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# Vegetation Structure of Mangrove Ecosystems in Panama

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# Vegetation Structure of Mangrove Ecosystems in Panama

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## Introduction

- Mangroves provide important habitat for terrestrial and marine wildlife
- They buffer shorelines from flooding and sequester excess nutrients and pollutants in runoff before reaching rivers and oceans
- They provide a wintering habitat for migratory bird species
- These habitats are being rapidly lost to coastal development



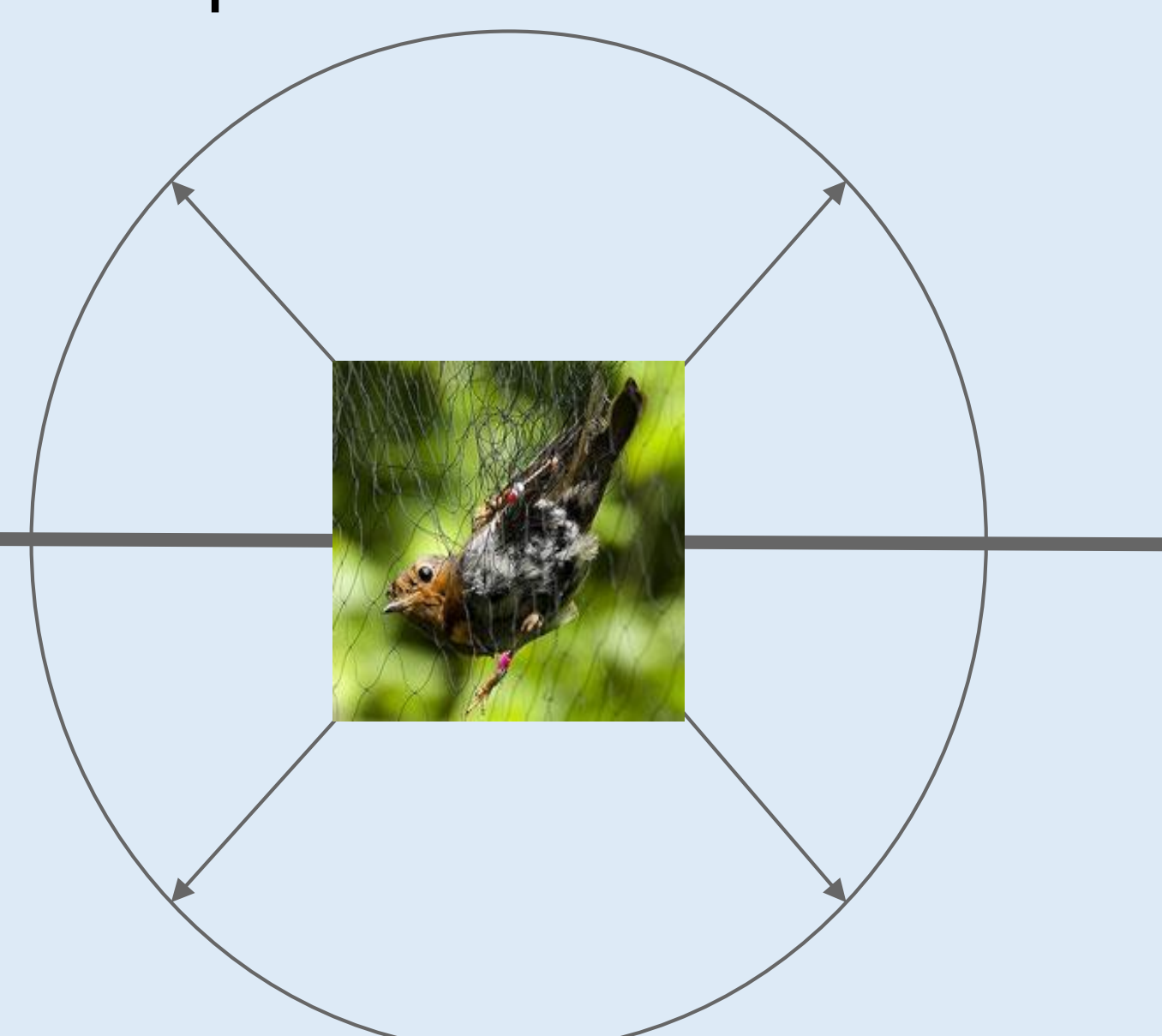
## Objectives

- Quantify habitat differences among mangrove sites by
- Quantifying differences in forest structure and tree species composition
  - Determining if these differences are related to site age
  - Analyzing differences in moisture, salinity, and pH across sites

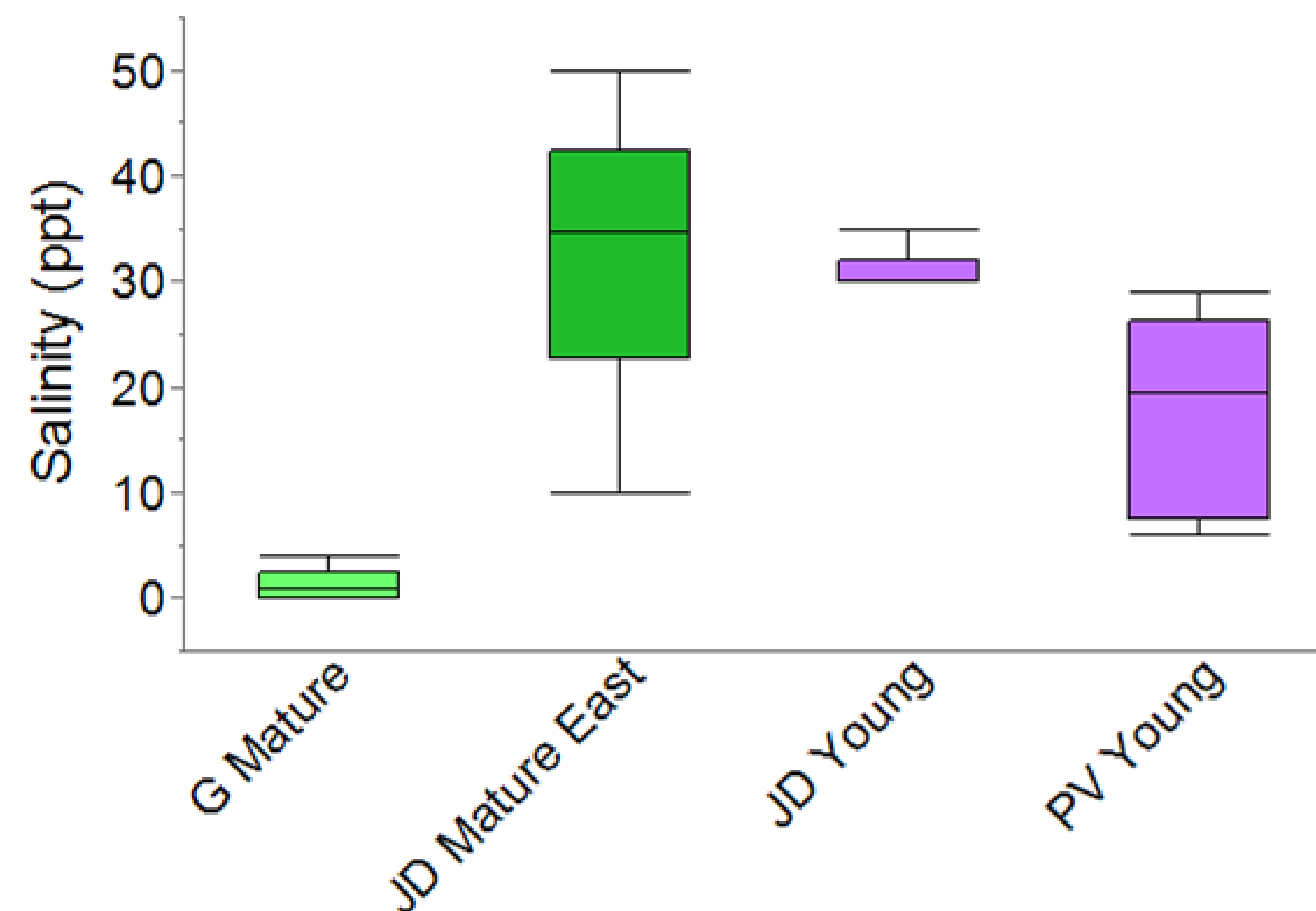


## Methods

- 20 meter transects walked diagonally from center of mist nets. Recorded individual tree species, tree height and diameter at breast height (DBH), standing water, percent canopy cover, and leaf litter
- Ocular tube readings every 2 meters for estimated % area cover
- pH and temperature were taken by Hanna Meter in standing water; holes were dug in drier areas until standing water was reached
- Salinity sampled with refractometer
- Canopy height and DBH recorded using a rangefinder and DBH tape



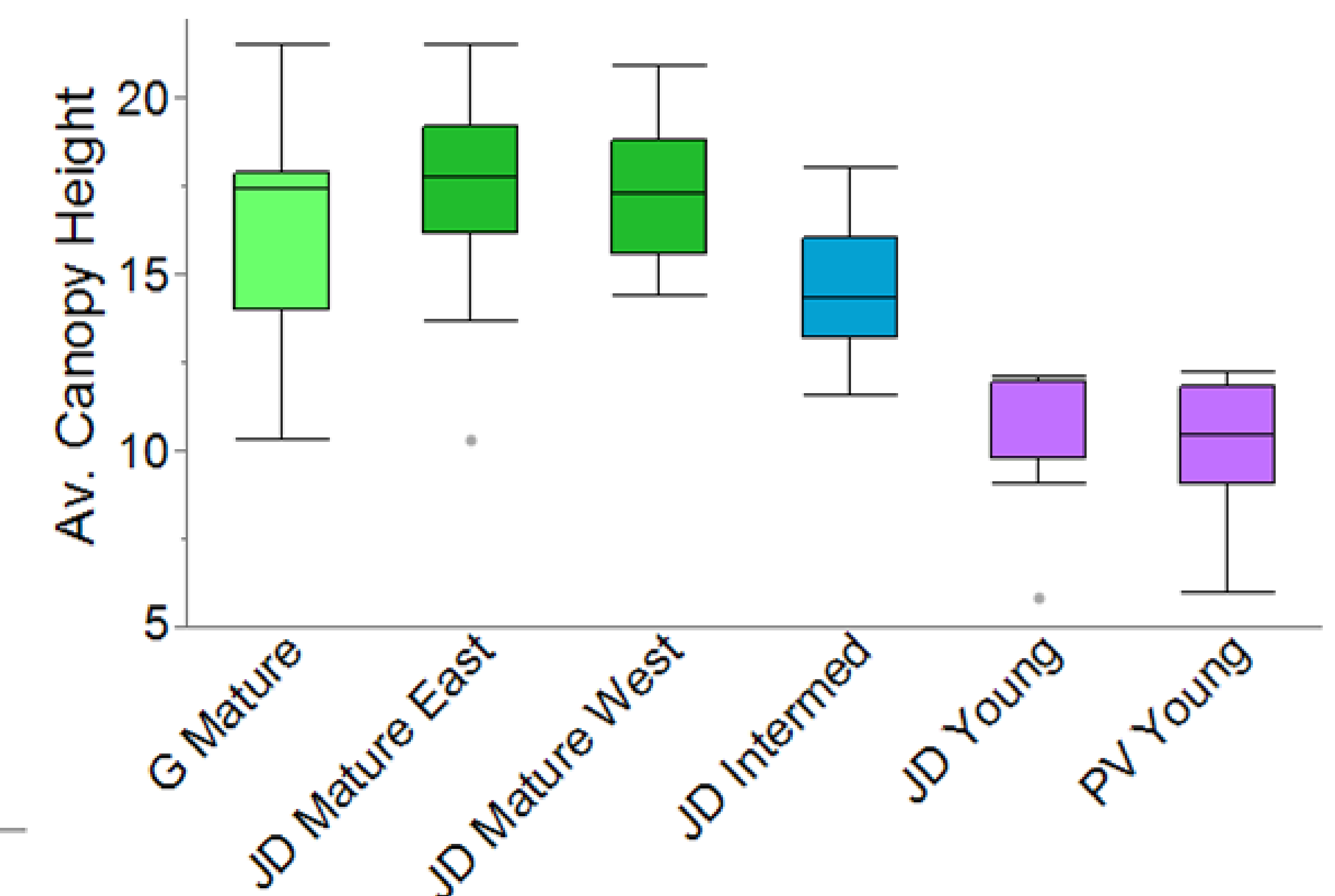
## Results



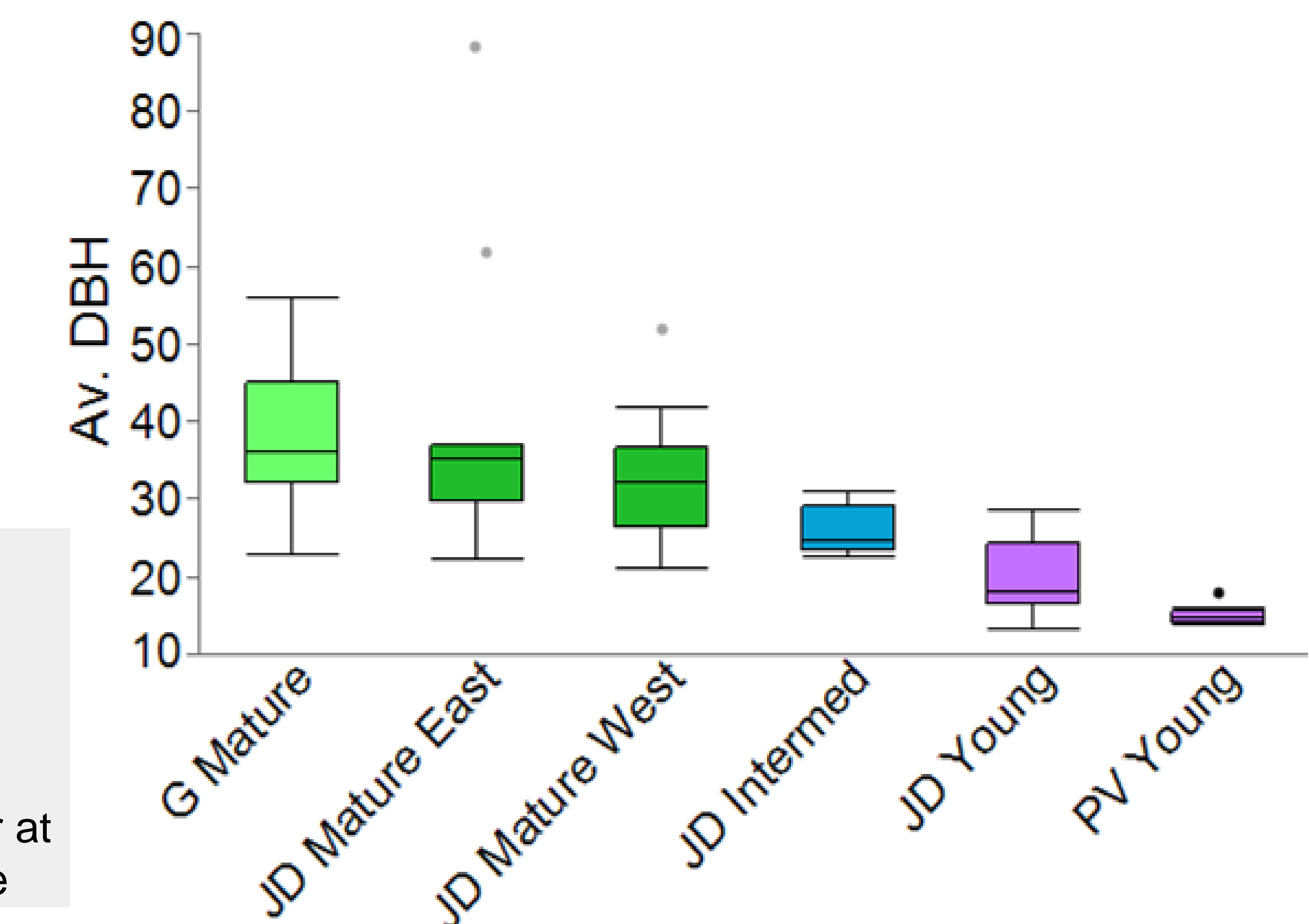
**Figure 1:** ANOVA comparing salinity levels in ppt by sites. JD Mature East, JD Young, and PV Young are located on Pacific coast while G Mature is on the Caribbean coast

Color: mature (green), intermediate (blue), young (purple)  
G Mature: Galeta (Caribbean/light green)  
JD Mature East: Juan Diaz 2014 - 2015  
JD Mature West: Juan Diaz 2013 - 2014  
JD Intermed: Juan Diaz 2010 - 2013  
JD Young: Juan Diaz 2013 - 2014  
PV Young: Panama 2010 - 2012, 2013 - 2014

**Figure 2 (top right):** ANOVA comparing the average canopy height by site



**Figure3 (bottom right):** ANOVA comparing the average diameter at breast height of tree trunks by site



## Conclusions

- Average canopy height and diameter at breast height were higher in mature sites.
- Canopy cover didn't vary across sites - younger stands have more, smaller trees while mature sites have fewer, but larger trees.
- Standing water was greater at the Caribbean site possibly due to rainfall gradient across Panama from north to south (Caribbean to Pacific). This may also explain the significantly higher salinity of standing water at the Pacific sites compared to the Caribbean site Galeta.

## Acknowledgements

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