Channel where they tend to be relatively uniform mix of Sandy muds with infauna. An exception is the significant maërl community that was recorded for the area close to Portmagee.

In the northwestern section of the site, communities of both Faunal and algal crusts (sparse cushion fauna), commonly associated with rocky habitat types, were limited in distribution and were most prominent west of Doulus Bay. Kelp communities were the dominant biological features occurring from Eanagh Point to Laght Point in Lough Kay and off the northern shore of Valentia Island between Reenadrolaun Point and Fort Point. Other communities recorded in the northwestern sector include substantial areas of Algal turf communities which were associated with areas of rocky habitat west of Beginish Island, as well as Sparse infauna of polychaetes, crustaceans and bivalves and rich robust infauna in sand and gravelly sand. The latter two communities were extensive in Doulus Bay and occurred west of Beginish Island also. There were smaller areas of seabed south of Doulus Head and west of Beginish Island that were characterised by Shelly gravelly mixed sediment with the Sand mason *Lanice conchilega*.

Valentia Harbour (including the Fertha River estuary) was characterised by the greatest diversity of seabed communities for any area within the site. Extensive areas of algae with fauna on mixed sediments were recorded throughout this area, especially between Knightstown and Reenard Point. Sandy mud with infauna occurred extensively between Reenglass Point and Lough Mask as well as close to the eastern end of Beginish Island. Areas of kelp community were recorded south of Beginish, as were several areas of sparse infauna of polychaetes, crustaceans and bivalves in sand. The area between Laght Point and Reenard Point was characterised largely by a significant area of Sugar kelp with red, green and brown seaweeds on sandy mixed sediment.

Portmagee Channel was characterised by extensive areas of homogenous sandy mud with rich infauna and sandy mud with rich infauna (and seapens), the latter being the more extensive of the two communities. A significant maërl bed was recorded in Portmagee Channel also, extending in a westerly direction from Reenarea Point to Quay Brack. This community was recorded as being relatively homogenous with little variation throughout the area of occurrence.

West of Quay Brack and extending as far as Scugaphort Reef, seabed communities were characterised by kelp and sparse algae with rich infauna in shelly gravelly mixed sediment (with sparse maërl). A small pocket of algae with fauna on mixed sediments was recorded in this area also. Returning to rocky type habitats, the area around Scugaphort Reef was characterised by sparse infauna of polychaetes, crustaceans and bivalves in sand. An area of algal turf was recorded north of Long Island. Rich robust infauna in sand and gravelly sand was recorded extensively in the area to the north of the Algal turf community off Long Island and extending westwards as far as Bray Head. In this area of extensive rocky habitat there were further small pockets of Fauna and algal crusts (sparse cushion fauna) as well as accumulations of coarse gravelly sand on the seabed.

3. Survey methodology

The survey was conducted using SCUBA diving techniques. Survey personnel consisted of a team of professionally qualified scientific divers who were also experienced biologists with a wide and varied experience of conducting subtidal surveys. Core personnel were:

Dr Louise Scally, MERC Consultants
Mr Peter McDonnell, MERC Consultants
Mr Nick Pfeiffer, MERC Consultants
Mr Bryan Deegan, MERC Consultants

Dr Bernard Picton, Curator of Marine Invertebrates at the Ulster Museum and Dr Lin Baldock, also provided assistance during the first two days of fieldwork. The remaining survey effort was completed using two two-man dive teams. All diving was conducted according to HSE Code of Practice for Scientific diving and dive teams comprised two surveying divers.

The first specimens of *E. delapiae* collected by Maud Jane and Constance Delap are believed to have originated from an area of foreshore west of the present day location of the lifeboat slipway in Knightstown Harbour. Today the seabed of this area is largely characterised by a mixed seabed habitat comprising gravel and sandy/muddy sediments, which supports a community of patchy seagrass *Zostera marina*, together with an associated diverse fauna. The most recent records for *E. delapiae* are from 1995 and 2002. During the BioMar survey of Irish marine habitats in 1995, *E. delapiae* was recorded from two subtidal sites located approximately ½ mile southeast of Knightstown Harbour. A subsequent series of dives conducted during 2002 confirmed the continued presence of *E. delapiae* in the same general area as the 1995 records. Geographical co-ordinates were available for the BioMar records, however no geographical co-ordinates were available for the site of the 2002 record.

The present survey was divided into two distinct phases. The over-riding objective of the first phase was to locate new specimen's of *E. delapiae* as quickly as possible, in order to confirm the continued presence of *E. delapiae* within the SAC at the outset of the study. A secondary objective was to collect additional data on seabed habitat and epifauna communities from the site of the most recent georeferenced record for *E. delapiae* (BioMar). The latter task was specifically aimed at assisting the identification of further areas within Valentia Harbour and Portmagee Channel SAC where *E. delapiae* might be likely to occur, based on seabed habitat and epifaunal community criteria.

During the first phase, sampling effort was concentrated within two small areas. The first was located 1/2 mile southeast of Knightstown (from where *E. delapiae* was recorded during the BioMar survey), while the second was located on the north side of Knightstown Harbour, in the area where the Delap sisters collected the first specimens. A six-person survey team undertook the first phase and completed the objectives over a period of two days of fieldwork. No limit was set on the duration of dives and dive teams spent between 45 and 75 minutes underwater at locations within the areas where *E. delapiae* was recorded previously.

The second phase aimed mainly to characterise seabed communities in as many areas of the SAC that were likely to be similar, in terms of seabed habitat and biological communities, to that from which *E. delapiae* was recorded during phase one. The task of identifying areas likely to be similar was greatly assisted through the availability of the various previous works carried out in Valentia Harbour and Portmagee Channel. In particular, the BioMar data (Picton and Costello. 1997) and the results of the broadscale mapping project (Anon, 2002) were useful to this end, while other works including Browne (1899), Beaumont (1899) and Minchin (1979) were also of assistance. Data collected during August 2007 by the same survey team and that aimed to map the distribution of sensitive subtidal communities in Valentia Harbour and Portmagee Channel SAC, was available to the present survey for *E. delapiae* and further assisted the task of selecting other suitable areas to sample.

An additional aim of the second phase was to investigate a variety of other habitats and communities for the presence of *E. delapiae* also. In this regard, a number of intertidal sites at Knightstown, Reenglass Spit and Portmagee Channel were characterised and surveyed for *E. delapiae*. Other subtidal sites were selected to focus survey some effort across the spectrum of sedimentary habitats present within the SAC. Therefore a number of muddy sand, muddy and sandy habitats were sampled, as were some maerl beds in Portmagee Channel.

In order to standardize the survey effort at each site where dives were conducted during phase two, a series of four randomly placed circular rings of 2 meter Ø, that were held in position using pegs pushed into the seabed, were intensively searched for *E. delapiae*. Each hoop represented a search area of 3.2 m², meaning that in total an area of 12.8 m² was searched at each dive site. During the dives, all faunal species observed within the search areas were recorded, as were any marine algae that were present in significant amounts. Photographic recordings were made of any Edwardsiidae observed as well as other unconfirmed species.

The possibility that *E. delapiae* may be nocturnal in behaviour was further investigated during a series of night dives conducted at sites within Valentia Harbour and at Quay Brack. The approach taken involved fixing the surveying ring to the seabed at carefully selected locations using pegs pushed into the seabed. The location of the survey ring was marked using a surface float. All fauna present within the ring were recorded during daylight hours. The sites were then revisited during the hours of darkness and the seabed within the survey ring once again examined for the presence of *E. delapiae*. For this purpose, low intensity battery operated diving lamps were utilised in an effort to minimise disturbance to any species.

A rapid observation based abundance estimation technique was employed for estimating the abundance of species encountered during dives. To this end, an AFOR (*Abundant, Frequent, Occasional, Rare*) abundance scale was utilised. Abundance scales are frequently used to describe the nature and extent of faunal and floral communities in marine and terrestrial ecological surveys; see Hiscock (1998) and Higgins *et al* (2004). While the use of an AFOR abundance index in the present study was largely subjective as estimates were based entirely on visual techniques, the technique provided a rapid method for estimating relative abundance of a species.

A rigid inflatable boat, which was fitted with a depth sounder and Furuno GP-37 dGPS navigator and Garmin GPS 76 dGPS differential GPS served as the survey vessel for the duration of fieldwork.

Georeferenced data recordings were made using as THALES *MobileMapper CE*, while species and habitat observation records were made during dives using dive slates. All photographic images were recorded using housed D-SLR camera systems. All dive site and species data recordings were transferred to Microsoft Excel for the purposes of presenting the findings. All records for *E. delapiae* were confirmed through the use of high-resolution digital photography.

Four specimens of *E. claperedii* and two specimens of *E. delapiae* were collected during the survey. All specimens were preserved in labeled containers using 96% ethanol and sent to the Ulster Museum, Belfast. The purpose of specimen collection was to confirm identification and to provide a reference collection.

4. Results

A total of 61 dives were completed during the survey. During the first phase, *E. delapiae* was not confirmed at either of the two locations from where it was previously recorded. A considerable amount of time was spent completing species inventories in these two areas, during which detailed recordings were made of all species present as well as in relation to the seabed habitat. During eight dives that were completed in the locations of the previous two recordings, no *E. delapiae* were recorded. In an attempt to secure a positive record during the first phase, a number of other areas were sampled. These locations were selected due to their proximity to seagrass beds. The first record of *E. delapiae* from the survey was made during day two of fieldwork. Several specimens were observed (identification confirmed through high resolution digital photography) at a depth of 5 meters in an area of sandy mud that was in very close proximity to a recorded *Zostera marina* bed, on the southern side of Beginish Island. Subsequent sampling carried out in the immediate area on the same day, confirmed the presence of several more *E. delapiae*; with a total of 5 *E. delapiae* being recorded over two dives. Of note was the particular abundance of anemones, many of which were of the burrowing type, within this area. Faunal species recorded as being present (with varying abundances) included:

- *Edwardsia claperedii*
- *Anthopluera ballii*
- *Cereus pedunculatus*
- *Sagartiogeton laceratus*
- *Sagartiogeton undatus*
- *Halcampa chrysanthellum*
- *Cerianthus lloydii*
- *Myxicola infundibulum*
- *Megalomma vesiculosum*

Phase 2 of the survey focused mainly on completing detailed species inventories for areas of muddy sand seabed habitat in Valentia Harbour. In addition to this, a range of other habitat types in different areas of Valentia Harbour and Portmagee Channel were surveyed and characterised in terms of flora, fauna and seabed habitat. A number of locations within each area were sampled the standardized survey methodology.

Areas sampled in this manner included:

- all known areas of muddy sand in Valentia Harbour
- maerl beds in Portmagee Channel
- perimeters of seagrass beds at Knightsown, Beginish Island and Gleanleam.
- intertidal areas west of the lifeboat slipway in Knightstown
- intertidal and subtidal seabed areas off Quay Brack Pier, Portmagee Channel
- intertidal areas of Reenglass Spit
- intertidal areas south of the ferry slip, Knightstown Harbour
- muddy habitats within Portmagee Channel

E. delapiae was recorded from just one further site during phase two of the survey. This second record was made at a depth of 8 meters during a dive on the southeastern side of the shallow area of seabed known as The Foot and which extends in a northeasterly direction from the end of the northern breakwater at Knightstown Harbour. The seabed of this location was characterised by muddy sand with a patchy veneer of pea-sized gravel. The bottom was relatively flat with small undulations and a gentle slope. The location was quite rich in anemones, including most species which had been recorded along with *E. delapiae* during the first phase of the study. In addition, some bivalves were also present at this site, including the scallop *Pecten maximus*.

Figure 4.1 records the location of dives carried out in the Valentia harbour area, while Figure 4.2 records those for the western end of the site in the Portmagee area. Figure 4.3 records the locations of both sites where *E. delapiae* was recorded during the survey, while Figure 4.4 records the location of these sites in relation to *Zostera marina* beds that were mapped by the same survey team during August 2007. All dive data including species lists are presented in Appendix II (see separate *Excel* file). Photographic records from the survey are presented on the accompanying DVD.

No confirmed records of any other burrowing anemones were made during the survey. In particular, *Scolanthus callimorphus*, which was recorded from the site during BioMar, was not reconfirmed during the present survey. The gastropods *Philine aperta* and *Haminoea navicula* were both recorded in significant numbers on several occasions during the present survey, however they were not recorded in the same areas as *E. delapiae*. The Golden phoronid *Phoronis psammophila* was not recorded at any site during the survey.

Attempts at searching for *E. delapiae* amongst living seagrass beds were unsuccessful due mainly to the fact that no actual seabed was visible amongst the seagrass on account of the growth of filamentous algae and the presence of dead and decaying seagrass leaves.

The possibility that *E. delapiae* may be nocturnal in its behaviour and may retract into the sediment during daylight hours was investigated by surveying a number of areas at night. Night dives conducted at precisely the same location as dives made during daylight hours at Beginish Island, Valentia Harbour and Quay Brack, where *E. delapiae* had not been recorded during dives conducted in daylight, did not record significant changes in seabed fauna and no additional records for *E. delapiae* were obtained during night dives.



Figure 4.1 Location of all *E. delapiae* survey dives carried out in the Valentia Harbour area



Figure 4.2 Location of all *E. delapiae* survey dives carried out in the Portmagee Channel area

Ordnance Survey Ireland Licence No EN 0059208 © Ordnance Survey Ireland / Government of Ireland. Data supplied under third party licence by the Department of Environment, Heritage and Local Government



Figure 4.3 Location of *E. delapiae* recorded during the survey



Figure 4.4 Location of *E. delapiae* recorded during the survey, shown in relation to seagrass *Zostera marina* beds.

Ordnance Survey Ireland Licence No EN 0059208 © Ordnance Survey Ireland / Government of Ireland. Data supplied under third party licence by the Department of Environment, Heritage and Local Government



Figure 4.5 *Edwardsia delapiae* on muddy sand close to *Zostera marina* bed at Beginish Island



Figure 4.6 Image taken with 105mm lens (160mm digital) of *E. delapiae*. The identifying 'peacocks' tail' marking close to the base of each tentacle can be clearly seen.



Figure 4.7 *Edwardsia claperedii* close to *Zostera marina* bed at Beginish Island



Figure 4.8 *Haminoea navicula* in Valentia Harbour on muddy sand substrate



Figure 4.9 *Halcampa chrysanthellum* in Valentia Harbour on muddy sand with occasional pea sized gravels



Figure 4.10 *Halcampa chrysanthellum* in Valentia Harbour on muddy sand with pea gravel veneer



Figure 4.11 *Anthopleura ballii* on muddy sand, Valentia Harbour



Figure 4.12 *Megalomma vesiculosum* on muddy sand, Valentia Harbour

5. Summary and discussion

E. delapiae was not confirmed from either location where previously recorded by the Delaps or BioMar, during the present survey

When considered in the context of the very thorough and intensive techniques employed and the overall methodical approach taken during the survey, the limited confirmed recordings for *E. delapiae* during this and previous studies, once again suggests that the distribution of the species is extremely limited within Valentia Harbour.

It is noteworthy that the seabed habitats of the two sites from which *E. delapiae* was recorded during the present survey appeared to be very similar; with both sites characterised by muddy sand with a patchy veneer of pea gravel. Both locations also occurred close to the perimeter of a bed of *Zostera marina*. Water depths varied from 4 to 9 meters, while the seabed was relatively flat. Exposure to wind and waves and ocean swell was low, and a moderate tidal current was noted at both sites.

Both sites from where *E. delapiae* was recorded during the survey were also characterised by the presence of a rich fauna of burrowing anemone species in particular. Anemone species present when *E. delapiae* was recorded included some or all of

- *Edwardsia claperedii*
- *Anthopluera ballii*
- *Cereus pedunculatus*
- *Sagartiogeton laceratus*
- *Sagartiogeton undatus*
- *Cerianthus lloydii*
- *Halcampa chrysanthellum*

The data collected by diving during the hours of darkness do not indicate that there is any marked diurnal change within the seabed community of any of the sites surveyed during both day and night phases. The fact that no *E. delapiae* were recorded during night dives in the vicinity of known populations of the species suggests that it is unlikely that significant or substantial populations of the species exist and remain unrecorded.

The locations from which *E. delapiae* was recorded during the present survey differed somewhat from the location southeast of Knightstown Harbour recorded by Picton and Costello (1997). The location from where *E. delapiae* was recorded during the latter study was characterised as “a plain of soft mud with a diversity of sea anemones and sea slugs. The sea pen *Virgularia mirabilis* was frequent”. In addition to the epifauna species recorded during the present survey of the same area, the earlier study recorded the presence of

- *Edwardsia delapiae*
- *Philine aperta*
- *Haminoea navicula*
- *Virgularia mirabilis*
- *Metridium senile*

in particular.

No explanation is offered for the absence of these species from this site during the present survey, however the possibility that this area may have been subject to fishing for bivalves by dredging may be a factor for consideration. It was also noted that the habitat of this particular site was best described on this occasion as patches of muddy sand and mud, which contrasts somewhat with the earlier description of a plain of soft mud.

The findings suggest that the occurrence of *E. delapiae* is very limited and is restricted to the Valentia Harbour area. The findings also suggest that the distribution of *E. delapiae* may have declined since the species was first described. Until such time as larger numbers or new and additional populations of the species are located within Valentia Harbour and Portmagee Channel SAC or another site, efforts should be made to ensure the preservation of the remaining seagrass habitat in Valentia Harbour. This is especially relevant in the case of the Beginish Island site, which for now is outside of the area where scallop dredging is permitted and which the present survey indicates supports the greatest numbers of *E. delapiae*.

It is worth considering the possibility that *E. delapiae* remains undiscovered at other locations in Ireland. In this regard, it could be beneficial to assess other potential sites for the presence of *E. delapiae* by dive survey. Sites which support significant beds of *Zostera marina* and which have documented populations of burrowing fauna especially anemones may harbour unrecorded populations of *E. delapiae*. Potential sites for study in this regard could include Kilkieran Bay and Clew Bay.

6. References

- Anon. (2002).** Broadscale Mapping of Valentia Harbour and Portmagee Channel SAC. National Parks and Wildlife Service, DoEHLG 2002.
- Beaumont, W.I. (1899)** The Benthos. Report on the results of dredging and shore collecting. *Proceedings of the Royal Irish Academy*, **21**, 754 – 854.
- Browne, E.T. (1899)** The fauna and flora of Valencia Harbour on the West Coast of Ireland. *Proceedings of the Royal Irish Academy*, **21**, 667 – 753.
- Carlgren, O., and T. A. Stephenson. 1928.** The British Edwardsiidae. *J. Mar. Biol. Assoc. U.K.* 15:1–31
- Higgins, G.T., Martin, J.R. & Perrin, P.M. 2004** *A National Survey of Native Woodland in Ireland*. National Parks & Wildlife Service, Dublin.
- Hiscock, K. 1998** *In situ* survey of subtidal (epibiota) biotopes using abundance scales and check lists at exact locations (ACE surveys). Version 1 of 23 March 1998. In: *Biological monitoring of marine special Areas of Conservation: a handbook of methods for detecting change part 2. Procedural guidelines* (Ed. K. Hiscock). Joint Nature Conservation Committee. Peterborough.
- Minchin, D. (1979)** Preliminary Assessment of Valentia Harbour for Mariculture. Department of Fisheries and Forestry, Fisheries Research Centre, Dublin.
- Picton, B.E. and Costello M. J. 1997.** *The BioMar biotope viewer: a guide to marine habitats, fauna and flora in Britain and Ireland*, Environmental Sciences Unit, Trinity College, Dublin.

Appendix I Site Synopsis

Site Name: Valentia Harbour ad Portmagee Channel SAC

Site Code: 1482

Valentia Harbour and Portmagee Channel, at the tip of the Iveragh peninsula in Co. Kerry, separate Valentia Island from the mainland. The Channel, which is approximately 1km wide, and Valentia Harbour and Douulus Bay to the east of the island, contain important examples of three habitats listed on Annex I of the EU Habitats Directive – reefs, large shallow inlets and tidal mudflats.

The reefs range from high water to 34 m in depth. They support an excellent range of communities from those that are typical of areas very exposed to wave action to those typical of areas sheltered from wave action but with some tidal stream present. A number of uncommon shallow subtidal communities occur here. The area also has an excellent range of sediment communities present including beds of free living red calcareous algae generally called maërl beds (also known as ‘coral’) with the uncommon anemone *Halcampa chrysanthellum*. Areas of soft mud or muddy sand are characterised by the sea pen *Virgularia mirabilis* and a range of burrowing anemones including the very rare species, *Edwardsia delapiae* which has not been recorded since it was originally found and described from this area in 1928, and *Scolanthus callimorphus*, only known from Kilkieran Bay, Co Galway and one site in England. The phoronid *Phoronis psammophila* occurs in this community and has not been recorded elsewhere in Ireland or Britain.

The littoral reefs of Valentia Island are composed of areas that are exposed to, or very sheltered from, wave action. At exposed sites there is a typical zonation for this habitat: an upper shore with a narrow band of the brown alga, *Pelvetia canaliculata*; a mid shore covered by barnacles, limpets and mussels with rock pools containing the purple sea urchins, *Paracentrotus lividus*, and coralline algal crusts; and a low shore dominated by mussels and barnacles with *Porphyra* sp. followed by mixed kelp species (*Laminaria digitata*, *Laminaria saccharina* and *Saccorhiza polyschides*). On mixed substrate in sheltered areas there is a typical zonation of bands of *Ascophyllum nodosum* and *Fucus vesiculosus* in the mid shore with *Fucus serratus* in the low shore. The subtidal fringe has mixed kelp species with an understory of red algae. On the north-east shore of Portmagee Channel, the very low shore has seagrass beds (*Zostera marina*) and a variety of bivalve species. Burrowing anemones, in particular *Cereus pedunculatus* occur in gravel and mud in very sheltered areas. Boulders in the sublittoral fringe have a kelp community on top and on the undersides a community of bryozoans and sea squirts (*Polyclinum aurantium* and *Morchellium argus*). The shallow water reefs in areas very exposed to wave action have kelp park communities of *Laminaria hyperborea* with dense foliose algae, the jewel anemone *Corynactis viridis* and the sea squirt *Pycnoclavella aurilucens*. Reefs moderately exposed to wave action with moderate current display good examples of *Laminaria hyperborea* forest with a cushion fauna of sponges and ascidians which is considered uncommon. Another unusual community characterised by the keel worm *Pomatoceros triqueter* and occasional kelp occurs on areas of scoured cobbles.

Vertical rock supports a range of hydroids, red algae, the sea urchin *Echinus esculentus* with only occasional kelp plants. In sheltered areas either a species rich community of mixed kelps with sand scour tolerant fauna may be present or a forest of *Laminaria hyperborea* and *Laminaria saccharina* may occur. This latter community is considered uncommon. Isolated silty bedrock outcrops support sponges, hydroids, anemones and occasional red and brown algae. In deeper water at the western entrance to Portmagee Channel the reefs are very exposed or moderately exposed to wave action. Very steep bedrock is characterised by sponges, the jewel anemone *Corynactis viridis* and the cup coral *Caryophyllia smithi*. More gently sloping and upward facing circalittoral bedrock is characterised by pink coralline crusts, encrusting bryozoans, *Caryophyllia smithi*, *Echinus esculentus* and the sponges *Haliclona viscosa* and *Mycale rotalis*. These communities are typical of these habitats.

The very sheltered beach on the shores of the Valentia River estuary has a gradually sloping shingle beach, with a narrow band of *Fucus vesiculosus*, *Ascophyllum nodosum* and *Enteromorpha* sp., amphipods (*Echinogammarus marina*) and winkles (*Littorina littorea*) are frequent under the algae. Seaward of the shingle in muddy sand the polychaetes *Scoloplos armiger* and the lug-worm *Arenicola marina* are common. The tide swept low shore is characterised by the polychaetes *Lanice conchilega*. The bivalve *Scrobicularia plana* is common in the upper mid shore, while *Angulus tenuis* is more prevalent in the mid and low shore.

The site has a good range of sediment communities which vary from gravel and pebbles to maërl, sand and mud. The moderately exposed sediments consist of areas of medium sand with the burrowing sea urchin *Spatangus purpureus* and the bivalve *Dosinia exoleta*. Areas with mixed sediments with different combinations of pebbles, gravel and mud are generally characterised by a variety of hydroids, anemones, bivalves and red algae. Soft mud or muddy sand is characterised by burrowing anemones, in particular *Sagartiogeton undata* and *Edwardsia claparedii*, the sea pen *Virgularia mirabilis*, the molluscs *Philine aperta* and *Haminoae navicula*, and bivalves. *Haminoae navicula* is common in these communities but rare elsewhere in Ireland. A number of other uncommon marine species are found within the site including the rare phoronid *Phoronis psammophila* which occurs at a number of locations within the site and two rare burrowing anemones *Edwardsia delapiae* and *Scolathus callimorphus*. The site is of particular interest because it contains important examples of three habitats listed on Annex I of the EU Habitats Directive.

Appendix II Species lists

- See attached EXCEL File -