# Citizen Science & Awareness Raising

Heather Sugden

Heather.Sugden@ncl.ac.uk

# 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

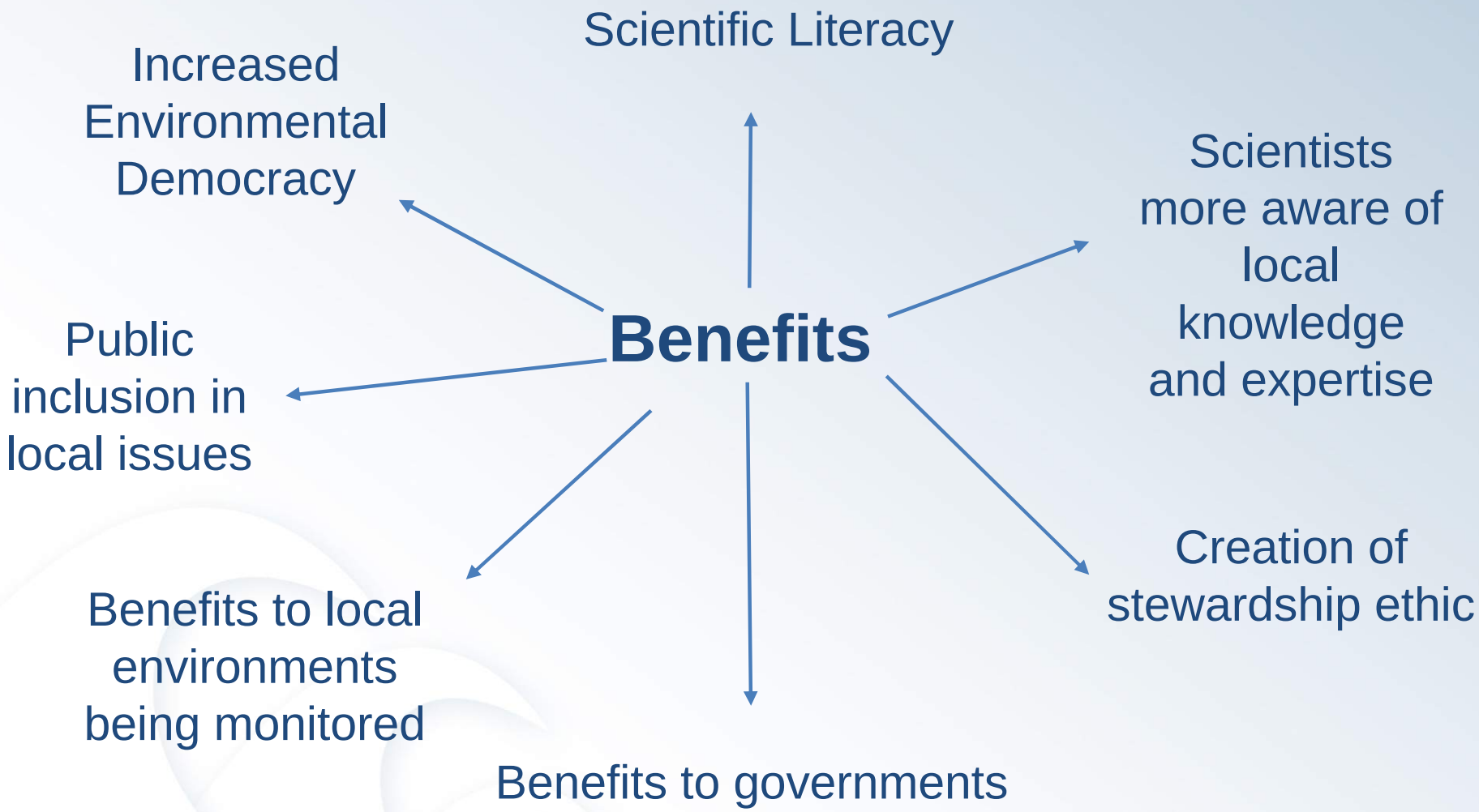
Local knowledge

Movement for volunteers to get involved in data collection

Knowledge of marine environments

New technologies

# A note on Citizen Science

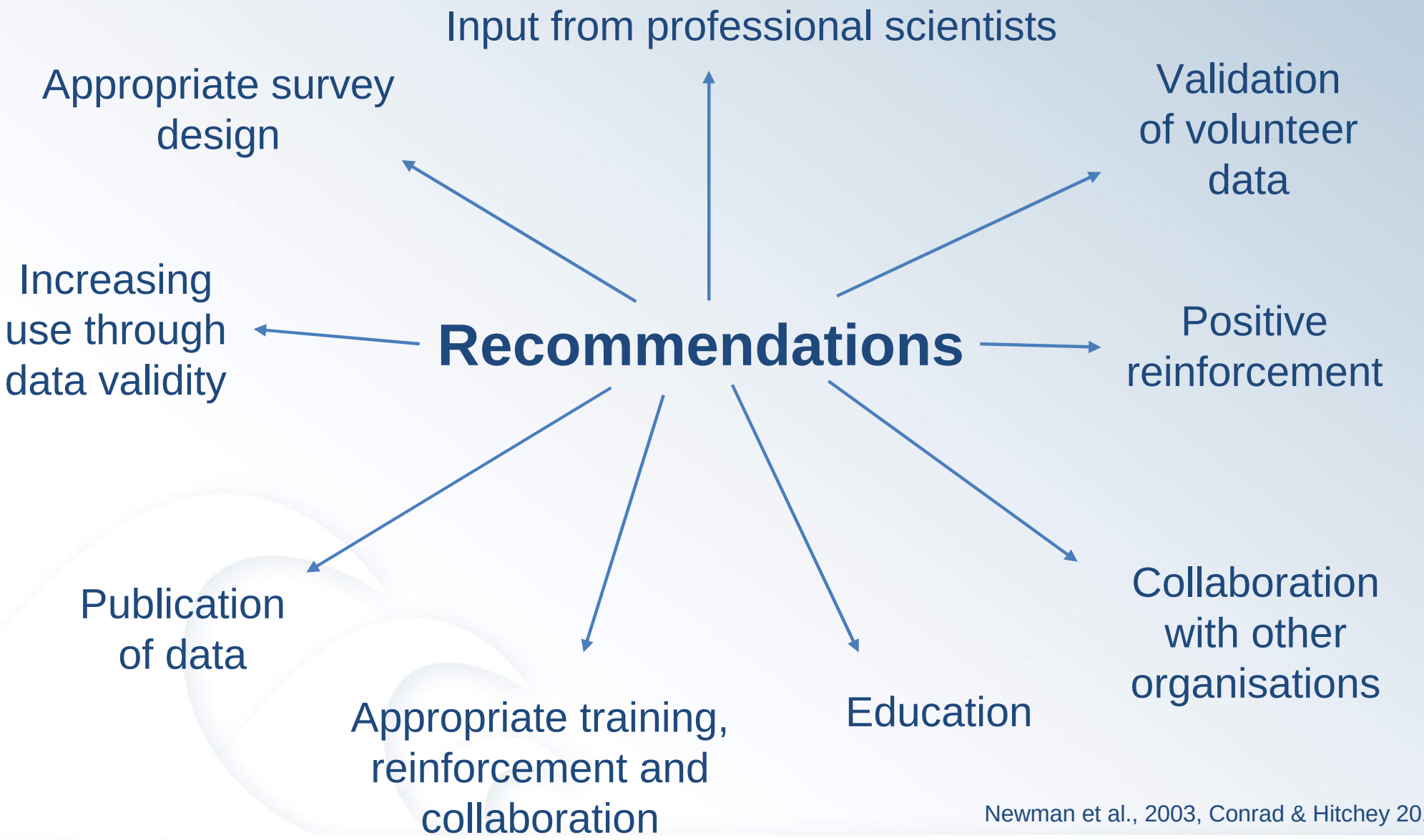



Newman et al., 2003, Conrad & Hitchey 2011

# A note on Citizen Science


Newman et al., 2003, Conrad & Hitchey 2011

# A note on Citizen Science




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

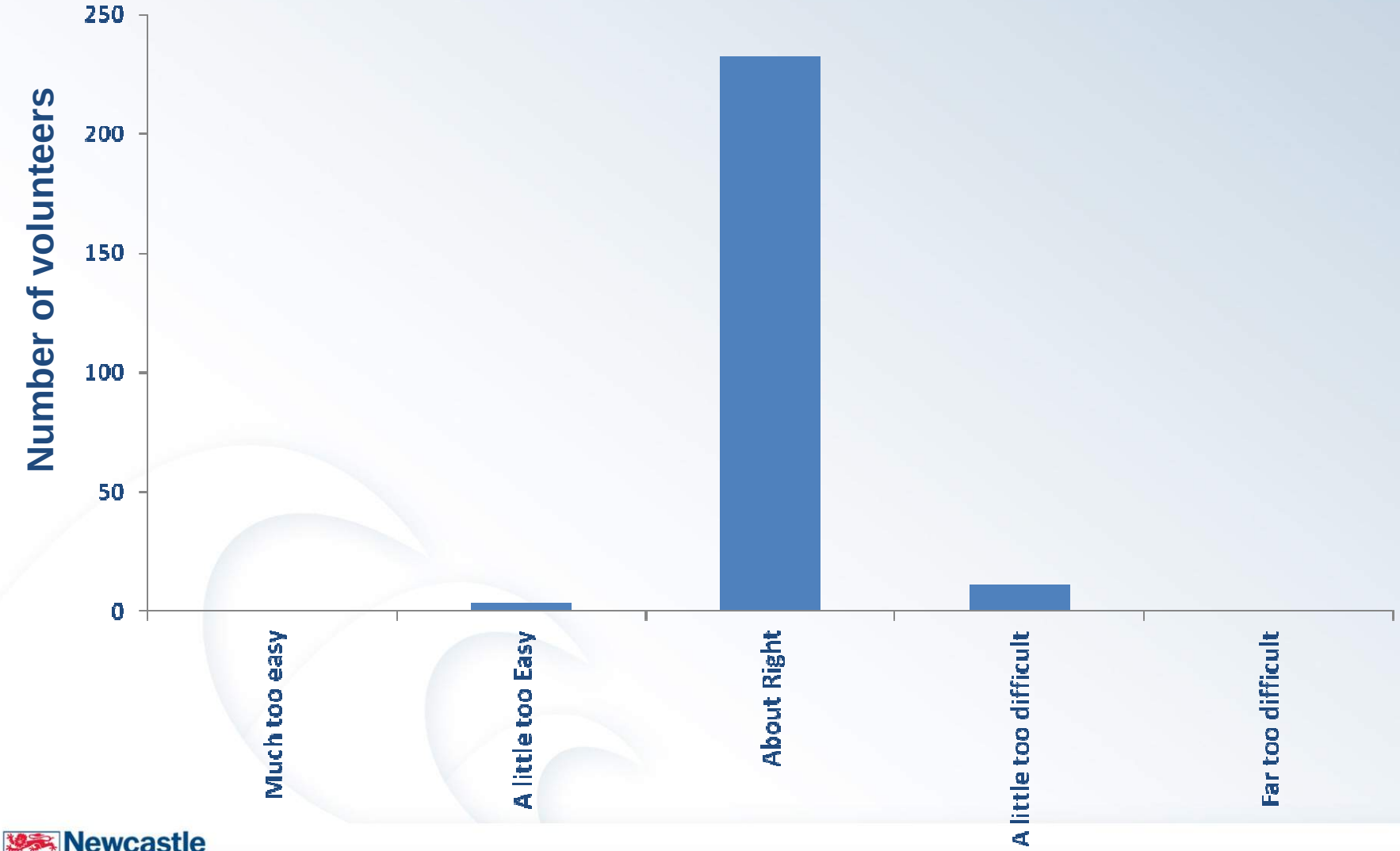
Regional trends

Seasonal changes

# Structure

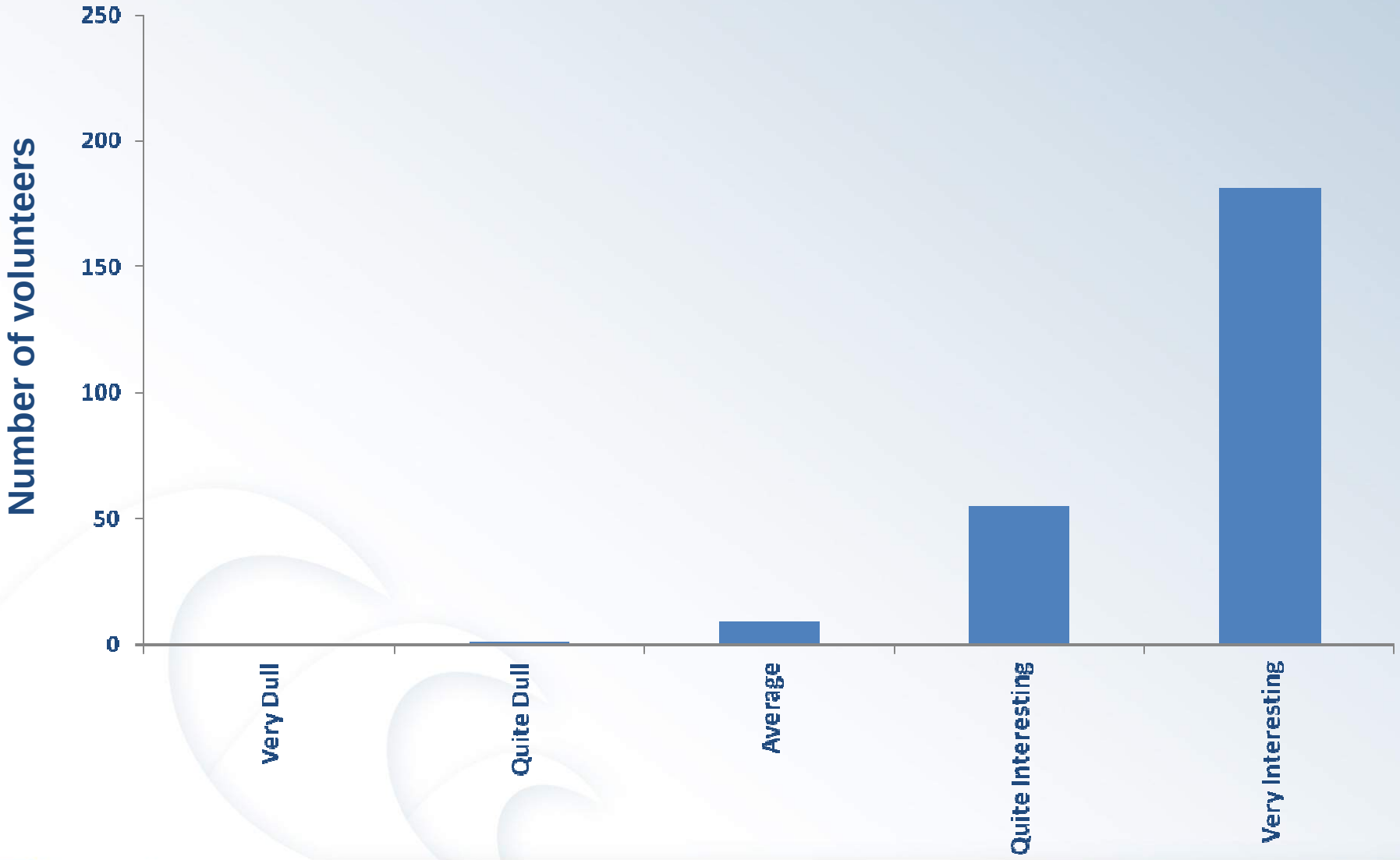
# Structure

## Difficulty of Training

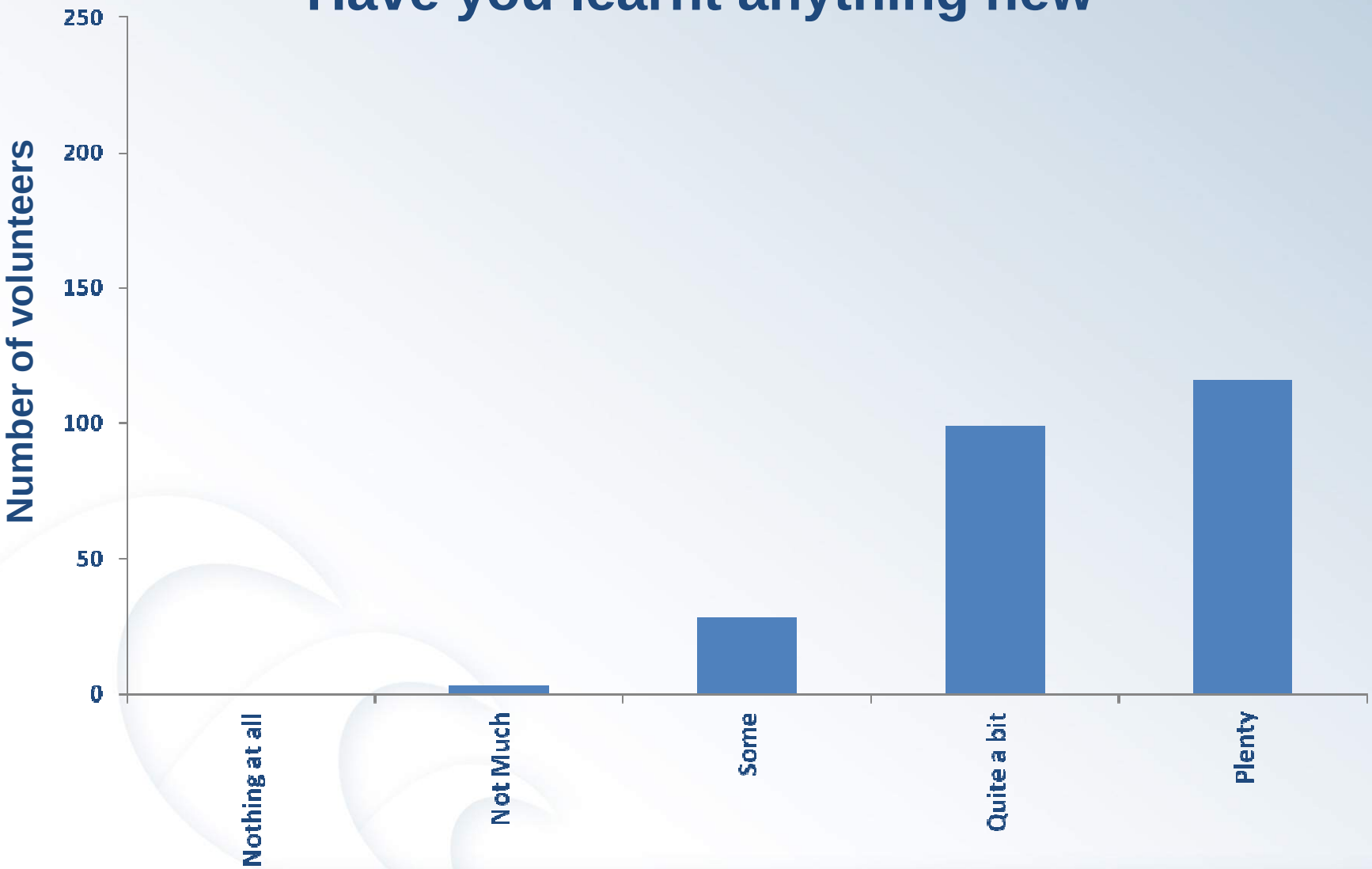


# Structure

## Interest of Training



# Structure


Have you learnt anything new
Number of volunteers
250
200
150
100
50
0
Nothing at all
Not Much
Some
Quite a bit
Plenty

# Structure

## Individual Surveys







# Response

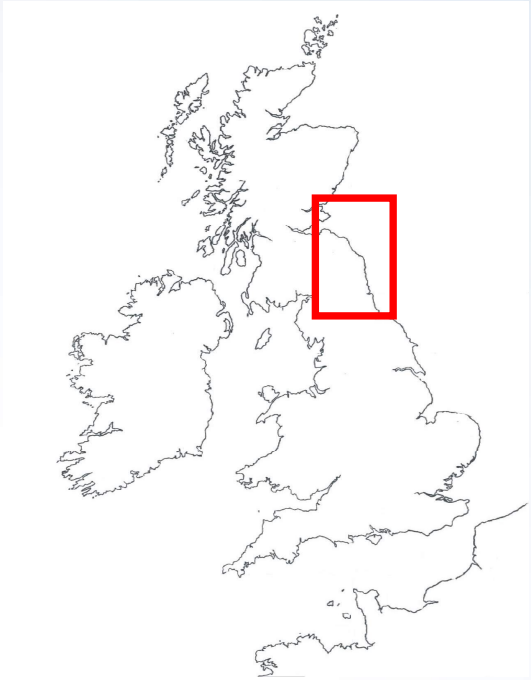
**Big Sea Survey began May 2010**

**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




Pease Bay
St Abbs
Linkim Shore
Coldingham Bay
Burnmouth
Border
Meadow Haven
Little Beach, Berwick
Cocklawburn
Ladies Skerrs
Coves Have
Back Skerrs
Beadnell Bay
Newton Haven
Low Newton
Craster
Howdiemont Sands
Marden Rocks
Warkworth
Low Hauxley
Cresswell
Newbiggin by the sea
Church Point
Sandy Bay
St. Mary's Island
King Edward's Bay
Marsden Rock
Roker
Whitburn
Seaham Harbour
Shippersea Bay
Blackhall Rocks - South Outcrop
Blackhall Rocks - North Outcrop
Blackhall Rocks - Middle Outcrop
Hartlepool Headland
Redcar Gare
Redcar Scars
Redcar
Saltburn
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2012 TerraMetrics
55°52'42.42" N 3°16'55.63" W elev 169 m

# The Wider Project


# 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 kelp holdfasts).










*Specie 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*
*Lamentaria articulata*
*Ulva intestinalis*
*Codium fragile*
*Cystoseira spp*

*Pagarus bernhardus*
*Cancer pagarus*
*Necora puber*
*Carcinus maenas*
*Porcellana platycheles*
*Psidia longicornis*
*Galathea strigosa*
*Semibalanus balanoides*
*Chthamalus montagui*
*Chthamalus stellatus*
*Austrominius modestus*
*Balanus crenatus*
*Verruca stroemia*
*Littorina littorea*
*Littorina obtusata*
*Melarhaphe neritoides*
*Gibbula cineraria*
*Osilinus lineatus*
*Margarites helicinus*
*Calliostoma zizyphinum*
*Nucella lapillus*
*Tectura testudinalis*
*Patella pellucida*
*Patella vulgata*
*Patella ulyssponensis*
*Tonicella rubra*
*Acanthochitona crinita*
*Leptochitona cinerea*
*Doris pseudoargus*
*Pleurobranchus membranaceus*
*Onchidoris bilamellata*
*Onchidella celtica*
*Onchidoris muricata*
*Adalaria proxima*
*Acanthodoris pilosa*
*Aeolidia papillosa*
*Rostanga rubra*
*Limacia clavigera*
*Actinia equina*
*Anemonia viridis*
*Urticina felina*
*Asterias rubens*
*Henricia oculata*
*Lepasterias mulleri*
*Amphiphalis squamata*
*Ophiocomina nigra*
*Ophiothrix fragilis*
*Psammechinus miliaris*
*Echinus esculentus*
*Paracentrotus lividus*
*Strongylocentrotus drobachiensis*
*Electra pilosa*
*Obelia geniculata*
*Spirobranchus lamarkii*
*Halichondria panicea*
*Hymeniacidon perleve*
*Lacazaleno botryoides*
*Botryloides leachi*
*Botryllus schlosseri*
*Botryloides violaceus*

DOVE marine LABORATORY
Newcastle University
NORTHUMBERLAND COAST
heritage lottery fund
LOTTERY FUNDED
www.bigseasurvey.co.uk
BIG SEA SURVEY

# 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 predating 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 eumymota** (sea squirt) and **Botrylloides violaceus** (colonial sea squirt).


DOVE marine LABORATORY · Newcastle University · NORTHUMBERLAND COAST · heritage lottery fund LOTTERY FUNDED

www.bigseasurvey.co.uk

BIG SEA SURVEY

# 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.

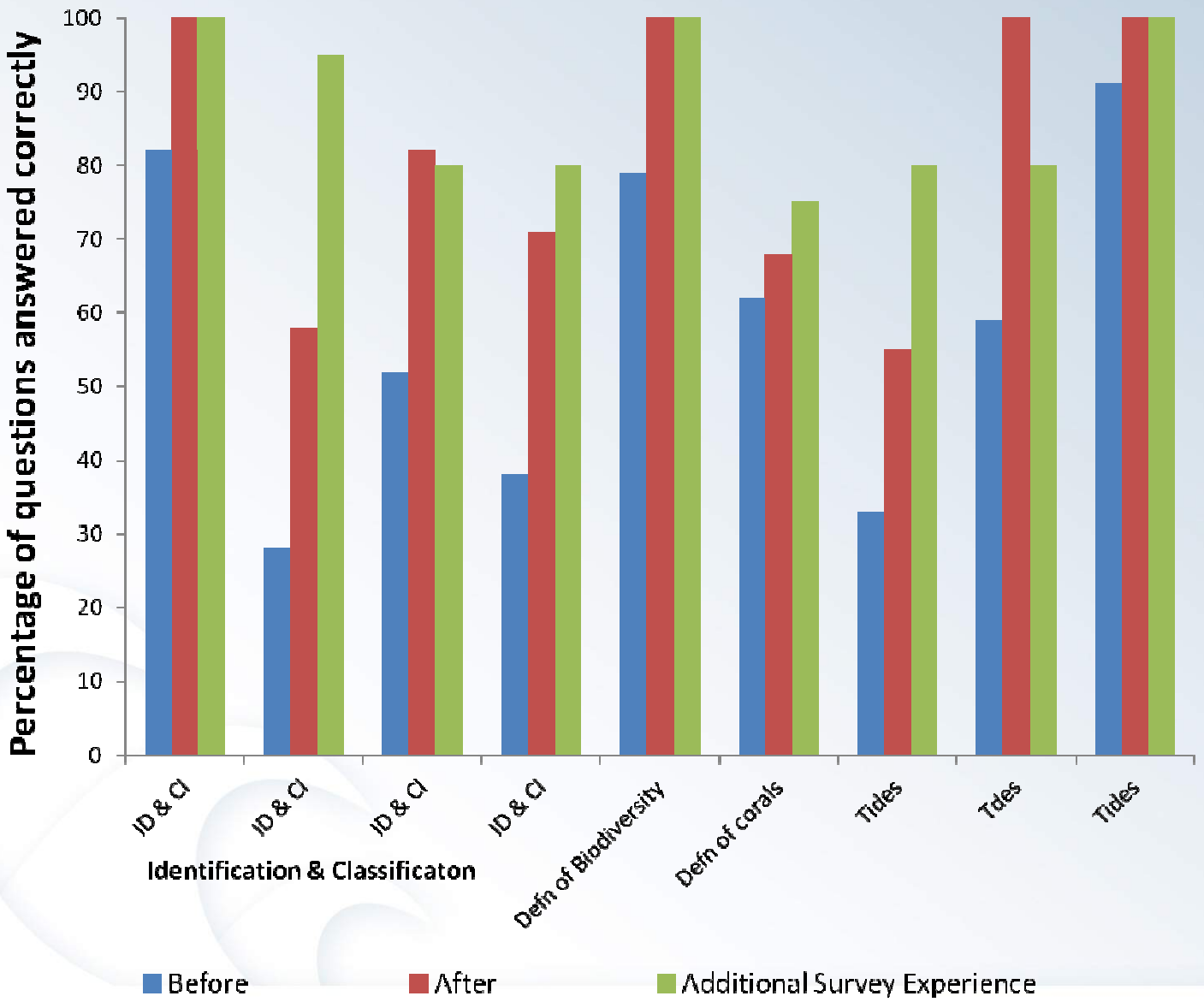
Very little is known about these animals, they are a cryptic species. Our Beadnell population appear to prefer to live on sea oak though a few individuals have been found on other seaweeds. They reach their peak in abundance during the summer months and disappear during the winter. Volunteers will continue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


DOVE marine LABORATORY
Newcastle University
NORTHUMBERLAND COAST
heritage lottery fund
LOTTERY FUNDED

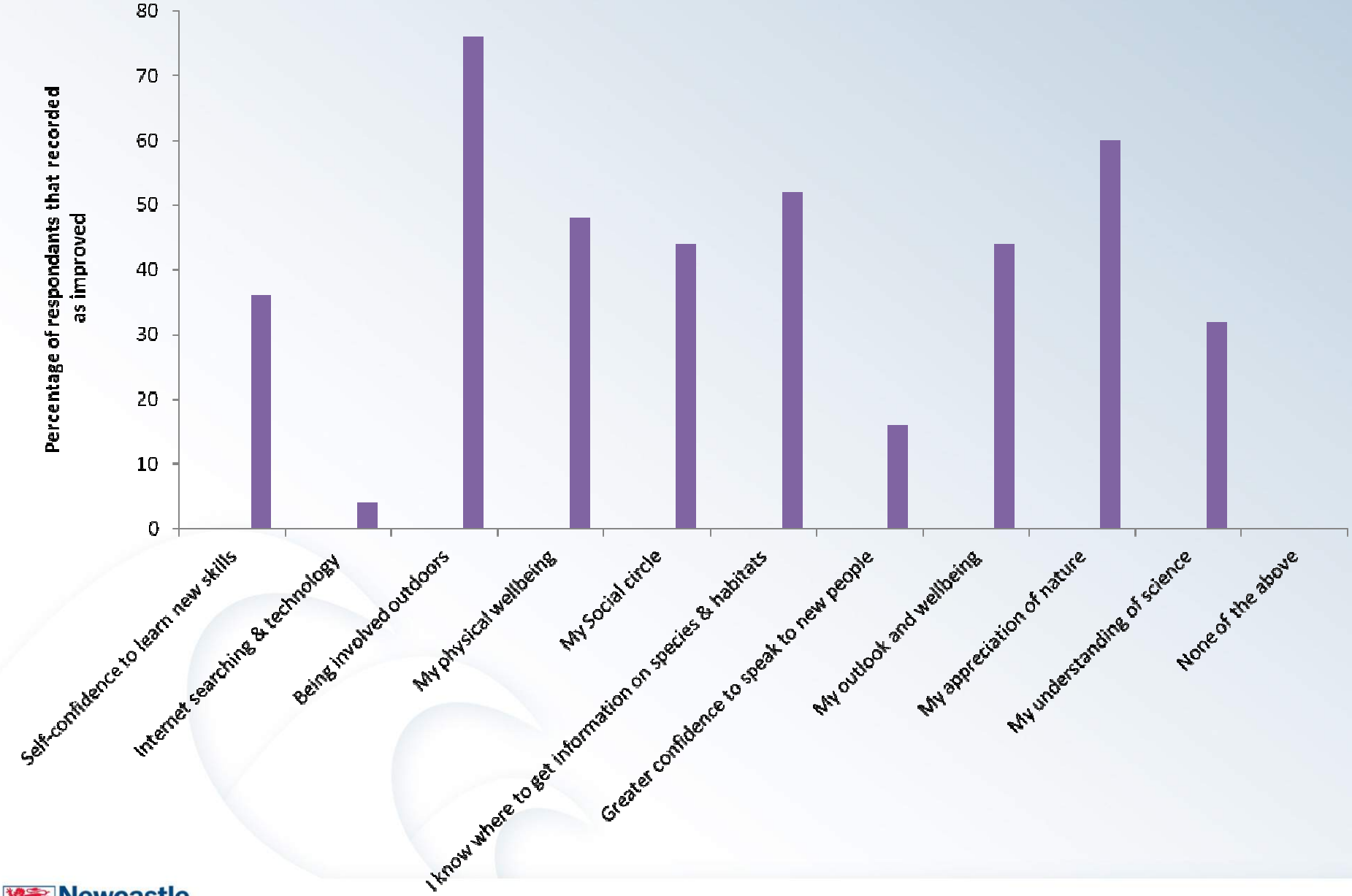
www.bigseasurvey.co.uk

BIG SEA SURVEY

# Knowledge


Percentage of questions answered correctly
100
90
80
70
60
50
40
30
20
10
0
ID & Cl
ID & Cl
ID & Cl
ID & Cl
Defn of Biodiversity
Defn of corals
Tides
Tides
Tides
Identification & Classificaton
Before
After
Additional Survey Experience

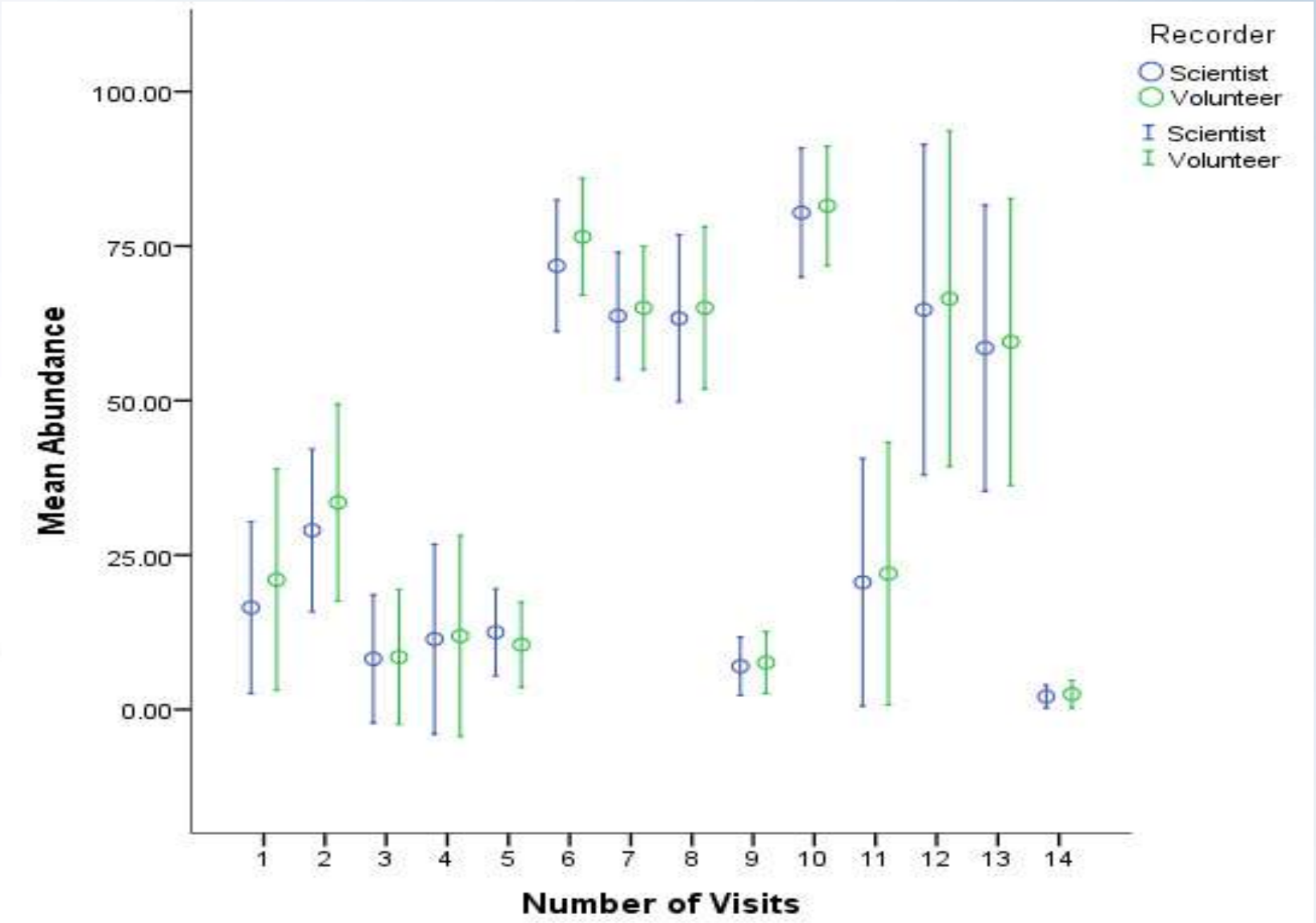
# Wider Perceived Benefits



# 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.**

**Contact: Heather Sugden, 01912223059**
**heather.sugden@ncl.ac.uk**