

Protocol to record sightings of harbour porpoise in offshore wind farms

The goal of this protocol is to record sightings of harbour porpoises in offshore wind farms in a consistent way. Data on the numbers of harbour porpoises, their behaviour and their exact position in an offshore wind farm can provide relevant information about the use of offshore wind farms by these marine mammals. Also, it is important to record the effort of the observations to determine absences of harbour porpoises.

The protocol can be carried out from vessels as well as from wind turbines (WTG).

Observations from a WTG

Record at the start of each period

- Date and time
- Name of observers
- Position of observers (which WTG)
- In which area the observations are carried out
 - For example, in an area between observers and certain nearby WTGs (record which WTGs)
- Sea state
- Temperature
- Wind force and direction
- Precipitation

Record any changes in these data during the day.

Record for every harbour porpoise sighting

- Date and time
- Number of porpoises
- Behaviour
 - see Table 1; use the codes provided for each behaviour
- Direction
 - The direction the harbour porpoise is moving to. If the harbour porpoise is not moving in one clear direction, then record as 'local'.
- Their position (as accurate as possible)
 - Ideally, measure the position (coordinates) of the harbour porpoise directly with a Laser Range Finder (LRF), although this will be quite hard.
 - Otherwise record *as accurate as possible*:
 - Compass angle between observers and harbour porpoise
 - Distance between observers and harbour porpoise, for example by:
 - directly measuring with the LRF
 - using the number of reticles from the horizon to the harbour porpoise with the LRF.
 - using an inclinometer; only if the harbour porpoise is close by
 - estimating as accurate as possible

- If applicable, mention in the comments any additional information which could be relevant for the interpretation of the behaviour of the harbour porpoise, for example associations/interactions with other species.

Record at the end of each period

- End time
- Percentage of time that the area was scanned for harbour porpoises.
- Subjective circumstances for observations (bad, moderate, good)

Observations from a vessel

Harbour porpoises can be recorded from both sailing and stationary vessels.

Counts from vessels are ideally performed by an observer from an observation box on the top of the bridge or at least 10 meters above the waterline. Observations are carried out on one side of the vessel (the side with the best (light) conditions). The method of counting harbour porpoises from a vessel depends on the sea state. The chance of detecting harbour porpoises is higher with lower sea states. Also, harbour porpoises can be detected up to larger distances with lower sea states. Determine at the start of the observations up to which distance harbour porpoise can reliably be detected. Recommended for sea states one and two is to count the porpoises in a strip of *at least* 500 meters wide, divided into eight distance bands: A (0-50m), B (50-100m), C (100-200m), D (200-300m), E (300-500m), F (500-750m), G (750-1000m) and H (>1000m). For the sea states three and four, recommended is to count the porpoises in a strip of *at most* 500 meters wide, divided into five distance bands: A (0-50m), B (50-100m), C (100-200m), D (200-300m) and E (300-500m). If the sea state is five or higher, the chances in detecting harbour porpoises are very small and therefore counting with sea state five or higher is not recommended.

Record at the start of each period

- Date and time
- Name of observers
- Whether vessel is sailing or stationary
- In which area the observations are carried out
 - At what side of the vessel
 - Up to which distance from the vessel
- Sea state
- Temperature
- Wind force and direction
- Precipitation

Record any changes in these data during the day.

Make sure a GPS track of the trip is made. It is important to accurately synchronize the time of GPS with the time used to record sightings.

Record with every harbour porpoise sighting

- Date and time (HH:MM:SS => record also the seconds to match with GPS track of trip)
- Number of porpoises

- Behaviour
 - see Table 1; use the codes provided for each behaviour
- Direction
 - The direction the harbour porpoise is moving to. If the harbour porpoise is not moving in one clear direction, then record as 'local'.
- Distance from the vessel
 - A = 0-50 m
 - B = 50-100 m
 - C = 100-200 m
 - D = 200-300 m
 - E = 300-500 m
 - F = 500-750 m
 - G = 750-1000 m
 - H = >1000 m
- Only if conditions allow, try to collect additional information on their position (as accurate as possible)
 - Measure the position (coordinates) of the harbour porpoise directly with a Laser Range Finder (LRF)
 - Compass angle between observers and harbour porpoise
 - Distance between observers and harbour porpoise
 - Measure the distance with the LRF.
 - Measure the number of reticles from the horizon to the harbour porpoise with the LRF.
 - Measure with an inclinometer; only if the harbour porpoise is close by.
 - Estimate as accurate as possible.
- If applicable, mention in the comments any additional information which could be relevant for the interpretation of the behaviour of the harbour porpoise, for example associations/interactions with other species.

Record at the end of each period

- End time
- Percentage of time that the area was scanned for harbour porpoises
- Subjective circumstances for observations (bad, moderate, good)

Table 1 Overview of different behaviours of harbour porpoise that are most likely to be recorded, given by a behavioural code, short description and explanation. Adapted from Camphuysen & Garthe (2004)¹.

Code	Description in short	Explanation
W	Wheeling or swimming slowly	Slow movement, no white crests, at least dorsal fin visible above water
SF	Swimming fast	Fast movements, splashes, at least dorsal fin visible above water
UW	Swimming under water	Moving animal completely under water
D	Diving	Diving away into the deep, becoming invisible
F	Apparently feeding	Animal (apparently) feeding on or chasing prey, indications of foraging could be quick movements in different directions, fish leaping out of the water, association with/attraction of other species (like foraging birds)
C	Calf at the tail of adult	Immature animal constantly staying close to the side of an adult
BK	Basking, afloat	Constantly visible animal, often with dorsal fin exposed, floating at the sea surface
SH	Spy-hopping	Head sticks out the water (including the eyes), apparently to look around
B	Breaching clear out of the water	Vertical leap, sometimes clear of the water
SB	Sexual behaviour	Any sexual behaviour (copulations) observed
P	Play	Any behaviour observed that could be play, such as interactions with floating material (driftwood or seaweed)
#O	Other	Any behaviour that cannot be assigned to one of the above classifications; clearly describe what is observed

¹ Camphuysen, C.J. & S. Garthe, 2004. Recording foraging seabirds at sea: standardised recording and coding of foraging behaviour and multi-species foraging associations. *Atlantic Seabirds* 6(1): 1-32.

