

# Citizen Science & Awareness Raising

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# Citizen Science

*“Scientific research conducted, in whole or in part, by amateur or non professional scientists”*

Members of the public are seen as key components in advancing knowledge about the sustainable use and management of the natural environment

Strikes a balance between scientific, educational, societal and policy goals

Davies, 2013

# Citizen Science

**Not new – Natural History Societies**

Amateur naturalists

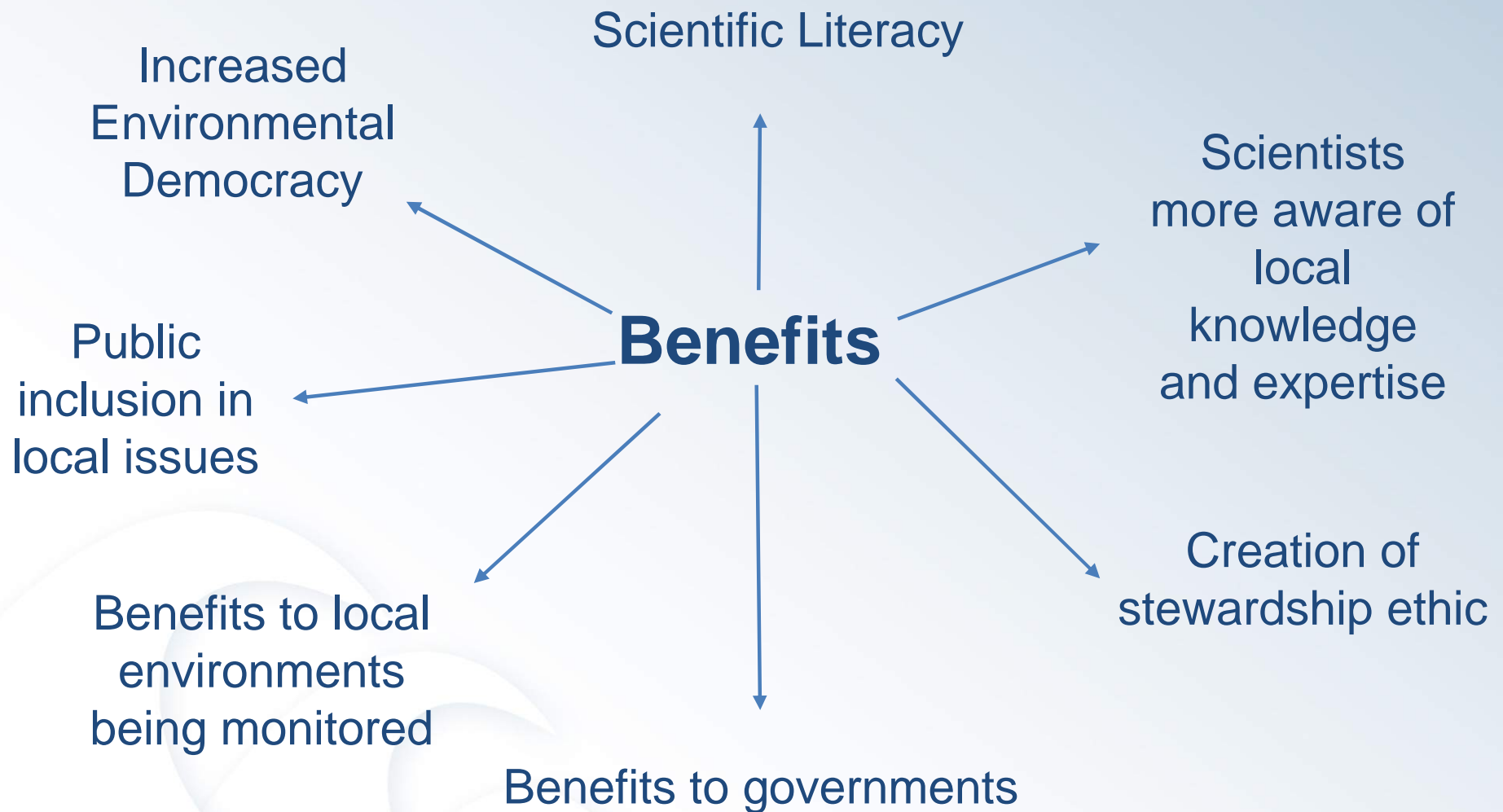
Local knowledge

Movement for volunteers to get involved in data collection

Knowledge of marine environments

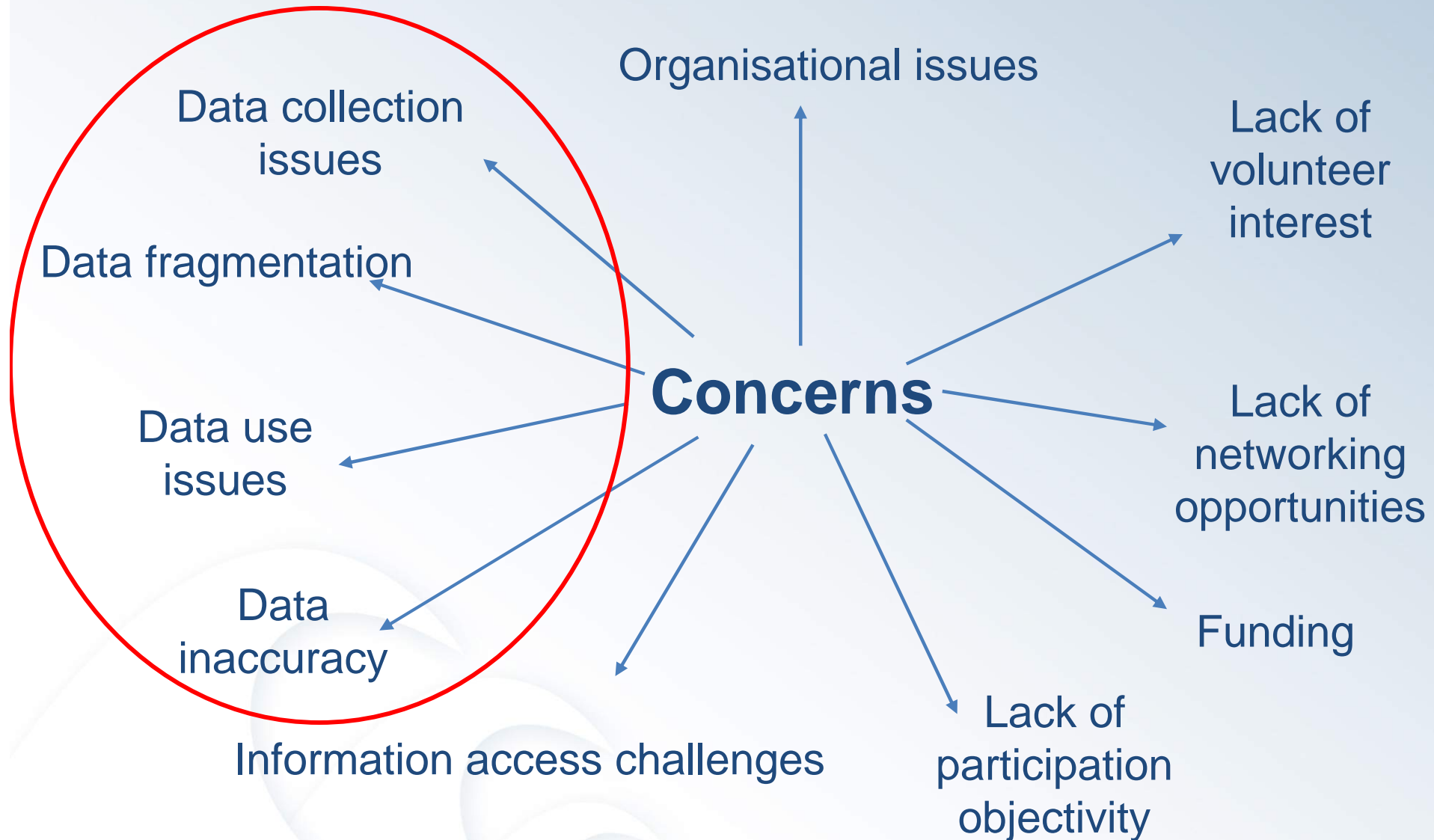
New technologies

# A note on Citizen Science



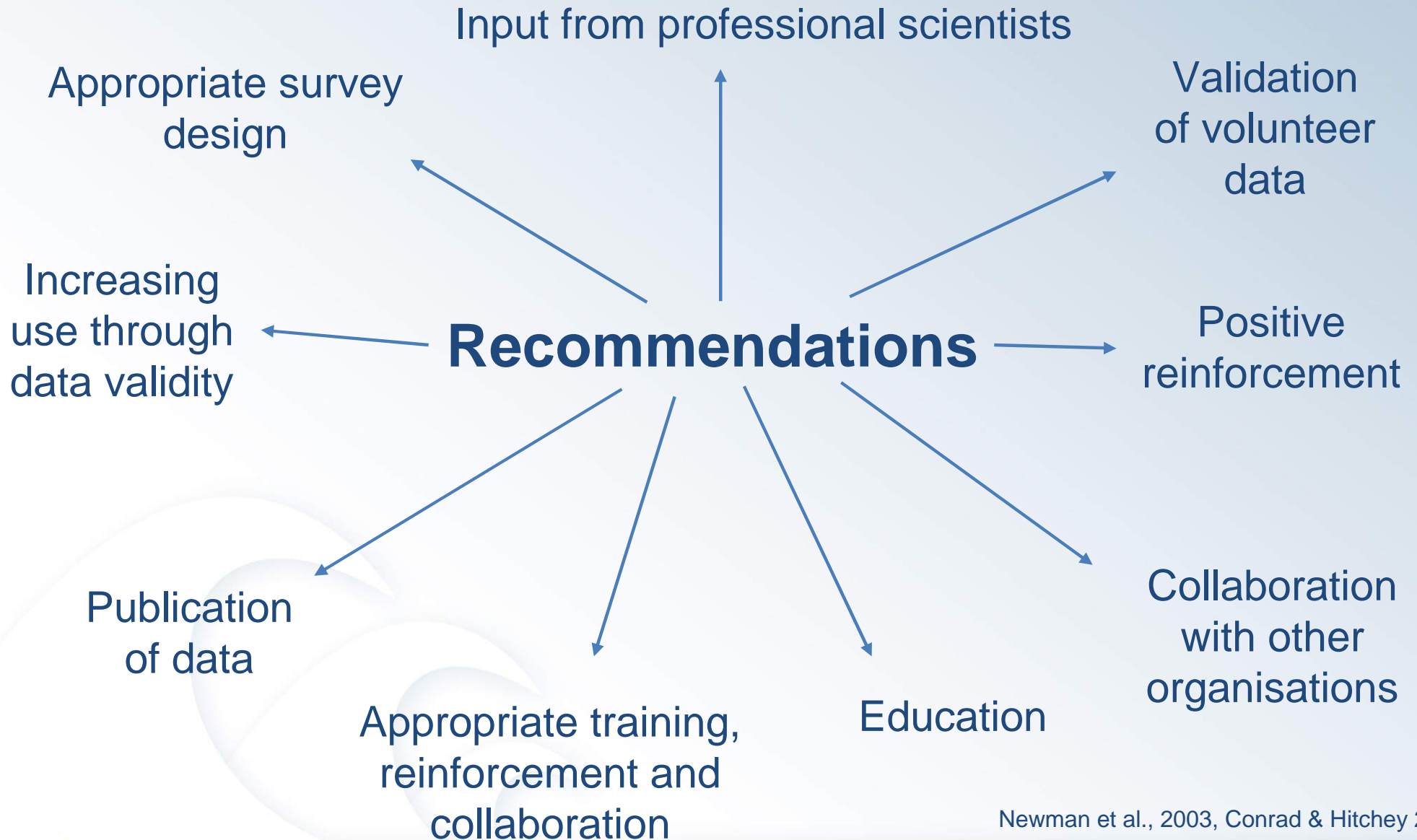
Newman et al., 2003, Conrad & Hitchey 2011

# A note on Citizen Science



Newman et al., 2003, Conrad & Hitchey 2011

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Newman et al., 2003, Conrad & Hitchey 2011



# Background

Tractable databases are crucial to monitor the impacts of climate change

Knowledge of abundance and geographic ranges was lacking in the north east of England

Often constraints of manpower

Citizen Science offers a way of overcoming this shortfall and fill in gaps

Building up long term databases



# Aims

- To engage the wider community with their natural environment through a programme of environmental monitoring surveys
- Promote a greater understanding, appreciation and stewardship of the coast resulting in a greater advocacy of the coast by local communities
- To understand the limitations of monitoring using local communities
- To assess the robustness of volunteer data





# Aims

- Actively audit species distributions and ecological dynamics in intertidal areas
- Address data gaps
  - Indicators of change
  - Invasive non-native species
  - Changes in Phenology
- To assess the robustness of volunteer data



# Structure

## Individual Surveys

- Volunteers choose species
- Volunteers choose the shore
- Volunteers choose how often

## Mini Team Projects

Specific projects focussed on targeted species

## Big Biodiversity Days

- Three sites
- Regional trends
- Seasonal changes



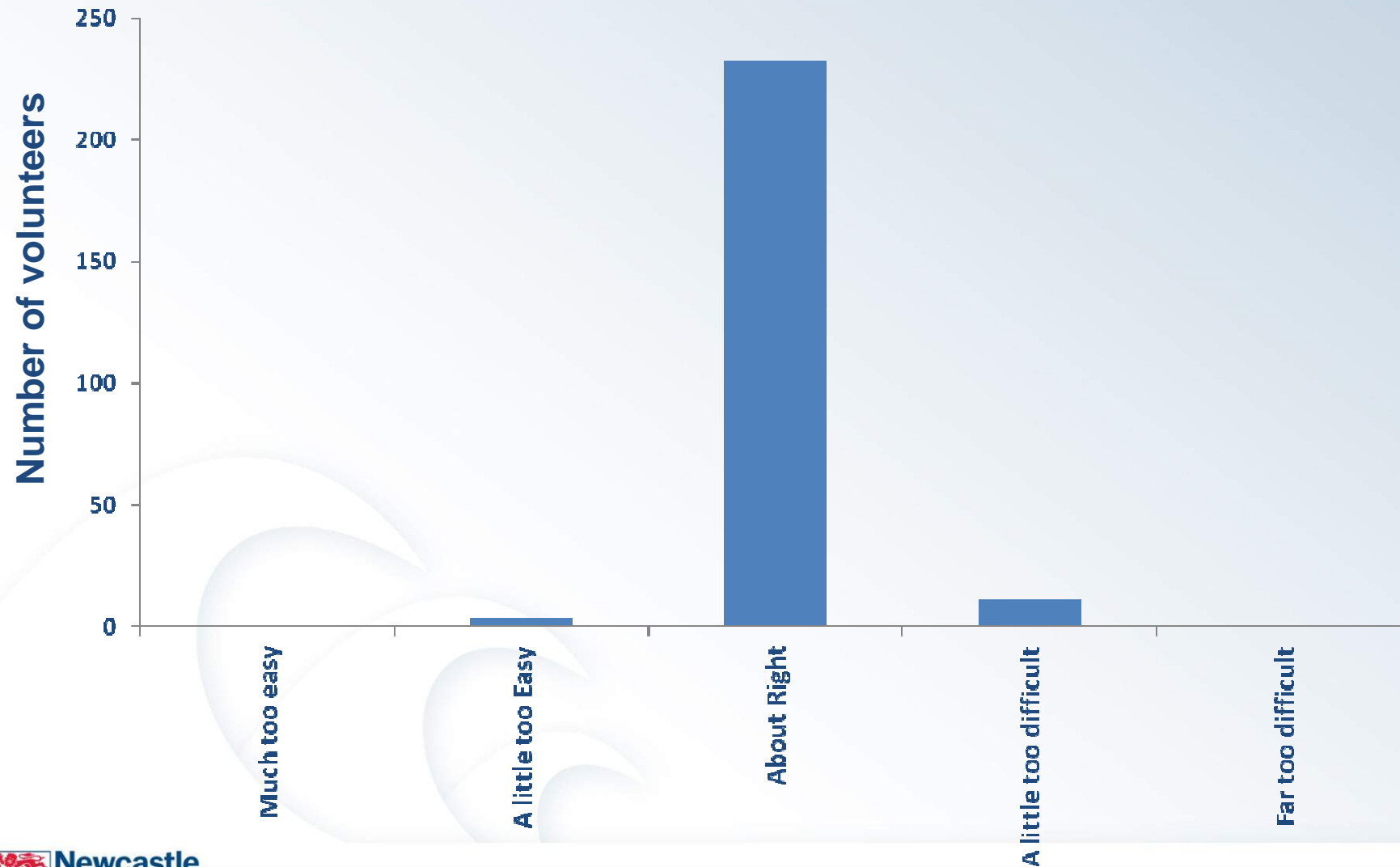
# Structure





# Structure

## Difficulty of Training

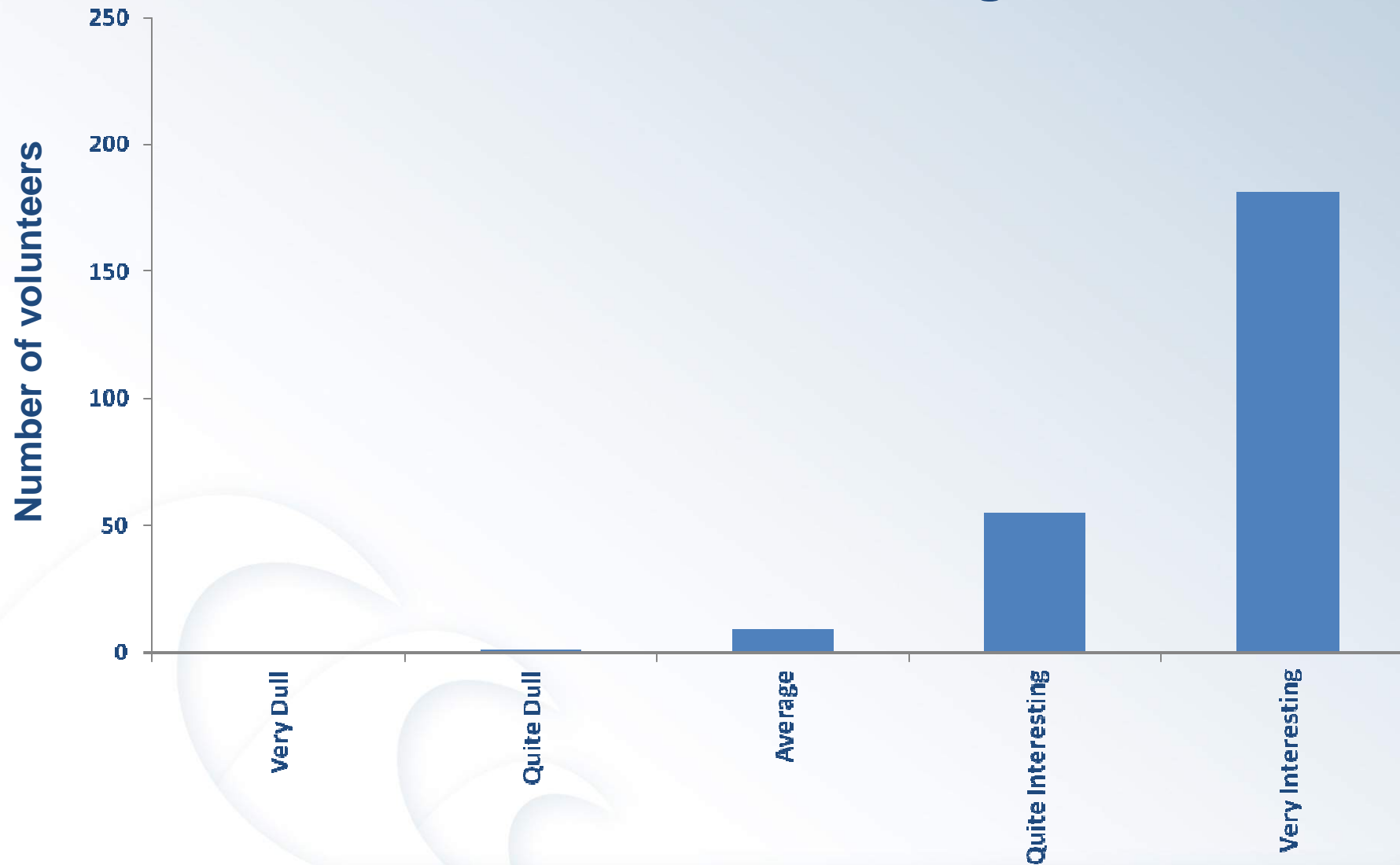






# Structure

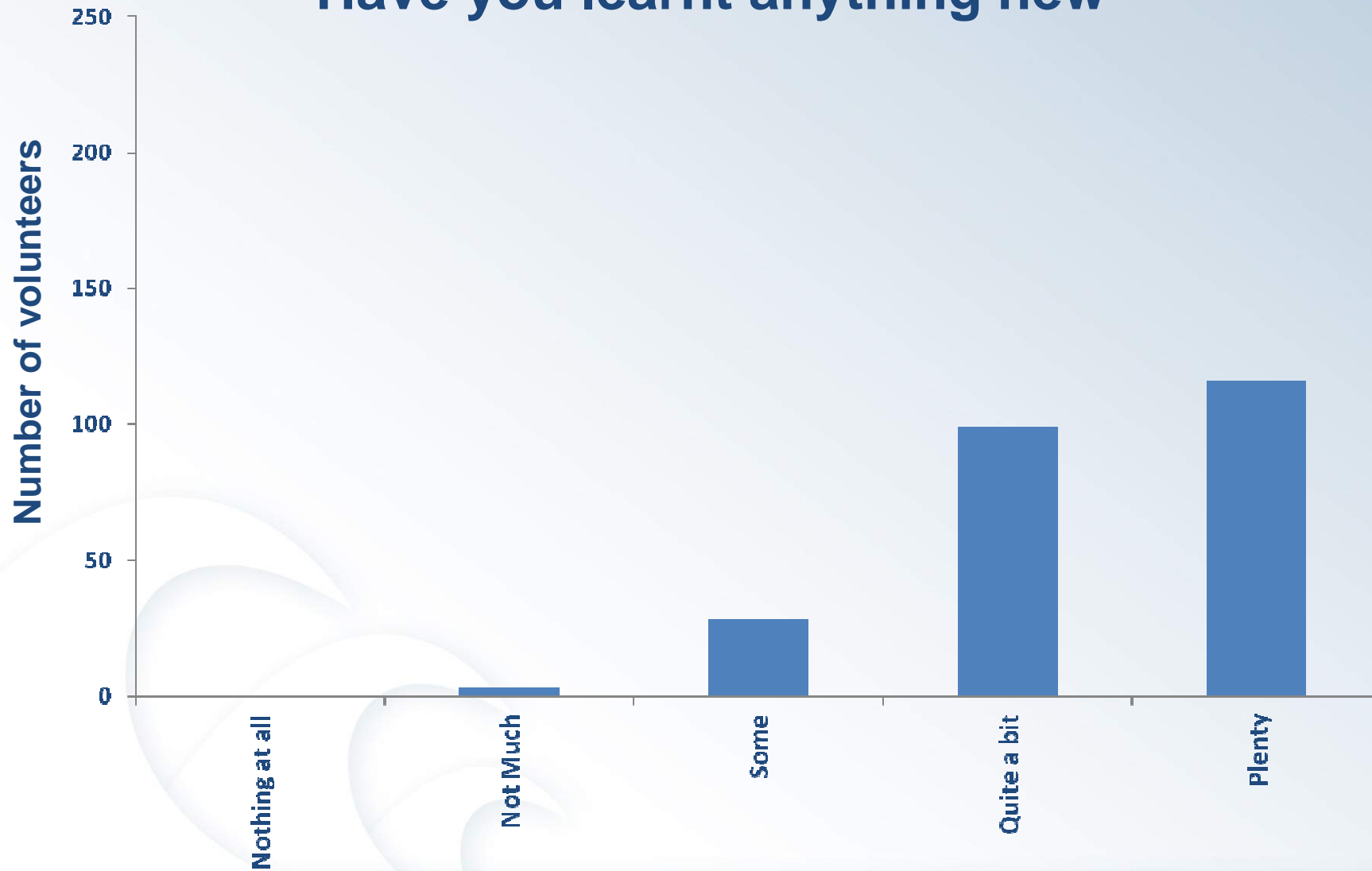
## Interest of Training





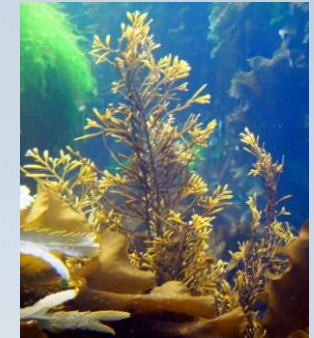
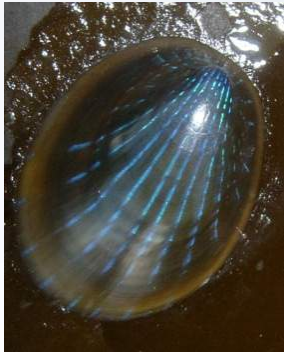
# Structure

## Have you learnt anything new



# Structure

## Individual Surveys





# Response

**Big Sea Survey began May 2010**

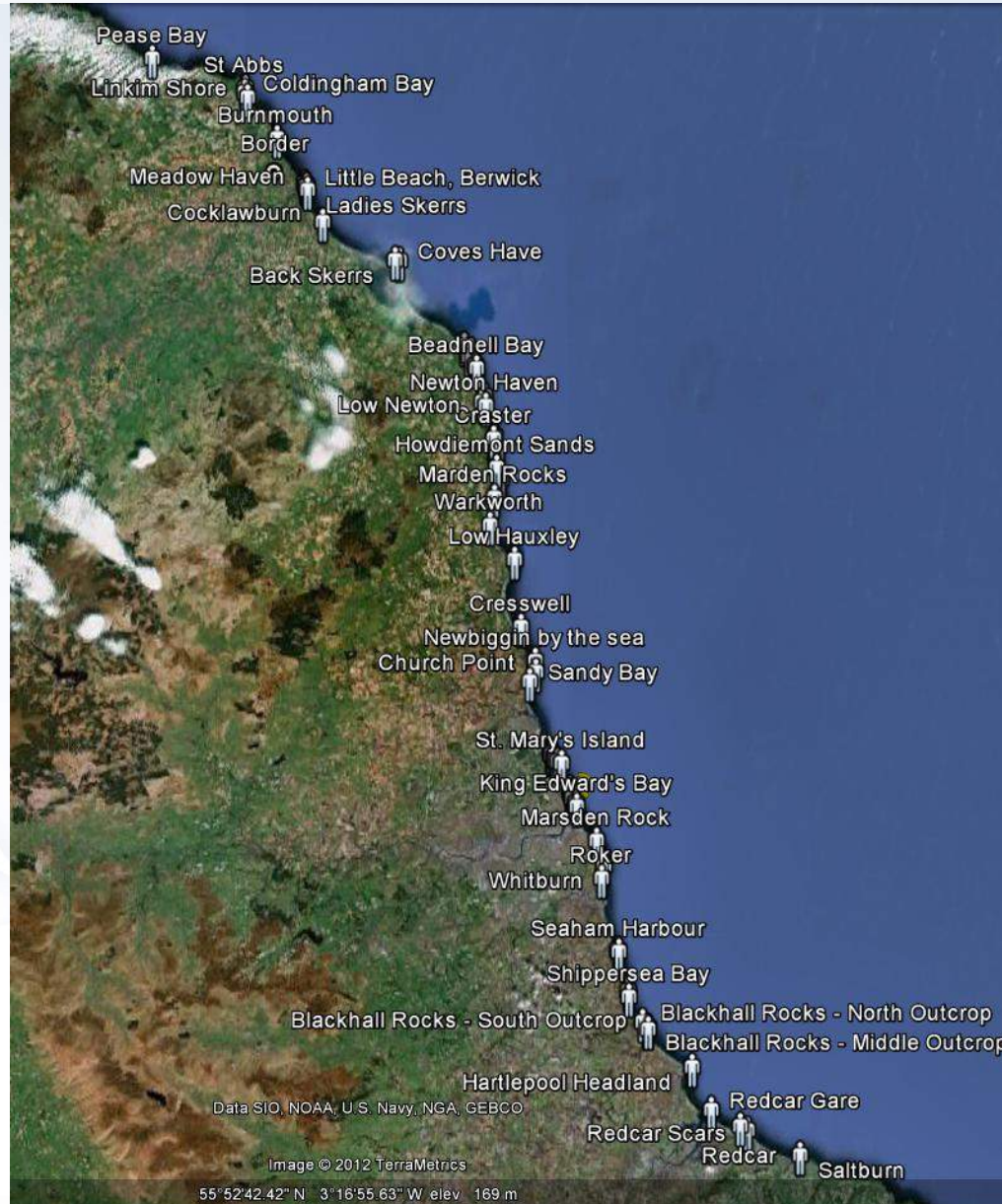
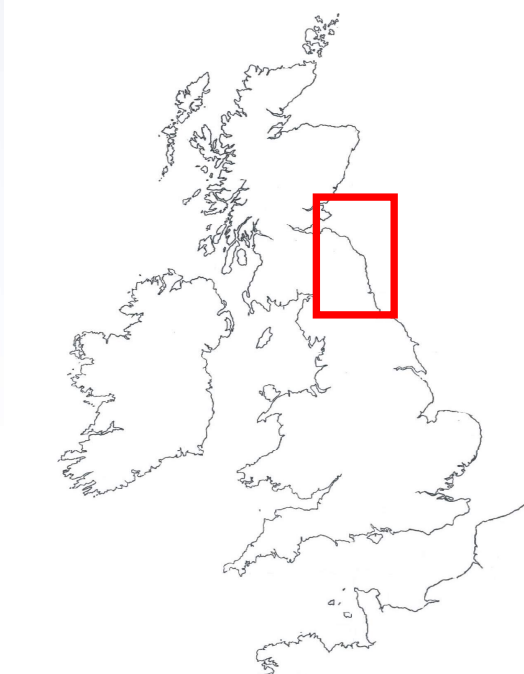
**Trained 360 volunteers in the project, 253 (70%) continuing to take part  
MAINTAINED RETENTION RATE**

**190 volunteers with kit out surveying  
DATA CONTINUING TO BE SENT IN**

**135,000 species records collected in three and a half years  
With rare species being monitored and recorded**



# Response







# The Wider Project



**Newsletter**  
January 2012  
**Happy New Year!**  
Below you will find a summary of all of the events and activities that will be taking place during the next few months here at The Big Sea Survey.

**Calling all barnacle lovers**  
As some of you remember, last year we ran a mini project hunting for baby barnacles of the species *Semibalanus subrotundus*. Well it is nearly that time of year again and we will be kicking off our 2012 programme of mini team projects in Feb 2012 by searching for our baby barnacles once again. For those of you who took part last year we would love you to take part again. See below for the map of first occurrence of baby barnacles across the region. It would be great to get a few more points on this map as it is starting to show a lovely regional trend for settlement. If any of you are interested in getting involved in looking for baby barnacles please get in touch and we will send you the relevant information. The winter months have been much warmer this year which means that we might begin to see settlement much earlier than last year so keep your eyes peeled.

**Field Support sessions**  
Field support sessions are designed to help you with your surveying techniques and species identification and to address any problems that you may be experiencing. It is essential to book onto one of these sessions at the earliest opportunity; we will not be coming out if no one books. Book either by email, the website or give us a quick call. Once you have booked onto the appropriate session your place is secure. Be prepared to come along with your surveying packs so that we can make as effective use of the time as possible, bring your warm clothes, hats, gloves and scarves.

**'Big Biodiversity Days'**  
The Big Sea Survey we are going to be conducting chosen three sites to carry out this activity and the aim of these days is to get a comprehensive survey of how the shores are changing with the following days will be taking place this month:  
22<sup>nd</sup> Feb 2012 (We will be meeting on the 4.5am details of location on booking)  
1<sup>st</sup> Feb 2012 (We will be meeting on the 4.5am details of location on booking)  
Feb 2012 (We will be meeting on the 4.5am details of location on booking)  
and there will be support in the survey. **DON'T FORGET to book and phone.** Please email or call for details of our Big Sea Survey.  
We will be holding a tour of the UK by taking a look at the resources to be managed through the themes of marine management in the UK using the above dates using the usual means. Let's give it a go!  
Doors will open at 5.15pm and the lecture will begin at 6.45pm. We are hoping this will help to accommodate all those people who find it difficult to get here for the earlier time. Book your place in the usual way either by phone, email or on the website.  
For future Wine & Science evenings please see the website.

**Wine and Science Evenings**  
We will be kicking off a new and exciting programme of wine and science evening this month. These evenings will have a UK focus exploring other monitoring projects and UK organisations and how this links together to manage our coastal and marine habitats.  
Wednesday 18th January 2012: The ORCA Project: World of Whales – Alison Lomas  
Far from being cold, grey and lifeless the North Sea is a rich marine habitat which supports a huge diversity of life, including globally important populations of whales, dolphins and porpoises. Collectively known as cetaceans, UK and European waters are home to 1/3 of the world's cetaceans but it is the smaller species found in our waters that have the most protection. Dive in to the amazing World of Whales and discover how they communicate, navigate and find food in the oceans. Find out about the activities which threaten their survival and the conservation work ORCA undertakes with its volunteers to protect the forgotten whales and dolphins of the North Sea.

**Wednesday 22nd February 2012: A whirlwind tour of marine management in the UK - Dr Aisling Lomas, Senior Evidence Specialist**  
We will dip our toes into the big story of marine management in the UK by taking a look at the resources to be managed and the effectiveness of our efforts. We will walk through the themes of marine management in the UK using the above dates using the usual means. Let's give it a go!  
Doors will open at 5.15pm and the lecture will begin at 6.45pm. We are hoping this will help to accommodate all those people who find it difficult to get here for the earlier time. Book your place in the usual way either by phone, email or on the website.  
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# Northumberland

The spectacular coastline of Northumberland is known for its varied landscape and rich natural diversity. Exposed rocky shores, deep sea caves, craggy islands, sheltered sandy bays and calm mudflats provide habitats for an abundance of marine life. This thriving shore is recognised internationally through its designation as part of a European Marine Site.

The coastline between the Scottish border and Berwick upon Tweed boasts imposing sandstone cliffs that tower over remote rocky shores below, harbouring complex sea cave systems. The unusual geological formations just south of Berwick create long folding gullies supporting many species. Further south and the rocky shore gives way to the vast dune-backed sandy stretches of Cheswick and Goswick Sands.

The sand and mud flats of Holy Island and Budle Bay are the most extensive in north east England and, at first glance, look like marine deserts with little sign of life. Scratch beneath the surface, however, and the sediment is teeming with thousands of marine invertebrates.

South of Holy Island is the first exposure of Great Whin Sill, a volcanic intrusion that formed around 300 million years ago. The craggy Farne Islands at Bamburgh are the most seaward outcrop of this highly robust and durable rock, withstanding the energy of the North Sea for thousands of years. These islands provide a safe haven for thousands of sea birds, grey seals, as well as many rocky shore species.

Written by Claire Carey,  
Berwickshire and North Northumberland  
European Marine Site Officer



South of Bamburgh, the coast is dominated by accessible rocky shores interspersed with sandy bays providing opportunities to explore life under the boulders, as well as the treasures of the rock pools. Low tides provide us with an enticing glimpse of the kelp forests that fringe the shore, their swaying fronds forming a dense canopy that shelters an astonishing variety of life.

Our Big Biodiversity Site at Beadnell reveals a resident population of the rare stalked jelly fish, *Craterolophus convolvulus*, found in the low shore rock pools. These animals are tiny and well camouflaged and although related to jellyfish they live attached to seaweeds by a foot.

*Calliostoma zizyphinium*, the painted top shell, is an extremely striking topshell with purple, orange and pink markings. It is extremely rare on this coastline but can be found in the cracks and crevices of the rocky shore.

Invasive species found in the Northumberland area include the green seaweed *Codium fragile* (Beadnell), the skeleton shrimp *Caprella mutica* (Holy Island), the barnacle *Austrominius modestus* (various sites) and the Pacific oyster *Crassostrea gigas* (various sites in the

Species being surveyed in the area:

- Alaria esculenta*
- Laminaria digitata*
- Saccharina latissima*
- Fucus serratus*
- Fucus vesiculosus*
- Fucus spiralis*
- Pelvetia canaliculata*
- Ascophyllum nodosum*
- Leathesia difformis*
- Palmaria palmata*
- Mastocarpus stellatus*
- Chondrus crispus*
- Corallina officinalis*
- Calliblepharis jubata*
- Lomentaria articulata*
- Ulva intestinalis*
- Codium fragile*
- Cystoseira spp*
- Pagurus bernhardus*
- Cancer pagurus*
- Necora puber*
- Carcinus maenas*
- Porcellio ptycheleis*
- Psidium longicornis*
- Galathea strigosa*
- Semibalanus balanoides*
- Chthamalus montagui*
- Chthamalus stellatus*
- Austrominius modestus*
- Nolana cretata*
- Verruca stroemia*
- Littorina littorea*
- Littorina obtusata*
- Microgaster neritoides*
- Gibbula cineraria*
- Ostrea (Anostrea)*
- Margarites helicinus*
- Calliostoma zizyphinium*
- Nucella lapidus*
- Tectarius testudinella*
- Patella pellucida*
- Patella vulgata*
- Patella alysianassa*
- Isanella rubra*
- Acanthochitona crenata*
- Leptochitona cinerea*
- Doris pseudosargus*
- Plesiobranchus membranaceus*
- Onchidaria bilamellata*
- Onchidaria celtica*
- Onchidaria muricata*
- Adalaria proxima*
- Acanthodoris pilosa*
- Aeolidia papillata*
- Rostanga rubra*
- Limacia clavigera*
- Actinia equina*
- Anemonia viridis*
- Urticina felina*
- Asterias rubens*
- Heterispa oculata*
- Lepasterias mulleri*
- Amphipholis squamata*
- Cyathocornia nigra*
- Cyathothrix fragilis*
- Panamnichinus miliaris*
- Echinus esculentus*
- Paracentrotus lividus*
- Strongylocentrotus drobachensis*
- Electra pilosa*
- Obolea geniculata*
- Spirobranchia lanarkii*
- Halimobdella pinnata*
- Hymenocidaris perlevis*
- Lucasolella botryoides*
- Botrylloides leachi*
- Botryllus schlosseri*
- Botrylloides violaceus*



www.bigseasurvey.co.uk





# Invasive Species

Our marine environment faces increased pressure from a number of factors including habitat loss, increased connectivity from the building of artificial structures, over exploitation, pollution, climate change and invasive species.

Invasive species can cause substantial economic and ecological damage by disrupting, for example commercial fisheries, and outcompeting or preying upon native species.

The Big Sea Survey has been raising awareness of invasive species in marine habitats to local communities. The project has been recording sightings of these species both on the open coast and in marina habitats and information has been provided to all volunteers.

Over the course of the project the following invasive species have been found: **Codium fragile** (green seaweed); **Caprella mutica** (Japanese Skeleton Shrimp); **Crassostrea gigas** (Pacific Oyster); **Corella eumyota** (sea squirt) and **Botrylloides violaceus** (colonial sea squirt).



*Crassostrea gigas*

*Crassostrea gigas*, the Pacific oyster, was first introduced to England in the 1960s from Japan either in ballast water or via aquaculture. It can now be found around the UK in extensive settlements potentially competing with native species. It is associated with other invasive species and diseases. The Big Sea Survey has recorded individuals in help holidays since 2011. In an area previously thought too cold for wild populations.



*Codium fragile*

The green seaweed *Codium fragile*, has been found in the high shore rockpools at Beadnell in Northumberland. This species has been recorded here since the late 1990s and does not appear to have any adverse effects. It has not increased in abundance nor migrated to other shores.



*Codium fragile*



*Australimnius (Australimnius) modestus*

*Australimnius modestus* is known as the original invasive species, brought to the UK in the early 1940s via shipping from Australasia. It is self-fertilising allowing it to become rapidly established. This species co-exists with native barnacles without any apparent damage. It is found throughout the UK and has been recorded at various locations during the Big Sea Survey.



*Corella eumyota*

*Corella eumyota*, a solitary ascidian, first arrived in the UK in 2004 in marinas on the south coast via aquaculture and shipping. It is found in high numbers in harbours and marinas outcompeting native species and causing problems for submerged structures. It is along the south and west coasts and was previously unrecorded in the north east until 2012 when it was found on the rocky shore at Lynemouth.



*Caprella mutica*

*Caprella mutica*, the Japanese skeleton shrimp, was first introduced to the UK in 2000 from north east Asia via aquaculture in Scotland. It is often associated with the algae *Sargassum muticum* and can outcompete native species, occurring in high numbers. Previously unrecorded in north east of England Big Sea volunteers recorded this species at Holy Island in 2012.



*Botrylloides violaceus*

*Botrylloides violaceus*, a colonial ascidian, first arrived in the UK in 2006 from Japan via aquaculture and is present in southern areas. It can cause significant ecological damage overgrowing native species as well as growing in abundance on submerged structures. Big Sea volunteers have recorded this species at Lynemouth in October in 2012.



# Stalked Jellyfish

In August 2011 during a Big Biodiversity day at Beadnell, Big Sea volunteers discovered a little red stalked jellyfish sitting on sea oak (*Halidrys siliquosa*) in a low shore rockpool. After extensive searching on the shore a total of 25 individuals were found.

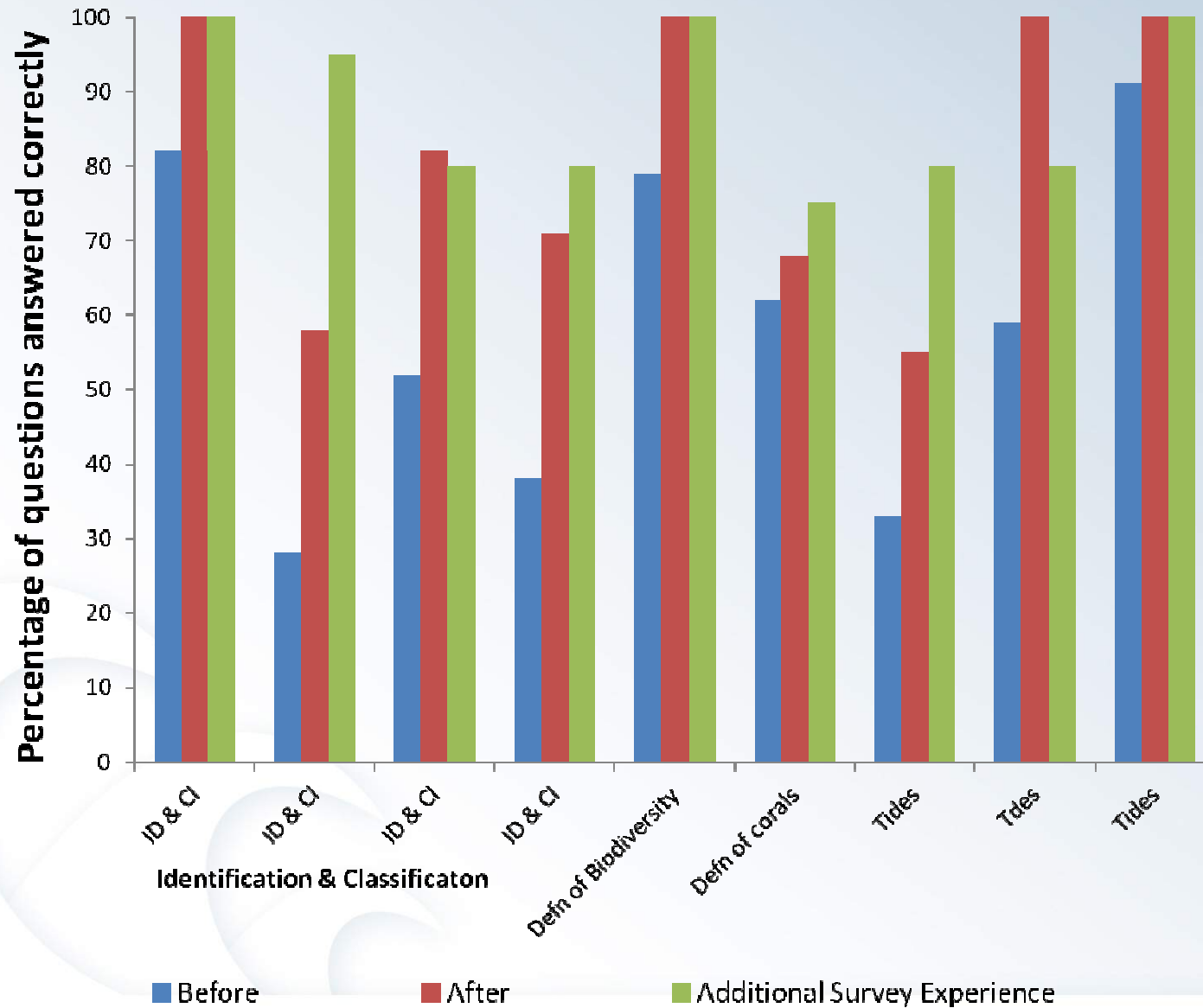
The stalked jellyfish in question was *Craterolophus convolvulus*, previously found at Low Newton in 1999 with a total of two individuals spotted. Since this time Big Sea volunteers have returned to the shore monitoring this population, systematically checking the same rockpools and scouting the surrounding area. Just one year later and 184 individuals were recorded during the summer Biodiversity Day.

Very little is known about these animals, they are a cryptic species. Our Beadnell population appear to prefer to live on sea oak though a few individuals have been found on other seaweeds. They reach their peak in abundance during the summer months and disappear during the winter. Volunteers will continue to monitor this population hoping to gather further information on their habitat choices, cryptic behaviour and discover populations on shores in the surrounding areas.





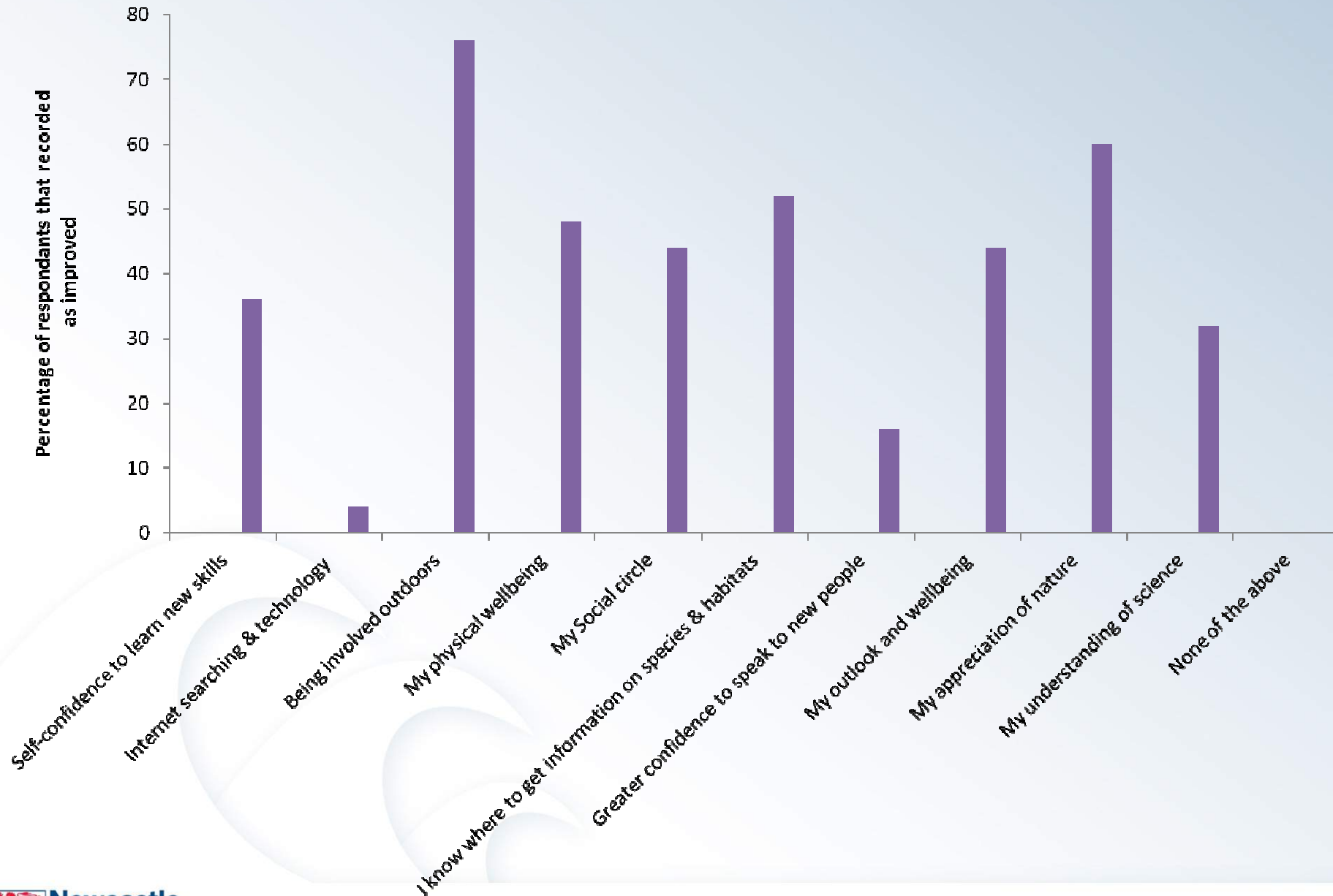
# Knowledge







# Wider Perceived Benefits



# Data Robustness



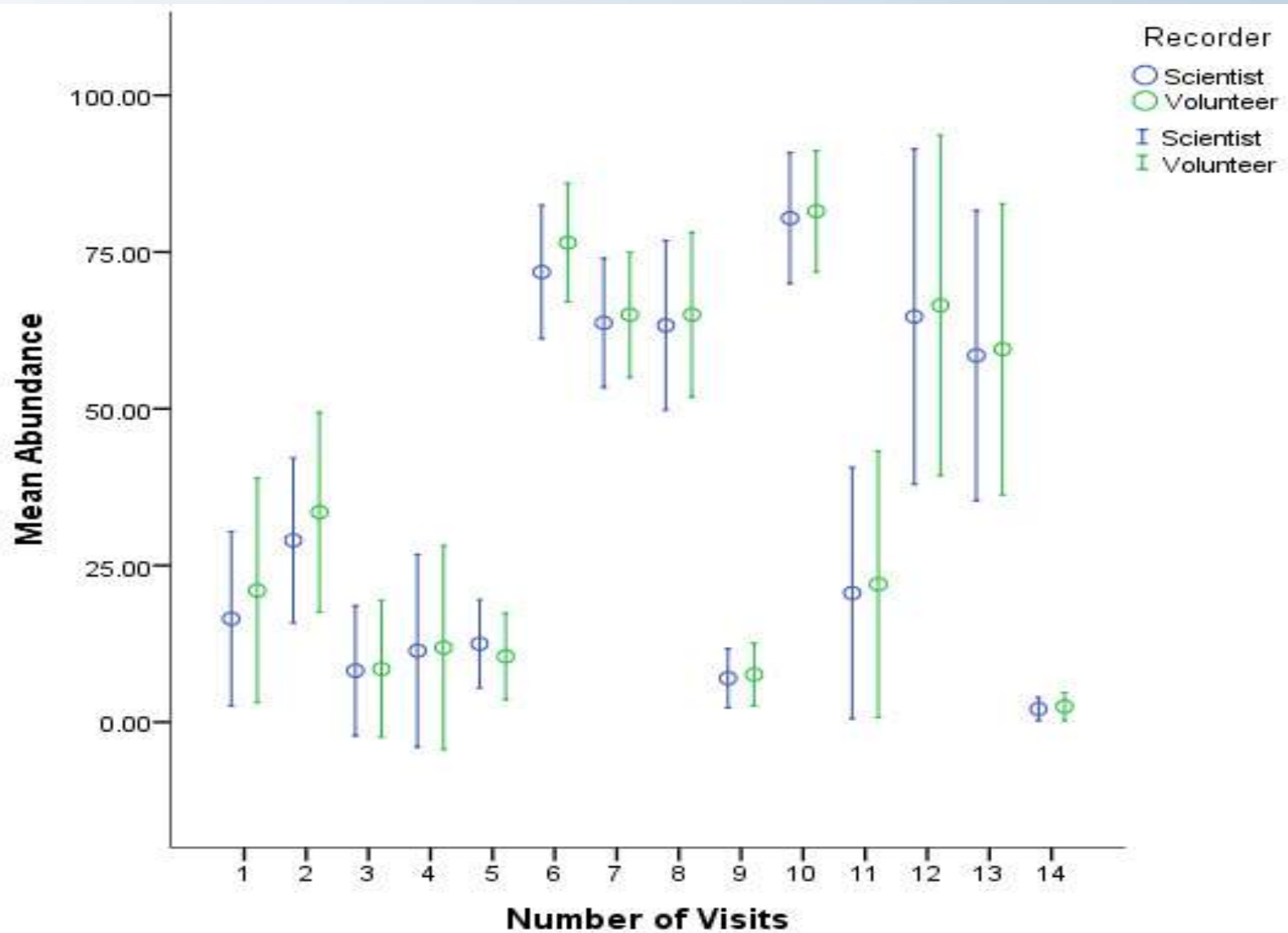
VS







# Data Robustness



**P = 0.717**



# Lessons Learnt

Many demands on a project of this type

Broad section of society

Not re-inventing the wheel but engaging with similar projects and working together

Limit species choice

Robustness of data – VITAL for this type of project and for promoting the use of the data



# Summary

The future of Citizen Science:

- Engagement of volunteers
- Training of volunteers
- Networks of volunteers and projects

BUT projects need to address concerns

Citizen Science has the power to connect the public with the environment and promote its stewardship

For Marine Conservation to be a success there needs to be public buy in



# Questions?

**Acknowledgements:** The Heritage Lottery Fund, all of the volunteers who have contributed to the Big Sea Survey, Northumberland AONB, Durham Heritage Coast, Northumberland Inshore and Fisheries Conservation Authority, The Berwickshire and North Northumberland European Marine Site, The British Phycological Society, Jellywatch, The Shark Trust, The Great North Museum: Hancock.

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