

**ESCI 330 NATURAL HISTORY OF THE PACIFIC NORTHWEST**  
Fall 2023

**Natural History Report 1**  
Due Wednesday 18 October 2023

Among the essential skills of a natural historian are observing patterns in nature, posing hypotheses to explain those patterns, and evaluating the hypotheses using additional observation. Tom Wessels demonstrated this form of hypothetical-deductive investigation in his book, *Reading the Forested Landscape*. In the book, he showed how to interpret simple observations to reconstruct the forest history of his New England home. Wessels' approach to reading the forest also works well in the Pacific Northwest. Although species and patterns differ here, some of the same disturbances described by Wessels have occurred in our area. More importantly, Wessels' approach can be applied to deduce the history of many ecological systems. In this assignment, you will apply the method to learn to read local forests.

Spend some time observing patterns in the forest on Sehome Hill Arboretum. Use the questions listed below to develop hypotheses to interpret your observations. Then use your hypotheses to predict additional patterns. Search for the predicted patterns, and apply results of your search to evaluate your hypotheses. If you are new to this process, reading Wessels' book will give you an idea of how it works. Wessels' book (Wessels, T. 1997. *Reading the Forested Landscape*. Countryman Press, Woodstock, VT.) is on reserve in Wilson Library.

For this report, you should deduce the likely mechanism that created the following two patterns. Please do not use the examples or location we observed in class or the landslide east of the Engineering Technology building. For credit, you must observe disturbances in a different location(s).

- 1 Find a living tree with a hollow in its trunk large enough that you could fit your hand inside. The hollow must include a breach the bark entirely. The underlying wood may also be hollowed out, or it may be solid. Deduce what caused the breach in the bark and the resulting hollow.
- 2 Find a large non-anthropogenic gap in the upper canopy of the Arboretum. "Non-anthropogenic" excludes gaps caused by roads, trails, parking lots, or other built structures. For this assignment, define "large" as exceeding 100 m<sup>2</sup> (e.g., a square with sides 10 meters in length). Define "upper canopy" as branches and foliage at least 25 meters above ground; there may be trees and/or branches growing within 25 meters of the ground. Deduce the mechanism that likely generated the canopy gap. Your mechanism must explain why no trees within the gap grow taller than 25 meters, but trees surrounding the gap grow taller than 25 meters.

For each of the patterns stated above, complete the following.

- (a) Describe the pattern you observed, and mark its location on a map of the arboretum.
- (b) Pose two hypotheses to explain the pattern. Both hypotheses must be plausible. (Do not state an hypothesis that obviously is incorrect, e.g., College gnomes cast fatal spells on trees in the area – this is not plausible because all gnomes at this college are benevolent; they do not know any fatal spells.)
- (c) Use your hypotheses to predict additional patterns related to the pattern in part (a).  
Make your predictions before doing parts (d) and (e).
- (d) Search for the patterns predicted in part (c).
- (e) Use results of your search to evaluate your hypotheses in part (b).

Submit results of your work in written (typed) form. A carefully written assignment need not fill more than 2 or 3 single-spaced pages. Please describe patterns you observe in sufficient detail that the reader can find them in the Arboretum, or at least determine whether they support your hypotheses. Feel free to illustrate your work with drawings, diagrams, or photographs. (Illustrations are not required for this assignment, however.)

Your work for this assignment will be evaluated using the following rubric.

### Point Allocation:

- 1 Living tree with hollow (*50 points total*)
  - (a) Description of pattern observed (*10 points*)
  - (b) Two hypotheses to explain the pattern (*10 points*)
  - (c) Additional patterns predicted from hypotheses (*10 points*)
  - (d) Description of results of search for predicted patterns (*10 points*)
  - (e) Evaluation of hypotheses, using results of search (*10 points*)
- 2 Canopy gap ( (*50 points total*)
  - (a) Description of pattern observed (*10 points*)
  - (b) Two hypotheses to explain the pattern (*10 points*)
  - (c) Additional patterns predicted from hypotheses (*10 points*)
  - (d) Description of results of search for predicted patterns (*10 points*)
  - (e) Evaluation of hypotheses, using results of search (*10 points*)

**Total: 100 points**

### Evaluation Criteria:

Excellent answers should match the following characteristics for each part.

- (a) Description of pattern observed [Some of the below may be more appropriate for (c).]
  - Identifies tree species.
  - Describes trunk hollow (Pattern 1), or canopy gap, including sizes and relative abundances of trees within and surrounding the gap. (Pattern 2).
  - Matches the pattern as defined above.
  - Precise description of the tree (Pattern 1) or gap (Pattern 2), including tree sizes (1,2), distribution of branches (1), surrounding forest (1), tree species (2), shape of gap (2), and any other relevant characteristics.
  - Description and location information contain enough detail for another person (TA, instructor) to find the site.
- (b) Two hypotheses
  - Hypotheses are plausible.
  - For each hypothesis, mechanism or events to generate pattern described clearly.
  - Sufficient to explain the pattern in (a) completely.
  - It is possible to distinguish between the two hypotheses using physical evidence that could be found.
- (c) Additional patterns predicted
  - Similar to criteria listed under (a).
  - Reason(s) for each prediction stated.
  - Predictions and reasoning are plausible.
- (d) Results of search
  - Includes results for both hypotheses.
  - Describes results of search for each kind of evidence predicted in (c).
  - Description is specific enough for another person (TA, instructor) to find the results.
- (e) Evaluation of hypotheses, using results of search
  - Both hypotheses are evaluated.
  - Evaluations follow directly from comparison between predictions and evidence found.
  - Evaluations are conclusive.
  - Evaluations are insightful.