

Wind Wildlife Research Meeting XII  
November 29, 2018  
Heather Beeler



## Risk Validation Analysis:

USFWS Pacific Southwest Region Example of Eagle Take  
Permit Renewal/5 year Review Process Considerations



The U.S. Fish and Wildlife Service has not made any decisions regarding the Shiloh IV Wind Facility permit, and we do not currently have formal policy regarding the permit compliance, permit renewals, or the five year review process.

# Shiloh IV Wind, LLC



- Eagle Take Permit Issued July 2014 (First Nationally)
- Permit Expires July 2019
- Permit Renewal Process is Similar to 5 year Reviews



# Shiloh IV Location



Montezuma Hills Wind Resource Area (WRA)  
Solano County, Northern California

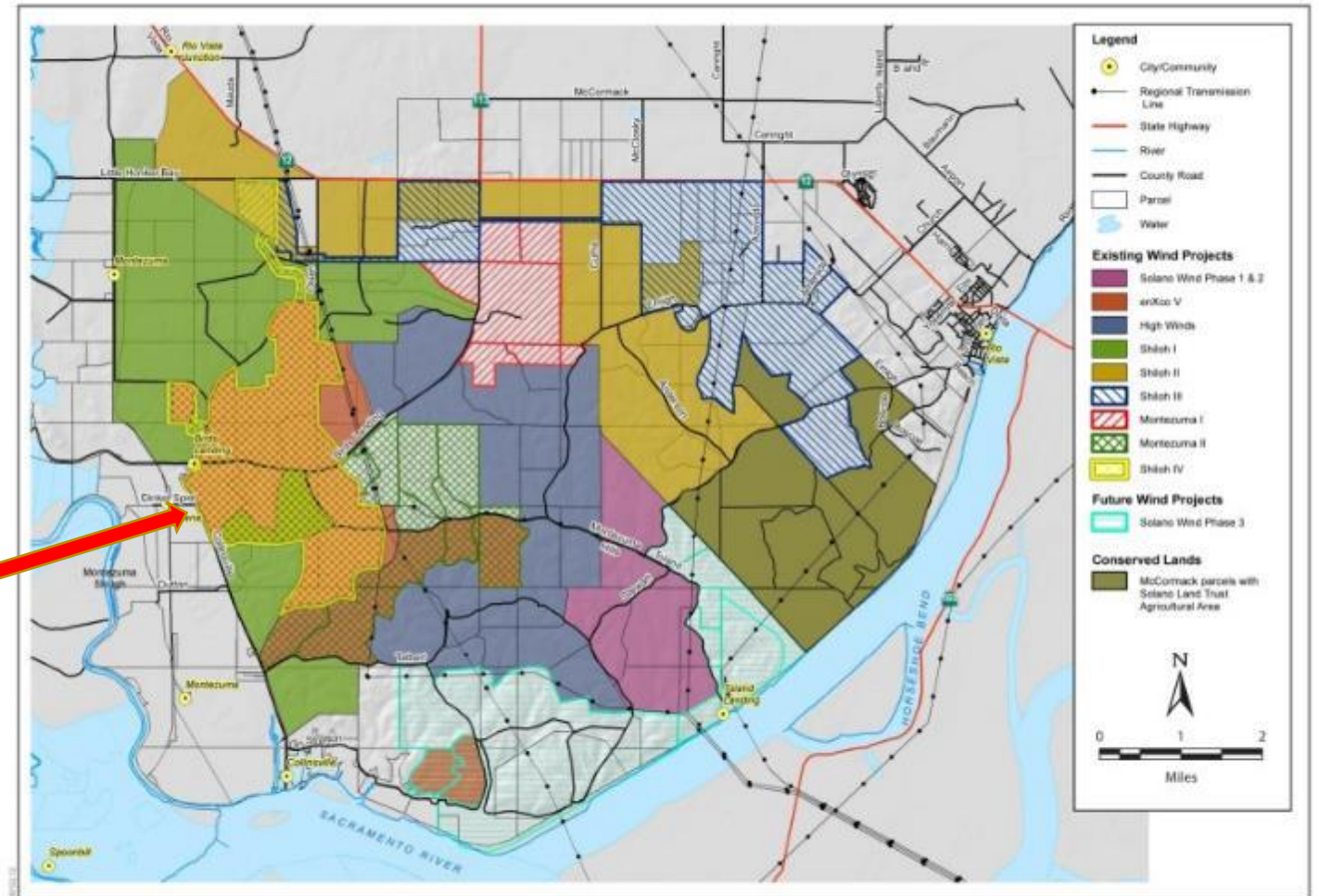
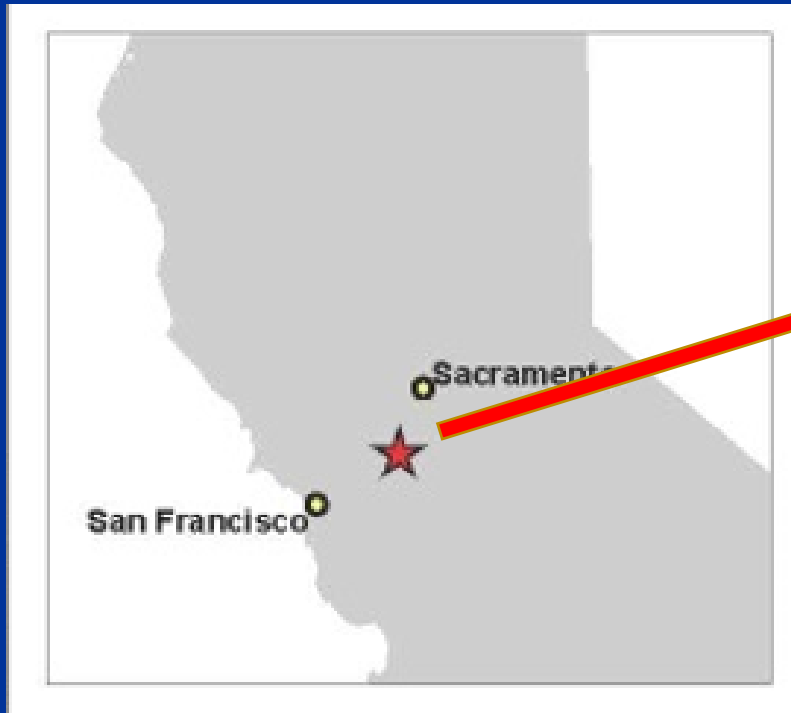


Figure 1-2  
Wind Projects in the Montezuma Hills WRA

# Permit Renewal/5 Year Review Process



Step 1: Permit compliance risk validation

-was eagle take within authorized limits?

Step 2: Update risk prediction for next permit term.

Step 3: Compensatory mitigation:

– Mitigation Credits or Mitigation Owed?





# Authorized Take

## Predicted take over 5 years

Preconstruction eagle use  
data

Service Collision Risk Model  
(CRM)

July 2014 Permit:

5 golden eagles







# Post-construction Fatality Monitoring

## Study Design:

### Bird and Bat Fatality Monitoring

- 3 years, 50% turbines, searched weekly

### Eagle Permit Fatality Monitoring

- 2 years, 100% turbines, searched monthly



# Post-construction Fatality Monitoring



## Dates:

### Bird and Bat Fatality Monitoring

- March 2013 - March 2016

### Eagle Permit Fatality Monitoring

- Sept. 2014 - Sept. 2016





# Post-construction Fatality Monitoring

## Study Design:

| Study      | number<br>turbines<br>searched | percent<br>turbines<br>searched | search<br>frequency | search<br>radius |
|------------|--------------------------------|---------------------------------|---------------------|------------------|
| Bird & Bat | 25                             | 50%                             | weekly              | 105m             |
| Eagle      | 50                             | 100%                            | monthly             | 120m             |







# Post-construction Fatality Monitoring

## Results

### Bird & Bat Study

- 44% of project area searched
- Zero eagles found



Photo: Patrick Kolar

### Eagle Study

- 100% of project area searched
- Zero eagles found



# Step 1: Risk Validation

## Permit Compliance:

Were eagle impacts within authorized take limits?

## Methods

- fatality monitoring data
- Evidence of Absence software (EoA) (Dalthorp et al. 2017)



# Step 1: Risk Validation

## Validate authorized eagle take not exceeded

Results: Evidence of Absence Multiple Year Model

Credibility level 0.5

Annual Mortality Estimates:

| Survey type/Year  | Eagles found | Detection Probability | estimated mortality | median estimated mortality | 95% CI | mean mortality rate | 95% CI           |
|-------------------|--------------|-----------------------|---------------------|----------------------------|--------|---------------------|------------------|
| Bird & Bat Year 1 | 0            | 0.36                  | 0                   | 0                          | [0, 4] | 1.38                | [0.0014, 6.9410] |
| Bird & Bat Year 2 | 0            | 0.36                  | 0                   | 0                          | [0, 4] | 1.38                | [0.0014, 6.9410] |
| Bird & Bat Year 3 | 0            | 0.36                  | 0                   | 0                          | [0, 4] | 1.38                | [0.0014, 6.9410] |
| Eagle Year 1      | 0            | 0.59                  | 0                   | 0                          | [0, 2] | 0.88                | [0.0009, 4.4840] |
| Eagle Year 2      | 0            | 0.59                  | 0                   | 0                          | [0, 2] | 0.88                | [0.0009, 4.4850] |

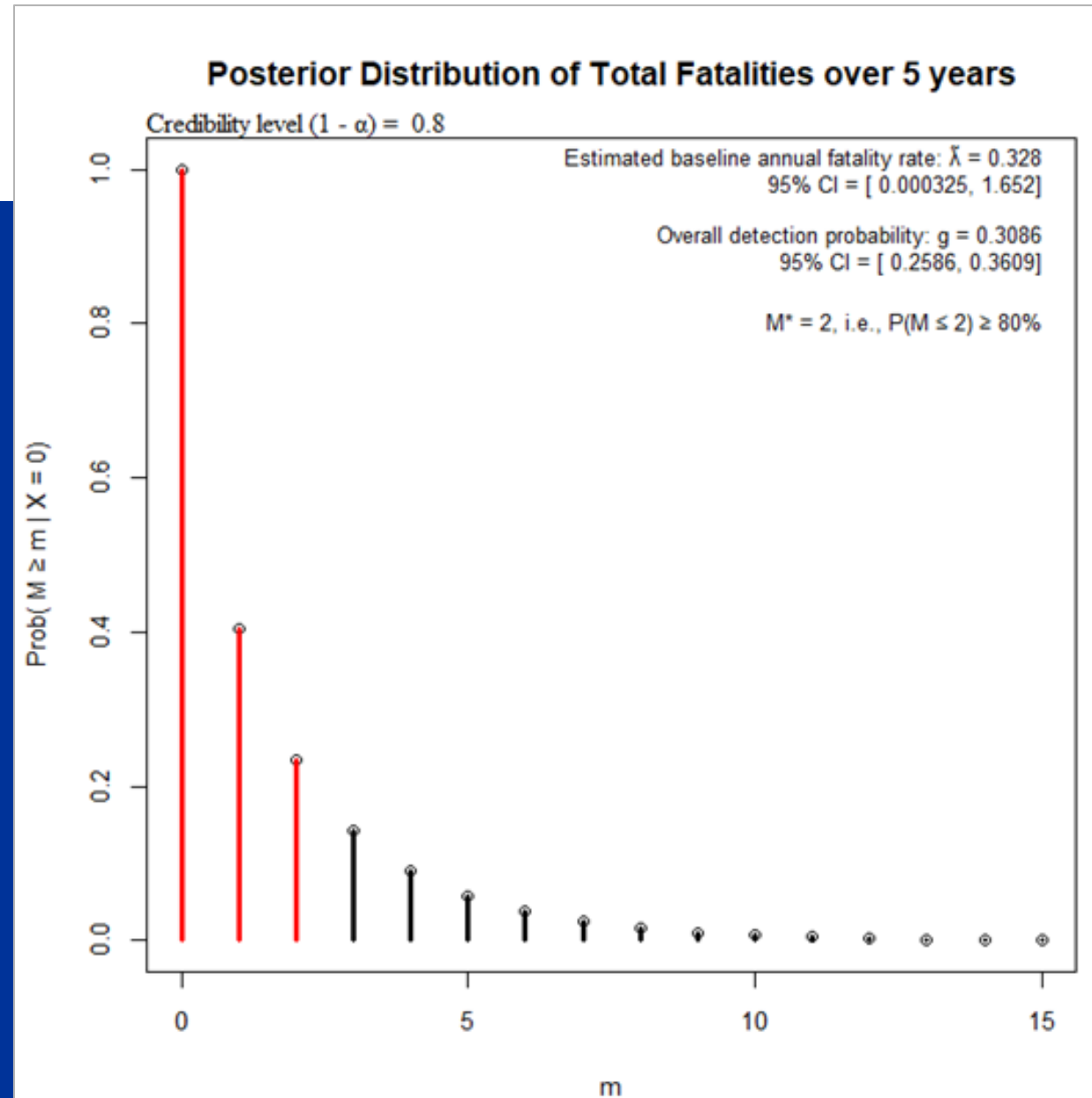


# Step 1: Risk Validation Evidence Of Absence (EoA)

## Permit Compliance Validation

### Conservative Method:

- Validated take did not exceed 5 eagles over 5 years
- 2 Years Eagle Data + 1 Year of Bird & Bat Data
  - Used data collected during permit term
- 80th Credible Interval



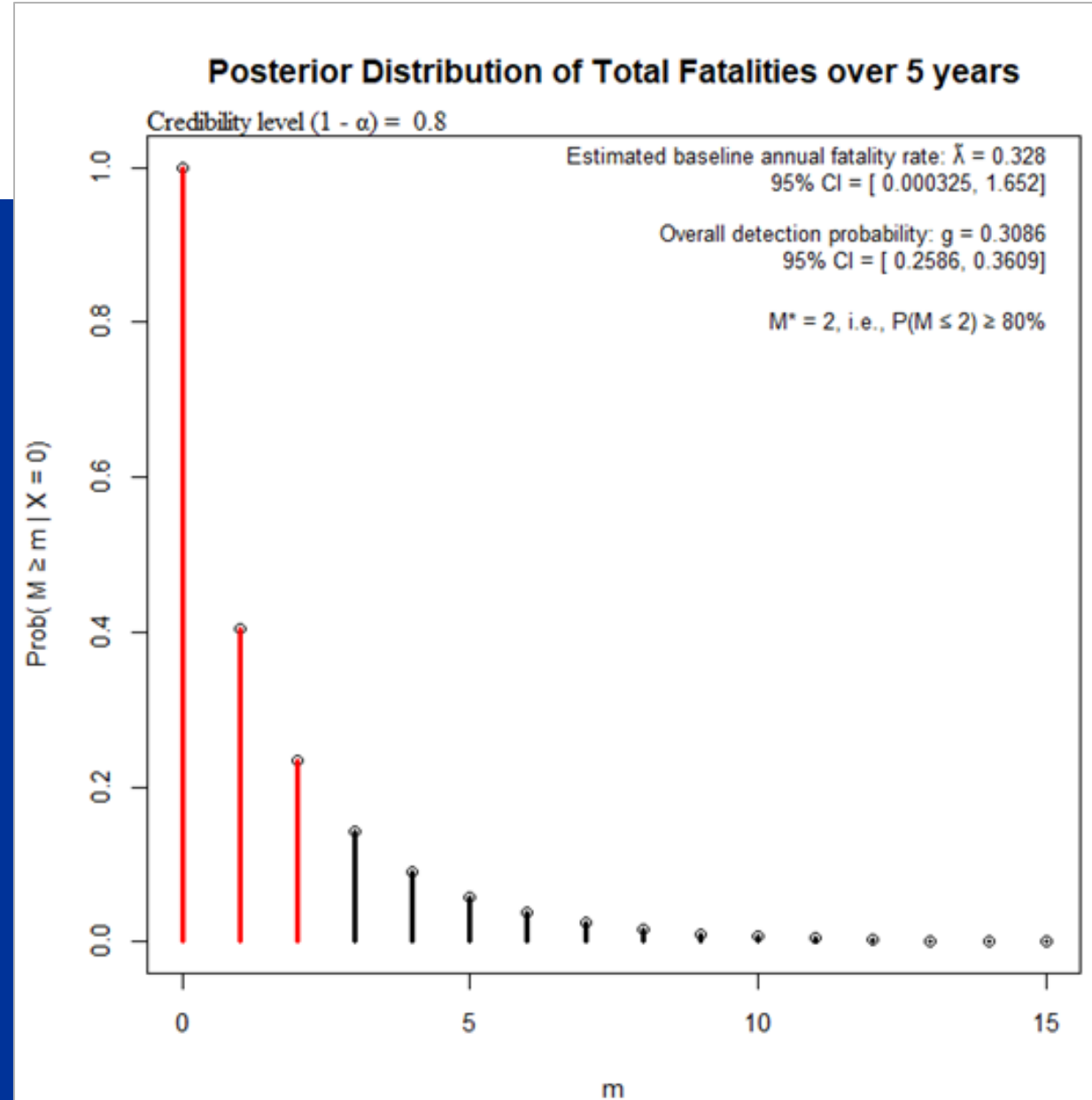


# Step 1: Risk Validation Evidence Of Absence (EoA)

## Permit Compliance Validation

In other words:

There is an 80% probability that the true number of fatalities was less than or equal to 2 eagles.



# Step 1: Risk Validation Evidence Of Absence (EoA)



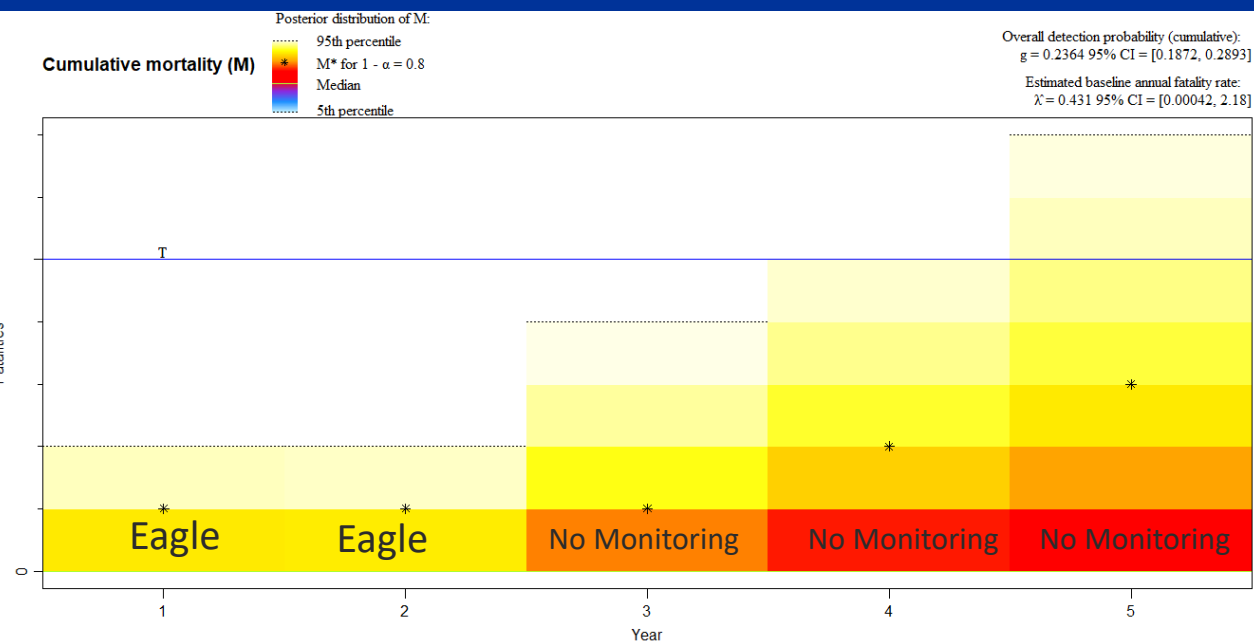
## Example of study design tradeoffs

### Eagle Study Only

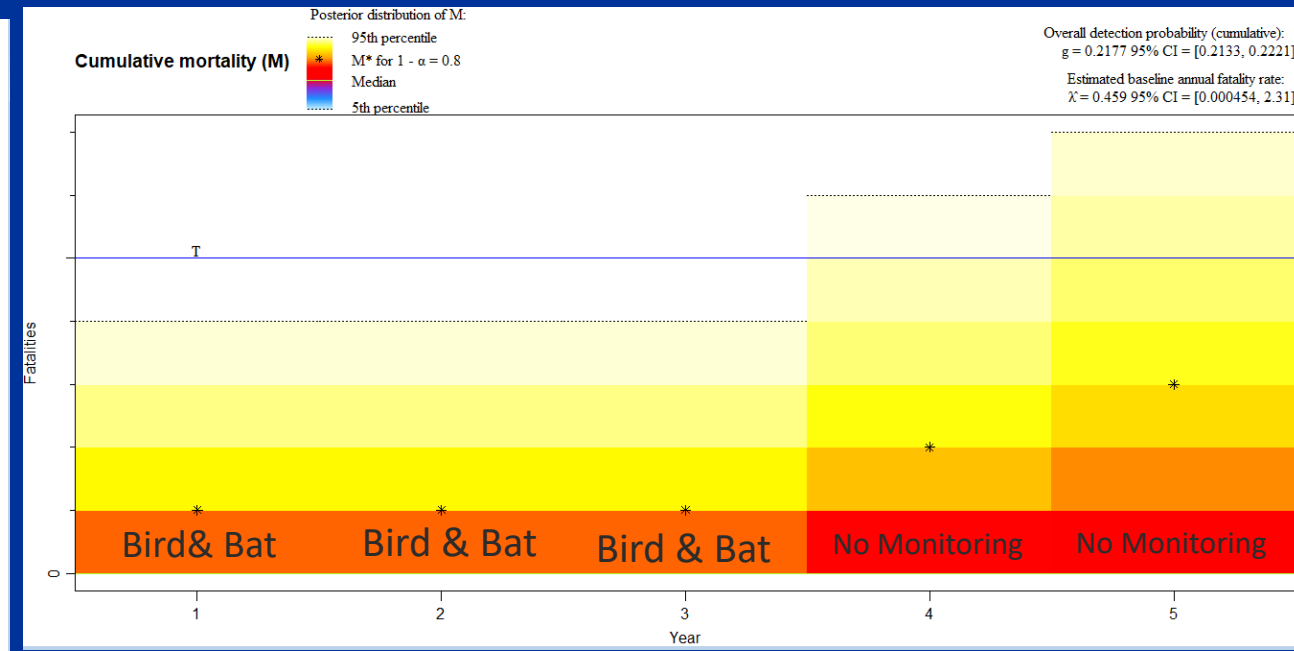
- 2 Years Data
- 80th Credible Interval

### Bird & Bat Study Only

- 3 Years Data
- 80th Credible Interval



~10% chance take exceeded in permit year 5



~5% chance take exceeded in permit year 4,  
 ~10% chance take exceeded in permit year 5





## Step 2: Update Risk Prediction

### Methods:

#### Update Shiloh IV take estimate

- Evidence of Absence output → Program R code script (DAPPER Stats 2017)
- “Expected value” output → Collision Risk Model

### Results:

#### Updated Risk Prediction using

- Pre-construction eagle use data
- Post-construction eagle fatality data





## Step 2: Update Risk Prediction Results



| Model Run           | Data used                                      | mean | SD   | CI80 | CI95 |
|---------------------|--|------|------|------|------|
| Original Prediction | Preconstruction Eagle use data                 | 0.61 | 0.41 | 0.89 | 1.4  |
| Updated Prediction  | Preconstruction Eagle use data + fatality data | 0.55 | 0.35 | 0.8  | 1.2  |



## Step 2: Update Risk Prediction

### Results:

Take authorized at 80% Credible Interval (CI)

Shiloh IV Eagle Permit:

$0.89/\text{year} \times 5 = 4.5$  - Rounded up to 5 eagles over 5 years

Updated Risk Prediction:

$0.80/\text{year} \times 5 = 4$  eagles over 5 years





## Step 2: Update Risk Prediction

### Pacific Southwest Region Options

Shiloh IV – First Eagle Take Permit Nationally

Eagle Use Data collected before ECP Guidance

- “unlimited distance” plots
- interpreted data conservatively
- 1-mile circular plot

Options....





## Step 3: Compensatory Mitigation



Does Shiloh IV Wind, LLC get Mitigation Credits or is Mitigation Owed?



# Compensatory Mitigation

## Shiloh IV 2014 Permit:

- Retrofitted 133 electric poles
- Mitigation location identified as high eagle use/risk area

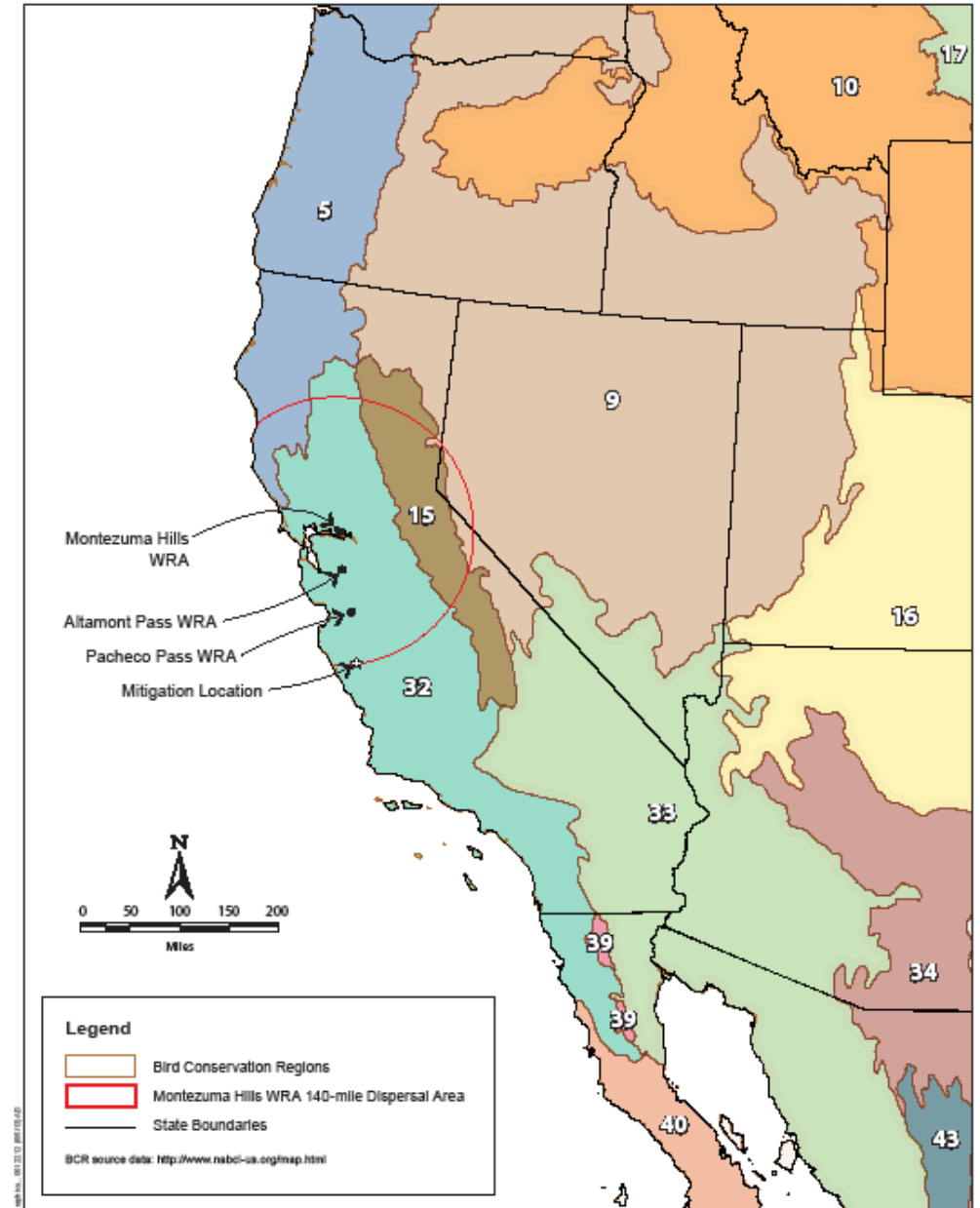


Figure 1-3  
Bird Conservation Regions





# Step 3: Compensatory Mitigation

Shiloh IV 2014 Eagle Take Permit Required  
133 electric utility poles be retrofit



PG&E Retrofit 140 poles

All poles are not equal



Photos: Mike Best, Pacific Gas and Electric



# Step 3: Compensatory Mitigation

## Shiloh IV 2014 Eagle Take Permit

**Project: Shiloh IV 2014 Compensatory Mitigation Package for the take of 5 golden eagles over 5 years at 1:1 ratio**

| Type of retrofit                    | range<br>poles<br>needed | # poles by<br>type<br>completed | # poles by<br>type<br>needed |
|-------------------------------------|--------------------------|---------------------------------|------------------------------|
| 10-year credit (plastic covers)     | 133                      | 110                             | -46                          |
| 30-year credit<br>(reframe/rebuild) | 58                       | 30                              | 0                            |

**Result: 46 Poles credited to next permit term  
= more than 1 eagle mitigation credited to next  
permit term**



# Permit Renewal/5 Year Review Process

## Take Home Message



Step 1: Permit compliance risk validation

-was eagle take within authorized limits?

➤ Yes

Step 2: Update risk prediction for next permit term.

➤ Yes, reduced by 1 eagle per 5 year term

Step 3: Compensatory mitigation:

➤ Mitigation Credited to next permit term for 2 or more golden eagles

Its an Adaptive Process!!



# Acknowledgments



Manuela Huso, USGS  
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Photo: Patrick Kolar





# Risk Validation Analysis:

## USFWS Pacific Southwest Region Example Of Eagle Take Permit Renewal/5 Year Review Process Considerations

Thank You!



Heather Beeler  
Eagle Permit Coordinator  
U.S. Fish & Wildlife Service  
Pacific Southwest Region  
Email: [heather\\_beeler@fws.gov](mailto:heather_beeler@fws.gov)