
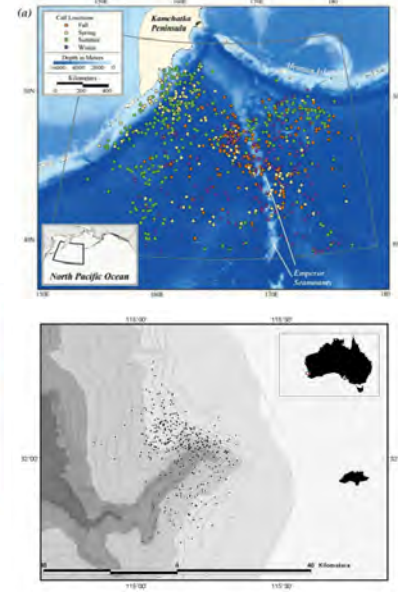
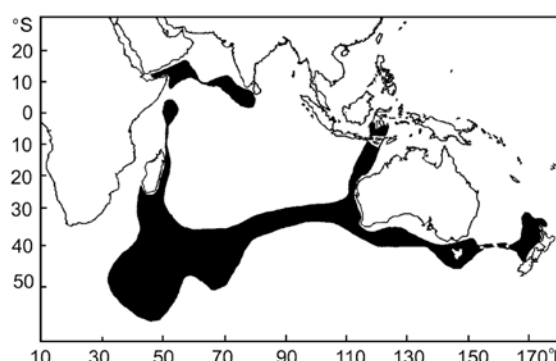
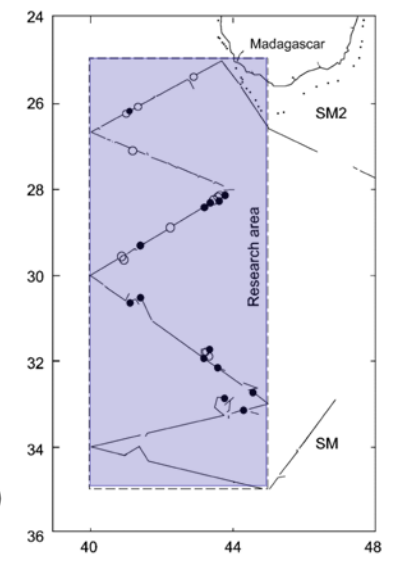
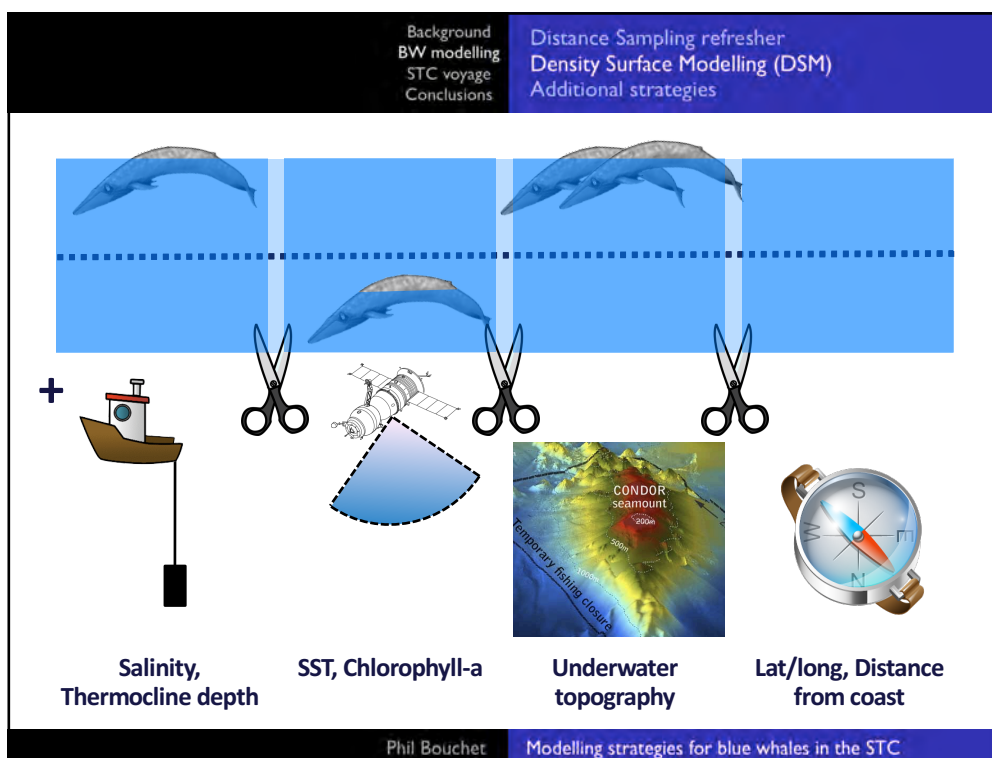
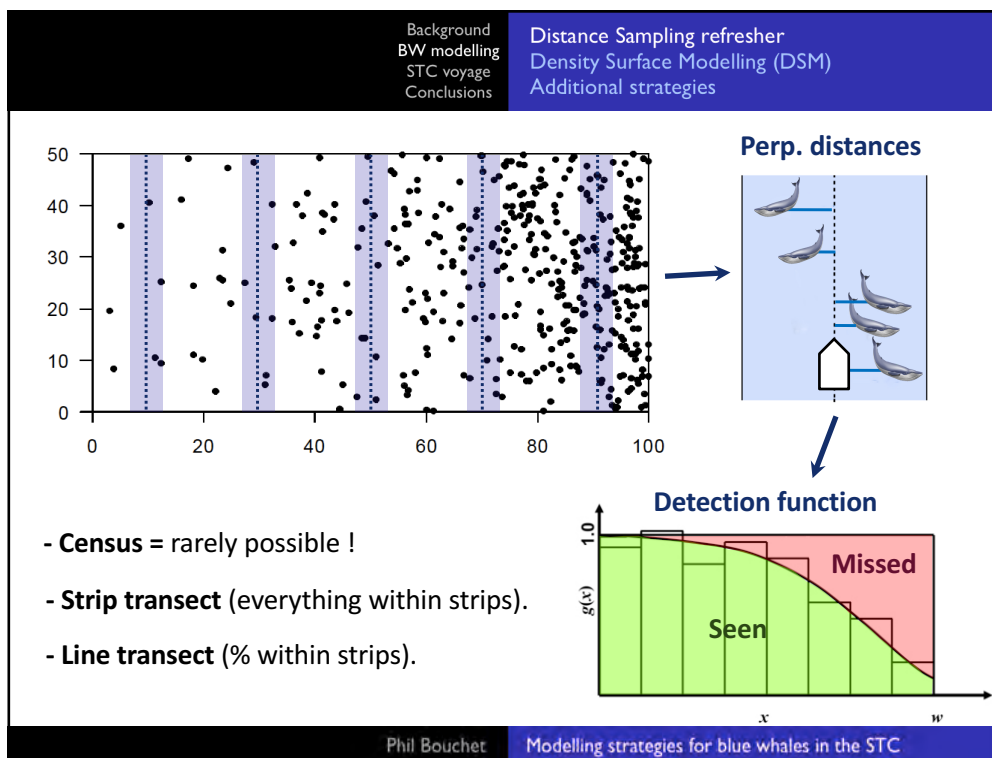


Background BW modelling STC voyage Conclusions	<h2>Modelling strategies for the study of blue whales (<i>B. musculus</i>) in the Southern Tropical Convergence</h2> <p>Phil Bouchet</p> <p>Centre for Whale Research (WA) Inc. PO Box 1622 Fremantle, WA 6959 <a href="mailto:phil.bouchet@cwr.org.au">phil.bouchet@cwr.org.au</a></p>  <p>Southern Hemisphere Blue Whale Workshop 13-15 July 2010, Adelaide (Australia).</p>
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Background BW modelling STC voyage Conclusions	<p>Habitat modelling for cetaceans Blue whales in the STC</p> <ul style="list-style-type: none"> <li>■ <b>Critical</b> for conservation and management.</li> <li>■ Recent development of <b>statistical techniques</b> to model wildlife abundance and distribution.</li> <li>■ Extensive literature about <b>species-habitat relationships</b> for a variety of cetacean species in a variety of locations. <ul style="list-style-type: none"> <li>- Dolphin species in the Spanish Mediterranean: Cañadas <i>et al.</i> (2002), Cañadas <i>et al.</i> (2005).</li> <li>- Fin whales in the Ligurian Sea: Borsani <i>et al.</i> (2005).</li> <li>- Elephant seals in the Antarctic: Bradshaw <i>et al.</i> (2004).</li> <li>- Sperm whales &amp; harbour porpoises off western Scotland: Embling (2008), Embling <i>et al.</i> (2010).</li> <li>- Beaked whales &amp; dolphin species in the Pacific: Ferguson (2005).</li> <li>- Sperm whales in the Gulf of California: Jaquet &amp; Gendron (2002).</li> <li>- Sperm whales in the Tropical Pacific: Jaquet <i>et al.</i> (1996).</li> <li>- Harbour porpoises in the Bay of Fundy: Johnston <i>et al.</i> (2005).</li> <li>- Bottlenose dolphins in Florida: Torres <i>et al.</i> (2008).</li> </ul> </li> </ul>
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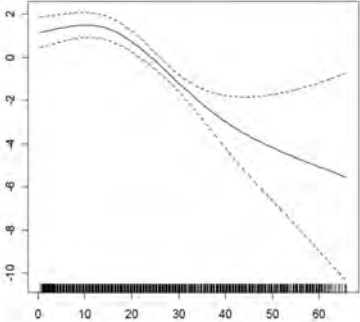
Moore <i>et al.</i> (2002) McCauley <i>et al.</i> (2004)	Background BW modelling STC voyage Conclusions	Habitat modelling for cetaceans Blue whales in the STC
<p><b>Little application to blue whales in general.</b></p> <p><b>Descriptive</b></p> <ul style="list-style-type: none"> <li>- Overlay of sightings onto maps of habitat.</li> <li>- Overlay of tracks onto maps of habitat.</li> <li>- Hypothesis tests.</li> <li>- Histograms of sightings vs. variables.</li> </ul> <p><b>Quantitative</b></p> <ul style="list-style-type: none"> <li>- Regression models (linear, GLMs, GAMs) applied to spatial and environmental data.</li> <li>- Regression and classification trees.</li> <li>- Correlation analyses.</li> <li>- Density function fitting.</li> </ul> <p><b>Little work along STC.</b></p>		
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Background BW modelling STC voyage Conclusions	Habitat modelling for cetaceans Blue whales in the STC
 <p>37% Soviet catches of South West Indian Ocean = within study area</p> <p>1996 abundance estimate = 424 (CV=0.42)</p> <p>Best <i>et al.</i> (2003)</p>	
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Background BW modelling STC voyage Conclusions	Distance Sampling refresher Density Surface Modelling (DSM) Additional strategies
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**Abundance**

$$\hat{n}_i = \exp\left(\alpha + \sum_k s_k(z_{ki}) + \log(a_i)\right) + e_i$$

**Density**

$$\hat{D}_i = \alpha + \sum_k s_k(z_{ki}) + e_i$$

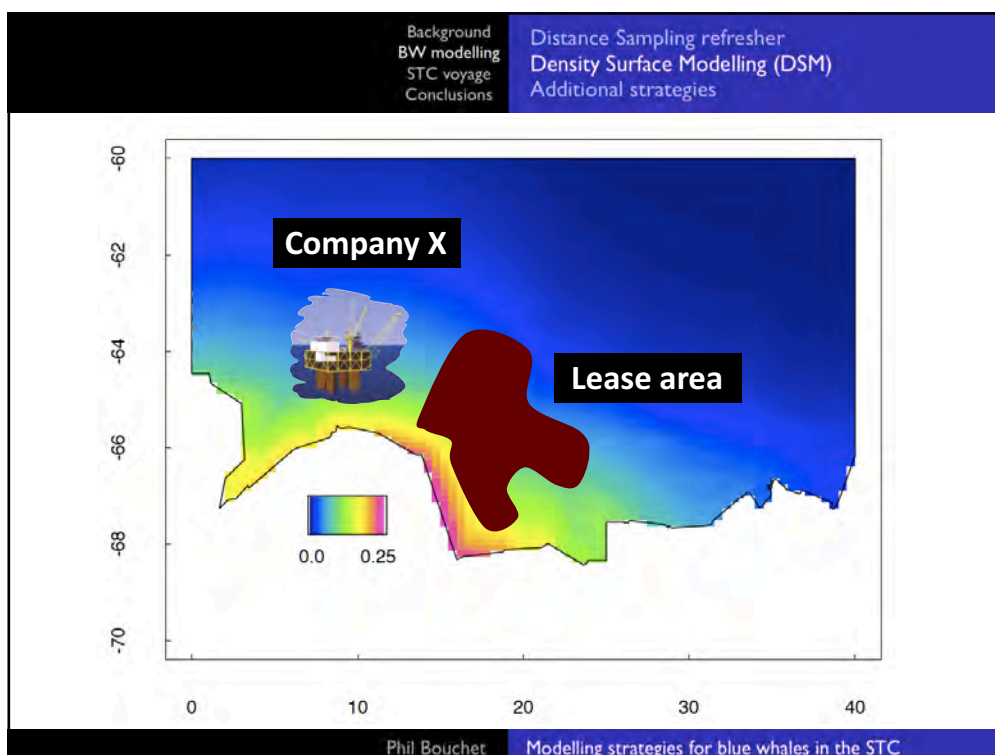
**Count**

$$n_i = \exp\left(\alpha + \sum_k s_k(z_{ki}) + \log(\hat{a}_i)\right) + e_i$$

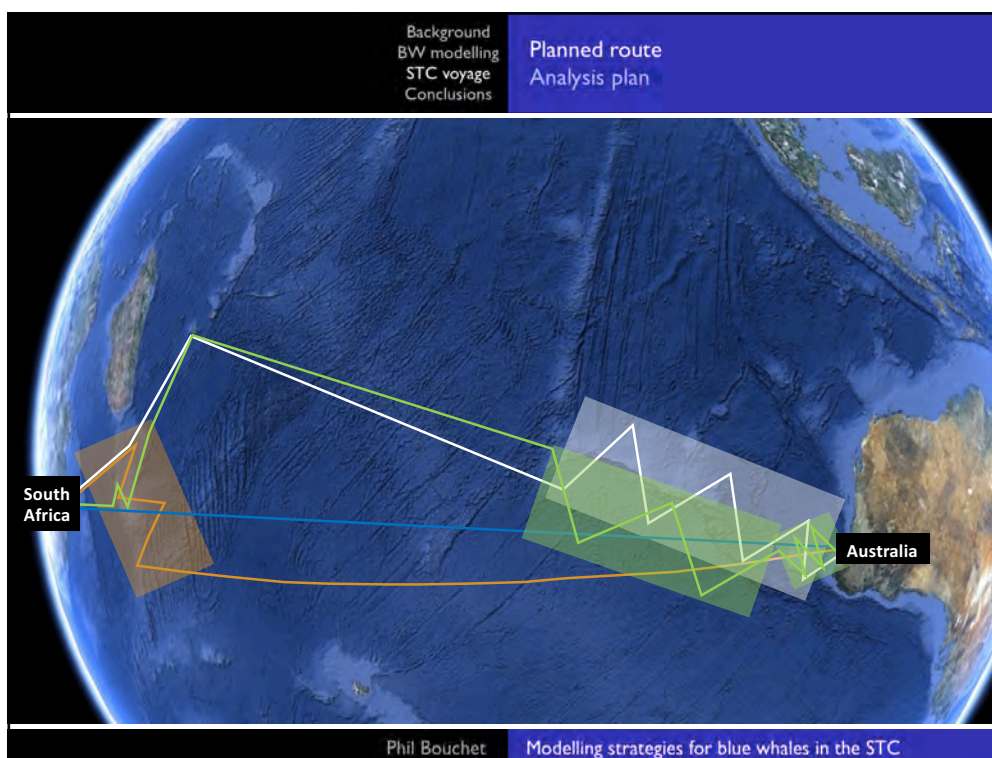
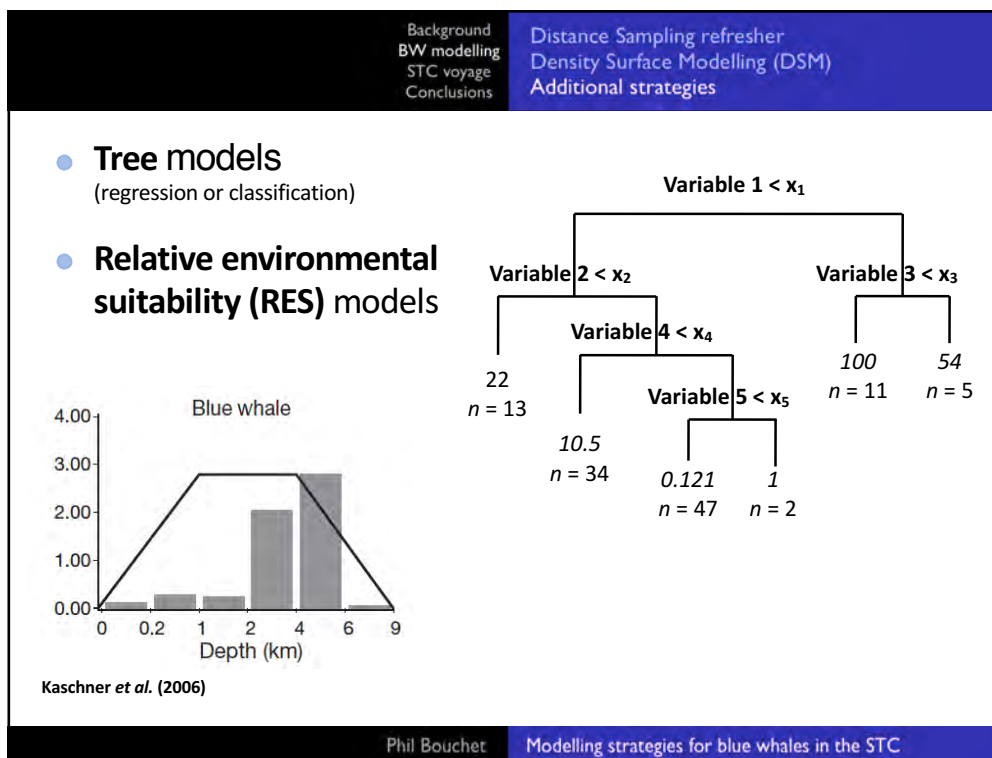
  

- Much **richer** than spatial models.
- **Model-based** approach.
- **Broad** applicability.

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Background BW modelling STC voyage Conclusions	Planned route Analysis plan
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- Maintain **descriptive** work
- **Ordination** techniques (PCA, RDA, CCA)
- **Kernel density estimation**
- Modelling of **telemetry data**

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Background BW modelling STC voyage Conclusions	The way forward References
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- **Great potential** for good science along STC
- **Wide array** of modelling tools available
- **Survey design** and planning
- But surveys are **costly** !
- Broadly **applicable** to other areas along STC

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Background BW modelling STC voyage Conclusions	The way forward References
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