DRAFT

ENDGANGERED SPECIES RECOVERY COMMITTEE

2 JULY 2014 MEETING MINUTES

Hawaii Department of Land and Natural Resources
Kalanimoku Building; 1151 Punchbowl Street; Room 322B; Honolulu, HI 96813

MEMBERS:	Dr. Scott Fretz (DLNR), Dr. Gordon Tribble (USGS), Dr. John Harrison (Appointee), Kristi Young (USFWS), Dr. Patrick Hart (Appointee).
STAFF:	DOFAW: Dr. Fern Duvall, Afsheen Siddiqi, Angela Amlin. USFWS: Lasha-Lynn Salbosa, Dawn Bruns, Jodi Charrier, Ian Bordenave.
COUNSEL:	None.
OTHERS:	Dr. Manuela Huso (USGS), Laura Nagy (Tetra Tech), Thomas Snetsinger (Tetra Tech), Alicia Oller (Tetra Tech), Marie VanZandt (Auwahi Wind), Huisheng Chen (DKIST), Paul Conry (HT Harvey), Douglas McClaflin (Castle and Cooke), Rex Hunter (NSO).

ITEM 1. Call to order.

Chair Fretz called the meeting of the Endangered Species Recovery Committee (hereinafter referred to as the "ESRC" or "Committee" to order at 9:07 a.m.

Committee Members introduced themselves. Chair Fretz announced that Afsheen Siddiqi was now the Conservation Initiatives Coordinator.

ITEM 2. Approval of Minutes.

The Committee determined that the minutes were excellent and moved to approve the minutes.

MOTION: Harrison
To approve the minutes.
UNANIMOUSLY APPROVED.

ITEM 3. Briefing of on-going work conducted by U.S. Geological Survey Statistician, Dr. Manuela Huso on wildlife fatality estimation at wind power facilities: *Evidence of absence or absence of evidence?*

Siddiqi introduced the briefing topic of assessing fatality estimates for incidental take

licenses (ITL) holders. Two possibilities exist if no fatalities are observed: there are in fact no fatalities or there are fatalities, but no evidence present. DOFAW is working with Dr. Huso, USGS statistician, who has developed models to estimate fatalities when no fatalities are observed. Fretz added that the issue of take estimates of zero has come up many times in the past and the Committee has not been comfortable or confident that fatality estimates of zeros are good take estimates. Huso thanked the Committee for the invitation.

Huso stated that take estimators are good for indicating the number of fatalities at a facility, but are inadequate when the objective is to determine when a take limit has been exceeded. Also, large amounts of data are needed to determine fatality estimates, which is hard to achieve for rare and endangered species (with the most that may be observed is two or three). Thus, Huso and her colleagues developed an alternative estimator – *not a take estimator*, but an estimator that determines when it is potentially likely that take has been exceeded. A new protocol was needed because low numbers were expected (including zero). These estimates have to be precise, which may be difficult. Also, knowledge of evidence that a certain take limit has not been exceeded is needed.

Fretz asked if this estimator can be used beyond wind turbines (e.g., light attraction, fence lines, power lines) – areas where finding birds at a rate of 100% is not achievable. Huso replied yes, however, it is required that not many birds are observed. If lots of birds are observed, then fatality estimators are more suitable. This alternate estimator is an exceedance estimator.

Huso mentioned that it is a challenge to determine whether the number of fatalities is closer to zero or 50 when none are observed. This can be resolved if the probability of detection is known and high. Huso gave an example of previous interpretations of zero fatalities using a study on golden eagles. The report had identified high golden eagle use, indicating high risk, yet no golden eagles fatalities were found. The authors of the study then determined that due to low scavenging rate and high searcher efficiency, it was likely that the five raptors that they did find were the only raptors that were killed. Huso then analyzed all the factors of this study and determined that in fact they had a probability of detecting only 1 in 3 raptors that were out there.

Huso then defined some mathematical terminology. An estimator is a mathematical process that will give a number that is trying to estimate a parameter (e.g., mean or variance). It is preferred that the estimators are unbiased, consistent, with uniformly minimum variance. There is a big difference between an estimator and estimate. An estimator is a process, and if it does not lead to the parameter of interest, but consistently under-estimates a parameter by 20%, then it is a biased estimator. An estimate will almost never equal the parameter of interest and is unbiased.

Huso described factors that would contribute to the probability of detection, allowing for an inference of what a zero means. The first assumption is the arrival distribution – the arrival of dead animals into the population of interest. For example, not a lot of information is known of the potential rate of kill over a period of time for the Hawaiian Hoary Bat, so the assumption would be the rate is constant. On the other hand, Hoary Bats in the Midwest

would not likely arrive in the dead population during late fall/winter and early spring because they are migrating and are not present there. The assumption of arrival distribution is a necessary component, but is not influential.

Another factor is the fraction of turbine searched. If a search is completed on 100% of the turbines, there is a chance of observing something dead on the ground. If a search is only completed on 50% of the turbine, on average, there is not a chance of observing 50% of them – half of them are in the area that is not searched. Another issue is that once the decision is made to search specific turbines, the search plots around each turbine may vary in size and the area that is searchable (e.g., if the search plot is near a cliff, that area may be unsearchable).

The density of carcasses around turbines is also not constant. Some carcasses are close to the turbines and some are far from the turbines. If a search plot is reduced by 25% near the areas that are not dense, then the fraction of carcasses that can be found is not reduced because less than 1% of carcasses have been lost; however, if the plot is reduced by 25% in the center (denser area), then 85% of the carcasses would be lost. Hence, density matters. The problem is that modeling density for rare species is usually not known due to lack of data. Therefore, the question is not what fraction of the plot is searchable – this will cause an over-estimation, rather the question is what fraction of the carcasses is expected to land in the search area. To answer this, models are developed to identify the general form of the density and expand it to a 3-dimensional volume of relative density of carcasses that could potentially land around a turbine.

Tribble asked why the volume is not a simple cone, but has a divet. Huso replied that this was the best model available. For example, if there was an equal probability of an animal being killed in any place, the density would drop the farther you are from a turbine because the area is increased. Also, within the first 10 m, 4 m are removed to account for the turbine base. Tribble then said the volume is done simply as a radius rather than an x-y coordinate (i.e., downwind and upwind are going to have one axis). Huso said that was true, that it is relatively similar in either direction. But, if there is a prevailing wind, variables can be added to the model to account for directionality, making the cone asymmetric.

The cone represents relative density; it can be standardized so that the sum of all the relative density units is equal to one. So, if there is an area of configuration that is not possible to search, an estimate of what fraction of carcasses is expected to land in a search area can still be calculated by removing that portion of the volume and what is left is the proportion of the carcasses.

Fretz asked what, other than wind, would influence the non-symmetry of the cone. Huso responded that the major thing would be the size of the carcass and the size of the turbine. Tribble then said Huso was talking about the asymmetry. Huso clarified that these things would influence the entire model. Huso was not sure about asymmetry. Fretz then asked if slope would have a difference (e.g., seabirds coming off the mountain). Young mentioned that a carcass can also tumble down a steep slope. Huso agreed that slope could have an influence. Young mentioned that if a bird coming down a mountain hit a turbine, it would

be in a prevailing strike direction. Fretz mentioned that it has been done before – not using a model, but proportionally subtracted the area with the assumption that it was completely symmetrical. It was done with ATST. Huso responded that in terms of asymmetry, wind and slope can matter, but in either case using an aerial adjustment is not a good idea. There is a trade-off between searching large areas, small areas, and being able to model the distribution of the carcasses within.

The next factor discussed was scavenging. What proportion of the carcass arriving between the last search and the current search persist so that it is possible to observe them. It is related to arrival rate, the time between searches, and their persistence distribution. Average persistence time is not enough information to do anything with. The distribution matters. Huso showed a graph of a commonly assumed distribution for persistence. The y-axis is the fraction of carcasses remaining and the x-axis is the number of days with 100% at day zero. In the example, the average persistence time is seven days but half the carcasses are gone in five days. Although this distribution is easy to use mathematically, it is often not a distribution that is seen representing what is actually going on in the removal process.

Huso then showed another distribution graph. It also has the same average. In this graph, almost nothing gets removed in the first couple of days. This could be due to olfactory predators who detect the carcasses once they start to smell. The carcasses are then removed rapidly. In this distribution, with an average persistence time of seven days, half the carcasses are gone in seven days. This is probably the best distribution for birds. The in-tact carcasses of birds are rapidly removed once they start to smell, but feathers persist for a long time. So even though it has a seven day average, it might take two days for half the carcasses to be gone.

These distributions show that 100% of carcasses are present at day zero, and by day seven 25% will be left. However, if the search interval is seven days, not all the carcasses would have been killed seven days ago. So it is important to calculate the proportion that will be likely to persist and be observed. To do this, we take the average area under the curve. This number has a large influence on the inference. This number is not known for rare species because the number is based on other data. An assumption has to be made on those kinds of distributions with species that are believed to be behaving similarly in terms of their attractiveness to predators. In Hawai‘i, a lot of carcass persistence trials have been conducted with mice or rats. It is not perfect, but it is better to use this than anything from the mainland because the mainland has different types of predators than here.

Searcher efficiency is the probability that someone sees the carcass that has persisted through scavenging pressure within an area that is searched. This is measured empirically by putting out carcasses and testing the searchers.

Huso stressed that there is no certainty in the estimate of the probability that something is found even though it is there. There is no certainty in the proportion that persists to be observable. Those things need to be modeled. We need to have an estimate of the variance in our estimate of those spieces we are interested in.

Huso then conducted an exercise with the committee members and those present at the meeting to demonstrate what is at stake when trying to understand how we estimate from what is observed to what could possibly be out there.

All the previously mentioned factors are combined to get an overall probability of detection and fatality estimate from what is observed. If there is a high probability of detection and a large true population, it is very unlikely that none would be observed. If there is a high probability of detection and small population, it is likely that zero would be observed. This is evidence that not much is out there. If there is a low probability of detection with high fatality, there is a good chance of observing none. If there is low probability and small population, there is a good chance of observing none. There is no way to tell the difference because the probability of detection is small.

Huso described an exercise that demonstrates the likelihood distribution (maximum likelihood estimators). It is possible to know the probability of detection yet it is not possible to know the number of fatalities exactly.

Huso mentioned that the mathematical model she and her colleagues developed is a Bayesian model. Huso presented an example where there was a probability detection of 0.14. In this case, if zero carcasses are observed, there is a 95% probability that no more than 19 carcasses are out there that were missed. If the probability detection is increased, then stronger statements can be made. The software presented aims to help managers make these kinds of decisions. The process is to set the limits, determine the level of confidence, the software will help determine what level of probability detection is needed to assure us that a take limit has not been exceeded. The software will help managers to determine how to achieve the probability detection (e.g., how many turbines should you search or what intervals to search at).

Huso summarized that the true fatality combined with the probability of detection is what determines what is found. If there is low fatality or low detection probability, then low numbers may be observed. The software Huso presented cannot be used to estimate take. Huso mentioned that it is not a good idea to estimate take when only one or two is observed. For the estimator Huso presented, a limit is set and then a protocol is designed to determine when this limit is potentially exceeded. This is done by targeting an overall probability of detection. Huso stated that this is her preliminary work and that the journal article and software are currently in review. Huso ended by acknowledging USFWS, USGA and her co-authors.

Fretz invited questions from the public and partners.

It was asked if there was any correlation between any of these factors and elevation. Huso responded that persistence related to elevation in the sense that elevation could determine what kind of predators population exists in an area.

Duvall mentioned that in Hawaiʻi, many of the wind turbines are on ridges, where the

topography falls away. How would that affect carcass density (the cones)? Huso responded that it is more important to get close to correct the proportion that is in the area that was searched. Duvall followed-up with a question that in the Midwest, you have to know if the turbines are on flat surfaces or on narrow roadways. Huso agreed, but said it is easy to apply – a GIS is needed of the search area for each turbine.

Hart asked that if Huso's journal article is accepted and it is determined that this method is the best method available, how would implementation occur – would it be piecemeal, trying to convince different agencies to use it; or would there be a higher level at which this method could be recommended to multiple agencies. Huso replied that she can only provide the science, and if it is useful, people can use it. Fretz mentioned that this is a good question for Young - what projects would this method apply to right now. Fretz asked Young and Siddiqi if they had been running this method for their projects to see which they apply to and what the results are. Young responded that they used this method at the workshop with the developers the day before on existing wind farms. Salbosa added that one of the key things was to identify the projects to use this tool with. One thing was to determine how this tool is applied to Hawai‘i and what are some differences. For example, trade winds play a big role on the cliffs and ridges that USFWS works on. This could be further investigated with USGS to determine if trade winds are a factor and how can it be incorporated given that there is really limited information on how carcasses fall. Salbosa also asked what the constraints of this model are and its ability to make certain statements and not make other statements. These tools are needed in Hawai‘i because the species in Hawai‘i are highly endemic and endangered and we need to determine with some level of confidence how we exceeded our limits. Salbosa asked Huso to explain the difference between the evidence of absence when a facility has zero to five carcasses versus a facility that has 12 to 15 carcasses. Huso responded that when there are more carcasses, then it is easier to determine take estimators. But if there are zero to one carcasses (i.e., small numbers), take estimators are not reasonable in identifying fatality estimates. This is when exceedance makes more sense – there is a possibility that a facility would have up to five carcasses. The cut-off between take estimators and the new proposed estimators can range anywhere between five and ten or 15 carcasses. It really depends on the probability of detection.

Harrison stated that he could conceptualize a situation where what varies is a volumetric probability that increases to unity within a particular radius. This is a different mathematical construct on how to approach the question of what can be done to assess what the take of a particular development is. In this case, the estimates are done with ex post facto data. There is no involvement in the conceptualization of the problem that relates to the probability of impact. Huso responds that she believes there is involvement. People work on risk or collision models. They determine a best estimate based on their models. Huso's model will give these other modelers feedback on how well their models do compared to Huso's models.

Tribble mentioned that Huso is working with USGS locally so that there will be local capacity to run these models. Fretz asked how this estimator would be applied – for example if take limit is 10, and only two carcasses are found, then based on confidence

levels of Huso's model it is expected to be between two and 12 takes, would the take limit then be 12? Huso said this model is not intended to adjust take limit. This model just says you have a potential of exceeding the take limit. Fretz said that the applicant can't exceed the take limit, so how would this model be applied? Would the agency then have to go back and increase the take level? Young mentioned that this would be a great opportunity to know when take has been exceeded. Huso said a decision like that should not occur on only one year of data. If there is a sequence of consecutive years with takes of two or three, then it might be a good idea to revisit the take limit. Salbosa said that take limits are based on a biological basis. What this tool gives agencies is an oversight and compliance monitoring. Also, if the range is between two and 12, but the take limit is four, the agencies can work with industries to better survey the turbines or search areas. Fretz mentioned that this applies to most HCPs.

Duvall mentioned that there is another consideration that is taken into account for setting biological take limits – if the carcass is a breeding bird or lactating bat, then it is really not one carcass but at least three carcasses. Productivity loss is also considered biologically.

Fretz asked if USFWS had guidelines dealing with this information or is it handled in the local office. Young responded that models are continuously evolving so it is hard to include them in guidelines. Young said it is more informal guidance. These discussions do occur at national meetings. Fretz asked if the USFWS and Huso are working together in working through some of these examples. Huso responded that they have been meeting for the last two days and working on a lot of this stuff. Fretz asked if this is new to USFWS and Huso and Young both responded that Huso came out a year ago and met with USFWS and wind farms. Huso has also worked with DOFAW.

Nagy mentioned that there are two things to consider. One is that it is important to look at take over multiple years. Because probability distributions curves could have a long tail, the cutoff to determine the probability of take needs to be considered.

Charrier said that USFWS has been working with the applicants and the state on this issue during monthly meetings to come up with solutions. Charrier is grappling from a regulatory permit perspective on how to apply this in the best possible way to get numbers for take triggers and mitigation triggers. Fretz asked if USFWS uses the model to determine if shorter intervals are better. Charrier responded that they have been working on tightening up each variable this past year and the applicants see the trade-off and the benefit of this.

Conry asked that if there are more fatalities, the confidence levels are tighter and if the fatalities observed are closer to zero, then the range is broader. Huso clarified that the tighter range is in the estimate of fatality, but when there are fewer carcasses, the question is not how many are killed, but what is the likelihood you killed more than you would like to. When calculating exceedance, the narrowness of the bound is a function of the probability with which you detect it. So if there is a higher probability of detection, the bounds become narrow.

Bruns asked if the probability of detection is at 85%, what is the ramification on the confidence interval versus a probability of detection of 50%. Huso mentioned that there are two issues. If the probability of detection is at 85% and there are zero carcasses, then there is good confidence that the most you missed was one carcass. There is a danger because if there really are three out there, chances are you will find at least two. This is a precise estimate of what could be out there.

VanZandt mentioned that you are limited by lowest valued factor.

Hart asked how much would video help improve precision of the estimates. Huso responded that they are trying to incorporate videos and acoustic monitors – so far it is not extremely promising, but it is possible. Acoustic monitors detected more take than videos, but had very little overlap. Hart asked about improving video capability, and Huso responded it is possible. But processing the data also becomes difficult – too much data.

Fretz said it is that time of year when all projects are submitting annual reports and agency staff will review the reports and determine which projects can use these models and let the Committee know. Young does not think the reports will provide any surprises since they have had monthly discussions with the applicants. Fretz mentioned that the Committee will review the reports too, and it would help the Committee if USFWS identifies which projects could use this tool. Young asked if Fretz was requesting a report back from USFWS staff for a future ESRC meeting? Fretz clarified that when the Committee will review the report, it would help the Committee to know when the staff (Siddiqi) reviewed the reports and worked with the applicants on these particular issues.

Tribble added that Huso should let the Committee know when the publication comes out because the model will be more persuasive with a peer-reviewed journal.

A member of the public asked if it is possible to use infrared telephoto cameras mounted on the wind stations that monitor each other. He apologized that he was not in attendance earlier in the meeting, but asked if the model considered other predator takes like feral cats. Huso said predators were discussed earlier in the meeting. Tribble mentioned that there is a resolution problem. Infrared illuminators can boost sensitivity, but they have a finite range. It is a challenge. Also, cost is an issue.

Fretz asked if there were any other questions. There were none. Fretz thanked Huso for the very informative presentation.

ITEM 4. **Briefing from Licensee on Status of Approved Habitat Conservation Plan and Incidental Take License:** Habitat Conservation Plan for the Construction of the Advanced Technology Solar Telescope at the Haleakalā High Altitude Observatory Site Maui, Hawai‘i. ITL-13 Issued December 1, 2011 for the take of 35 Hawaiian Petrels (*Pterodroma sandwichensis*) over a ten year period from the date of ITL issuance. As of 2014, the National Science Foundation (NSF) and the Association of Universities for Research in Astronomy (AURA) have renamed the Advanced Technology Solar Telescope, the Daniel K. Inouye Solar

Telescope.

Fretz asked Siddiqi to brief the Committee on this project and Siddiqi responded that this was an annual update. Hunter mentioned that the National Solar Observatory (NSO) operates telescopes in New Mexico and Arizona, but both sites have older telescopes that are inferior to the 4 m telescope at Haleakalā. The telescope at Haleakalā was recently renamed to Daniel K. Inouye Solar Telescope (DKIST). Most of the excavation and concrete work at the site on Haleakalā has been completed. The enclosure erection will begin at the end of 2014. After the enclosure, the telescope mount assembly and optics will be installed. The start date of telescope operations is expected to be July 2019. Hunter showed a picture of the enclosure in Spain, where it was built. All the components of the enclosure should be on Maui in the fall. The main mirror is currently at the University of Arizona – Tuscon. The mirror is being polished and will be shipped to Maui in the beginning of 2016. Once it arrives, the mirror will be coated and installed. Hunter then showed a current picture of the site on Haleakalā. Weather has been a major impact this year.

Huso asked if the mirror will be polished continuously from now until the University ships it to Maui. Hunter responded that the mirror has to meet very high standards so the University will be polishing and testing it in a very detailed manner. The mirror will arrive in early 2016, but the mirror should be completed some time before that.

Hart asked after the mirror is coated will it be tested again. Hunter responded that the coating will be done on site before testing and installing it.

Chen, resource biologist for DKIST, presented the annual report. The report structured his presentation in three parts: first he will provide a recap of compliance from 2011-present, next he will provide the summary findings of monitoring and finally future conservation and monitoring activities will be presented.

Chen said that monitoring the Hawaii Petrel reproductive success began in 2011. A control site was established in 2011. Monitoring of potential Petrel collisions with FAA towers also began in 2011. Construction started in December 2012. At the same time, monitoring of the noise and vibrations began. In the spring of 2013, a long-term rodent control grid was established and is now complete. The ungulate fence was completed in November 2013. The polytape installation was complete in 2014. Two searcher efficiency trials were completed in 2013 and 2014. Two seasons of carcass removal trials were also conducted in Fall 2013 and Spring 2014. The predator control grid was completed in 2014. Right now, we are deciding what will be the best approach that will be most beneficial to Petrel recovery. Also, right now we are collecting data to determine the best approach for outplanting. Adaptive management has been ongoing – collecting more data than what is required by the HCP.

Chen then proceeded to describe the summary findings of monitoring. The searcher efficiency is high because of a systematic methodology and the experience of the resource management team. In terms of monitoring potential Petrel collisions with DKIST

structures, the HCP requires monitoring twice a week. Chen said they have been monitoring seven days a week for the last three years. They have monitored the FAA towers and the construction site.

Fretz asked if the HCP covered strikes of FAA towers and Chen responded yes they were included in the HCP because the FAA thought the telescope would interfere with their signals so DKIST had to modify the FAA towers.

Because of the 3 years of data with zero detection of collisions, this year's monitoring has been scaled back to twice a week – Monday and Thursday. The monitoring covers 4 km. The area of monitoring was broken down into two parts because of the terrain – Area A and Area B. Area A is systematically searched. Area B is monitored with binoculars to reduce the impact to Petrel burrows in this area. Also, the management team walks along the fence line to search for collisions. So far, no collision has been detected.

Tribble asked if the fence was built to keep out ungulates and rats. Chen responded that it was built for ungulates only and not rats due to the difficult terrain and difficulty of fencing along cultural sites. Young mentioned that the predator trapping occurs inside the fence.

Chen described the searcher efficiency trials – three to four team members, 5 m apart from each other, walk a straight line to comb the area for carcasses. If less than three carcasses were found, another run was completed to make sure no carcasses were missed.

KC environmental conducted carcass removal trials and avoided placing test carcasses in areas that were less than 50 m from a known burrow.

Searcher efficiency was at 85% - three birds were missed in the first year and two birds were missed in the second year. For the carcass removal trial – two carcasses were put in the open area and two were hidden in the rocks. In the fall of 2013, only one incomplete carcass was removed. In the spring of 2014, none of the four in-tact carcasses were removed. Cameras were mounted to see what predators would scavenge the carcass, but no predators came near the carcasses. Huso asked how long carcasses were left out. Chen replied one month.

The noise and vibration monitoring was conducted by KC environmental. They monitored the burrows closest to the construction site to make sure the noise and vibrations were not exceeded. So far, no vibration from the construction site has exceeded the limit of 0.12 in/sec. For now, no noise level from the construction site has reached the noise limit.

Hawaiian Petrel monitoring started every year in February until all the known burrows had fledged their chicks (~November). Chen said they monitored the reproductive successes in the control site (~80 acres) and all the conservation areas (~321 acres). They used the toothpick method to determine if Petrels were coming in and out of their burrows. They also monitored the active burrows with camera tracks. A 23% decline of active burrows from 2011 and 2013 was observed. Chen does not know yet if this is a trend or a fluctuation because there is not enough data currently to make a determination. The

conservation area had a 22% decrease of active burrows (160 to 126). Fretz asked what it was in 2012. Chen said roughly 150. In the control site, there was a 40% drop of active burrows. The number of burrows that fledged a chick dropped since construction began. But since a number of conservation measures have been introduced, the numbers have climbed back up in 2013. This is not enough data to determine if it is a trend or a fluctuation. Looking at reproductive successes at different elevations showed that the higher the elevation (closer to construction site), the better the success. Looking at the active burrows immediately near the construction site, there are more active burrows now than in 2011. The construction activity is not contributing to the decline in reproductive success. In addition, the number of predation events have reduced over the years, so it is not contributing to the decline of active burrows. More observations are needed.

Fretz asked for clarification on a table presented by Chen regarding an adult presented. Chen said it was an adult mortality of unknown cause. Tribble, looking at the graph or table, said three adults were lost last year. Chen said that one pair died inside the burrow due to starvation and dehydration. The other one died from collision, but no structures were present at the time. Tribble asked if there was equipment on site. Chen said yes, but all tractors had to lower their gears lower than the existing structure per the HCP. Hunter mentioned the terrain because it was off the shear side of the pu‘u. Huso asked what could explain the abrupt jump of 9 adults preyed upon at the control site. Chen said that there is no management in the control site. Huso said but the other two years had one and zero loss. Chen said the control site is a killing zone because it is lower and is susceptible to predation. The construction site is above 10,000 ft and has more extreme weather conditions, making it less suitable for petrel predators.

Chen showed a picture of the fence that was recently completed in November 2013. There are 16 cameras mounted along the fence. No goats have been observed since September 2013. Chen believes the ungulates have been eradicated due to the noise surrounding fence construction.

Chen also mentioned that his project has the longest commitment (50 years) to predator control measures when compared to other projects. Chen’s group has been working close with USFWS rodent control experts to design a predator control grid. Short-term predator control grids are in place, but will only be utilized for the duration of the HCP.

For the long-term rodent control grids, Chen’s group and USFWS rodent experts came up with a 48 m grid system. They planned for 51 traps, but as of now only 44 are in use. Each station comes with temper-resistant rat box and mouse box. Snap traps are used in the boxes because the current label for the poison had expired. The problem with using poison is that it is required that it be used to at least 225 m away from the site that is being protected. This is not feasible for this site so Chen’s group is working with USFWS to come up with alternatives to poison such as traps like A24. Bordenave clarified that poisons need a 250 m buffer, and the group could not go beyond the fence on one end and had no access on the other end (air force), there was no contiguous buffer, which is a requirement. Young was curious as to why the buffer was put in place when you’d want to use it closer to the site. Fretz mentioned that the buffer is discouraging the use of it now.

Bordenave said the reason for the rigid language for the labels was to discourage its misuse. Bruns said for small areas like this site, if a rat's range is 200 m, then there is a lot of effort of killing rats with no effect. So it is encouraged to go beyond the 200 m outside to have more of an effect. Chen said the policy is to make it effective and be compliant with the regulations. Duvall said its important to make sure that the State Department of Agriculture Pesticide Branch knows because they are getting ready to get rid of the label because it made it unusable. Fretz asked if there was no flexibility in the label. Bruns said she didn't see anything wrong with a pesticide label hui, but the issue is the efficacy of the product. For example, the Army and other applicants used poison in a way that it was hard to gauge its effectiveness. Fretz asked if there is actual evidence regarding the spatial distribution of diphacinone and for example if it is used at 50 m intervals throughout 316 acres and that you don't put out a 250 m buffer, that rats are going to keep coming in. Bruns said no, the rodent grid is in Area A, near the telescope building. Chen said based on the label, the grid would have to be extended into private lands. Fretz asked what the green dots were from another map and Chen said those were predator controls for animals such as cats and mongoose. Chen said that intensive trap grids should be near the buildings and looser grids farther away. Chen said the structures within the site, and the site itself, make it difficult to create rings with GIS. He is trying to come up with ways to make it work. Young said that follow-up on the labels should be done because it is unusable right now. Fretz agreed the label is unusable as it is written now. Young said part of this could be due to EPA not wanting to get involved. Bruns thinks it is thoroughly vetted and that for rats there are really effective ways like the Goodnature trap to kill them. Fretz asked if there was evidence that the Goodnature traps are working and Bruns replied that it was her understanding that they were working. Young clarified that the traps were currently still experimental. Fretz then said it is not a topic for now and the label issue should be revisited because it is written in a rigid manner making it unusable for many projects.

Chen then talked about the short-term predator control grids. The northern portion has been fully working since last August. Predator control experts from USFWS recommended reconfiguring the northern portion, which Chen's group recently did. The southern portion has recently been completed. In total, there are 40 cat traps and 42 mongoose traps and a 125 m grid system. All live traps are monitored via radio telemetry. The radio signals are checked at least every other day. Cat traps use baits to lure the cat. Bordenave asked if Chen had been in touch with the guys from the National Park about visual lures and Chen said yes. Chen said right now they are still in the trial and error stage to find what is most effective. So far in this season, nothing has been caught.

Chen said they collect additional data not required by the HCP that help other agencies with their adaptive management strategies. For example, they monitor rodent population next to the rodent grid to measure the impact of local rodent population. Monitoring occurs four times a year. Chen also monitors predator and ungulate populations in the control and conservation sites by using cameras.

Chen then discussed future conservation and monitoring activities. Chen wants to monitor and possibly promote reproductive success of petrels. At the moment there are over 100 empty burrows available. Chen wanted to know if they use courtship sounds to promote

courtship, would it attract predators.

Chen then discussed silversword outplanting. A botanist has been contracted to collect and propagate seeds and outplanting should occur later this year or next year.

Chen said they are concerned about how they estimate Hawaiian petrel reproductive success. Right now, the HCP requires them to estimate success by the standard textbook method. But burrow scopes make it difficult to look into burrows to determine the number of pairs that laid eggs. KC Environmental is developing a new burrow scope, but it is not effective if you want to monitor >300 burrows. Chen mentioned that Cathleen Bailey from the National Park came up with a new term – fledgling success, which uses the number of active burrows. Chen and other agencies that work on Hawaiian petrels in Haleakalā are hoping to publish an article about the impracticality of calculating reproductive success in this area. It is easier to estimate the numbers of chicks that fledge.

Chen reiterated that they have low carcass removal and high searcher efficiency. Because of this and the inclusion of poly tape, he thinks they can reduce the frequency of monitoring the fence (since it also takes up a whole day to search). Because of the loose cinder substrate on Haleakalā, every time searchers walk along the fence, it causes erosion and reduces the life span of the fence. Chen's group submitted an official request of monitoring frequency in April and the USFWS replied that Chen's group can reduce monitoring to 14 days.

Chen invited questions from the public and Committee.

Tribble asked how many cats were captured and Chen said one, but no mongoose. Tribble asked about rodents, and Chen said that for trapping, 1-3 rodents were captured per 2 trap night– very low. Fretz asked if there was some way they were monitoring the presence of cats. Chen replied that they have camera traps but they have not seen any cats (although they have seen footprints). Fretz asked if the high rate of failure is due to predation. Chen said right now the known failures are due to predation, but they do not know the cuase for unknown failures. Fretz asked if there was any pattern in terms of the time of the year for the unknown failures. Chen said they monitor during the breeding season. Fretz asked if the unknown ones are abandoned burrows. Chen said yes, or eggs roll out or chicks come out of burrows. Fretz asked if there were any dogs in the area and Chen said they haven't seen any evidence for dogs. Duvall asked if Chen put cameras in locations where cat tracks were seen. Chen said he thinks that the cats did not establish their territory – they randomly come up to higher elevation. These high elevations are extreme conditions for cats. When they do see tracks, they have gone back two days later with the cameras and the tracks are gone. Duvall mentioned that his group put cameras on active burrows in Kahikinui and have seen cats and that cats do not like to go into live catch traps. Fretz asked if Chen ever searched for cats at night and Chen said they have not done it. Harrison asked if cats do not like live catch traps, then what was used that was more effective. Duvall said he is just saying that live traps are not effective – they have locations with over 50 cat traps and trapped very little. They also have A24 rat traps with cameras mounted on it, and they have seen cats there. Duvall said the rat traps attract rats and cats know they

can find rats there. Chen said that the HCP requires live traps. Hart asked if Chen had cameras on the A24 traps and Chen said no, but they do have cameras on the burrows and during the day they have lots of images of mongoose, but Petrel chicks come out at night. Young asked Bordenave if he is coordinating with Brandt on this and Bordenave said yes, but Brandt cannot dedicate a lot of time on this because he is stretched thin already. Chen said he would prefer to use kill traps for cats but HCP required live traps to reduce the chance of by-catch. Fretz asked if the kill traps can be rigged so that birds can't get in them. Chen said the HCP wording is live trap. It was suggested that the wording could be changed if it seems reasonable. Fretz said it seemed like something had to change because it is not working. Fretz stated that the park staff go out at night and shoot cats, has Chen communicated with them. Chen said yes and that some of his guys have gone out at night with the Park staff. Fretz asked if they could come over and kill the cats. Bordenave said that would require an MOU. Duvall asked if Chen had access to high tech thermal imagery, because that would be the way to find cats. A member of the public said that Chen needs to make improvements and also sending out two people to the fence line doubles the risk of injury – don't they carry a radio. Chen said having two people is typical wilderness protocol, especially if one becomes unconscious.

Fretz asked if there were any further questions. There were none. Fretz called for a break and to reconvene at 1:15.

ITEM 5. **Briefing from Licensee on Status of Approved Habitat Conservation Plan and Incidental Take License:** Habitat Conservation Plan for the Construction and Operation of the Lanai Meteorological Towers, Lanaʻi, Hawaiʻi. ITL-09 Issued October 10, 2008 for the take of 14 Hawaiian Petrels (*Pterodroma sandwichensis*), 2 Newell's Shearwater (*Puffinus auricularis newelli*), 2 Hawaiian Stilts (*Himantopus mexicanus knudseni*), and 2 Hawaiian Hoary Bats (*Lasiurus cinereus semotus*) from the date of ITL issuance until March 1, 2016, as amended.

Fretz reconvened the ESRC meeting. Siddiqi stated that Lanai Meteorological towers would be presenting a status update on their HCP.

Oller presented a status update for the Lanaʻi Meteorological towers. Oller mentioned that the ITL was issued in 2008 and extended to 2016. During this time monitoring has occurred and no fatality or take of any listed species was observed. All meterological towers were removed as of April 2014. All permit requirements have been met. Castle and Cooke is in the process of terminating the ITL. Castle and Cooke has been collecting data at the towers since 2006 and have an amazing amount of data. Oller mentioned that the agency is now completing the final report for 2014. McClaflin mentioned that he hoped the data they gathered for this project will help the state for other projects and is happy that they had no take.

Fretz reiterated that the ITL was extended to 2016 and the license holder wants to terminate it early because they no longer want to have the option of using the meteorological towers. The state is working with them on the formal process that is needed to terminate. Fretz then asked USFWS what they need done. Young said that the permit holder would need to

submit a letter. Oller responded that they are working on the letter and hope to submit paperwork to both offices. Young responded that they would analyze the project to make sure that all the mitigation is complete.

A member of the public asked why the briefing was so short and Fretz replied that annual reports are still required but that formal presentations are not unless the state asks for it. The member of the public asked why there was no elaboration for why the agency no longer wants the ITL. Fretz responded that the agency originally had an HCP because it was putting up 7 meteorological towers that had potential for take. There was no take and they took all the towers down. The ITL holder wanted to keep one tower up so they extended the HCP, but now no towers are being used therefore the ITL holder wants to terminate the HCP early.

McClaflin mentioned that this was the first HCP for meteorological towers in the country.

Fretz asked if there were any further questions. There were none. Fretz thanked McClaflin.

ITEM 6. Briefing from Applicant on Status of Draft Habitat Conservation Plan and Incidental Take License. Proposed Na Pua Makani wind energy project in Kahuku on the north shore of O‘ahu.

Fretz moved on to the next item on the agenda, Na Pua Makani. Siddiqi stated that the applicant is here to give the ESRC a preliminary briefing on proposed wind project on the north shore of O‘ahu.

Oller presented the briefing of the draft HCP. The draft should be completed and sent out in a couple of months. Oller introduced Tetra Tech staff and Keoki Wallace. Oller stated that the proposed project site is adjacent to the existing Kahuku wind farm project. The site is located on Department of Land and Natural Resources (DLNR) and private lands. The site will have up to 10 turbines and will depend on the type of turbine (1.7- 3.3 megawatts) that is selected. The maximum blade tip height will range between 427 and 512 feet, and there will be one permanent meteorological tower. The plan is for commercially operation to begin by the end of 2015. They hope to have all permits and start construction by the 2nd quarter of 2015.

The list of covered species in the draft HCP include the Hawaiian hoary bat, Newell’s shearwater, Hawaiian goose, Hawaiian duck, Hawaiian stilt, Hawaiian moorhen, and Hawaiian short-eared owl.

Oller then described the environmental studies that occurred at the site. Their agency completed three seasons of studying avian and bat radar surveys. The bat acoustic monitoring is currently ongoing and the biological wetland water assessment is being completed.

Oller presented the proposed take numbers and mitigation proposed for each species. The

estimates were determined with the avoidance and minimization perspective. The basis for the proposed take estimates come from the fatalities that have occurred on the existing wind farm in Kahuku, and then adjusted for the number of turbines for this proposed project; unobserved and indirect take; and low wind speed curtailment. The estimated take for bats is 34.

Young asked if there have been studies on the low wind speed curtailment. Nagy responded that studies have occurred in Pennsylvania and Canada and both show a reduction. Also, Bat Conservation International (BCI) presented a summary at the wind power meetings.

Duvall asked what elevation the site was at. Snetsinger said it was a few hundred feet, similar to Kahuku. Duvall asked if the point counts for birds were for the entire month of October. Oller responded that they did monthly surveys – points on site and point count locations outside as well. Duvall asked if they had any indication for the presence of the black-footed albatross that use Kaena. It is a concern because the birds might use the area as a transit route – that's why elevation matters. Young asked if it was Laysan albatross and not black-footed albatross. Duvall said there is also black-footed albatross. Oller asked Snetsinger if any black-footed albatross was encountered in the point counts. Snetsinger said he didn't believe any were picked up outside the project area– just shearwaters, frigate birds, and white-tailed tropic birds – but Snetsinger is not sure. Young asked if those birds were found outside the project site and Snetsinger said yes.

Oller said that for mitigation, they plan to do a habitat restoration at Poamoho Ridge State Natural Area Reserve. Oller's agency is working with the Watershed Partnership and DLNR to provide financing for them to complete the management plan; remove pigs; manage invasive plant species; maintain fences; and monitor pig activity, invasive plant species, and bat monitoring. Oller's agency will also provide funding for research in the project site as well. Oller mentioned that they are also looking at tiers of take and mitigation – the first tier will be based on 100% of the overall take estimate (the number for the second tier has not yet been determined). Each tier of mitigation will be a combination of funding for the habitat conservation and research.

Tribble asked if the number 34 for bats is the estimate of what the applicant is expected to take. Oller said it was the fatality estimate based on the fatalities that were observed on Kahuku, which was then adjusted for the number of turbines on the projected site plus expected unobserved take and indirect take. Tribble then mentioned that based on bat behavior on the Big Island, bats are not discriminatory – they are indifferent if it is an 'Ōhia tree or Eucalyptus tree – so habitat restoration would not help bats like it might for other species. Oller said both USFWS and DOFAW recommend habitat restoration as the preferred method of mitigation. Fretz mentioned that there are a lot of unknowns surrounding bats so it is difficult to determine what would be the right mitigation. Fretz said the consensus so far has been habitat restoration, but that a workshop in the future might be beneficial to explore what is the appropriate mitigation for bats. Oller responded that this is why research is so important. Tribble asked if the research Oller has planned to fund will try to look at total population. Oller responded that it is yet to be determined.

Fretz mentioned that the Committee has asked the staff to organize a day long workshop to hash out these issues to come to some consensus of how to move forward. Young mentioned that before the workshop, a discussion of what the unknowns are and what types of research would have to occur to answer some of these questions needs to take place. Oller said that there was a bat hui before. Fretz said it still exists – someone just has to call it together. It is a really useful group that tried to better understand limiting factors and what bat needs to recover. Duvall mentioned that there will be a lot of papers presenting on bats in one of the sessions at the Hawai‘i Conservation Conference.

A member of the public asked Oller how the applicant would handle information from an expert who mentions the possibility of another species in the site (e.g., black-footed albatross). Oller responded that the questioner had asked if the agency had observed the albatross in the surveys and the agency did not. Oller also mentioned that although a species may be in the vicinity of the site, it does not necessarily mean it would transit through the site. Oller said they had done a year’s worth of survey and feel comfortable with their results. Duvall said he did not realize that it was a year’s worth of surveys. Oller said the surveys were conducted monthly for a year, and in some cases bimonthly. Tribble said he assumed that Laysan albatross had been seen in the Kahuku wind farms. Duvall said that because the State lists black-footed albatross birds as threatened, the applicant may want to include it in the HCP. Young said Laysan has been observed at Kahuku Point offshore.

Oller said no shearwaters were observed. As an avoidance and minimization measure, the collection of transmission lines associated with the project will be underground to the maximum extent possible. Oller said the take estimates were based on the radar survey flight paths. Over the three seasons of surveys, there was no confirmed sighting of Newell’s shearwaters or Hawaiian petrels. There was one unidentified shearwater/petrel target during the summer survey. The take estimate is 4 adults and 2 chick eggs. The recommendation was to go with NFWF mitigation fund because the take estimate is low.

Hawaiian waterbirds have the same avoidance and minimization measures. Oller mentioned that they expect low frequency of transit. Their take estimates for the Hawaiian coots and moorhens is 8 adults and 4 adults for the stilts and the ducks.

Harrison asked if Bishop Museum has done anything on the restoration of a pond on O‘ahu because there is a potential of bird migration between James Campbell and Bishop Museum property sites, especially for stilts and other waterbirds, that might transit this project site. Oller said that is why they include these birds in the HCP. Fretz asked if Oller had seen any Hawaiian stilts. Oller said none were seen in the point counts on the site, but some were observed adjacent to the refuge. Snetsinger said that all of the observed birds were off the project site and were not doing big transit sites. Harrison said that for the Cyanotech project stilts were observed transiting between two sites near this area. Oller said this is why the bird is included in the HCP. Duvall mentioned that based on mobility, it seems the take estimates should be reversed – 8 for stilts and ducks and 4 for coots and moorhens – to cover the birds that might be seen transiting the area more frequently. Nagy said that they can take a look at it, but that the estimates are over a 21 year period, not an

annual take level.

Oller said that the applicant will support management at the Hamakua Marsh State Waterbird Sanctuary. The proposed mitigation is to construct a fence to keep the public (including dogs) out of the area. Mitigation will include public outreach to help educate the public and restaurant owners that feeding food to the birds is not the best thing.

Fretz asked Oller how the applicant would quantify the mitigation for 8 birds. Nagy said that the applicant is using collected data from the past reported fatalities that have occurred. Fretz then asked if the applicant is targeting mortality and targeting to reduce mortality so they can document that they reduced it. Nagy said yes. Young asked if the applicant looked at restorations at Kawainui because Hamakua will always have human impacts. Nagy mentioned that because Hamakua has the highest number of documented fatalities so it is a very quantifiable thing. Oller said that they did consider other options.

Oller said that because of the recent trans-located arrival of the Hawaiian goose on O‘ahu, this bird has been included in the HCP. It is anticipated that in the 20+ year permit term, more trans-located birds will arrive on O‘ahu and there will be on-island reproduction therefore, they are still in the process of evaluating what the take and mitigation would be.

Oller mentioned that short-eared owls are state listed species. No owls were observed during the point count surveys. The Kahuku wind farm surveys did have some observations of pueo. Based on this, the take requested is 4 adults and 4 chicks. The mitigation for pueo is to contribute to the State mitigation fund.

For the post-construction monitoring, standardized searches will be conducted for years 1-3, operational monitoring for the subsequent years, and then standardized searches for years 10-11. Adjustments for bias will be done using carcass persistence and searcher efficiency trials. For search plots, all turbines will be searched. Oller mentioned that they are trying to use wind turbines that have extended clearance of the area underneath the turbine to try to enhance the searchable area. Nagy said that they looked at the topography and density weighted functions (that Huso discussed in Item 3) and are working with the wind turbine manufacturer to determine a reasonable area that can be cleared so that searcher efficiency is improved. Oller said the search plot will extend out to 75% of the maximum blade tip height.

ITEM 7. **Announcements.** Set/confirm next meeting dates.

The ESRC members scheduled the next meeting to be held over two days on October 23rd and 24th to include a possible site visit to Na Pua Makani.

ITEM 8. **Adjournment.**

Meeting adjourned at approximately 2:30 pm.