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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
One project led to another.....

- 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
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>Majoidea 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>Ulva spp.</td>
<td>Chlorophyta</td>
<td>Flatworm</td>
<td>Platyhelminthes</td>
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<tr>
<td>Tunicate</td>
<td>Chordata</td>
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<td></td>
</tr>
<tr>
<td>Anemone</td>
<td>Cnidaria</td>
<td></td>
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<tr>
<td>Hydroid</td>
<td>Cnidaria</td>
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<tr>
<td>Bivalve: clam</td>
<td>Mollusca</td>
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<tr>
<td>Jingle shell</td>
<td>Mollusca</td>
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<td>Limpet</td>
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<tr>
<td>Scallop</td>
<td>Mollusca</td>
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<tr>
<td>Slipper snail</td>
<td>Mollusca</td>
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<tr>
<td>Mussel</td>
<td>Mollusca</td>
<td></td>
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</tr>
<tr>
<td>Sponge: calcareous</td>
<td>Porifera</td>
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</tr>
<tr>
<td>Demosponge</td>
<td>Porifera</td>
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<td></td>
</tr>
<tr>
<td>Unidentified</td>
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</tbody>
</table>
Depth Differences After 2 Years

Non-motile species ( % cover)

Motile species (presence/absence)
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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