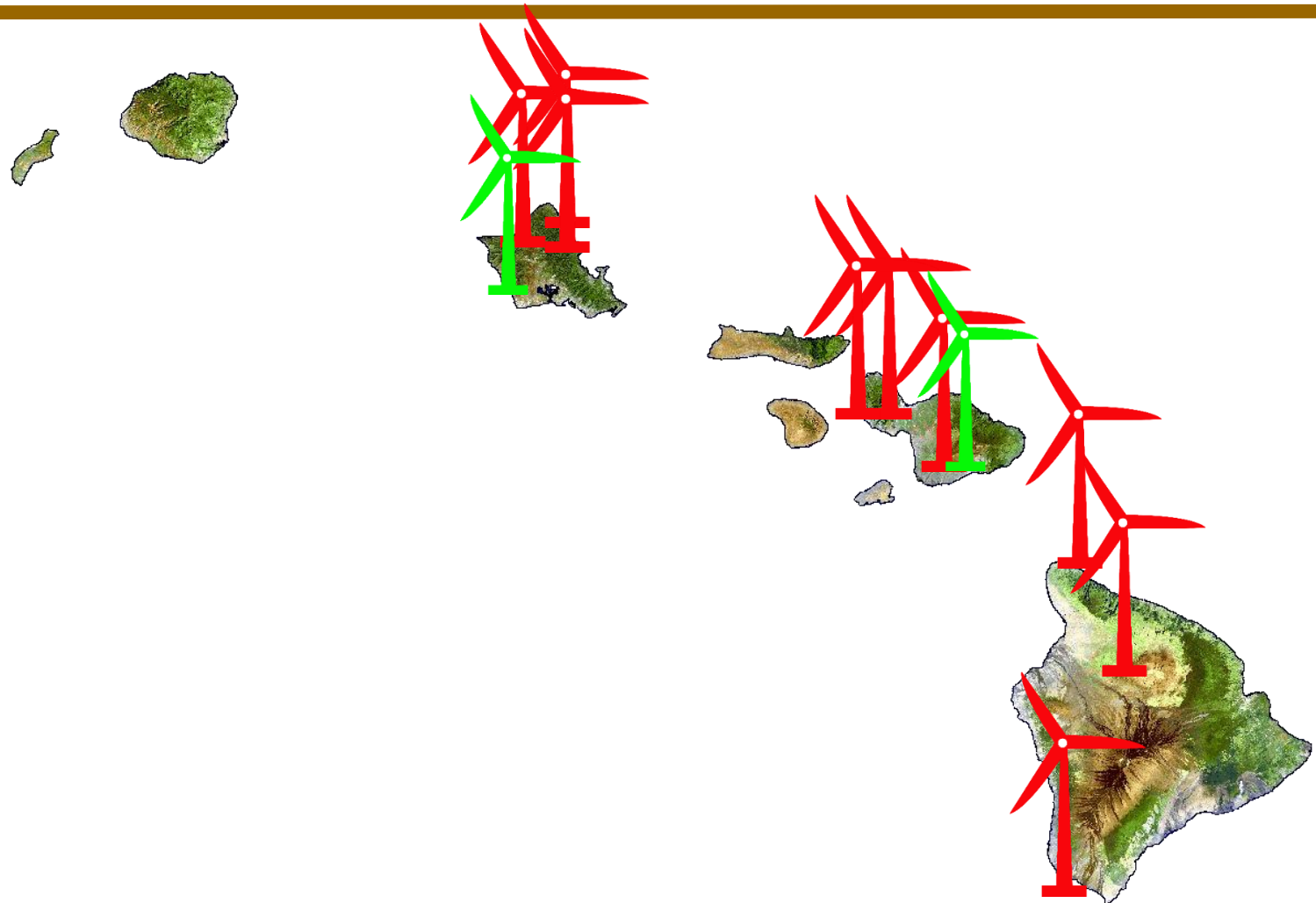


2015 versus 2020: Key Changes



Loyal A. Mehrhoff
March 6, 2020

2020 vs 2015:

- **Identify key changes:**
 - **Particularly items that may impact wind projects**
 - **Potentially controversial items**

2020 vs 2015: Key Changes

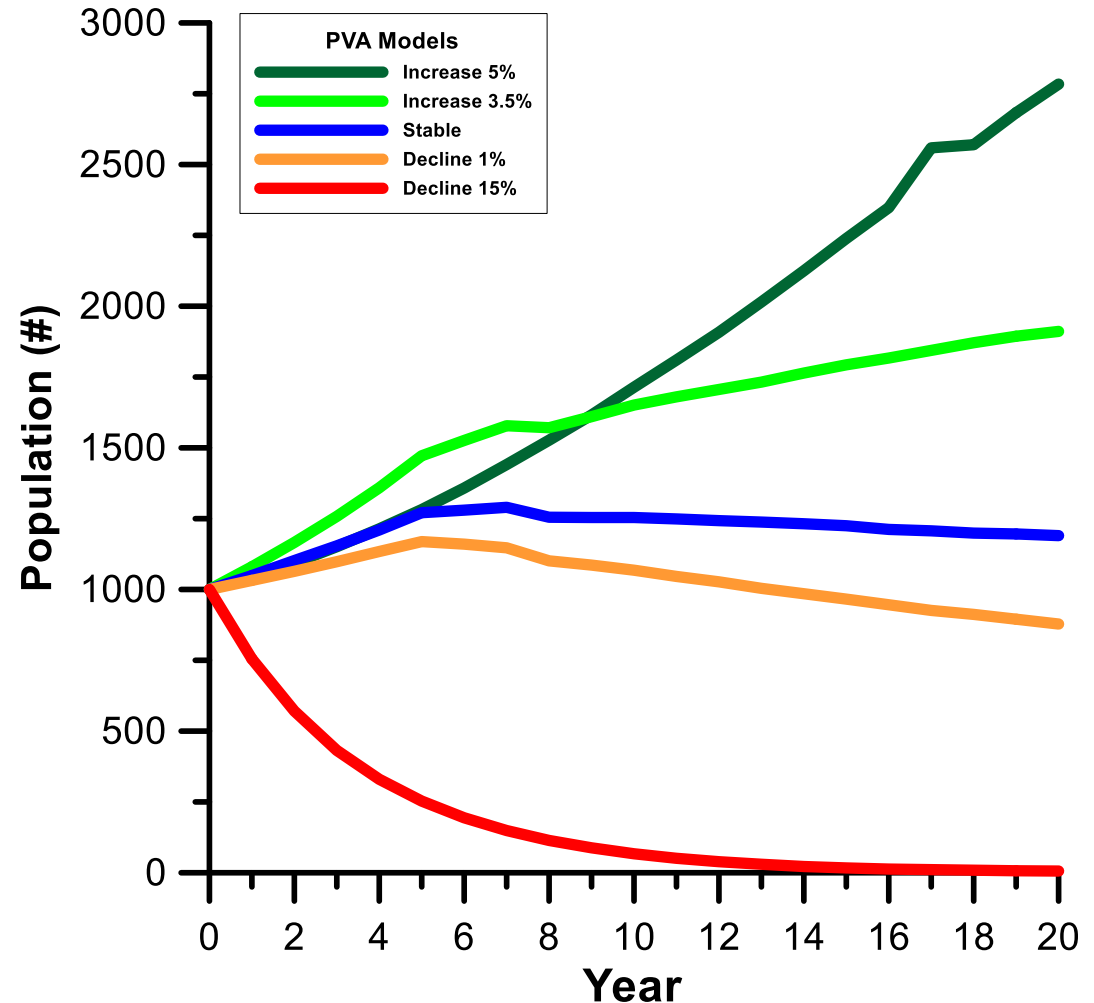
- Revised sections on HCP take and impacts to bats
- New recommendations on take avoidance/minimization
- Updates on Low Wind Speed Curtailment
- New Adaptive Management Section
- Summary of Research Program
- Checklist of HCP requirements
- Discussion of PVA use for Hawaiian hoary bat

2020 vs 2015: Take, Monitoring, Impacts

- **Process for estimating potential take using info from similar projects, types of equipment, bat monitoring, and avoidance/minimization efforts**
- **Post-construction activity monitoring for bats at sites and desired statistical power (80% confidence of a 20% change in activity)**
- **Conservative assumptions for impact analyses**
 - **0-1% annual population growth**
 - **Not prudent to assume compensatory reproduction (if take > annual population growth then population declines)**
 - **Oahu =1,000; Maui =1,500; Hawaii =5,000**

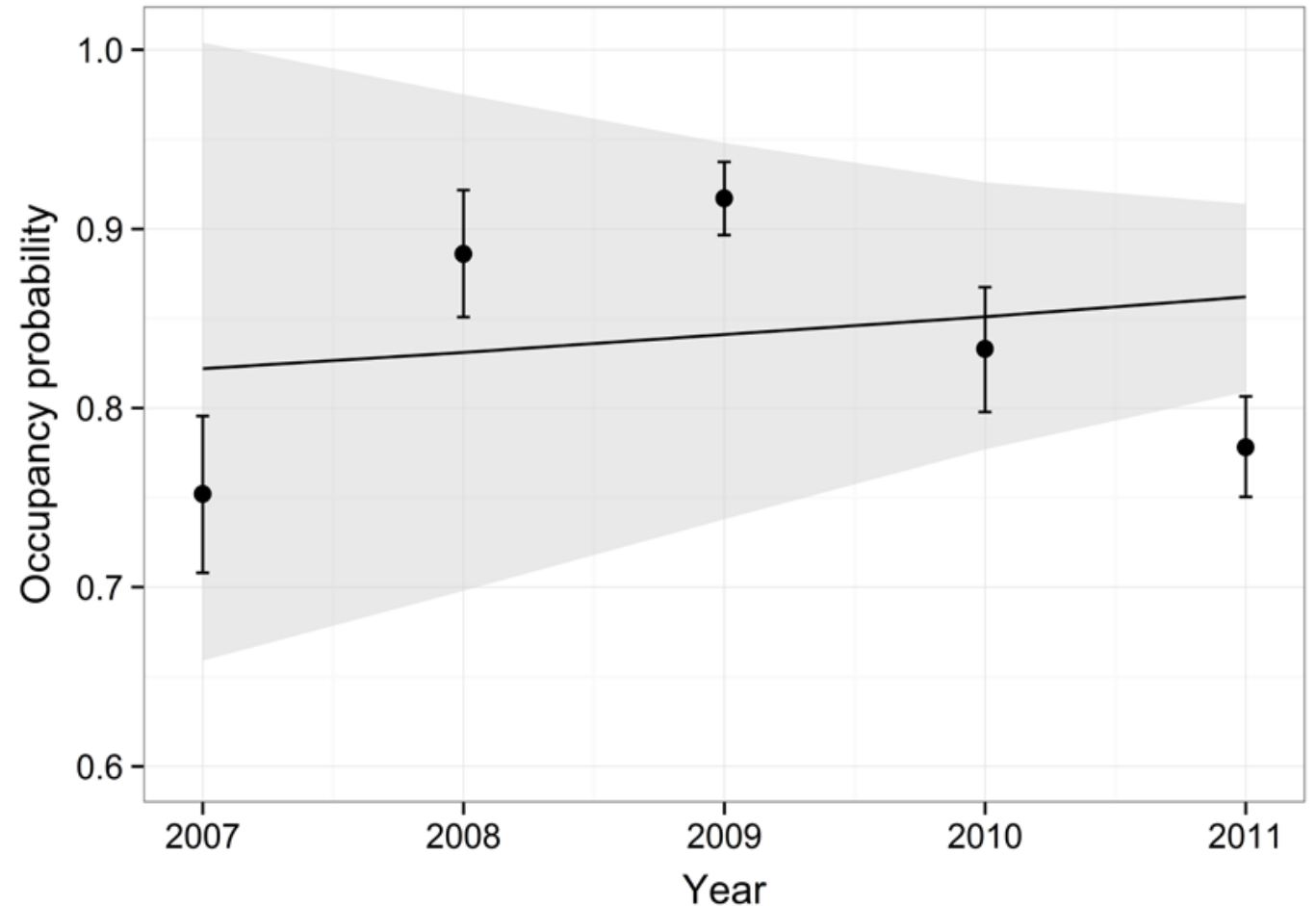
2020 vs 2015: Population Modeling

- Stable to slightly increasing populations
- Not prudent to assume compensatory reproduction or habitat limitation
- Oahu = 1,000
- Maui = 1,500
- B.I. = 5,000



2020 vs 2015: Population Modeling

- Stable to slightly increasing population
- 5-year occupancy study
- Hawaii Island



2020 vs 2015: Take, Monitoring, Impacts

- **Process for estimating potential take using info from similar projects, types of equipment, bat monitoring, and avoidance/minimization efforts**
- **Post-construction activity monitoring for bats at sites and desired statistical power (80% confidence of a 20% change in activity)**
- **Conservative assumptions for impact analyses**
 - **0-1% annual population growth**
 - **Not prudent to assume compensatory reproduction (if take > annual population growth then population declines)**
 - **Oahu =1,000; Maui =1,500; Hawaii =5,000**

2020 vs 2015: Tiers and Site Selection

- **Recommend tiers not be used**
- **Consider key factors when selecting sites:**
 - **Ability of the site to incorporate low wind speed curtailment**
 - **Special features that may increase bat activity**
 - **Proximity to existing bat habitat**
 - **Proximity to areas likely to be restored to native habitat in the future**
 - **Proximity to conservation areas**
 - **Presence of water features**
 - **Climate records**

2020 vs 2015: Turbine Size/Operations

- **Assess how turbine size and operation may impact bats**
- **Recommend Low Wind Speed Curtailment of 6.5 m/s**
- **Consider deterrence systems**
- **Consider:**
 - **Potential for higher bat kills from larger turbines**
 - **20-minute rolling averages to trigger spin up**
 - **Revalidating turbine mounted wind speed estimates**

2020 vs 2015: Adaptive Management

- **Adaptive Management triggers and initial responses should be established and clearly defined**
 - **Rate of overall take and tier take**
 - **Monitoring**
 - **Mitigation**
 - **Operational success (e.g., percent of time deterrence is functioning)**
- **HCP should discuss range of adjustments that may be made via adaptive management**
- **If authorized take is exceeded turbines will not operate when bat take is possible**

2020 vs 2015: Research

- **2016 research needs from 2015 Bat Workshop**
- **Research projects initiated**
- **2020 PVA specific needs:**
 - **Bat population trend on Oahu, the Maui?**
 - **Have past habitat restoration projects increased bat populations?**
 - **Bat population size on Oahu, Maui, and Hawaii?**
 - **Are bat populations habitat limited?**
 - **Determine adult bat mortality?**
 - **Determine juvenile bat mortality?**
 - **Determine maximum age of bat reproduction?**

2020 vs 2015: QUESTIONS
