If you build it, they will come: marine habitat provided by a wastewater outfall

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If You Build it, They Will Come: Marine Habitat Provided by a Wastewater Outfall

Kimberle Stark, Jeff Lundt, Wendy Eash-Loucks
King County Dept. of Natural Resources & Parks
Brightwater Treatment System Outfall

- Completed in 2008
- Twin 63-in (1.6m) diameter, mile long HDPE pipes
- Weighted with concrete collars
- Terminates at -600 ft MLLW (183m)
ROV Surveys: 2009--2017

80-150 ft (30-46m) depth

300 ft (91m) depth
600 ft (183m) depth

Photo: Bob Pacunski WDFW
Fish Species Observed

- **Bocaccio rockfish**
- Brown rockfish
- **Canary rockfish**
- Copper rockfish
- Quillback rockfish
- **Yelloweye rockfish**
- Yellowtail rockfish
- Lingcod
- Pacific herring
- Kelp greenling
- Cabezon
- Ratfish
- Skate (sp?)
- Pile perch
- Surf perch

Photos: Jen Vanderhoof
What is the effectiveness and amount of habitat artificial structures, such as outfall pipes, provide?

Document presence and abundance of marine organisms on the pipes at various depths

Do marine organisms attached to the pipe affect the structural integrity?
Study Design

- 2 ft x 1 ft pipe sections deployed in 2012
  - -100 (30m), -300 (91m), -600 (183m) ft MLLW
  - 10 “settlement plates”/depth
- 3 replicates/depth
- To retrieve at 2, 5, & 10 yrs
Plate Assessment

- Assessed for total % cover in field
- Flexible mesh grid (21 cells) to aid estimation
- Macroscopic biota identified & counted in field
- Photographs taken of each plate & grid cell
- % cover & counts determined in office (Image J)
- Structural integrity tests

- cute scallops
- not as cute tunicate
## Organism Categories

<table>
<thead>
<tr>
<th>% Cover Categories (non-motile)</th>
<th>Phylum</th>
<th>Count Categories (motile)</th>
<th>Phylum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubeworm: calcareous</td>
<td>Anellida</td>
<td>Polychaete: errant</td>
<td>Anellida</td>
</tr>
<tr>
<td>Polychaete: tube</td>
<td>Anellida</td>
<td>Amphipod/shrimp</td>
<td>Arthropoda</td>
</tr>
<tr>
<td>Amphipod: tube</td>
<td>Arthropoda</td>
<td>Cancridae crab</td>
<td>Arthropoda</td>
</tr>
<tr>
<td>Barnacle: live</td>
<td>Arthropoda</td>
<td>Majoidae crab</td>
<td>Arthropoda</td>
</tr>
<tr>
<td>Bryozoan: branched</td>
<td>Bryozoa</td>
<td>Sea urchin</td>
<td>Echinodermata</td>
</tr>
<tr>
<td>Bryozoan: coral</td>
<td>Bryozoa</td>
<td>Gastropod</td>
<td>Mollusca</td>
</tr>
<tr>
<td>Bryozoan: encrusting</td>
<td>Bryozoa</td>
<td>Trichotropis gastropod</td>
<td>Mollusca</td>
</tr>
<tr>
<td><em>Ulva</em> spp.</td>
<td>Chlorophyta</td>
<td>Flatworm</td>
<td>Platyhelminthes</td>
</tr>
<tr>
<td>Tunicate</td>
<td>Chordata</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anemone</td>
<td>Cnidaria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydroid</td>
<td>Cnidaria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bivalve: clam</td>
<td>Mollusca</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jingle shell</td>
<td>Mollusca</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limpet</td>
<td>Mollusca</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scallop</td>
<td>Mollusca</td>
<td></td>
<td></td>
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<tr>
<td>Slipper snail</td>
<td>Mollusca</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mussel</td>
<td>Mollusca</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sponge: calcareous</td>
<td>Porifera</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demosponge</td>
<td>Porifera</td>
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<td></td>
</tr>
<tr>
<td>Unidentified</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Non-motile species ( % cover)

Motile species (presence/absence)

Depth Differences After 2 Years
Settling Plate Summary

- **100 ft**
  - coral bryozoans

- **300 ft**
  - calcareous tubeworm
  - checkered hairy snail

- **600 ft/Ref**
  - tunicates
  - scallops
  - encrusting bryozoans
  - clams
  - amphipods
Photos After 5 Years: 2017
Take Home Messages

★ Brightwater outfall structure is providing multiple habitat functions

★ Something for everyone

★ Make as structurally complex as possible to provide the most benefit
Acknowledgements

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- Jim Devereaux: King County Environmental Lab ROV team leader
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- Maggie Dutch - WA Dept. of Ecology
- Dany Burgess - WA Dept. of Ecology