Response to Hodge's web posting in BirdLife International (KIttlitz's Murrelet review). By Kuletz,

31 January 2012

This is a response to the Jan 23, 2012 posting by Jack Hodges regarding population trends of Kittlitz's Murrelets (hereafter KIMU) in Prince William Sound (hereafter PWS) and Lower Cook Inlet, Alaska. Mr. Hodges addresses several articles of which I am lead author. As background information I think it is fair to point out that Mr. Hodges has not conducted directed surveys for KIMU and has not published on the subject of KIMU population trends. I have responded personally to several of his concerns about KIMU data analyses over the past few years, yet his posted statements are mostly inaccurate, misleading, appear to be based largely on his personal opinion, or have been addressed in the papers to which he refers. I hope that Birdlife International treats these unpublished and unsubstantiated comments accordingly. In contrast, I encourage interested parties to read the articles cited by Hodges, which were published following extensive peer review by statisticians and murrelet experts. But for those that wish to delve into the details of Hodge's memo and my response, then please keep reading.

With the exception of a 1972 PWS survey, which had a different study design but used similar survey protocols, the PWS surveys constitute the longest running, consistent survey for marine birds in Alaska. From 1989-2010, the USFWS conducted 11 annual surveys during the month of July, using three vessel-based crews, and including randomly selected shoreline (n=220) and pelagic transects (n=~150) that comprised a total ~2,035 km surveyed each year. Results of these surveys have been published numerous times in various journals, to assess population trends in seabirds following the Exxon Valdez oil spill, among other things. The methods have undergone close scrutiny by scientists, statisticians, and lawyers, and have been vetted repeatedly.

Much of the criticism leveled by Hodges has to do with the difficulty in distinguishing KIMU from its close and more common relative, the Marbled Murrelet (MAMU, *Brachyramphus marmoratus*). Indeed, this is a problem, and presents challenges for data collection and interpretation, as I have long recognized and reported (and tried to rectify by developing identification manuals and training). Because of this identification issue it is instructive to consider the trends of Brachyramphus murrelets (BRMU), which includes all KIMU, MAMU and unidentified murrelets. It is generally agreed that survey biologists can distinguish birds of this genus from other seabird species. The long-term survey data from PWS therefore reveal, and nobody disputes, that the total number of BRMU declined from 110,000 to 35, 000 individuals, or by about 70%, from 1989 to 2007. Now for some simple logic: if ALL of that decline was due to MAMU, and KIMU numbers stayed constant as believed by Hodges, then the proportion of all BRMU that were KIMU would have changed from about 9% to 50% over that time. But that did not happen, rather, the KIMU/MAMU ratio stayed almost the same (0.10-0.19 in the early years to 0.08 in 2005 and 2007). It is not possible to have a 70% decline in total BRMU without KIMU declining and have the ratio of the two species staying almost the same. Therefore this approach supports a finding of KIMU decline.

With respect to some more specific criticisms, Hodges correctly noted that an unusually high population estimate in 1993 influenced the estimated trend, and high numbers of unidentified murrelets also occurred that year. There were indeed higher than normal counts of KIMU in some areas during 1989, and particularly in 1993. Additionally, he correctly noted that KIMU distribution was anomalous in 1989 and 1993. In 1989, the Exxon Valdez oil spill affected seabird distribution due to the 11 million gallons of oil spilled as well as disturbance from hundreds of response vessels. In 1993, both Brachyramphus murrelets (not just KIMU) had anomalously large populations in PWS, as did Common Murres. This coincided with a large 1993 ENSO in the North Pacific, which created anomalously warm temperatures in the Gulf of Alaska.

The 1993 survey had an unusually high proportion of unidentified BRMU, and Hodges states that "…it is obvious that identification of murrelets was not easy for most of the 1993 observers". Well, obviously, and there may have been several contributing factors: possibly some inexperienced observers, birds were more widely distributed in offshore waters in 1993, where seas tend to be choppier, making close scrutiny of birds difficult, and counting extremely high numbers of murres and murrelets gave less time for confirming species identifications, etc. At any rate, his claims amount to conjecture. Furthermore, just because we have some anomalous results in 1993, doesn't mean that all the other years of data are invalidated; it does mean that our analyses need to consider these aspects of the data.

Because of the variable estimates and species identification rates we asked two biometricians (who became coauthors) for advice on how to best use our survey results to model population trends of MAMU and KIMU (Kuletz et al. 2011a). First, for field estimates of identified KIMU, there was a 62% decline (-5% per annum) between 1989 and 2007. In brief, models that apportioned unidentified BRMU were run with and without two years with substantial influence on trends - 1993 (anomalously high estimate) and 1998 (anomalously low estimate). In all modelling scenarios , the KIMU trend was negative, with the per annum rate of decline ranging from –30% (with 1993 omitted) to -13% (with 1998 omitted). Despite an uptick in population estimates in 2005 and 2007, the overall trend for KIMU remained negative. Incidentally, in 2010, which was not in this article, numbers were lower than the previous two surveys, thus the long term trend remains negative, though perhaps indicative of a stabilization since about the early 2000s. So, contrary to Hodge's assertions, the observed negative trends are not simply the result of spurious population counts or poor identification rates in a few years.

Regarding the claim that high KIMU population estimates in 1989 and 1993 resulted from misidentification of some MAMU as KIMU, Hodges (who has not studied KIMU habitat use) contends that: (1) KIMU were recorded outside of their 'core habitat' (in the vicinity of tidewater glaciers and heavily glaciated fjords), where we should not have seen them, thus they must have been miss-identified; (2) Identification rates were similar to those during a 1993 survey conducted in lower Cook Inlet, and he suggests the survey crews were identical and had the same problem of misidentification. The first claim is simply wrong. In personal discussions with Hodges, the areas he marked as non-KIMU habitat have in fact had KIMU recorded over multiple years during the same PWS-wide surveys to which he refers. Examples include the Knight Is. area, (KIMU presence recorded 8 of the 11 years, 1989-2010), Port Nellie Juan (6 of 11 years), Unakwik Inlet (5 of 11 years), southwest passages (5 of 11 years), central PWS (3 of 11 years), and Hinchenbrook Entrance (3 of 11 years). Furthermore, in a separate study on

marbled murrelets, I spent 6 years conducting multiple surveys per year in many of these areas and regularly or sporadically recorded KIMU in them between 1989 and 1998. During the Intensive KIMU surveys of 2001 and 2009, we also encountered KIMU in these areas.

In total I have spent at least 14 summers in PWS, primarily conducting at-sea surveys, and I know that KIMU can often be found outside their 'core habitats'. Indeed, it is well known from other areas such as Glacier Bay and Cook Inlet that KIMU may forage well away from tidewater glaciers and glaciated fjords. One area Hodges claims to be outside core KIMU habitat is the SE portion of PWS, despite the fact that a NOAA gillnet bycatch study recorded KIMU taken by gillnets in this area during 1990 and 1991. Hodges also cites our publication based on the 2001 Intensive surveys (Kuletz et al.2003) as evidence of where KIMU should be found. However, as stated in the paper and to Hodges, this study targeted 17 fjords and bays in western and northern PWS with known high densities of KIMU and did not include offshore areas or eastern PWS, thus it did not address habitat use in the latter two areas.

The 1993 survey of lower Cook Inlet also had a low species identification rate, and was likely impacted by observing conditions similar to 1993 in PWS (more offshore distribution and corresponding seas, high densities of Brachyramphus murrelets) but not necessarily the same crew members. Because of high numbers of unidentified BRMU that year, we decided to be conservative when examining trends by applying a ratio averaged from subsequent surveys in 1996-1999 (Kuletz et al. 2011b). The resulting lower 1993 estimate for KIMU thus reduced the slope of the decline, but regardless of which 1993 estimate we used, or whether we excluded the 1993 estimate entirely, or used identified birds only, the trend in KIMU estimates was significantly negative. Note that the Cook Inlet study examined a core study area of 4813 km^2 covered by an average of ~650 km of transects per year during 5 years between 1993 and 1999.

In summary, my coauthors and I acknowledge the difficulties in using historic data, but we think that Hodges is disingenuous in attempting to focus attention on a few problems rather than see the big picture provided by analysis of more than 22,000 km of surveys spanning a 20 year period. Again, we emphasize that Brachyramphus murrelets in PWS declined by about 70% between 1989 and 2007. Bearing in mind some problems with species identification and anomalous counts in some years, we believe that the data provide compelling evidence for a major decline of KIMU that has perhaps leveled off in recent years. Once again, we refer you to our peer-reviewed publications, which deal with anomalous data points using models coupled with extensive field experience in the study regions.

Kathy Kuletz, 31 January 2012.

Literature Cited:

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