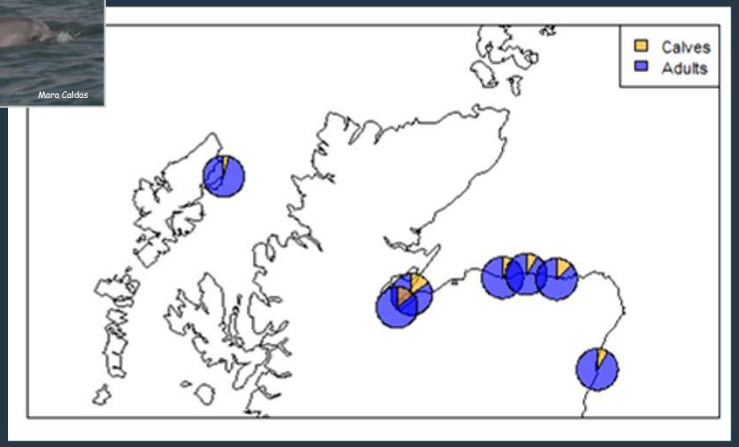
Citizen science and cetaceans: Shorewatch

What can we learn from Shorewatch data?



Graham Pierce (IIM),

Paula Gutiérrez (IIM),

Alice Walters (WDC)

With WDC Shorewatch

staff and volunteers

SMASS and WDC Marine Forum 2019

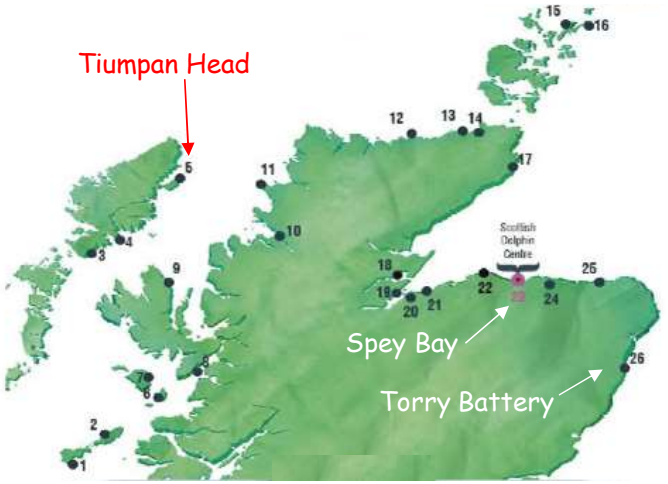
Saturday 2nd March

CSIC
Consejo Superior de Investigaciones Científicas

INSTITUTO DE INVESTIGACIONES MARINAS

WHALE AND DOLPHIN CONSERVATION
WDC

The Shorewatch data



1. Hynish, Isle of Tiree
2. Hough Bay, Isle of Coll
3. Rodel, Isle of Harris
4. Eilean Glas Lighthouse, Scalpay
5. Tiumpan Head, Isle of Lewis
6. Isle of Eigg
7. Otter Hide, Isle of Rhum
8. Armdale, Isle of Skye
9. Kilt Rock, Isle of Skye
10. Rhue Lighthouse, Ullapool
11. Stoer Lighthouse
12. Strathy Point
13. Scrabster Lighthouse and Holborn head
14. St John's Point
15. Holmes of Ire, Sanday (Orkney)
16. Start Point, Sanday (Orkney)
17. Castle of Old Wick
18. Cromarty
19. Chanonry Point
20. Fort George
21. Nairn
22. Burghead
23. Spey Bay
24. Cullen Bay
25. MacDuff
26. Torry Battery, Aberdeen

- Over 9000 hours of observations (since 2005)!
- Over 15000 sightings of marine mammals
- Information on species, group size / composition, behaviour, environmental conditions, etc.,

Minke whale

Common dolphins

- **What can we learn from Shorewatch data?**
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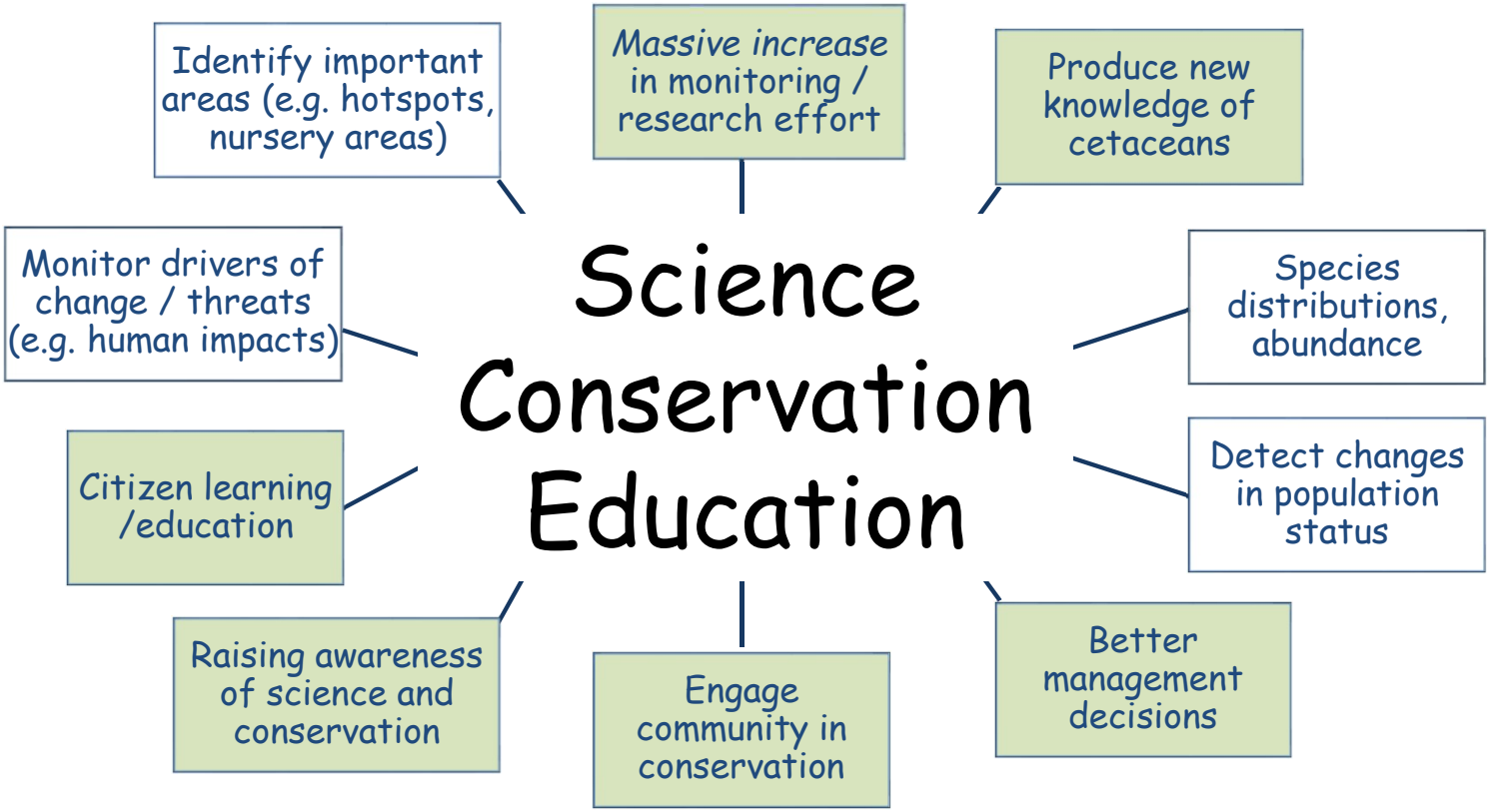
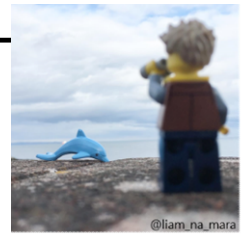
http://www.wdcs.org/national_regions/scotland/shorewatch/shorewatch_sites.php

Relevance of Shorewatch data



Quality of Shorewatch data

Data characteristics	Importance
Effort-based	Estimate of relative abundance (sightings per unit effort)
Protocol and training	Good quality, reliable data (e.g. species ID)
Fixed observation period	Consistent "sampling unit"
Fixed observation sites	Broad coastal coverage, known sites
All year round	Detection of seasonal patterns
Collected since 2005/2010	Time series (year to year variation)



Watch exactly 10 minutes, no more than once per hour

Analysis of Shorewatch data

- Distribution and relative abundance of cetaceans: which species, how many, when and where?
- Patterns and trends in distribution and abundance (variation between years, seasonally)
- Identify environmental characteristics (and other factors) which drive variation (in progress)
- Evaluate protocols

Which species are present?

Harbour porpoise

Long-finned pilot whale

Species	Latin name	Sightings
Bottlenose dolphin	*Tursiops truncatus*	7,232
Harbour porpoise	*Phocoena phocoena*	1,079
Minke whale	*Balaenoptera acutorostrata*	802
Dolphin family	Delphinidae	672
Risso´s dolphin	*Grampus griseus*	480
Common dolphin	*Delphinus delphis*	425
White-beaked dolphin	*Lagenorhynchus albirostris*	213
Humpback whale	*Megaptera novaeangliae*	176
Whale or dolphin	Cetacea	123
Baleen whale	Mysticeti	94
Killer whale	*Orcinus orca*	48
White-sided dolphin	*Lagenorhynchus acutus*	26
Long-finned pilot whale	*Globicephala melas*	11
Fin whale	*Balaenoptera physalus*	6
Whale, dolphin or ungulate	Cetartiodactyla	5
Fin whale or sei whale	*B. physalus/borealis*	5
Sowerby´s beaked whale	*Mesoplodon bidens*	3
Bottlenose whale	*Hyperoodon ampullatus*	2
Sei whale	*Balaenoptera borealis*	2
Sperm whale	*Physeter macrocephalus*	2
Striped dolphin	*Stenella coeruleoalba*	1
Pygmy sperm whale	*Kogia breviceps*	1
Beaked whale	Ziphiidae	1
Cuvier´s beaked whale	*Ziphius cavirostris*	1

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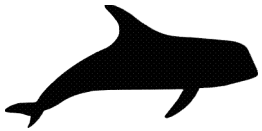
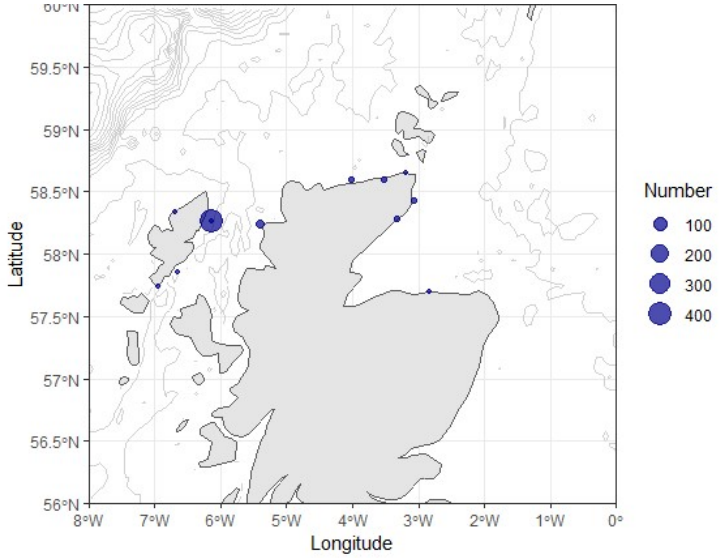
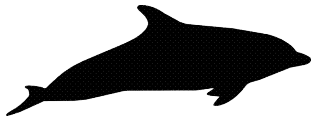
Species distribution; adults and calves

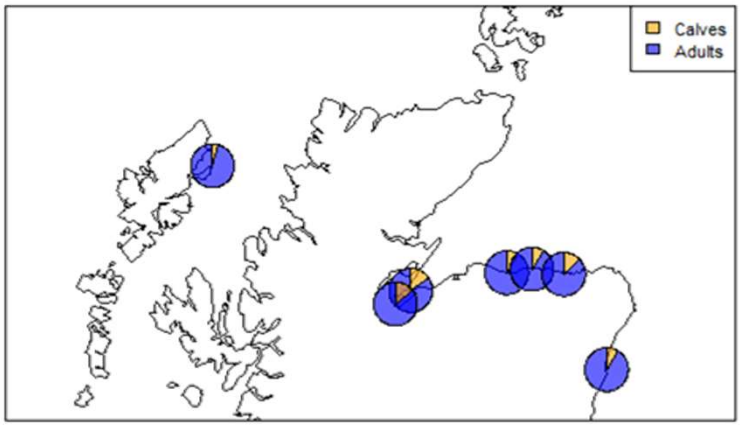


Relative abundance
Risso's dolphin
Grampus griseus

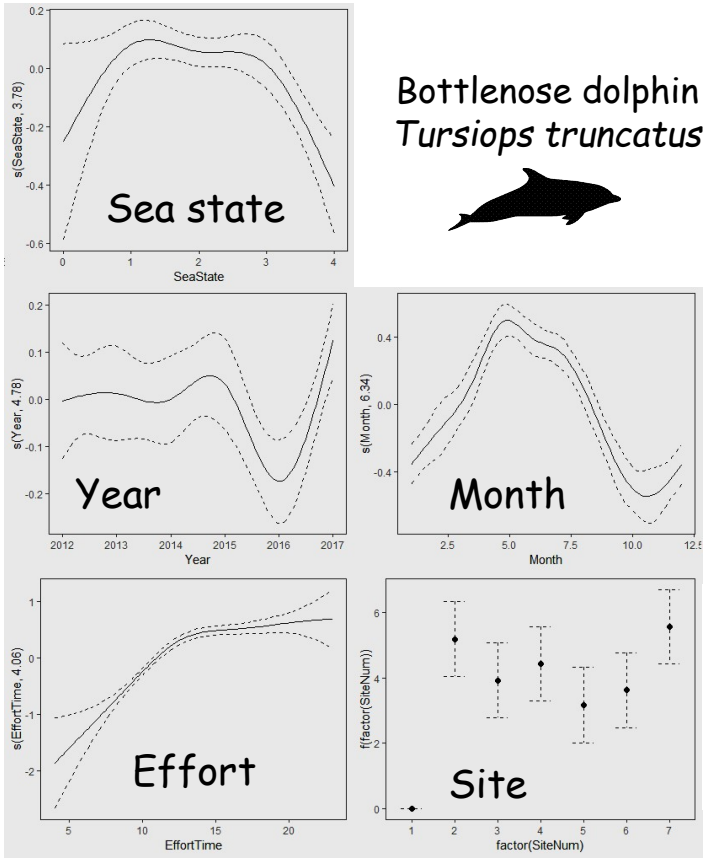




Occurrence of adults + calves
Bottlenose dolphin
Tursiops truncatus



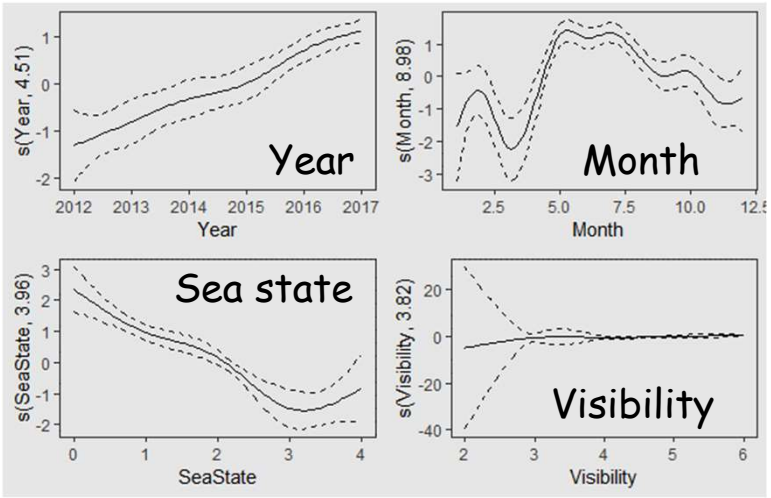
Statistical models of variation in sightings rate



Bottlenose dolphin
Tursiops truncatus

1. Tiumpan Head
2. Chanonry Point
3. North Kessock
4. Spey Bay, Scottish Dolphin Centre
5. Cullen
6. Macduff, Gellymill
7. Torry Battery, Aberdeen

Minke whale
Balaenoptera acutorostrata



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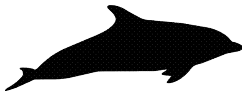
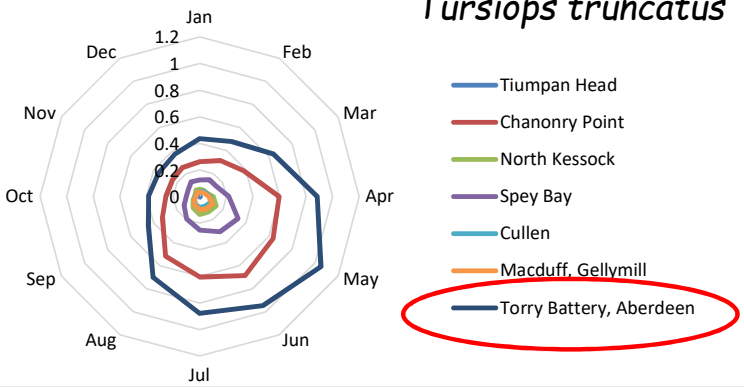
Patterns + trends in sightings rate

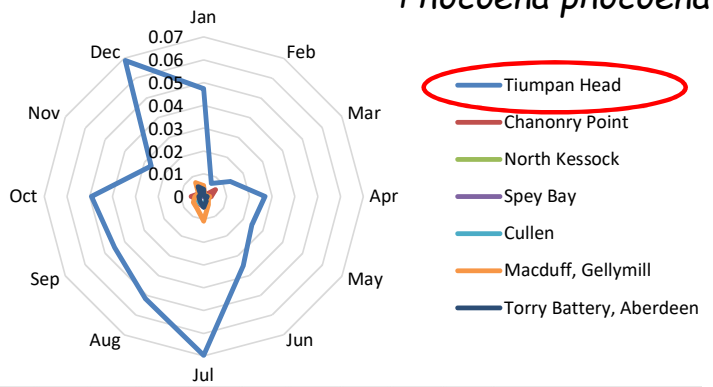


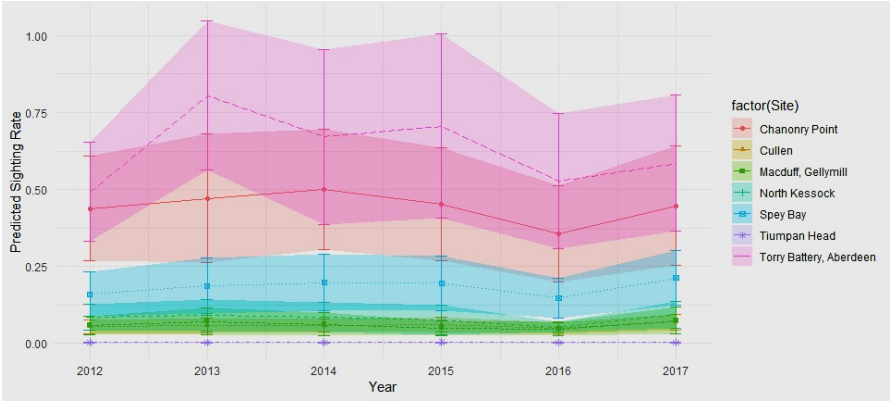
Bottlenose dolphin
Tursiops truncatus



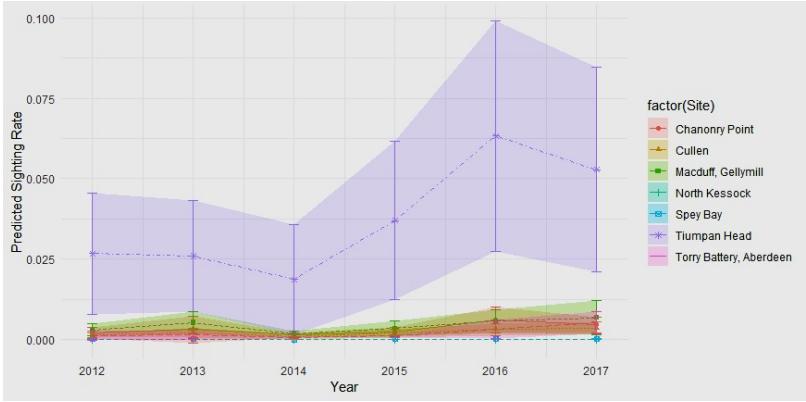
By month and site

Harbour porpoise
Phocoena phocoena





Year to year



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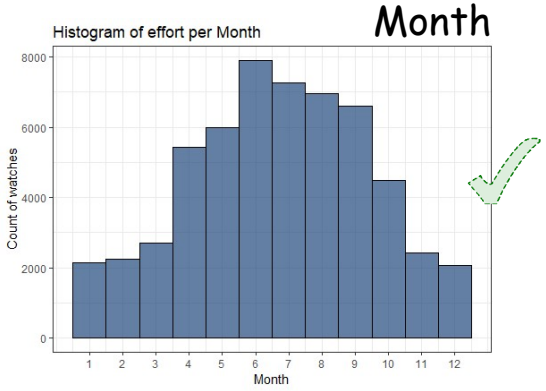
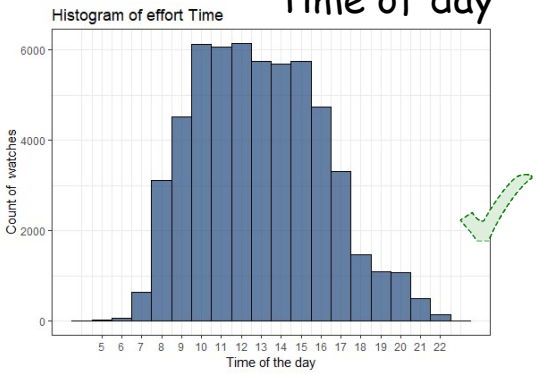
How good are Shorewatch data?

Month

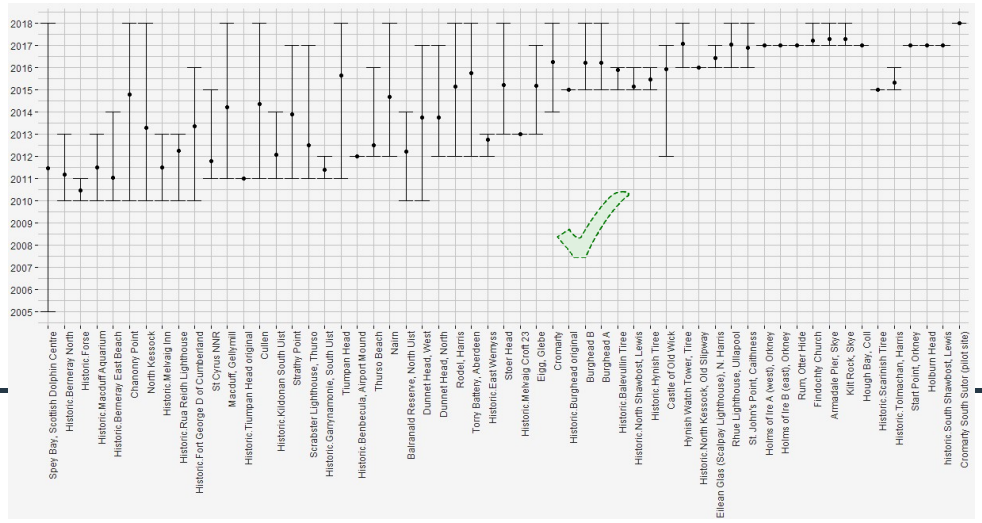


Time of day

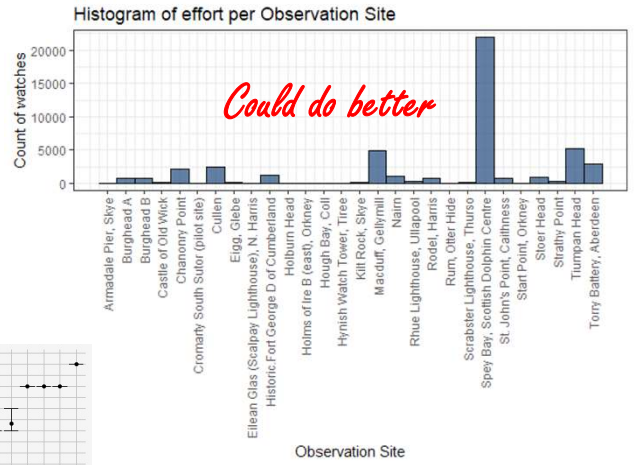


- Regular distribution of observation effort?

Site and year



Main sites



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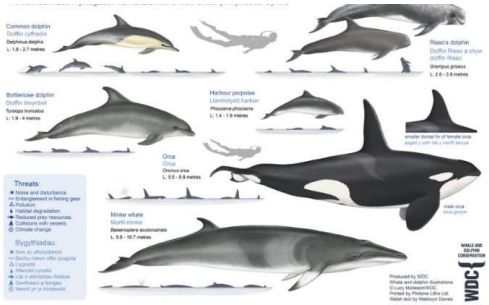
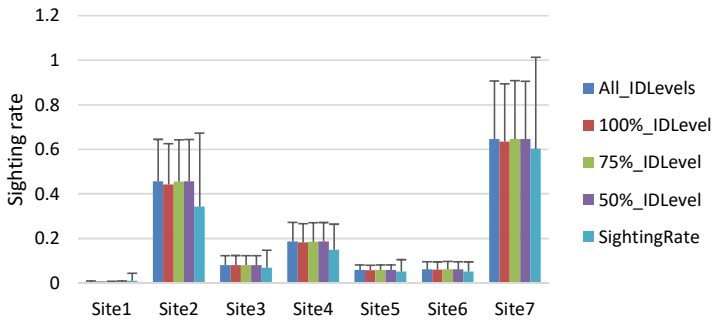
How good are Shorewatch data?

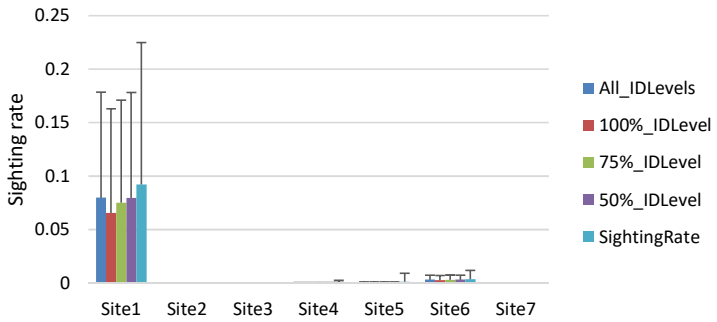
- Regular(-ish) effort distribution ✓
- Good species ID (at least in common species) ✓
- Independent sightings (no "autocorrelation") ✓



Bottlenose dolphin *Tursiops truncatus*



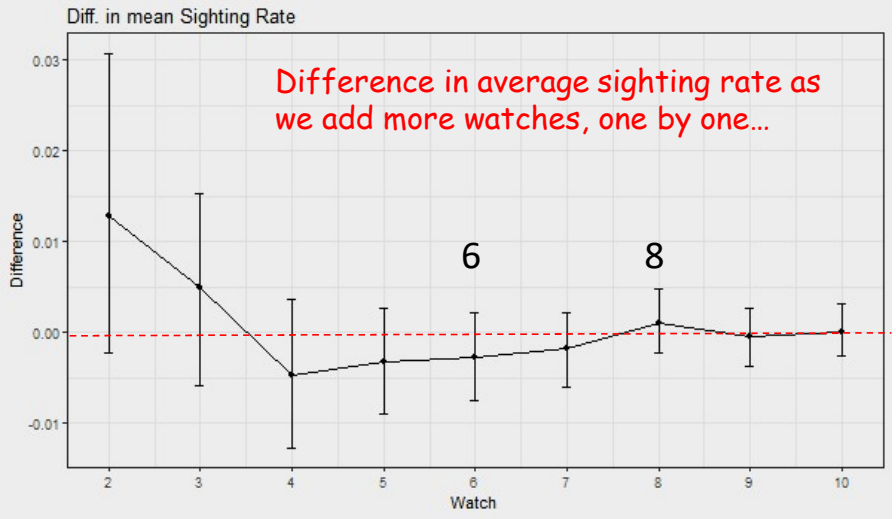
Minke Whale *Balaenoptera acutorostrata*



How good are Shorewatch data?

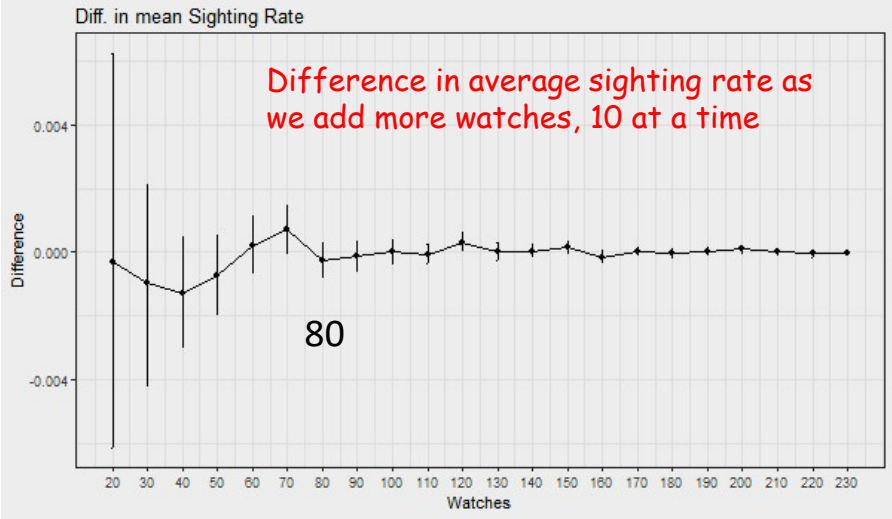
Watches per DAY at a site:

To be confident about ***average daily sighting rate***, we need 6+ (ideally 8+) watches per day!



Watches per MONTH at a site:

To be confident about ***average monthly sighting rate***, we probably need 80+ watches per month!



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What can we learn from Shorewatch data?

- The Shorewatch citizen science project has collected over 15000 sightings of 19 cetacean species, mainly since 2010;
- Temporal coverage is good, spatial coverage is more patchy;
- The data have scientific, conservation and educational value
- We know when and where species occur, where there are calves, species differences and trends in local abundance;
- Data quality is very good but many watches are needed to get reliable sightings rates (depending on the precision (and accuracy) required);
- It may be useful to carry out longer or more frequent watches.

Acknowledgements:

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Shorewatch coordination and volunteer support: Katie Dyke
Sightings data: thanks to all the volunteers !
New analysis funded by WDC