Habitat Conservation Prioritization for Phoenicopterus Chilensis

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Introduction

The Wildlife Conservation Society in conjunction with Clark University undertook this project to guide preservation efforts by analyzing the habitat trends for Chilean Flamingos (Phoenicopterus chilensis). This work represents the first known endeavor to incorporate solely remotely sensed data on a regional area to identify and measure the essential characteristics of flamingo habitats. These important flamingo habitats were prioritized based on their size, health, habitat size, proximity to anthropogenic threat, and ability to withstand the effects of climate change, most notably the El Niño/Southern Oscillation (ENSO).

The objective of this research is to answer the following questions:

1. Which Habitat Lakes will prove to be resilient given the potential impacts of climate change?
2. How stable are the lakes?
3. What is climate changes expected impact on these areas?
4. What is the expected human threat?
5. How healthy are the lake systems?

Study Area & Data

The study region consists of the Andean alpine region which extends from southern Peru, into Bolivia and northern Argentinian lowlands, representing 88% of the known flamingo habitats (Caziani, 2007). A list of coordinates for wetlands habitats was provided by the WCC. Of the approximately 430 wetlands, 21 were selected for further study.

Data

Lake Stability

Area of wetlands was measured monthly. Because the goal is to find persistent lakes, the range of the fluctuation in area was divided by the maximum area.

Lake Health

Proximity to populated centers was based on the Euclidean distance from the closest towns to each lake, and was standardized by dividing each of the distance values by the longest distance.

Lake Size

Flamingos feed in the shallows of lakes and wetlands. Shallows were measured monthly and classified into 4 groups based on the percentage of months that a given area within the lake is at an ideal depth for the Chilean Flamingo.

Ranking Lakes with six factors

<table>
<thead>
<tr>
<th>Lake Name</th>
<th>Habitat Size</th>
<th>Lake Stability</th>
<th>Predation Risk</th>
<th>Lake Health</th>
<th>Habitat Conservation Prioritization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laguna Celeste</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>8.22</td>
</tr>
<tr>
<td>Lago Titicaca</td>
<td>9.8</td>
<td>6.5</td>
<td>2</td>
<td>5.5</td>
<td>8.36</td>
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<td>Laguna Charipu</td>
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<td>6.2</td>
<td>5</td>
<td>5</td>
<td>8.76</td>
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<tr>
<td>Lago Chiquita</td>
<td>9</td>
<td>5.9</td>
<td>4</td>
<td>4.5</td>
<td>8.79</td>
</tr>
</tbody>
</table>

Methodology

5. Seasonal Changes

In order to find the most persistent lakes for the flamingos, six factors were selected for further study. These factors were lake area, lake stability, predation risk, lake health, habitat size, and vegetation along the shore.

Lake Stabilty

For each lake the difference between the two curves was calculated and standardized based on the 1982 precipitation rates to see at what degree the seasonality has changed. The index scores were calculated with the area difference divided by the area of earlier year. The following are four examples among all the lakes.

Seasonal Changes

To understand how El Nino affects each lake, anomalies in Sea Surface Temperature were correlated with anomalies in Precipitation from 1983 – 2010.