

FOLDS AND FOSSILS OF THE CHUCKANUT FORMATION

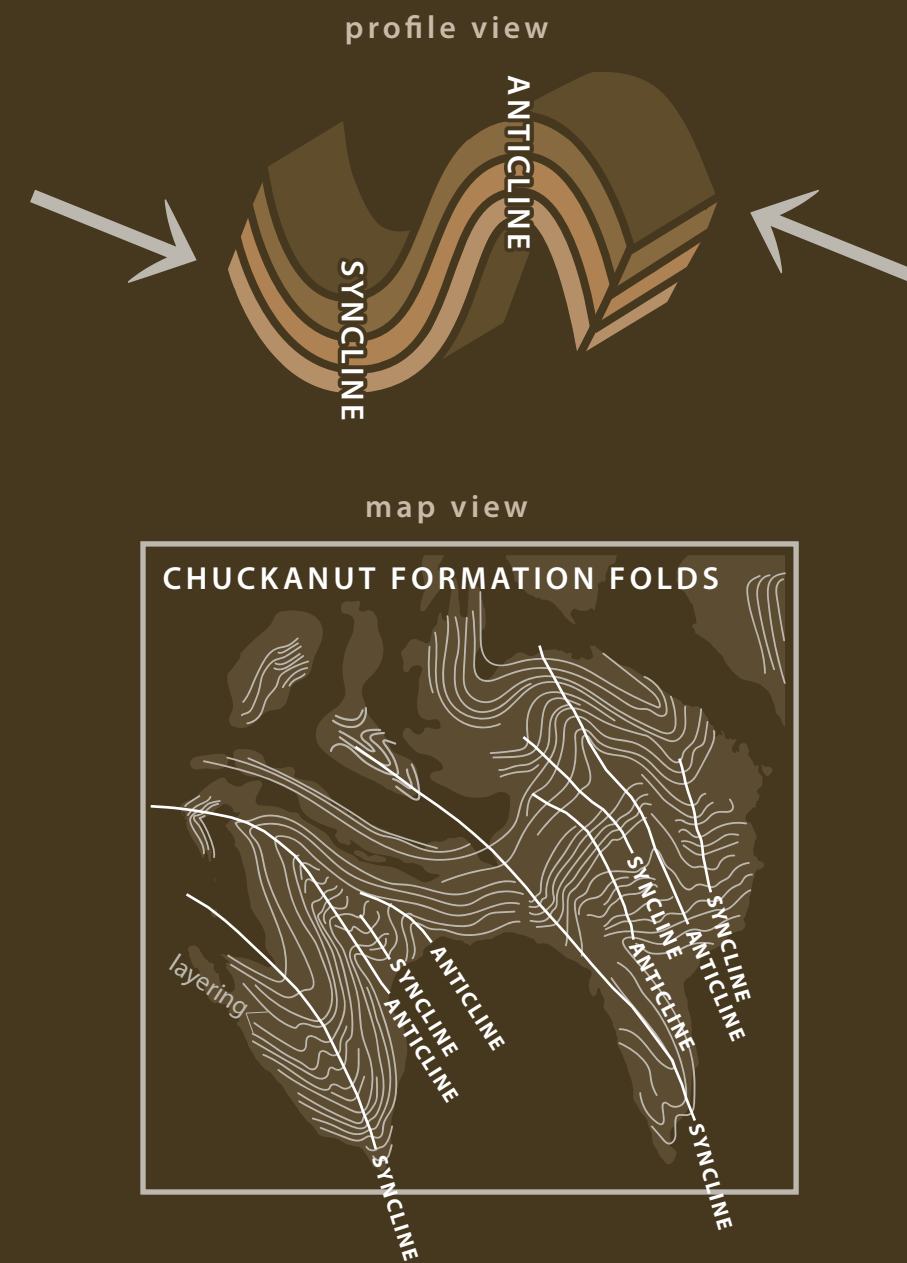
IN NORTHWESTERN WASHINGTON

Chuckanut Formation

The steep hills and mountains in and near Bellingham, Washington contain tightly folded siltstones, sandstones, conglomerates, and coal beds of the Chuckanut Formation.

Folds

The prominent patterns within the lidar-based* map at far right are resistant beds of the formation. These beds were tilted on end and folded into a series of mountain-scale, plunging anticlines and synclines (diagrams at right) due to regional tectonic forces. Driving down Chuckanut Drive, for example, you may actually drive across the same stratigraphic layer more than one time due to folding of the well-bedded layers. This deformation, along with faulting (less visible in the lidar) occurred sometime between ~45 and 25 million years ago.



Fossils

The fossils within the Chuckanut Formation record a large, dynamic, and complex ancient (~54 to 45 million year old) river floodplain that teemed with subtropical rain forest life.

Abundant leaf fossils (drawings at left) found in these rocks show that the climate during that time was warm and humid, resembling that of southeast Asia. Seeds, palm fronds, giant ferns, insects, reptiles (see crocodile footprint, upper left), shore birds, large swamp-dwelling mammals, amphibians, and shallow aquatic fossils have also been collected from these rocks.

Before going out on your own to find fossils, make sure you understand the rules for collection in that area.

REFERENCES

Drawings: based on: (1) photographs taken at Western Washington University Geology Department and Larrabee State Park and (2) figures in Mustoe, G. E.; Dillhoff, R. M.; and Dillhoff, T. A., 2007, *Geology and paleontology of the early Tertiary Chuckanut Formation*, In Stelling, P., and Tucker, D. S., editors, *Floods, faults, and fire*. Geological field trips in Washington State and southwest British Columbia. Geological Society of America Field Guide 9, p. 121-135.

Text: Mustoe, G. E.; Gannaway, W. L., 1997, *Paleogeography and paleontology of the early Tertiary Chuckanut Formation*, northwest Washington. *Washington Geology*, v. 25, no. 3, p. 3-18.

DATA SOURCES

Lidar: 2013 Bellingham lidar (City of Bellingham) and 2006 North Puget lidar (U.S. Geological Survey [USGS]).

Transportation: © OpenStreetMap contributors, openstreetmap.org

Chuckanut Formation: Modified from Washington Geological Survey (WGS) 1:100,000-scale geology and from Ralph Haugenud, USGS, written commun., 2017.

Folds: Modified from WGS 1:100,000-scale geology.

Background image: Characteristic tafoni, or honeycomb weathering, found in the Chuckanut Formation along the coastline of Larrabee State Park



Map Symbols

- major route
- road
- non-motorized path
- county boundary
- railway

*** What is Lidar?**
 The topographic detail depicted on this map is the result of lidar. Lidar is a remote-sensing technique that uses light pulses to rapidly collect a very large quantity of elevation points across large areas.
 To learn more about lidar in Washington visit: www.dnr.wa.gov/lidar



The shaded areas on the inset map (left) correspond to the dark shaded regions on the main map and represent the surficial extent of the Chuckanut Formation near Bellingham.