For the protection and use of the sea – for a future worth living

Federal Maritime and Hydrographic Agency - BSH

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Environmental aspects of dismantling offshore wind farms

Benedikt Niesterok

Which extractions methods are known to BSH?

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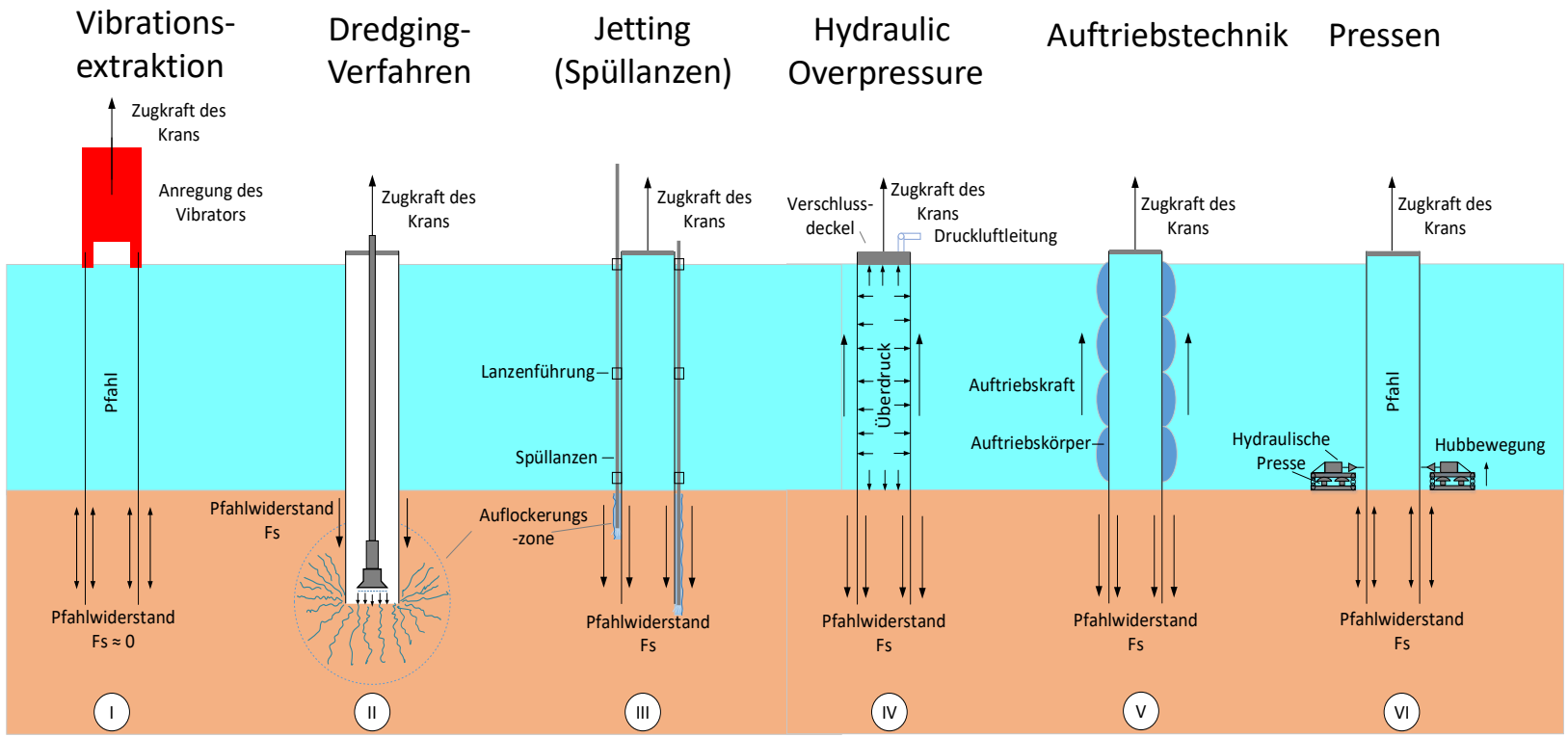
Complete extraction of foundations



From: research project DeCoMP | Nils Hinzmann 14.11.2023

Fundamental questions of environmental assessment

- What are the differences of different extraction techniques with respect to environmental impacts?
- Which methods exist for removing cables and scour protection?

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- Which removal techniques are most suitable to the marine environment?
- Any unknown effects?
- What are the long term effects to the sea floor with respect to its recovery ?

- **No experiences yet! Difficult to deduce measures to follow during removal of structures.**
- **Environmental impact assessment needed!**
- **First thoughts…**

Sea floor

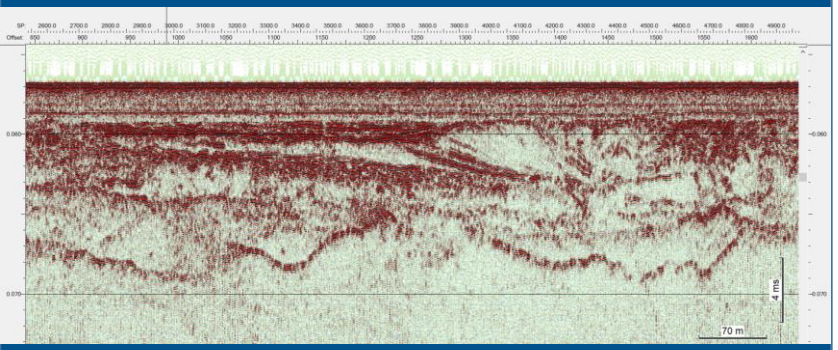

Photo: BSH

Potential impacts:

- Impacts on layer structure of sea floor within a certain radius around foundation (radius different for different techniques)
- Impacts on sea floor surface (radius unknown for different techniques)
- Redistribution of sediment layers (due to sediment plumes, resuspension)

Potential monitoring:

- Monitoring sediment plumes during removal of structures
- Geophysical und sedimentologic monitoring
- Area around foundation affected by loosening
- Long term measurements
- Monitoring of changes after removing scour protection
- Geotechnical monitoring after extended recovery time

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Benthos and biotopes

Photo: Benedikt Niesterok

Potential impacts:

- Turbidity (especially considered for §30-biotopes)
- Redistribution of sediment layers (especially considered for §30-biotopes
- Changes of substrate around foundation structure
- Potential removal of critically endangered species (at least Red List category 2)

Potential monitoring:

- Monitoring sediment plumes during removal of structures
- Geophysical und sedimentologic monitoring
- Long term measurements
- Monitoring of changes after removing scour protection
- Pre-Monitoring (assessment of status quo) > assessment of population of critically endangered species

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Schutzgut Fische

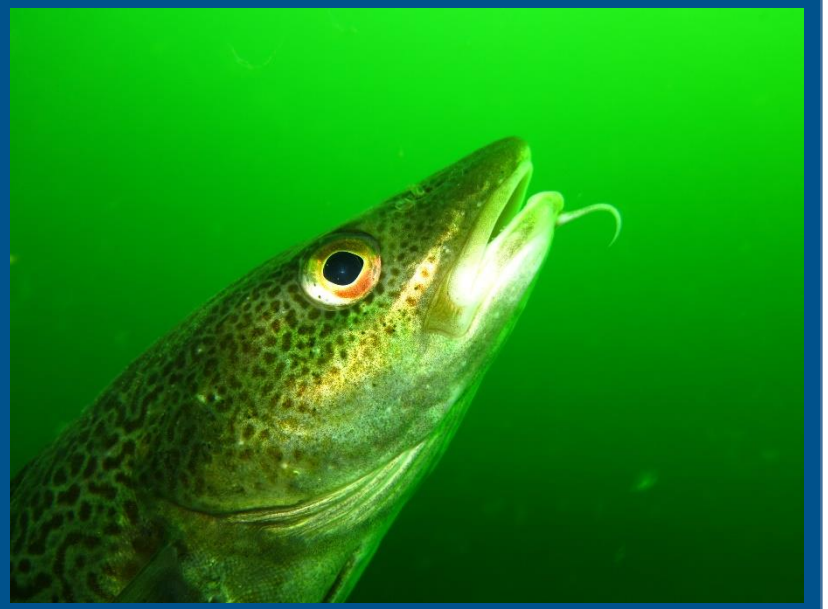

Photo: Benedikt Niesterok

Potential impacts:

- Protection and food resources removed
- Removal of scour protection probably has larger effect than removal of foundation
- Reef habitat removed (decrease of reef adapted species)
- Potentially reduction of local biodiversity, abundance and biomass

Potential monitoring:

Monitoring of fish community in proximity of foundations

- Pre-Monitoring (assessment of status quo) before removal of structures including species inventory, abundance, biomass, fitness
- Monitoring after removal of structures

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Birds

Photo: BSH

Potential impacts:

- Changes in species composition (avoiding vs non-avoiding species)
- Impacts probably similar to construction phase
- Scaring off
- Attraction due to lights
- Potentially collision

Potential monitoring:

- Monitoring of species composition
- Comparison before, during and after removal of structures

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Marine mammals

Photo: BSH

Potential impacts:

- Underwater noise according to removal technique
- Underwater noise during removal of scour protection
- Impacts on higher trophic levels

Potential monitoring:

- Underwater sound measurements during removal of structures
- Presence of harbour porpoise using PAM (passiv acoustic monitoring)

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Hazardous Substances

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Potential impacts due to operational phase

- Potentially hazardous substances in surrounding marine environment
- Sources:
  - Corrosion protection: anodes, coating
  - Operating materials: oils, lubricants, fire extinguishing agent, other sources
- Hazardous substances mainly expected to be in sediment; currently difficult to comfirm

→ Taking samples in proximity of foundation and from the inside of a monopile **before** removal of structures

Hazardous Substances

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Further aspects for removal of offshore windfarm structures

- Development of environment friendly removal techniques
  - How to deal with contaminated sediment, water, marine fauna?
  - Use of environment friendly operating materials
  - Complete removal of foundations
  - Removal of geotextiles and concrete matresses
  - Avoidance of leackages and accidents

- Disposal and potential recycling
  - Safe and professional disposal of operational materials
  - Disposal and recycling of rotor blades
  - Disposal and recycling of sulphur hexafluoride (SF_6)

Thank you very much for your attention!

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