



## Ocean Energy – Oil and Gas Prospectivity

### description

This map represents the relative subsurface hydrocarbon exploration potential of sedimentary basins along the British Columbia coast. Only the marine (offshore) portions of the basins are shown.

The Royal Society of Canada (2004) described the prospectivity of the Queen Charlotte Basin (QCB) for hydrocarbons based on hearings and workshops that they conducted. The QCB has been the focus of most technical work in Canada's Pacific Ocean, and the following is paraphrased and updated to current prices from their report.

There is direct indication of hydrocarbons in the QCB, but wells drilled on land and at sea have so far failed to make commercial discoveries. In the absence of hard data on oil or gas reservoirs, Hannigan et al. (2001) made a thorough statistical analysis of the likelihood of occurrences of oil and gas pools. From this they have estimated that the total hydrocarbon resource (in-place volumes) of the QCB is 9.8 billion barrels of oil and 25.9 trillion cubic feet of gas. These are median estimates. There is a 50% probability that the hydrocarbon resource reaches this size. There is a 90% probability that the QCB contains at least 6.3 billion barrels of oil and 12 trillion cubic feet of gas. There is a 10% probability that the QCB hydrocarbon resource is at least 19.4 billion barrels of oil and 48 trillion cubic feet of gas. At the workshops Hannigan indicated that the recovery efficiencies might be around 25% of the resource for oil and about 75% for gas. Hence the QCB is estimated to contain median recoverable volumes of 2.45 billion barrels of oil and 19.4 trillion cubic feet of natural gas, although it should be pointed out that smaller pools within these totals will likely have lower recovery efficiencies and may, indeed, be uneconomic to produce.

A further refinement involved the use of field size cutoffs. From the internal details of the median estimates, the Royal Society (2004), based on data presented by Hannigan at the workshop, reported that the largest single oil field in the QCB would have a recoverable volume of 440 million barrels and that there would be 6 fields of over 100 million barrels recoverable, which together could comprise 1.3 billion barrels. At US\$80 per barrel, this would amount to a potential revenue stream of about C\$104 billion. From median estimates of the gas resource, the largest field would contain 2.5 trillion cubic feet of recoverable gas and there would be 9 fields with more than 500 billion cubic feet recoverable, totalling 9.8 trillion cubic feet. This would amount to a potential revenue stream of around C\$39 billion, at a price of US\$4 per 1,000 cubic feet.

The results obtained by Hannigan et al. (1998 and 2001) for the QCB, Tofino and Georgia offshore basins together indicate a median in-place resource potential of 9.8 billion barrels of oil (all in the QCB) and 43.6 trillion cubic feet of natural gas. The deep water Winona Basin was not assigned any resource potential due to a lack of data. Using the same recovery efficiencies referred to above, these resource estimates translate into recoverable volumes of 2.45 billion barrels of oil and 32.7 trillion cubic feet of natural gas for the West Coast offshore basins in total, subject to the same limitations for smaller accumulations.

Only the QCB has been subdivided into prospective and more prospective areas, largely based on the relative thicknesses of Late Tertiary sediments. For this purpose, data from the Offshore Oil and Gas Map Gallery ("Petroleum Exploration Potential (QCB)" and "Coastal Basins"), originally prepared by Natural Resources Canada, were updated with information from maps contained in Hannigan et al. (1998 and 2005) (provided as CorelDraw files). Updated maps were reviewed by Peter Hannigan and verified as accurate according to the two published sources, then sent to representatives from Shell Canada and Chevron Canada for further review.

Chevron staff modified the edges of this revised QCB dataset to correspond with their understanding of the sediment edges in the younger (Tertiary) basin, of places where older underlying basement sediment assemblages are present and of areas that they felt to be collectively prospective or more prospective. The resulting map, shown here, represents a merging of the potential of several vertically stacked plays and could best be described as "Chevron after Hannigan et al."

It should also be noted that the descriptions above refer to the potential of these basins for conventional oil and gas accumulations. The potential of these basins for unconventional oil and gas resources has not been assessed to date, and the high cost of offshore operations would certainly challenge the economics of their recovery.

### data sources

- Natural Resources Canada (Peter Hannigan), with updates from Chevron Canada

### data resolution

- None provided.

### date compiled

- 1998 and 2001 with updates in 2010

### reviewers

- Peter Hannigan, Natural Resources Canada
- Shell Canada
- Chevron Canada

### reviewer comments

- Reviewer comments were incorporated into the description and map. The BCMCA thank staff from Shell and Chevron, who provided content for this description.

### caveats of use

- The information depicted on this map differs from the layer called "Potential Oil and Gas Plays (QCB)" found on the Offshore Oil and Gas Map Gallery. The information on this map supersedes the layers from the Offshore Oil and Gas Map Gallery called "Petroleum Exploration Potential (QCB)" and "Coastal Basins."
- Recommended date of expiry for use of these data in a marine planning context: In the absence of any ability to acquire new data, the prospectivity assessments of Hannigan *et al.* (1998, 2001 and 2005) will likely continue to stand.


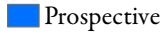
### map, feature data and metadata access

- Visit [www.bcmca.ca/data](http://www.bcmca.ca/data) for more information.

### references

- Hannigan, P.K., J.R. Dietrich, P.J. Lee, K.G. Osadetz. "Petroleum resource potential of sedimentary basins on the Pacific margin of Canada." *Geological Survey of Canada*, Open File 3629. 85 pages. 1998.
- Hannigan, P.K., J.R. Dietrich, P.J. Lee, K.G. Osadetz. "Petroleum resource potential of sedimentary basins on the Pacific margin of Canada." *Geological Survey of Canada*, Bulletin 564, 72 p. 2001.
- Hannigan, P.K., J.R. Dietrich, P.J. Lee, K.G. Osadetz. "Petroleum Resource Potential of the proposed Scott Islands Marine Wildlife Area, Pacific margin of Canada." *Geological Survey of Canada*, Open File 4829; 57 pages 1 CD-ROM. 2005.
- Royal Society of Canada. *Report of the Expert Panel on Science Issues Related to Oil and Gas Activities, Offshore British Columbia*. Report prepared for Natural Resources Canada. 2004.
- Offshore Oil and Gas Map Gallery (last updated in 2006) is available at: [www.empr.gov.bc.ca/OG/offshoreoilandgas/OffshoreMapGallery/Pages/default.aspx/](http://www.empr.gov.bc.ca/OG/offshoreoilandgas/OffshoreMapGallery/Pages/default.aspx/)

**BCMCA Atlas**  
**Ocean Energy**  
**Oil and Gas Prospectivity**

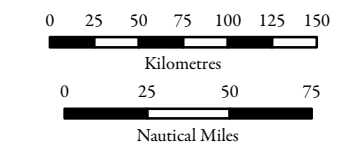
**Legend**  
**Oil & Gas Prospectivity**  
 More Prospective  
 Prospective

**Data Sources:**  
 Natural Resources Canada,  
 Chevron Canada

**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.  
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