

Marine Mammals – Chlorophyll

description

The concentration of chlorophyll in seawater (mg/m^3) is a commonly used index of primary productivity, since living phytoplankton are the main sources of chlorophyll in the ocean. Areas of higher chlorophyll concentration may be related to areas of importance for some seabirds and marine mammals, in particular those that feed on organisms lower in the food web (e.g., zooplankton or krill).

Chlorophyll (chl-*a*) concentration is estimated from ocean colour measurements from satellite imagery. The estimates are based on how much light is absorbed by the water surface, which is assumed to be due to the presence of phytoplankton in the water. Near shore, this absorption is also affected by sediment and other sources of turbidity in the water, leading to predicted chl-*a* concentrations well beyond reasonable values. To control for this effect, we used a maximum value of $30 \text{ mg}/\text{m}^3$, assuming that values above this were invalid due to sediment contamination. This masked out inlets and near shore areas where higher sediment loads can be expected, thereby increasing the confidence in these data as a proxy for primary production.

The data illustrated were obtained from SciTech Environmental Consulting, who retrieved the source data from the Moderate Resolution Imaging Spectroradiometer (MODIS) remote sensing website and prepared this climatology data. Climatology means the data represents the average condition over a period of time. The climatology represented here is for spring months of the years 2003 to 2006. This includes the Julian days of 080 to 171, or March 21 to June 20 for non leap years 2003, 2005 and 2006; but March 20 to June 19 for 2004, a leap year. Source MODIS data had a resolution of 4 kilometres and was imported and resampled, using a nearest neighbour technique, to a 500 metre British Columbia bathymetry grid by SciTech. BC Marine Conservation Analysis (BCMCA) calculated average values for each of our planning units, applied a log scale and classified for illustration into 30 classes based on Jenks natural breaks classification.

The Jenks' natural breaks classification scheme (automated in ESRI ArcGIS software) (Jenks, 1977 and Fisher, 1958) determines the best arrangement of values into classes by iteratively comparing sums of the squared difference between observed values within each class and class means. The "best" classification identifies breaks in the ordered distribution of values that minimizes within-class sum of squared differences, and thus identifies classes that are most homogenous within.



PHOTO: DAVID PERSSON

data sources

- SciTech Environmental Consulting – Spring Chlorophyll Concentration Climatology: 2003-2006 - Edward Gregr.

data resolution

- Original satellite data in a 4 kilometre raster grid retrieved from OceanColor WEB - Chlorophyll (Aqua-MODIS).
<http://seadas.gsfc.nasa.gov/>

date collected

- 2003-2006

date compiled

- Retrieved and processed by SciTech, 2007, adapted by BCMCA for atlas, 2010.

reviewers

- Edward Gregr, SciTech Environmental Consulting

reviewer comments

- The layer was originally intended as a measure of the primary production input into the system during the spring boom. Its use as a proxy for foraging spots for lower trophic levels is sufficient as part of a preliminary planning process, but will likely need to be enhanced by indices of seasonal and inter-annual variability, preferably using higher resolution (i.e., 1 kilometre) data, before the final delineation of foraging hotspots.

caveats of use

- The layer is considered sufficient for preliminary planning processes for a decade past its production. An update to this layer is recommended prior to the final stage in the planning process.
- Recommended date of expiry for use of these data in a marine planning context: 2016.

map, feature data and metadata access

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

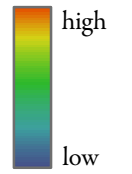
references

- Fisher, W. D. On grouping for maximum homogeneity. *Journal of the American Statistical Association*. 1958. 53, 789-798.
- Jenks, G. F. Optimal data classification for choropleth maps. *Occasional paper No. 2. Lawrence, Kansas: University of Kansas, Department of Geography*. 1977.

BCMCA Atlas
Marine Mammals
Chlorophyll

Legend

Spring Chlorophyll Concentration
 Climatology: 2003-2006 (log scale)



Notes:
 - Classification based on natural breaks.
 - Values greater than 30 mg/m³ have been removed.

Data Sources:

Scitech Environmental Consulting

Base Data:

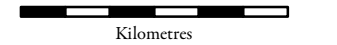
ESRI Base Data, GeoBase, GeoBC,
 NOAA, Natural Resources Canada,
 USGS, Washington State Government

Thematic Data:

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

Projection: BC Albers NAD83

0 25 50 75 100 125 150



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.

August 4, 2010

