**G.J. McChesney comments on “Modeling the Impacts of House Mouse Eradication on Ashy Storm-Petrels on Southeast Farallon Island” by Nur et al., June 2013 version**

**(July 12, 2013)**

**Introduction**

* Paragraph 3, sentence 1: refers to BUOW as “introduced native predator.” Not introduced.
* Paragraph 3, last sentence reads “We argue that the available evidence indicates that removing the invasive house mice will eliminate or substantially reduce Burrowing Owl predation on Ashy Storm-Petrels.” This is a conclusion and doesn’t belong in introduction.
* Focal Species, House mice, Paragraph 1, next to last sentence: “Despite over 40 years of continuous study of breeding seabirds on the Farallones, there is little evidence of direct effects of mice on breeding seabirds – though these interactions would be difficult to document.” The only interactions that would be difficult to document would be on storm-petrel nest predation. All other data indicates no impact. Be specific on this.

**Methods**

Field Data Collection

* House Mouse abundance – Cite original data sources.

Mistnetting of Ashy Storm-Petrels

* Sentence 1: Says island is 35 km west of SF. If we use 30 miles west, this is about 48 km. 27 mi = 43 km. Please correct.
* A more proper citation for the storm-petrel section in Ainley and Boekelheide (1990) is Ainley et al. (1990): Ainley, D. G., R. P. Henderson, and C. S. Strong. 1990. Leach's Storm-Petrel and Ashy Storm-Petrel. Pages 128-162 *in* D. G. Ainley and R. J. Boekelheide, editors. Seabirds of the Farallon Islands: Ecology, dynamics, and structure of an upwelling-system community. Stanford University Press, Stanford, CA.

Ashy Storm-Petrel predation index

* Sentence 1 states the index included data from 2003-2011, but sentence 6 says you included data from 2003-2012. For additional clarification, state the start and end months of the time series; e.g., instead of saying “2003 to 2011”, say “September 2003 to April 2011,” or whatever it should be. Figure 4 shows this time series to 2011. If time series is only to spring 2011, why doesn’t it go to 2012 given that all other time series go to 2012?

Analysis of Ashy Storm-Petrel Population Trends

* Paragraph 1: You used the reference Peterson and Schwing (2003) as the reference for the statement “oceanographic conditions in the 1990’s were much different from that experienced in the period 2000-2012.” Need a more recent reference(s) that covers the period up to 2012.
* Paragraph 2: You stated: “In addition to the six models listed above, we also assessed 6 models of linear splines to determine whether an apparent change in trend occurred, from linear increasing to linear decreasing trend, during the period between 2005 and 2008.” No reasoning was provided for why you chose this period.

Parameters of the “Current Population Dynamic Model”

* vi) **Balance between Emigration and Immigration.** Regarding the sentence “These individuals might be dispersing widely during the subadult, pre-breeding period, as has been observed with wide ranging vagrant storm petrel species detected on SEFI (Tristram’s Storm-Petrel *O.tristrami*- Warzybok et al. 2009, Fork-tailed Storm-Petrel *O.furcata* – PRBO unpublished)…,” there is lots of data showing wide-scale wandering of immature Storm-Petrels (*Hydrobates pelagicus*) and Leach’s Storm-Petrels, including captures at non-natal colonies and away from colonies (e.g., Mainwood 1976, Love 1978, Furness and Baillie 1981, Fowler et al. 1982).

Fowler, J.A., J.D. Okill, and B. Marshall. 1982. A retrap analysis of Storm Petrels tape-lured in Shetland. Ringing and Migration 4: 1-7.

Furness, R.W., and S.R. Baillie. 1981. Factors affecting capture rate and biometrics of Storm Petrels on St Kilda. Ringing and Migration 3: 137-148

Love, J.A. 1978. Leach’s and Storm Petrels on North Rona: 1971-1974. Ringing and Migration 2: 15-19.

Mainwood, A.R. 1976. The movements of Storm Petrels as shown by ringing. Ringing and Migration 1: 98-104.

Starting Population Size

* This was changed from an actual estimate of population size to setting to an index of 1.0 in Year 0. Even if not used in model, there are other benefits to having a revised population estimate.

Population model: modeling impacts of Burrowing Owl predation

* Paragraph 2, sentence 2 reads “Thus, we used the “recent population dynamic model” to represent three plausible baseline condition scenarios: the expected population trends in the near future if there were no change in abundance of Burrowing Owl on the island.” This only seems to describe one of the baseline conditions, unless I’m missing something. In the previous draft, this sentence read: “Thus, we used the “recent population dynamic model” to represent the baseline condition scenario: that is, the expected population trend in the near future if there was no change in abundance of Burrowing Owl on the island.” It did not refer to three scenarios.
* Paragraph 4, sentence 1 reads: “We analyzed the most recent 3 years of data on Burrowing Owl abundance on SEFI…” Specify what years (2010-2012?). Previous draft also stated that most recent 3 years were used. Did that change with addition of 2012?
* Paragraph 5, sentence 1 states: “We suspect that migrating Burrowing Owls may still errantly land on the Farallon Islands in the fall…” Their landing is not “errant”. Delete the word “errantly”.
* Paragraph 5, sentence 2 states: “…when no readily available food source is present.” I think “adequate” would be a better word than “readily”.
* Paragraph 5, sentence 2 states “…but the storm-petrels are present in low numbers during those months.” However, there are still quite a few birds coming in to feed chicks through October and less into November; chicks are also fledging and could be another potential source of owl prey (even though they don’t seem to feed on them). It’s probably more true that storm-petrels are simply spending less time above the surface during Sep-Oct, which makes them less detectable and also helps reduce their susceptibility to owl predation.
* Paragraph 6, sentence 6 states “Our mist-net data for storm petrels contains very few birds banded as chicks, and so are of known age.” I think you mean “unknown” age.

**Results**

Monthly Variations

* Paragraph 1: “2) at the time that Burrowing Owls arrive on the island (in September), house mouse populations are at very high levels (September is the second-highest month for house mouse abundance).” I think it would be more correct to state that arrival is September-October (they’re just beginning to arrive in Sep), the two highest months for mouse densities.

Variation in Index of Ashy Storm-Petrel Population Size

* Paragraph 1, sentence 5: “Prior to the change point, the storm-petrel population index had increased significantly (p < 0.001, Table 3).” Can you provide trend estimate? This would help demonstrate just how substantial the change in trend was.
* Paragraph 1, sentence 6: “After the change point there was a significant change in trend p = 0.002, Table 3)…” Need first parentheses inserted.
* Paragraph 1, sentence 6: “…with a linear decrease in population (p = 0.095, Table 3). The trend for the period 2007-2012 was equivalent to a 7.19% decrease per year, which we refer to as the “observed steep decline” scenario.” Given that this is not significant, at least at 0.05 level, need to provide an explanation of why you continued with modelling after that. It’s actually surprising to me that such a large annual decline would not be significant. Maybe time series of decline too short to detect significance at 0.05? Large standard error is probably one factor. In this case, p=0.05 may be too stringent? Regardless of the reasons, I think the decision to examine various scenarios was good.

**Population Dynamic Model**

* Last paragraph. I’ve edited as follows for clarification: “The monthly data presented here indicate that Ashy Storm-Petrels are a secondary prey for Burrowing Owl.
* In summary, reduction in Burrowing Owl abundance has strong positive Ashy Storm-Petrel population impacts in all scenarios examined. Under the “Observed Steep Decline” scenario, rates of storm-petrel decline are drastically reduced, under the “Moderate Decline” scenario the storm-petrel population trends change from moderate decline to stable or slight annual increase, and under the “Near Stable” scenario, rates of annual storm-petrel population change from a very weak increase to a strong increase with owl reduction, equivalent to a five-fold increase in the net population growth rate.”
* This summary paragraph seems like it belongs more in the first paragraph of the Discussion. I’d suggest moving it there and incorporating (including some replacement) of the text in that paragraph.

**Discussion**

* Paragraph 2, sentence one: “The monthly data presented here indicate that Ashy Storm-Petrels are a secondary prey item for Burrowing Owls.”
* Paragraph 3, sentence one: “on SEFI, a non vegetated terrain…” SEFI is hardly non-vegetated. Delete that phrase.
* Paragraph 4, sentence one: “In addition, the timing of the recently observed increase in Burrowing Owl abundance, which began in 2007 (Figure 3), aligns with the change point from an increasing population to a declining population in the top model selected to describe recent population trends.”
* Paragraph 5: Do you have any references to support claims of possible BUOW population increases or changes in coastal distribution? There could be other factors associated with increase numbers as well, such as possible increases in mouse abundance on the island.
* Paragraph 6, sentence 1: “It is rare in ecological studies to have direct evidence of variation in predation rates that are so tightly…”
* Paragraph 6, sentence 3: “The longer current levels of owl predation continue, the less likely this population is to recover.” While this may be true, the ASSP population is higher now than it was even 10 years ago, based on the capture rate index, and this was a recovery from even lower population size in the early 1990s. Thus, I feel more like the big concern is that the population could be sliding back the reduced level found in the 1990s or even lower. If we allow that to happen and predation levels continue, other threats continue, climate change becomes more of an issue, etc., then the population will really be in jeopardy.
* Paragraph 6, sentence 5: “To reduce the Western Gull predation levels on Ashy Storm-Petrels by a substantial amount, a very large number of Western Gulls would likely need to be removed from the island.”
* Paragraph 6: Please delete the sentence “Since the South Farallones host the world’s largest Western Gull breeding population, numbering in the tens of thousands, and because Western Gulls are a resident, native breeding species, there are no plans, intentions nor mandate for the USFWS to attempt to manage the population of Western Gulls on the Farallones**.”** This statement is a bit too broad and off the topic.

**Figures.**

* In figures using the neon green, can you change the green to something darker like dark green or blue. The neon green, esp. on the axis label of Figure 2, is hard see, esp if printed in black and white or on screen.
* **Figure 4.** Index of Burrowing Owl predation on Ashy Storm-Petrels from August 2003 to July 2011 on Southeast Farallon Island.

**Burrowing Owl Population Index**

* The BUOW population index is based on numbers of owls actually seen.  However, there is  a substantial area of the island not surveyed, including the SEFI closed areas, West End, and Islets, which could add up to nearly half the area of the South Farallones (if not more). If owls are using those areas (probably are), there could be a substantial, unknown number of additional owls on the islands.  This point needs to be made in more than one place in the report because it has potentially large implications for owl and storm-petrel management.  Locations in the report I think this should be mentioned include:
  + Methods, Burrowing Owl abundance index
  + Results, Ashy Storm-Petrel Survival Probability, Last paragraph, I provide the following suggested edits: "The estimated magnitude of the effect of reducing (or increasing) Burrowing Owl abundance was large: a decrease of 1 Burrowing Owl in the abundance index (= 8 “owl-months”, based on known numbers of owls) is associated with an absolute increase in survival of 0.8% to 1.4%, depending on the baseline value of survival. Specifically, a 50% reduction in Burrowing Owl abundance during the 8 month period, as calculated for the past 3 years (equivalent to a reduction in the Burrowing Owl abundance index of 3.145 owls, based on known numbers of owls), is expected to increase adult storm-petrel survival by a relative 2.64 to 4.92% for adults, depending on the scenario; a 71.5% reduction in Burrowing Owl abundance (equal to reduction in the index of 4.5 owls, based on known numbers of owls) is expected to increase adult storm-petrel survival by a relative 3.54 to 6.66% for adults, depending on the scenario (Table 6)." I know it’s called an index, but we need to make sure these numbers of owls are not taken literally because they underestimate the true number of owls.
  + Discussion, Caveats and Limitations: Adding a sentence or two here referring to the fact that the analyses only included known owls and that the number of owls, and depredation of storm-petrels, is not precise and is merely an index based on surveys of regularly accessed areas of the island. Actual numbers of owls and actual mortality of storm-petrels is likely higher than recorded by an unknown factor, but is possibly substantial.