

Ocean Energy – Wave Energy Areas of Interest

description

Ocean energy refers to the energy that can be harnessed from the ocean's tides, currents and waves. Waves are created by ocean winds that form as a response to the differential solar heating of the earth's surface and atmosphere. Because water is denser than air, ocean waves have very high energy densities relative to wind. The power of a wave is determined by wave height, wave speed, wave length and water density.

There are a number of technologies currently in various stages of development designed to harness the energy created by ocean waves. These wave energy generators or devices are used in both the near shore and offshore environments, and capture the energy at the surface of the water or from pressure fluctuations in the water column. Available wave power varies considerably throughout the world's oceans and can also be highly seasonal. However, the northwestern coasts of the United States and Canada hold some enormous wave energy potential. Wave energy is a significant source of clean and renewable electricity and because waves are energy dense, substantial amounts of energy can be captured in small geographic areas.

There is an estimated 37,000 megawatts of potential wave energy distributed along the 1,000 metre isobath (an isobath is a line on a map connecting points of equal depth) along Canada's Pacific Coast, which is equivalent to over 55% of Canada's electricity consumption (Cornett, 2006). The west coast of Vancouver Island has attracted international interest as an area for potential wave energy development but many of these wave energy exploration sites have yet to prove their commercial viability.

In order to get a more comprehensive depiction of wave energy development potential in British Columbia, BC Marine Conservation Analysis (BCMCA), in cooperation with the Ocean Renewable Energy Group, convened a workshop on November 17, 2008 with industry representatives, scientists and resource managers.

Nine of the workshop participants (1) reviewed existing maps illustrating wave energy potential, (2) developed criteria additional to energy potential that influence the potential of sites for energy capture developments, and (3) individually mapped the areas of interest or promise for energy development on the BC coast, assigning measures of relative importance (value) to each area they mapped.

Workshop participants identified numerous criteria that factor into their perspectives on the potential of sites for energy development. These criteria related to the proximity of support services and transmission infrastructure, the compatibility of energy projects with other environmental or socio-economic values in the site area, and physical site characteristics like substrate and proximity to land.

Participant's maps were digitized then overlaid and weighted through addition of participants' assigned values to show the composite map represented here. The data are displayed using equal interval categories, meaning that the data are divided into 5 equally spaced classes where each class may contain a different number of grid cells.



PHOTO: FRED GOLDSTENT

data sources

- Expert knowledge

data resolution

- Participants drew their areas of interest using pen on 11x17 maps which ranged in scale from 1:700,000 in the south to 1:900,000 in the north.

date collected

- Workshop, November 2008. GIS mapping, April 2009

reviewers

- Jessica McIlroy, Ocean Renewable Energy Group
- Chris Campbell, Ocean Renewable Energy Group
- Participants in the Renewable Ocean Energy Workshop (November 2008) also provided comments.

reviewer comments

- The map should be verified against up-to-date resource information found online at the Ocean Renewable Energy Group.
- Access to transmission lines is the key driver for decision making for wave-related projects.
- The type of data used to generate this Areas of Interest (AOI) map is likely the best available approach at this stage in the interest in this resource.
- Representation of groups with interests in wave energy who participated in the mapping exercise appears to be reasonable.
- The areas of interest are likely over-represented in some areas and time may show that some areas were actually left out.
- The BCMCA mapping will facilitate the opportunity for early ocean energy projects to consider avoiding areas of high use by existing industry and communities or intense biological sensitivity.

caveats of use

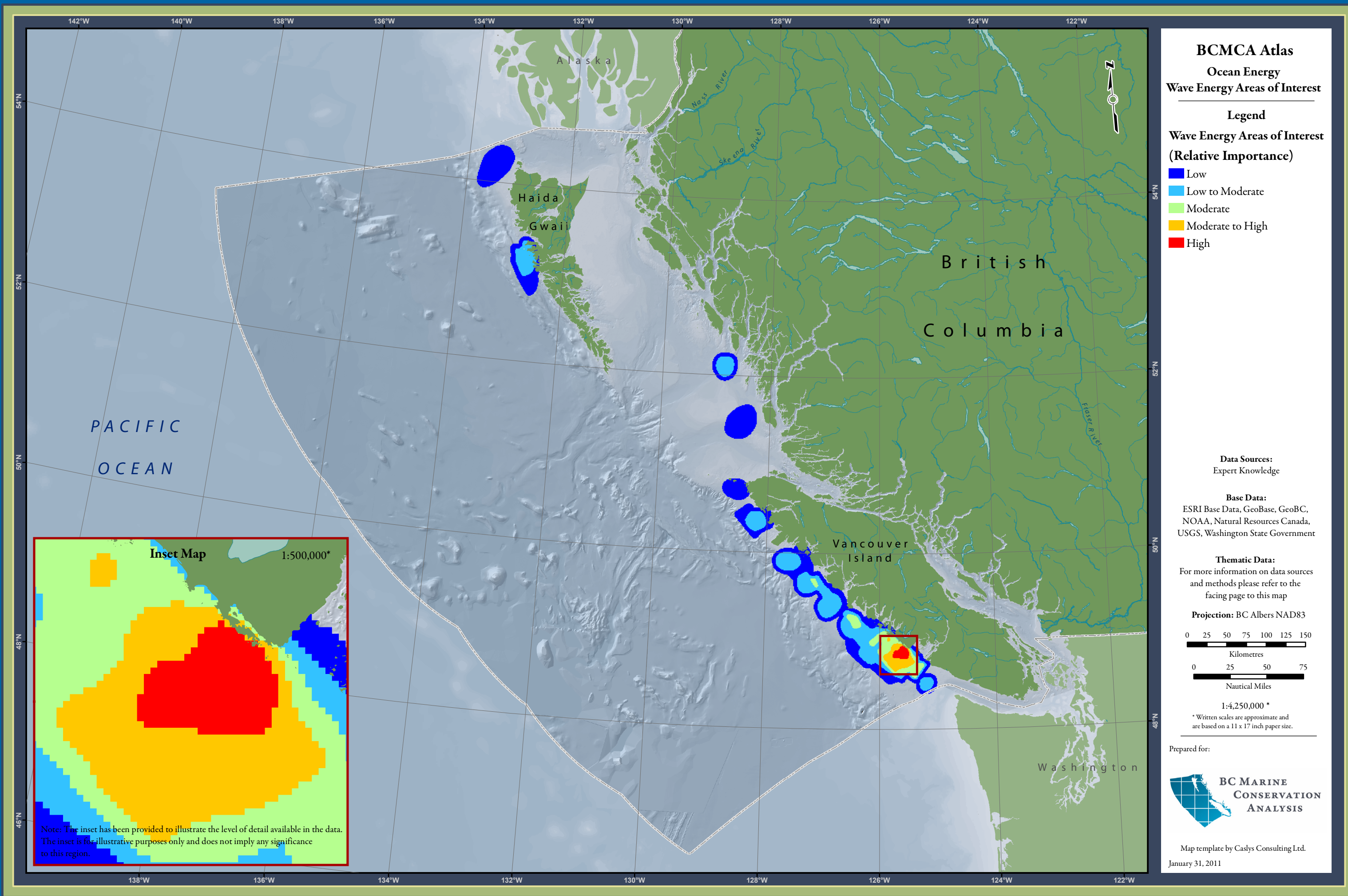
- These maps provide only a coarse indication of wave energy resources, and as such, cannot be used for planning purposes to predict where energy development may or should happen. Finer scale, more detailed data are needed to inform where energy development may occur.
- The areas of interest assessments are preliminary and based on a limited understanding of BC's ocean energy resources. The knowledge of what sites may be appropriate is incomplete.
- Improved understanding of BC's ocean energy resources, technological advances, evolving population centres, global warming, and changing economic conditions are all likely to change future areas of interest for wave and tidal energy development.
- Participants in the mapping exercise may have considered criteria to identify and weight their areas of interest differently from each other.
- Recommended date of expiry for use of these data in a marine planning context: 2013-2018, although information should be verified against up-to-date information available through the Ocean Renewable Energy Group.

map, feature data and metadata access

- Visit www.bcmca.ca/data for more information.

references

- BCMCA Renewable Ocean Energy Mapping Workshop report. November 2008. www.bcmca.ca/document-library
- Cornett, A. "Inventory of Canada's Marine Renewable Energy Resources." *Canadian Hydraulics Centre, National Research Council*. CHC-TR-041. 2006. www.oreg.ca/web_documents/chc-tr-041.pdf
- Ocean Renewable Energy Group www.oreg.ca



BCMCA Atlas
Ocean Energy
Wave Energy Areas of Interest

Legend
Wave Energy Areas of Interest
(Relative Importance)

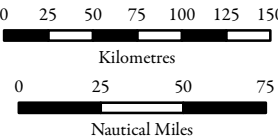
- Low
- Low to Moderate
- Moderate
- Moderate to High
- High

Data Sources:
Expert Knowledge

Base Data:
ESRI Base Data, GeoBase, GeoBC,
NOAA, Natural Resources Canada,
USGS, Washington State Government

Thematic Data:
For more information on data sources
and methods please refer to the
facing page to this map

Projection: BC Albers NAD83



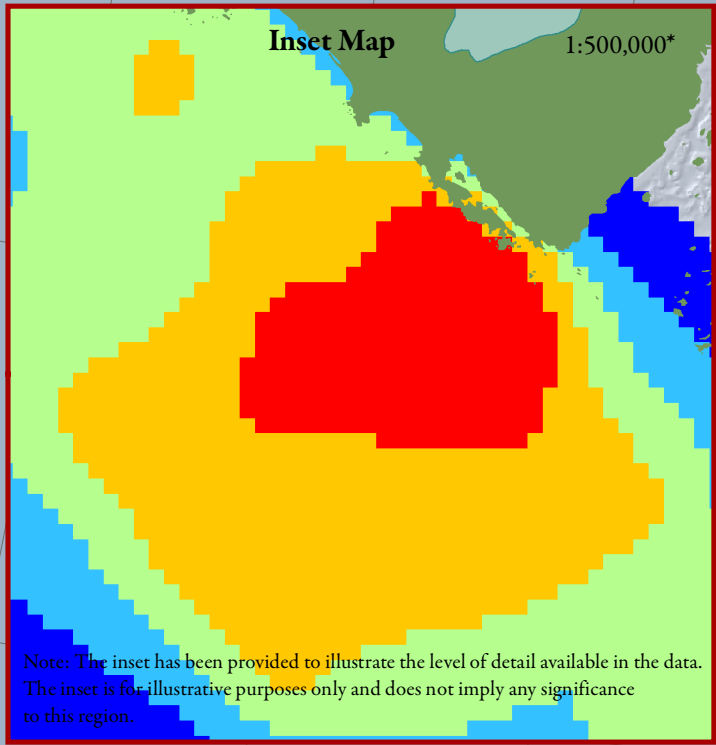
1:4,250,000 *

* Written scales are approximate and
are based on a 11 x 17 inch paper size.

Prepared for:



Map template by Caslys Consulting Ltd.
January 31, 2011



Note: The inset has been provided to illustrate the level of detail available in the data.
The inset is for illustrative purposes only and does not imply any significance
to this region.