SOUTHERN IFCA

Southern IFCA Fish Monitoring Report – Year 1

2016

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The Southern IFCA report considered a number of other pieces of available literature in the public domain, particularly the survey reports and standard operating procedures made available online by the Langstone Harbour Board as these proved to be very useful sources of information.

1.0 Introduction

During 2016, Southern IFCA undertook a number of small fish population surveys for the first time targeting estuaries and harbours in Dorset and the Isle of Wight. These surveys acted as a pilot study for a potential monitoring programme, and the first year provides a baseline if these surveys are to be taken forward.

The survey was led by the Southern IFCA, while staff from the Environment Agency, Dorset Wildlife Trust, Natural England, Isle of Wight Estuaries Project, Yarmouth Harbour Master, National Trust and local anglers joined the survey at various sites. The first seasons have been used as pilot surveys to identify appropriate sites to be taken forward in future years.

One site, Lytchett Bay was surveyed in Poole during 2015, however this report will not focus on the 2015 survey in significant detail but will consider its findings in the discussion. Six sites were surveyed during June 2016 (the spring surveys): Lytchett Bay (1) and Brownsea Island (2) of Poole Harbour, Ferrybridge (3) and Pirates Cove (4) of the Fleet, and the Old Mill Pond (5) in Bembridge Harbour and Yarmouth Harbour (6) at the Isle of Wight. These were visited again in October (the autumn surveys) with the exception of Pirates Cove and Bembridge Harbour, which both proved unsuitable. In addition Newtown Harbour (7) was added to the October Surveys.

Fish were caught using the seine net method, then identified, measured, photographed and released close to point of capture. Metadata of environmental conditions were recorded including weather, wind speed, sea state, water clarity and state of tide.

1.1 Importance of Estuaries and Harbours

Estuaries and coastal ecosystems are known for their high productivity and biodiversity, providing ecosystem services such as sustenance and coastal protection (Barbier *et al*., 2011). Fish are a major component of aquatic communities and are a good general indicator of ecological status and habitat health. Fish species in the coastal and near shore areas vary from juvenile species utilising relevant habitats as nursery areas as well as those which remain in the nearshore for their full life cycle.

The aim of the survey was to collect quantitative information on juvenile and resident fish communities presently occupying these waters. The information may be used in conjunction with future survey data to understand seasonal and annual changes in the fish communities over time. This will help to inform any necessary further management to take its best form in the future as well as provide a better understanding of the fish communities utilising the survey areas.

1.2 Survey Sites in Detail

Poole Harbour is large harbour with a double high water regime and small tidal regime, making it a unique feature of the coastline for the UK. It is a multi-statutory designation region of both national and international importance, and includes Sites of Special Scientific Interest (SSSI), a Special Protection Area (SPA) and is a Ramsar site. Commercially important fish species (incluging mullet, flounder, bass and sand eels) are known to have nursery grounds or populations within the harbour. Within the harbour 2 sites have been considered for fish monitoring, Lychett Bay and Brownsea Island. These represent two different habitats within the harbour. Lytchett bay displays a natural succession from heathland to marshland habitats whereas the site at Brownsea is closer to the entrance of the harbour and more saline.

Similar to Poole Harbour, The Fleet is a multi-statutory designation region including a Special Area of Conservation (SAC), SPA, Ramsar and SSSI. The survey sites included in the surveys fall at the Eastern end of The Fleet close to the entrance and Portland Harbour. Ferry Bridge (Site 3) located at the entrance to The Fleet exhibits strong tidal currents while Pirate's Cove (Site 4) is much more sheltered and shallow with weaker tidal currents.

The majority of the Isle of Wight's surrounding waters are protected under SAC designation, include the South Wight Maritime SAC to the south and the Solent Maritime to the north. The Old Mill Pond (Site 5) of Bembridge Harbour is designated SPA status under the Solent and Southampton Water SPA, and lies adjacent to the South Wight Maritime SAC. Bembridge Harbour mouth is a known nursery area for bass. Yarmouth Harbour (Site 6) also has designated SPA status and forms part of the Solent Maritime SAC. Newtown Harbour is SPA, SAC, SSSI and a National Nature Reserve. All the sites on the Isle of Wight represented estuaries and harbours, but are varied in habitat type. The site at Newtown is characterised coarser sediment at the end of the harbour, at Yarmouth the site was much muddier on the fringe of saltmarsh and Bembridge was soft sediment covered in algal mats.

Site Locations

Figures 1 + 2 - The sites in Dorset and on the Isle of Wight which were targeted for fish surveys

Figures 1 and 2 show the location of the sites in Dorset and the Isle of Wight. Each site varies in substrate and energy regime providing an interesting comparison and a useful range of habitats.

Site 1 – Lytchett Bay, Poole Harbour, Dorset

Substrate: Muddy and soft sediment

Freshwater Input: Close to freshwater sources

Tidal Regime: Low Energy

Site 2 – Brownsea Island, Poole Harbour, Dorset

Substrate: Sandy and coarse sediment

Freshwater Input: Close to Harbour entrance so highly saline

Tidal Regime: High Energy

Site 3 – Ferry Bridge, East Fleet, Dorset

Substrate: Sandy with rocks and weed

Freshwater Input: Highly Saline

Tidal Regime: High Energy

Site 4 – Pirates Cove, East Fleet, Dorset

Substrate: Sandy with large rocks with weeds attached

Freshwater Input: Highly Saline

Tidal Regime: Low Energy

Site 5 – Old Mill Pond, Bembridge Harbour, Isle of Wight

Substrate: Muddy with rocks and a large amounts of weed especially *Fucus and Ulva*

Freshwater Input: close to freshwater sources

Tidal Regime: Low Energy

Site 6 – Western Yar Estuary, Yarmouth, Isle of Wight

Substrate: Muddy and soft sediment

Freshwater Input: adjacent to saltmarsh

Tidal Regime: Low energy estuarine environment

Site 7 – East Spit, Newtown Harbour, Isle of Wight

Substrate: Coarse Sediments on spit

Freshwater input: Highly Saline

Tidal regime: High energy

Figure 3 - Images of site locations
A – Brownsea Island
B – Lytchett Bay
C – Ferry Bridge
D – Pirates Cove
E – Saltmarsh
F – Bembridge
G – Newtown Harbour

3.0 Methodology

The methodology for this survey follows guidelines used by organisations such as the Environment Agency and Langstone Harbour Board, although altered depending on resource and local requirements, so as to increase standardisation and aid comparison between different sites. A 43 metre seine net was used for two successful hauls per site (due to rock coverage and excessive *Fucus* macroalgae cover two hauls were deemed unsuccessful as the net rolled and caused fish to escape). The sites are targeted at the same state of the tide each time, for these surveys an hour either side of high tide was targeted.

Different net deployment methodologies have been used between sites, with some sites benefitting from the use of a vessel to deploy the seine and others being more suitable to walk the seine net out by foot. This is typically determined by the water depth of the survey sites. A vessel was used at Yarmouth, Newtown and Brownsea, whereas in Lychett, Bembridge, and in the Fleet the shore profile was more suitable for the net to be walked out.

Fish were identified to species level, with the length of the first 50 of each species recorded and counted thereafter.

Abiotic factors including weather, wind speed, sea state, water clarity and tidal regime were also recorded. Due to device failure, temperature and salinity were not recorded. An aeration device was used from mid-survey due to higher mortality rates of sand eels at the Brownsea Island site. The use of the aerator significantly reduced mortality thereafter.

Figure 4 - Deployment of the Seine Net (A) in the shallow water at the Fleet by foot or (B) in the deeper water at the Yar assisted with a vessel

4.0 Results

A total of 18 species and 1,846 individuals were caught across the six sites during spring 2016. In autumn 2016, at a reduced 5 sites, less species were caught – only 14, but high catches (of sand smelt, sand gobies and herring) led to a total catch of 2,790 individuals.

Figure 5 + 6 – Sand eels were the most abundant species in the spring 2016 surveys (left) whereas in autumn 2016 the most abundant was the sand smelt (right)

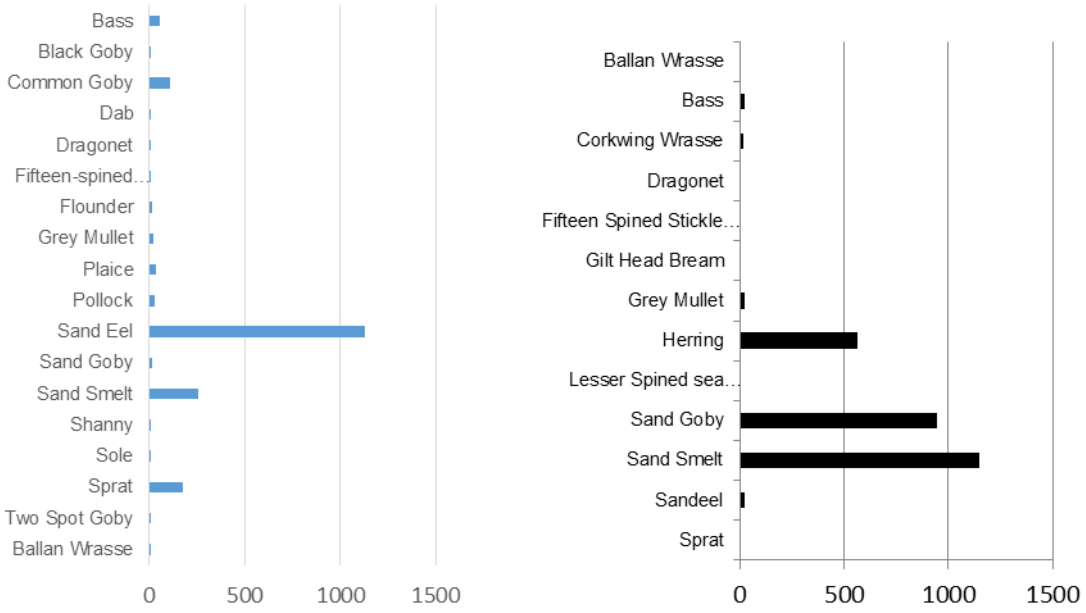

Figure 7 - Total Catch from all sites – A – June; B - October

Figure 4 shows the total catch at all sites split between June and October. A total of 18 species of fish were caught across six sites during June 2016. The total individuals caught were 1,846. Sand eel were the most abundant species, with a total of 1,129 individuals, followed by sand smelt with 258 individuals. In October 2016 a total of 14 species were caught across the 5 sites. Sand smelt, sand gobies and herring were the most abundant with totals of 1146, 944 and 564 individuals.

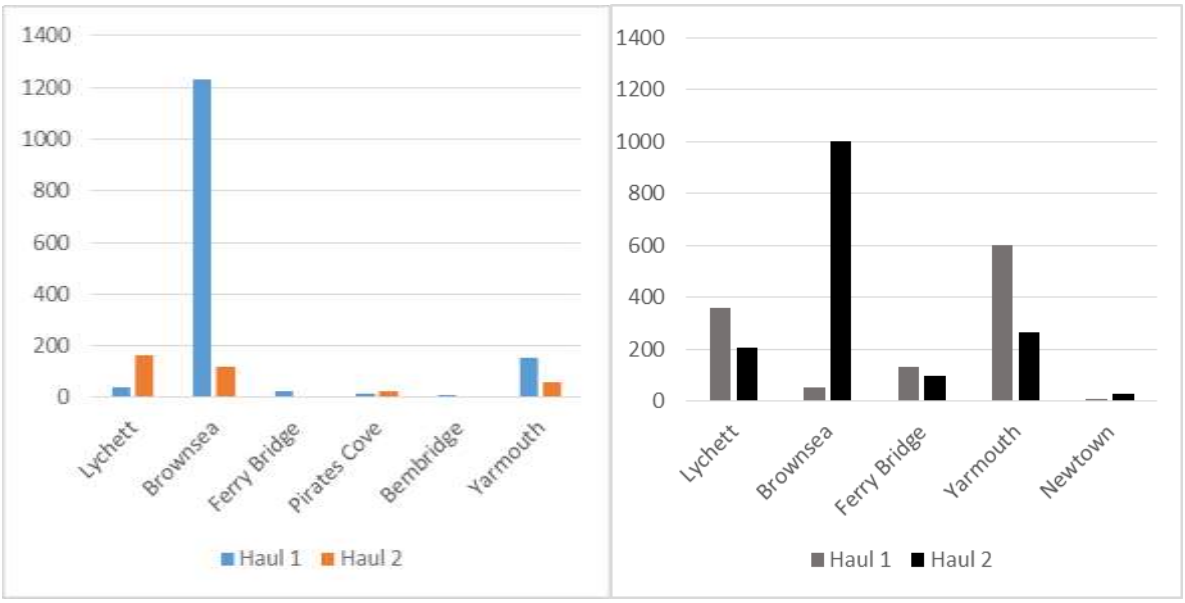

Figure 8 – Total catch split by site A – June; B - October

Considering the sites separately, in June total abundance was highest at Brownsea with 1,347 individuals in total with most of these individuals being made up of sand eels from the initial haul. The lowest abundance was found at the Old Mill Pond, Bembridge with 11 individuals in total caught over two hauls, making up just 0.6% of the total catch for all sites.

In October 2016 only 5 sites were surveyed with Newtown added and Bembridge and Pirates Cove not continued. Again Brownsea saw the most individuals caught, followed by Yarmouth with a total of 1055 and 864 individuals respectively. Similar to the spring there was a contrast between the two hauls at Brownsea with the majority (91% in the spring and 95% in the autumn) of the combined hauls being made up from one haul.

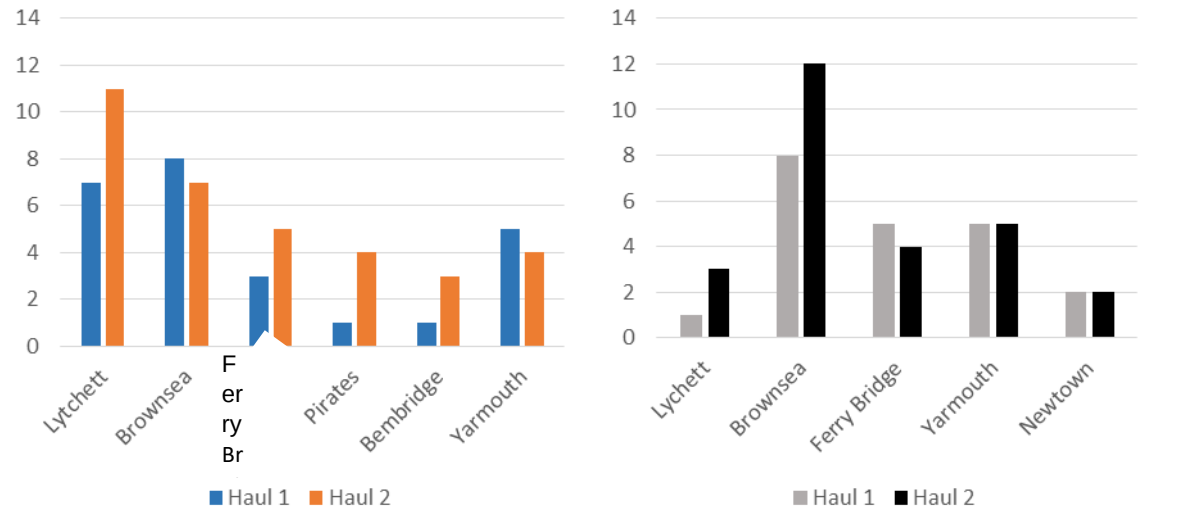

Figure 9 - Number of Species Caught per site – A – Spring B- Autumn

In the spring, species diversity was particularly high at Lychett Bay and Brownsea Island with twelve and ten species in total respectively (Figure 6). Species diversity was lowest at the Old Mill Pond, Bembridge Harbour with three species caught in two hauls. Again in the

autumn, Brownsea displayed the highest species diversity with all 14 species found during the October 2016 surveys found occurring at Brownsea.

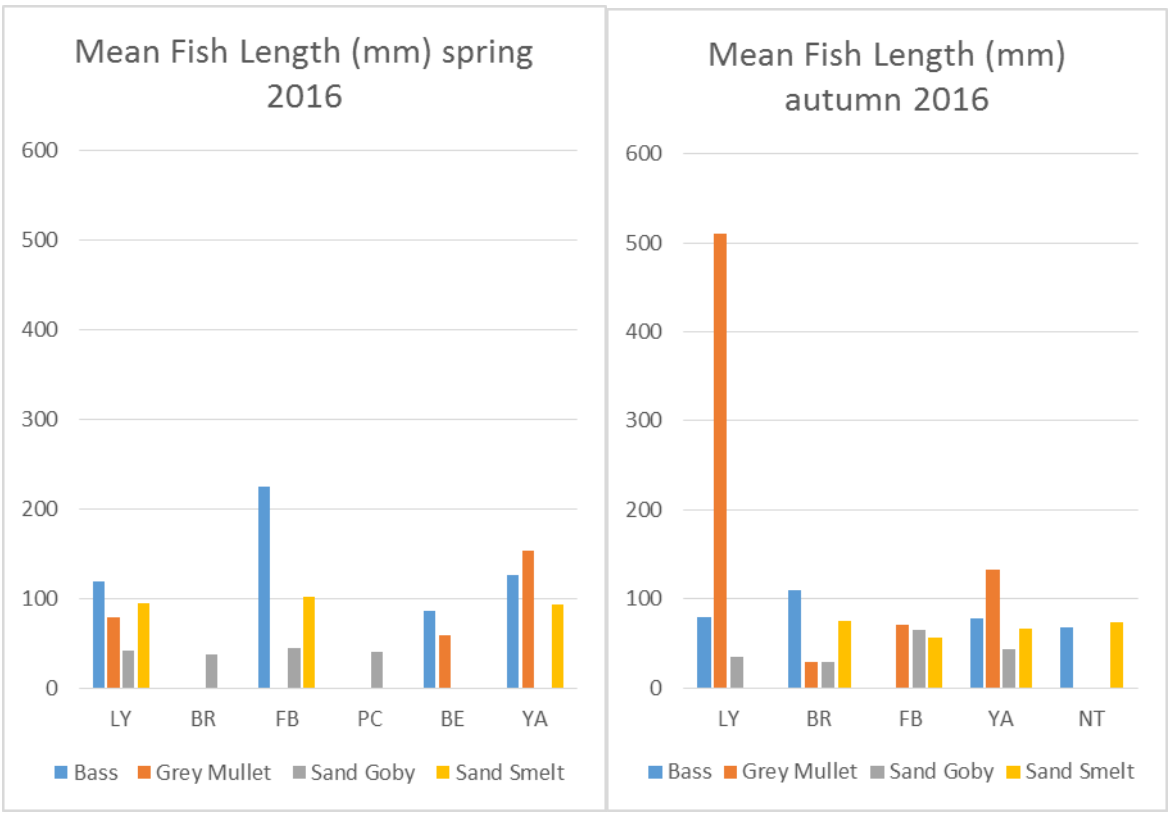

Figure 10 - Mean fish length of common species found in Spring and Autumn 2016

For comparison of species lengths between sites, due to this being the first year of detailed data collection only species found at more than three sites in both seasons have been included initially, these are bass, flounder, grey mullet, sand goby and sand smelt. In both Spring and Autumn surveys single larger fish caught have skewed the comparison slightly, with a single large bass and a large mullet increasing the mean at Ferry bridge in spring and at Lychett in the autumn. Aside from those results the length of sand smelt surveyed in the spring was typically larger than in the autumn.

4.2 Metadata

Poor visibility at Lytchett Bay and Yarmouth Harbour may explain why these sites had the second and third highest abundance and species diversity respectively. Ferry Bridge and Pirate's Cove both had very clear waters, which may have allowed fish to detect the net and swim away, leading to a lower number of individuals caught.

A number of sites experienced high presence of macroalgae which in some cases inhibited the ability of the net to catch fish. These sites included Bembridge and parts of Ferry Bridge. The low catch at Bembridge may be due to the high presence of macroalgae, possibly presenting a lack of oxygen or unsuitable habitat for some fish species. Future metadata sampling and recording including temperature, salinity and oxygen may lead to further insights and explanations.

In the Autumn survey at a number of sites the conditions around the survey were slightly worse than the previously experienced. Particularly on the Isle of Wight at the Newtown site where the survey was undertaken in strong winds which made it more difficult to work. This may have had an effect on the ability to deploy and retrieve the net.

4.3 Key Findings

- 1,846 individual fish representing 20 species were caught during spring 2016. 2790 individual fish representing 14 species were caught during autumn 2016

- Juvenile bass were caught in Lytchett Bay, Ferry Bridge, Bembridge and Yarmouth in the June surveys, and Brownsea, Lytchett, Yarmouth and Newtown in the October Surveys

- Sand eels were caught in the highest numbers with 1,129 individuals in spring and sand smelt were caught in the highest numbers with 1, 146 individuals in the autumn Surveys

- 40 flatfish in total were caught between Lytchett Bay, Ferry Bridge and Pirate's Cove. These species comprised of Dab, Flounder, Plaice and Sole. No flatfish were caught in the autumn surveys

- Plaice were the most common flatfish followed by flounder, both present in the sandy shores of Lytchett Bay, Ferry Bridge and Pirate's Cove, which is characteristic of these species.

- Grey mullet, sand goby, sand smelt and bass were found on the most surveys with each located on 8 separate surveys in spring and autumn.

Table 1. Species caught during the survey at the six sites during spring 2016: Lytchett (LY), Brownsea (BR), Ferry Bridge (FB), Pirates (PI), Bembridge (BE) and Yarmouth (YA).

Species	**Scientific Name**	**Locations Caught**	**Total No. of Individuals**
Ballan Wrasse	*Labrus bergylta*	BR	2
Bass	*Dicentrarchus labrax*	LY, FB, BE, YA	52
Black Goby	*Gobius niger*	BR	1
Common Goby	*Pomatoschistus microps*	LY, BR, PI, BE	107
Dab	*Limanda limanda*	LY	1
Dragonet	*Callionymus lyra*	BR	1
Fifteen Spined Stickleback	*Spinachia spinachia*	BR	3
Flounder	*Platichthys flesus*	LY, FB, PI	14
Grey Mullet	*Liza/Chelon sp.*	LY, BR, BE, YA	22
Plaice	*Pleuronectes platessa*	LY, FB, PI	34
Pollock	*Pollachinus pollachinus*	BR	28
Sand eel	*Ammodytes tobianus*	BR	1129
Sand goby	*Pomatoschistus minutus*	LY, BR, FB, PI	14

Sand smelt	*Atherina presbyta*	LY, FB, YA	258
Shanny	*Lipophrys pholis*	FB	2
Sole	*Solea solea*	LY	1
Sprat	*Sprattus sprattus*	BR	175
Two Spot Goby	*Gobisulus flavescens*	LY, BR	4

Table 2. Species caught during the survey at the five sites during autumn 2016: Lytchett (LY), Brownsea (BR), Ferry Bridge, Yarmouth (YA) and Newtown (NT).

Species	**Scientific Name**	**Locations Caught**	**Total Individuals**
Ballan Wrasse	*Labrus bergylta*	BR, NT	5
Bass	*Dicentrarchus labrax*	BR, LY, YA, NT	26
Corkwing Wrasse	*Symphous mellops*	BR, FB	19
Dragonet	*Callionymus lyra*	BR	2
Gilthead Bream	*Sparus aurata*	BR	1
Fifteen Spined Stickleback	*Spinachia spinachia*	BR, FB	5
Grey Mullet	*Liz/Chelon sp.*	BR, FB, YA, LY	21
Herring	*Clupea palassi*	BR, YA	564
Short-spined sea scorpion	*Myoxocephalus Scorpius*	BR	1
Sand Goby	*Pomatoschistus minutus*	BR, LY, FB, YA	944
Sand Smelt	*Atherina presbyta*	BR, LY, FB, YA, NT	1146
Sandeel	*Ammodytes tobianus*	BR	21
Sprat	*Sprattus sprattus*	BR	6
Two Spot Goby	*Gobisulus flavescens*	BR	29

4.4 Seasonal/Annual Data

It is not yet clear whether seasonal trends are occurring, but data from future years may show this. For the sites undertaken in 2016 the aim is to continue collecting data at all the sites except Bembridge and Newtown which proved unsuitable, in future years. This will enable longer term trends to be considered.

Fleet Data

At the time of undertaking the spring 2016 surveys in the Fleet the Environment Agency also undertook surveys at Chickerell Hive, Langton Hive and Clouds Hill, all within the Fleet but further to the west. The species recorded at Ferry Bridge and Pirate's Cove were fairly different from the sites surveyed by the EA, primarily the caused by presence and high number of Three-spined stickleback caught at all EA sites and at neither of the Southern IFCA sites. Species abundance and diversity was higher at all EA sites.

Sand gobies were found at all five locations. Sand smelt were caught at all sites bar Pirate's Cove. Common gobies were only found at Pirate's Cove while Shannies were only found at Ferry Bridge. Bass were caught, though at very low numbers, at three of the five locations: Ferry Bridge, Chickerell and Langton.

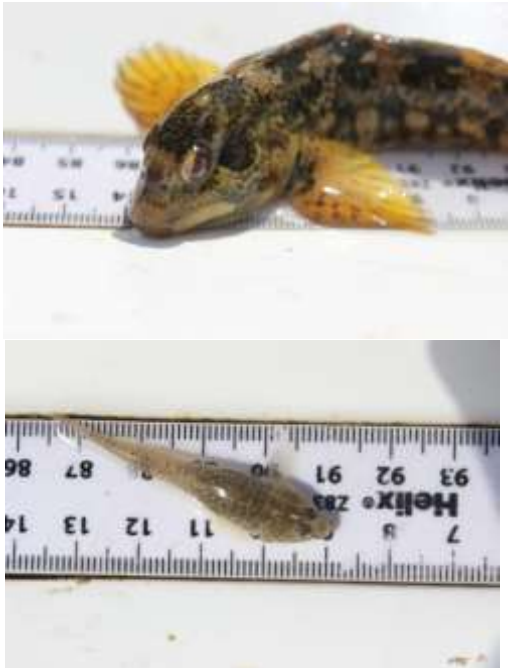

Figure 8 – Shannies (above) were unique to the Ferry Bridge site in the fleet but Sand Gobies (below) were found at all sites.

5.0 Discussion

The Southern IFCA 2016 surveys proved to be a success, with 23 species caught between 7 sites and 11 surveys. The data from year one not only provides an indication of the typical species found in the various harbours but also can act as a pilot project to identify appropriate areas and techniques to be taken forward in future years. Initial comparison is difficult due to this being the first full year of the survey but some comparisons between the sites are possible.

Some sites such as Lytchett Bay and Brownsea Island were found to relatively high species diversity, while Bembridge Harbour and Newtown Harbour had lower species diversity and fish numbers than expected. It is thought that this could due to high macroalgae cover at Bembridge and poor conditions at Newtown meaning that fewer fish were caught as the lead line of the net rolled up and allowing fish to escape. In contrast the high species diversity at Brownsea may reflect the nature of the site and its close proximity to the harbour entrance.

Species found before in the previous surveys in 2015 in Poole Harbour such as grey mullet, flounder, bass and sand eel, are all characteristic of Poole Harbour and were all found at Lytchett Bay or the waters surrounding Brownsea Island in the spring surveys and all but the flounder were caught in the Autumn surveys.

While gobies, sand smelt, grey mullet, sand eels, blennies and flat fish are all previously found in the Fleet at the sites surveyed, no sand eels or blennies were located and grey mullet were only located in the Autumn surveys. This may again be due to issues surrounding the macroalgae fouling the gear but future surveys should allow greater clarification.

Bass were the fifth most abundant species caught during the spring 2016 survey, and were present at all sites except Brownsea and Pirates Cove. During the autumn 2016 surveys bass were the sixth most abundant species and caught at all but the Ferry Bridge site. In the

spring the bass had a mean length of 12cm indicating they were typically year 1 bass. One bass was significantly larger than the rest at Ferry Bridge measured at 225mmm indicating that it was in the 2-3 year age group. The number of bass observed in the autumn was lower than in the spring catches. In the autumn the bass collected were of a mean length of 83.4mm indicating that they were in the 0-1 year age class. The relatively low numbers in autumn makes it difficult to consider the significance of any observed difference, but development of a longer time series may be able to show clearer overall trends.

Sand eels and sand smelt were caught in relatively high numbers, but only at the Brownsea site. Sand eels are a burrowing species characteristic of shell and gravel-bottomed habitats, which explains their presence at this site. Further years survey may identify sand eels at the other sites with a similar substrate.

Flat fish were found at Lytchett Bay, Ferry Bridge and Pirate's Cove in the spring surveys however none were found at other sites or in the autumn surveys. This may have been due to the varying habitats, but sites at Yarmouth proved difficult bringing the seine nets onto the shore line due to the presence of saltmarsh and a nearby channel and Bembridge and Newtown produced low levels of fish in general (likely due to algal mats at Bembridge and poor conditions at Newtown). It may well be the different habitat types that led to variation in some instances and local conditions in others. It is likely that due to the nature of flat fish that the capture in a seine net is particularly reliant on the lead line not rolling over and leaving gaps along the seabed.

6.0 Future Improvements

Quantitative metadata were limited from the 2016 survey and instead details were mostly based on visual assessments. This was largely in part due to device failure and limited access to equipment in the surveys first year. As many species survive within a limited salinity range, measuring salinity and conductivity and monitoring changes may yield explanations to future changes or trends of species present across sites. Similarly, species have varying temperature ranges, so measuring the temperature at the beginning and end of each haul is recommended. More qualitative information could be collected on the water turbidity as well. At sites using a vessel a secchi disc would provide more accurate information, although this would be more difficult for the purely shoreside surveys.

To increase species identification speed and accuracy, it is recommended a more detailed species identification kit could be included. This could include tweezers to aid common and sand goby identification of the isthmus membrane, however assessments would have to be made regarding the time requirements this would take and the ability to do this on the shore side. Glass or clear plastic identification jars of varying sizes (e.g. 250ml, 500ml and 1l) will also aid identification via the dorsal fin for goby species. From the beginning of the survey, it is recommended that when there is doubt of species identification, one of two protocols should be set in place. Either species are identified to family level or samples are taken in sample bags and for further off-site identification. A photograph of each species at each site should always be taken, while also taking a photograph of the species ID card beforehand. This will aid photograph identification speed and accuracy and allow for Quality Assurance of the data.

Problems with the seine net arose at two of the sites: Pirate's Cove and Mill Pond. To aid efficiency it has been considered that these survey sites are not suitable for the survey methods. Due to the amount of macroalgae present, it was recommended a different site be considered either at Bembridge Harbour or at another location on the Isle of Wight, following the initial survey in the spring it was determined that Newtown was a suitable alternative and

Bembridge would not be continued. Pirates Cove proved problematic due to the obstructions and associated weed, for this reason it was decided that this would not be appropriate for future surveys.

7.0 References

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