OREGON MARINE SCIENTIST AND EDUCATOR ALLIANCE

North Pacific Humpback Whale Genotype Matches
Student Worksheet #1

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Problem Statement: Which population(s) of whales are getting entangled off the Oregon coast?

Background
Humpback whale populations have different breeding grounds, and each population is known as a Distinct Population Segment (DPS). From Estimated Humpback Whale Bycatch (2002-2017) by Hanson, et. al., 2019:

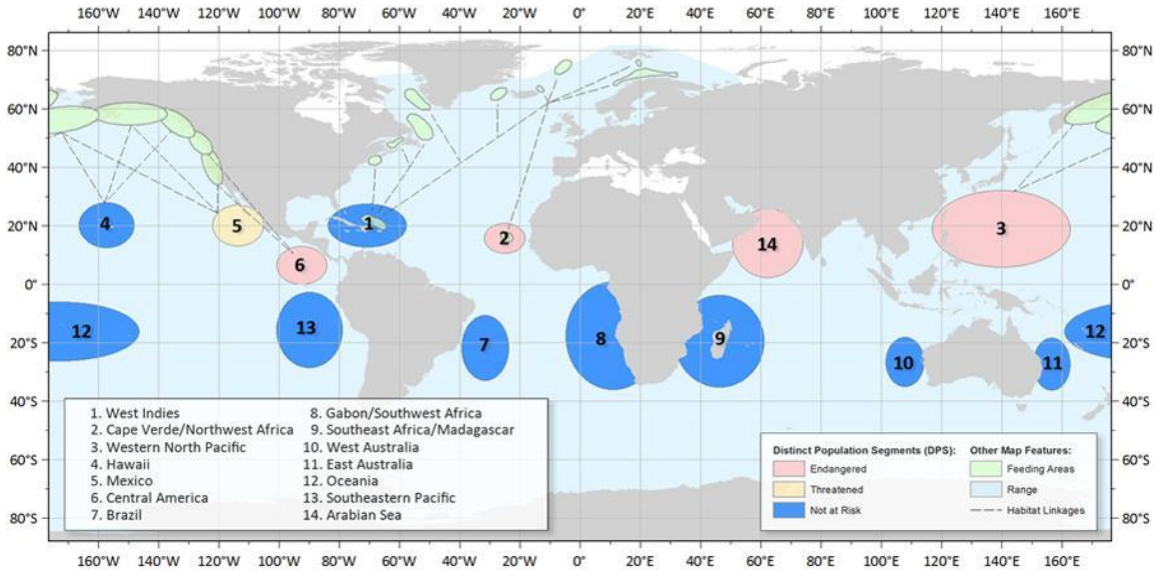
"In the North Pacific, there are four discrete and significant DPS, identified by breeding location: Hawaii, Central America, Mexico, and Western North Pacific. Humpback whales found off the Oregon, Washington, and California coast are from the Central America, Mexico and Hawaii DPS (Barlow et al. 2011). Only the Mexico DPS and Central America DPS are listed, as threatened and endangered, respectively." (Hanson, et. al., 2019)

Humpback whales from three DPS seasonally migrate to feed off the west coast of North America (California, Oregon, and Washington).

"Humpback whales may break through, carry away, or become entangled in fishing gear. Whales carrying gear may later die, become debilitated or seriously injured, or have normal functions impaired…" (Hanson, et. al., 2019)

Instructions: Use the map and this data set to answer the following questions.

1. Looking at the map below - do all of the individuals from each breeding population feed off of the west coast of California, Oregon, and Washington exclusively? Which breeding population does favor our coastline almost exclusively? **5pts**



Understanding the Data

Click on the bottom tab ***NP Breeding Ground Reference.*** This data set represents genetic samples taken from the three breeding populations that seasonally migrate to feeding grounds off the west coast of North America.
Note that there are **10 different gene loci** indicated by the various marker designations, *such as* ***EV14 or GATA28***; the **numbers** below these **represent fragment lengths**; there are **30 different samples (individuals)**, **10 from each DPS** (distinct population segment or breeding population).

2. Why are there two different numbers listed for each gene locus? **2pts**

3. Explain what the different numbers mean specifically - what do they represent? **2pts**

Scatter Plots

Use the scatter chart graphs for each DPS to answer the following questions. The plots are located at the bottom of the ***NP Breeding Ground Reference*** sheet.

4. Which gene loci have the highest STR variability? **3pts**
   a. Central America:
   b. Mexico:
   c. Hawaii:
5. Which gene loci have the lowest STR variability? **3pts**
   a. Central America:
   b. Mexico:
   c. Hawaii:

Solving the Entanglement Mystery!!!

Click on the bottom tab ***The Entanglement Mystery.***

Five humpback whales have been entangled off the Oregon coast...it is up to you to determine which breeding population these whales are from.

6. For each mystery whale, **mark the specific fragment with the breeding population color,** but ONLY if it is unique to that population. **Example is done for you with whale #1 at the EV14 loci.* **5pts**
   a. Why is EV96 not informative for whale #1?

7. **Fill in the yellow boxes at the bottom of the data sheet** with your best guess as to which populations the mystery whales genetic profiles best match. ***Have your instructor check this off before you submit it***. **5pts**

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