State of Hawai‘i
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Forestry and Wildlife
Honolulu, Hawaii 96813

September 30, 2020 Meeting

Endangered Species Recovery Committee
State of Hawai‘i
Honolulu, Hawai‘i

Committee Members:

SUBJECT: DRAFT HAWAIIAN HOARY BAT GUIDANCE FOR RENEWABLE WIND ENERGY PROPONENTS: PUBLIC COMMENT MATRIX FOR INTRODUCTION AND SECTIONS 2-4, AND KEY BAT WORKSHOP FINDINGS

Presented for your consideration is a staff summary of the public comments received by the Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) prior to the Hawaiian Hoary Bat Workshop held on March 5 and 6, 2020, on the Draft Hawaiian Hoary Bat Guidance for Renewable Wind Energy Proponents update for 2020 (“guidance document”).

The first edition of the guidance document was developed by the Endangered Species Recovery Committee (ESRC) in 2015 with the goal of incorporating new research and information every five years. In January 2020, the ESRC’s bat task force provided a draft update to the 2015 guidance document, and during the March 2020 Hawaiian Hoary Bat Workshop the ESRC had the opportunity to review current and ongoing research on the species’ ecology, distribution, and interactions with wind energy projects, as well as advances in monitoring, avoidance, and minimization technology. The below matrix summarizes public comments (in white) and information presented at the workshop (in grey) as they apply to the first four sections of the guidance document. This matrix will be updated as additional public comments and testimony are received, and will be expanded to include the public comments and workshop findings for the remaining sections and appendices of the guidance document as the committee progresses in its review.

SECTION I. INTRODUCTION:

Topic	Comment	Commenter
Financial Burden of Recommendations	• Scope of recommendations impedes development of new wind energy projects and leads to increased power costs for state residents.	Marilyn Teague, AEP Renewables Eric Pendegraft, Na Pua Makani, LLC
Perceived Rulemaking	• The ESRC treats the guidance document as a mandatory requirement which must be followed in order to recommend an ITL for approval. This approach is akin to illegal "underground rulemaking." • Should clarify that the guidance document contains recommendations to the Department of Land and Natural Resources and is not rules under Chapter 195D, HRS.	Marilyn Teague, AEP Renewables Matt Stelmach, on behalf of TetraTech Whitney Wilson, TerraForm Power Chris Clevenger, Kawailoa Wind, LLC
Best Available Science	• Best scientific and other reliable data are not utilized in the guidance document and should be incorporated in order to make sound recommendations. • The guidance document recommendations are in places ambiguous, inconsistent, missing context, or outdated, and provide conflicting recommendations. • Draft does not utilize the most recent science on Hawaiian Hoary Bats.	Marilyn Teague, AEP Renewables Matt Stelmach, on behalf of Tetra Tech Whitney Wilson, TerraForm Power George Akau, AEP Renewables Chris Clevenger, Kawailoa Wind, LLC
	• More research into newer technologies to observe and monitor interactions and take of bats at wind power facilities must be enhanced for all HCPs to be approved. • Should require that any HCP's bat take not be authorized beyond the listed population sizes for the respective HCP site and island, and stipulate that net species recovery levels should supersede any bat losses to be expected at the project.	Fern Duvall, NEPM Maui Coordinator, DOFAW

SECTION II. BACKGROUND:

Topic	Comment	Commenter
Species Classification	• Hawaiian Hoary Bats are recognized at the species level (*Lasiurus semotus*) and there is general consensus they are no longer considered a sub-species.	Kristin Jonasson, Bat Conservation International (BCI)
	• American Society of Mammologists recognize Hawaiian Hoary Bat as a full species but they recognize it under the genus *Aorestes* not *Lasiurus*.	Frank Bonaccorso, U.S. Geological Survey (retired)
Population Estimate	"Hawaiian Hoary Bat populations on each island are stable or slightly increasing (i.e., a 0 to 1 percent annual population increase as found by Gorresen et al. (2013)" • This statement is based on acoustic data from just a single island; it might be the best data available but with all the acoustic data collected at each project, it seems possible to design in a way to adjust this to be more project specific. • It is important to caution that this trend may not be applicable to other islands which have different levels of development and human impact currently and historically.	Michael Schirmacher, Bat Conservation International Kristin Jonasson, Bat Conservation International
Risk to Bats	"Bat collisions and mortality at wind facilities are well-documented throughout the U.S., mostly involving migratory tree-roosting bat species such as silver-haired, hoary, and eastern red bats …" • A more recent book chapter (Arnett et al. 2016) shows that the most common feature shared by susceptible species is the use of open habitats. "An emerging hypothesis is that bats that regularly move and feed in less cluttered and more open air-space are most vulnerable to collisions with wind turbines, regardless of continent, habitat, migratory patterns, and roost preferences."	Kristin Jonasson, Bat Conservation International

	"Bat foraging behavior may be influenced by the turbines themselves because of 1) an attraction of bats to the turbine for various reasons, most unknown." • The attraction hypothesis deserves merit and there are several papers which support this. This is also something for developers to be aware of and consider when they are conducting pre-construction surveys.	
Application of Mainland Hoary Bat Data	• This section should at least have as much information as the PEIS (USFWS 2019). There is a significant body of information about the Hawaiian Hoary Bat and relevant information about the mainland hoary bat that would benefit readers but is not included here. Citations from recent HCP and HCP amendments, mitigation plans, recovery plan, etc. all provide sources of information that could be incorporated.	Matt Stelmach, on behalf of Tetra Tech
Topic	**Bat Workshop Finding**	**Presenter(s)**
Roosting	• Mean height of roosting trees is 21 meters (n = 24). • Mean bat roost height is about 14 meters (n = 24). • Mean forest stand canopy height is 24 meters. • ʻŌhiʻa is the only native tree in which bats were identified roosting.	Kristina Montoya-Aiona, U.S. Geological Survey/ Hawaiʻi Cooperative Studies Unit
Pupping	• All pupping occurs below approximately 1,000 feet elevation as temperature is critical for pupping; higher elevations are too cold.	Frank Bonaccorso, U.S. Geological Survey (retired)
Diet	• Foraging habitat can be estimated based on diet but requires knowledge of insect host plants. • Possible to characterize habitats based on composition of insects collected.	Bob Peck, U.S. Geological Survey

	• Two-thirds of the Hawaiian Hoary Bat's diet is comprised of moths, particularly *Lepidoptera*. • Hawaiian Hoary Bats eat many non-native insects. • Diet depends on where the bat is feeding and may vary by island and habitat.	Dave Johnston, H.T. Harvey & Associates Corinna Pinzari, U.S. Geological Survey/ Hawai'i Cooperative Studies Unit
Range	• "(The Hawaiian Hoary Bat has) a lot of plasticity showing a lot of behavioral flexibility. Prey availability is likely the driving factor in its distribution." • From the acoustic data collected in East Maui, it was determined bats spent more time foraging in gulch, low-density developed, and grassland habitats, although differences existed between months. • The mean core use area used by the bats in East Maui for foraging was 3,700 hectares, but there was a wide range of values among individual bats.	Dave Johnston, H.T. Harvey & Associates
	• The species is an extreme habitat generalist and has been observed flying from sea level up to volcano summits. • Hawaiian Hoary Bat data show order of magnitude differences in foraging ranges on different islands and habitats depending on resource availability.	Frank Bonaccorso, U.S. Geological Survey (retired)

SECTION III. ASSESSMENT OF TAKE AND IMPACTS FOR HCPs:

Topic	Comment	Commenter
Acoustic Activity Monitoring	• Acoustic monitoring cannot determine the number of bats present in any given area. • Hein et al. (2013) found that pre-construction acoustic monitoring results are not correlated to bat fatality rates. Pre-construction monitoring should be considered on a case-by-case basis. • Occurrence of bat fatalities is documented through fatality monitoring,	Marilyn Teague, AEP Renewables Matt Stelmach, on behalf of Tetra Tech

	not by acoustic monitoring; therefore, acoustic monitoring is not necessary for this purpose. • There are no existing flaws in self-monitoring of wind projects and third party monitoring would add data quality uncertainties. The proposed 20% outer area buffer for fatality monitoring is unnecessary when there is no indication current monitoring standards are inadequate. • The 20% change in activity standard does not consider baseline acoustic activity or time frame. • "Activity" should be defined (occupancy, calls per night, etc.). • Significant financial burden imposed by the number of detectors that would be required to meet recommendation. • Documentation of habitat preferences at the site through acoustic monitoring may not be possible or meaningful for all sites. Seasonal and temporal activity changes have been consistent for all wind farms with HCPs. Other sources of data may provide sufficient information to evaluate risk and bat activity patterns. • Interannual variability limits statistical comparisons between years.	
	"Activity monitoring is recommended at both nacelle and ground levels." • Consider comparing activity at nacelle and ground levels to determine if there is a relationship. This could identify opportunities to shift cost away from things that are not providing 'good data' to other techniques.	Michael Schirmacher, Bat Conservation International
Use of Tiers	• Tiers are biologically appropriate and beneficial. Tiers enable the identification and implementation of more biologically effective mitigation based on new, best available information and research results.	Marilyn Teague, AEP Renewables
	• The past use of tiers seems to indicate that they are consistent with State law. Suggest Attorney General review the use of tiers, or remove the speculative discussion of the legality of tiers from the guidance document.	Matt Stelmach, on behalf of Tetra Tech

Fall Distribution Models	• I believe there are better fall distribution models than Hull and Muir (2010). USGS is working on a module for GenEst that allows calculating fall distribution that should be complete this summer. "There is new data showing that impacted bats fall farther from wind turbines at higher wind speeds (Hein 2017) which has implications for Hawai'i wind energy facilities that should be evaluated." • This is also important if you are implementing curtailment, because blades are only spinning at higher wind speeds so bats are falling further from the turbine by default (see Manuela Huso presentation at NWCC). • Wind speed, wind direction, temperature, etc. should be provided when bats are not found to determine if there are conditions when risk is higher.	Michael Schirmacher, Bat Conservation International
Carcass Retrieval Protocol	"Treatment of carcasses found during fatality monitoring, or incidental to the regular monitoring, should follow the most current standardized protocol provided by the agencies." • Defining "incidental" is important. • If a bat is found outside a standard search and needs to be collected, then a surrogate should be placed to see if the carcass would have been found during a standard search. If not found after 20 days, then it should be considered incidental; if found, then should count as a search fatality.	Michael Schirmacher, Bat Conservation International
Take Risk Relative to Turbine Size	• Zimmerling and Francis (2016) show turbine size is not correlated to bat fatality rate. "Figure 3. (No. of fatalities/turbine relative to modified tower heights)." • Showing Hawai'i projects wind turbine sizes on this figure is inappropriate. This data is unrelated to Hawai'i projects and was based	Matt Stelmach, on behalf of Tetra Tech

	on outdated turbine designs. The Hawai‘i projects are outside of the scope of inference for this data both geographically and based on turbine design. When Hawai‘i projects are used as examples in the document, treatment should be unbiased.	
Evidence of Absence (EoA)	• The use of the 80% credible level is arbitrary and has not been adequately justified. Justification should be provided. The text should also read: "...the use of the 80% credible level results in overestimating take in eight out of every ten years and a high degree of certainty that estimated take is greater than actual take."	Matt Stelmach, on behalf of Tetra Tech
Rho Value	"When using the EoA model to calculate the ongoing take, a *rho* value should not be applied unless a baseline from site-specific monitoring is first established at a site." • *Rho* values for assessing compliance with take authorization are different from *rho* values for projection of take. It is valuable to clarify the distinction between *rho* values for compliance and *rho* values for projections of fatalities. "To justify the use of a *rho* factor in the EoA calculation… average wind speed at site, pre-operational monitoring of bat activity, rotor diameter, nacelle height…" • These factors have been shown to be poor predictors of fatality rates. Post-construction monitoring results are the most appropriate means of assessing fatality rates. EoA also provides a test of bias in *rho* values for assessing unobserved take.	Matt Stelmach, on behalf of Tetra Tech
Third Party Monitoring	• Taking monitoring out of the control of the ITL holder implies owners and consultants are not qualified or doing a good job performing the monitoring, while the case is the opposite. The Hawai‘i wind companies have been quite innovative in their monitoring efforts as demonstrated	Matt Stelmach, on behalf of Tetra Tech

	by the use of canine search teams. • Owners will not be able to manage quality control and monitoring costs.	
Application of Mainland Hoary Bat Data	• Mainland hoary bat demographics (Frick et al. 2017) are not meaningful for Hawaiian Hoary Bats because the environments that constrain the populations are dissimilar. • Frick et al. (2017) was not an empirical study but an expert elicitation that solicited results from only nine researchers and the eight primary authors are the experts solicited. The results spanned five orders of magnitude, suggesting this is not meaningful information. Suggest removing reference to this paper. • Guidance document should apply results from mainland studies consistently. Research from mainland studies are heavily incorporated into the minimization section but nearly absent from the mitigation section.	Matt Stelmach, on behalf of Tetra Tech
Assessment of Take	• Preventing loss of genetic representation only applies to plants, not animals per 195D-4 (g)(9), HRS.	Marilyn Teague, AEP Renewables
Topic	**Bat Workshop Finding**	**Presenter(s)**
Acoustic Activity Monitoring	• Multiple studies show differences in activity from ground-based detectors versus nacelle-based detectors. • Acoustic activity is concentrated in the first six hours of the night. • Acoustic activity is negatively correlated with wind speed. We have many more detections occurring at low wind speeds. • Wind speed does not predict all bat activity. • "We know that pre-construction acoustic monitoring cannot predict bat fatality rates so I would… suggest that we assume new wind sites would have bat activity and use appropriate surrogates to estimate take, and not (make it) a requirement for mandatory baseline monitoring."	Matt Stelmach, on behalf of Tetra Tech
	• Bats are not always echolocating near the nacelle or the rotor-swept	Marcos Gorresen, U.S. Geological Survey/

	zone.	Hawai‘i Cooperative Studies Unit

	• Bats emit micro calls which are hypothesized to:
	  ○ Save energy compared to “expensive” normal echolocation,
	  ○ Increase ability to sneak up on prey, and
	  ○ Enable sneaking up on the opposite sex during mating season.
		Ted Weller, U.S. Department of Agriculture Forest Service

	• The East Maui study showed bats were much less likely to call on nights with rainfall.	Dave Johnston, H.T. Harvey & Associates

SECTION IV. AVOIDANCE AND MINIMIZATION MEASURES:

Topic	Comment	Commenter
Low Wind Speed Curtailment	• Prior analysis and publicly available studies have not been able to translate available data into an actionable smart curtailment management strategy. • Should provide definitions for curtailment, low wind speed curtailment, and deterrents.	Matt Stelmach, on behalf of Tetra Tech
	“…studies conducted across numerous ecosystems and facilities have consistently shown a decrease in fatalities of over 50 percent once cut-in speeds are equal to or greater than 5.0 meters per second (m/s).” • This depends on a number of factors, like the turbine start-up speed (different from the cut-in speed) and the species. • BCI is finalizing a curtailment synthesis which should provide a better understanding of the reduction at a given cut-in speed. • The assessment of >50% decrease in fatalities at 5 m/s is high. • Recent data shows bats fall further from the turbine when curtailed so if plots are too small you likely miss fatalities that occur at curtailed	Michael Schirmacher, Bat Conservation International

	turbines.	
Deterrence	• Because UV lights are insect nocturnal attractants, especially moths, there could be a risk that UV lights could accumulate prey and attract bats.	Kristin Jonasson, Bat Conservation International
	• Deterrents need further testing before recommending them in HCPs, for which we have the ability. Some research has shown an increase in the fatality of bats when using the earlier versions of deterrents.	Michael Schirmacher, Bat Conservation International
Project Siting	• There might be enough baseline data from projects to examine this and determine if there are particular features that should be avoided or require higher minimization. We are pursuing something similar for continental U.S.	Michael Schirmacher, Bat Conservation International
Other Operational Factors Affecting Bat Take	• Suggest accounting for hysteresis events (wind gusts that could inflate average wind speed causing turbines to start-up before wind speeds are actually high) should be considered. "Young et al. (2011) found that feathering the blades to reduce the rotational speed of turbine blades at or under the manufacturer's cut-in speed of 4.0 m/s significantly reduced bat fatalities." • The authors could not repeat these results in the second year.	Michael Schirmacher, Bat Conservation International
Topic	**Bat Workshop Finding**	**Presenter**
Occupancy	• Oʻahu: o Occupancy rates inversely associated with population density but not with tree cover or elevation. o 12,000 detections over entire island in 2.5 years. o High levels of detection in North Shore and Waiʻanae Mountains areas.	Joel Thompson, Western EcoSystems Technology (WEST) Inc.

	• Leeward Haleakalā, Maui:
	  o Highest activity detected at mid-upper elevations.
	  o 17,000 bat detections over study site in 1-3 months.
	• Maui bat activity much greater than on Oʻahu.	

	• Mauna Kea, Hawaiʻi Island: preliminary model estimates are 2-8 bats per square kilometer.	Marcos Gorresen, U.S. Geological Survey/ Hawaiʻi Cooperative Studies Unit

Acoustic Deterrents	• Deterrent units have an approximately ten year lifespan
	• It is assumed bats cannot become desensitized to the deterrents
	• Illinois Study: deterrents and 5 m/s low wind speed curtailment:
	  o 68% reduction in total bat fatalities
	  o 57% reduction in the Eastern Red Bat fatalities, and
	  o 71% reduction in the mainland hoary bat fatalities
	• Texas Study: deterrents only:
	  o 50% reduction in total bat fatalities, and
	  o 54% reduction in Mexican Free-tailed Bat fatalities, and
	  o 78% reduction in mainland hoary bat fatalities
		John Ugland, NRG Systems

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