Impact of Environmental and Anthropogenic Factors on Pacific Walrus

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Domain: **Polar Biology**

A Bayesian network model developed by **Jay et al** to study the effects of changing environmental conditions and anthropogenic stressors on the population of **Pacific Walrus** (Odebenus rosmarus divergens) in **Chukchi** and **Bering** seas.

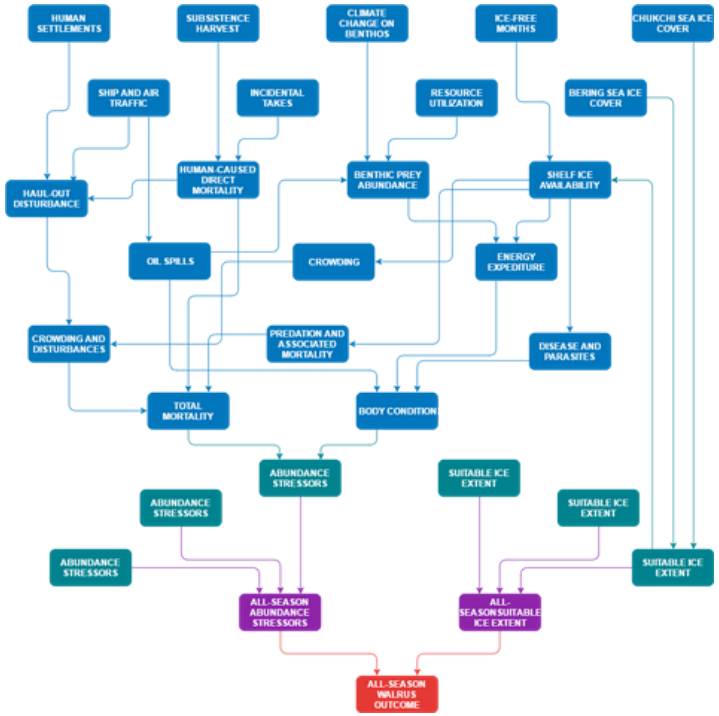
- Model constructed from data obtained during 1979 to 2008
- Attempt to study the impact of these factors through the 21st century
- Probabilities (vulnerable, rare and extirpated) increased from <10% in 2004 to 40% by 2095

Variables

- Ice-free Months
- Chukchi Sea Ice Cover
- Bering Sea Ice Cover
- Climate Change on Benthos
- Resource Utilization
- Ship and Air Traffic
- Human Settlements
- Subsistence Harvest
- Incidental Takes
- Suitable Ice Extent
- Abundance Stressors
- Shelf Ice Availability
- Benthic Prey Abundance
- Energy Expediture
- Disease and Parasites
- Oil Spills
- Body Condition
- Predation and Associated Mortality
- Haul-out Disturbance
- Crowding
- Crowding and Disturbance
- Human-caused Direct Mortality
- Total Mortality
- Breeding Environment
- Birthing Platform
- All-season Abundance Stressors
- All-season Subsistent Ice Extent
- All-season Walrus Outcome

All continuous variables have been transformed to categorical.
Scales Used:
{Low, Moderately-Low, Moderately-High, High} {Positive, Neutral, Negative}
{Superior, Adequate, Inferior} {90–100%, 70–90%, 30–70%,10–30%, 0–10%}

Bayesian Network



Objective

Inference by sampling

- Goodness of the network
- Independencies implied by the DAG
- Identify Reasoning Patterns
- Identify Active Trails and Immoralities
- **Develop and Evaluate Inference Algorithm - Gibbs Sampling**

Original Paper: *Projected status of the Pacific Walrus (Odebenus rosmarus divergens) in the twenty-first century* - Polar Biol (2011) 34:1065–1084
Authors: Chadwick V. Jay, Bruce G. Marcot, David C. Douglas
Link: http://www.plexusowls.com/PDFs/projected_status_pacific_walrus.pdf