United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

JUN 20 2012

Dear Interested Party:

Subject: Modification of Marbled Murrelet Nesting Season Definition in Washington and its application in section 7 consultation

Over the last 2 years, the Washington Fish and Wildlife Office (WFWO) has been conducting a review and evaluation of the best available science, both of published literature and unpublished data, on the timing and characteristics of marbled murrelet (*Brachyramphus marmoratus*) nesting activities. Our evaluation of this information and guidance on its application are described in the attached white paper. Based on this review, we have developed new dates for defining the marbled murrelet nesting season, including hatching and fledging dates, in Washington. We have also reviewed new information related to daily timing of feeding of marbled murrelet chicks in the nest during the nesting season. This information is relevant to how we conduct section 7 consultations, recovery activities, and Habitat Conservation Plans. We will be using this information in our risk analyses in section 7 to determine the likelihood and potential magnitude of adverse effects, and to develop conservation measures and terms and conditions. We also expect that action agencies will use this information when designing projects to minimize and avoid effects to marbled murrelets.

With this letter, I am making this new guidance available for use by WFWO staff in Washington, and the agencies and partners with whom we work in project design, analysis, and consultation. This guidance will be fully applicable as of the 2013 breeding season for marbled murrelets. We are providing this to you for your planning processes, and expect to conduct our analyses using this information for any actions that will be implemented in the 2013 breeding season. Consequently, Biological Assessments submitted after December 1, 2012 should reflect this new nesting season information.

We recognize the practicality of a transition period for application and consideration of this new information. Projects for which consultation has been completed, including those submitted under programmatic consultations, may proceed as planned. Projects to be implemented in 2012 may also follow the previous nesting season information.

If you have any questions, please contact Carolyn Scafidi of my staff at 360-753-4068.

Sincerely,

Ken S. Berg, Manager
Washington Fish and Wildlife Office

Attachment

Marbled Murrelet Nesting Season and Analytical Framework for Section 7 Consultation in Washington

Photos by Nick Hatch, USFS

U. S. Fish and Wildlife Service
Washington Fish and Wildlife Office (WFWO)
Lacey, Washington
June 20, 2012

The following narrative presents a summary of the best available science to describe (1) the timing of the marbled murrelet nesting season, (2) the distribution of feedings throughout the day, and (3) our analytical framework for section 7 analyses. It is intended to provide guidance for conducting section 7 consultations in Washington, but should not substitute for consultation with the U.S. Fish and Wildlife Service on actions that may affect marbled murrelets.

This document was prepared by Kent Livezey and Kim Flotlin of the WFWO. Technical support and review were provided by John Grettenberger, Emily Teachout, Deanna Lynch, Carolyn Scafidi, Carrie Cook-Tabor, Tim Romanski, Kevin Shelley, and Marc Whisler, all of the WFWO; Bridgette Tuerler of the Oregon Fish and Wildlife Office; and Lynn Roberts of the Arcata Fish and Wildlife Office.

I. Timing of the nesting season

Background. Starting in the early 1990s, we considered the marbled murrelet (murrelet) nesting period to have two seasons—the early (incubation) season and the late (nestling) season. We considered the early season to take place from April 1 to August 5, and the late season to take place from August 6 to September 15. The August 5 date was based on survey information used in the Inland Survey Protocol of the Pacific Seabird Group which indicated the likelihood of detecting murrelets using audio/visual methods dramatically dropped after August 5.

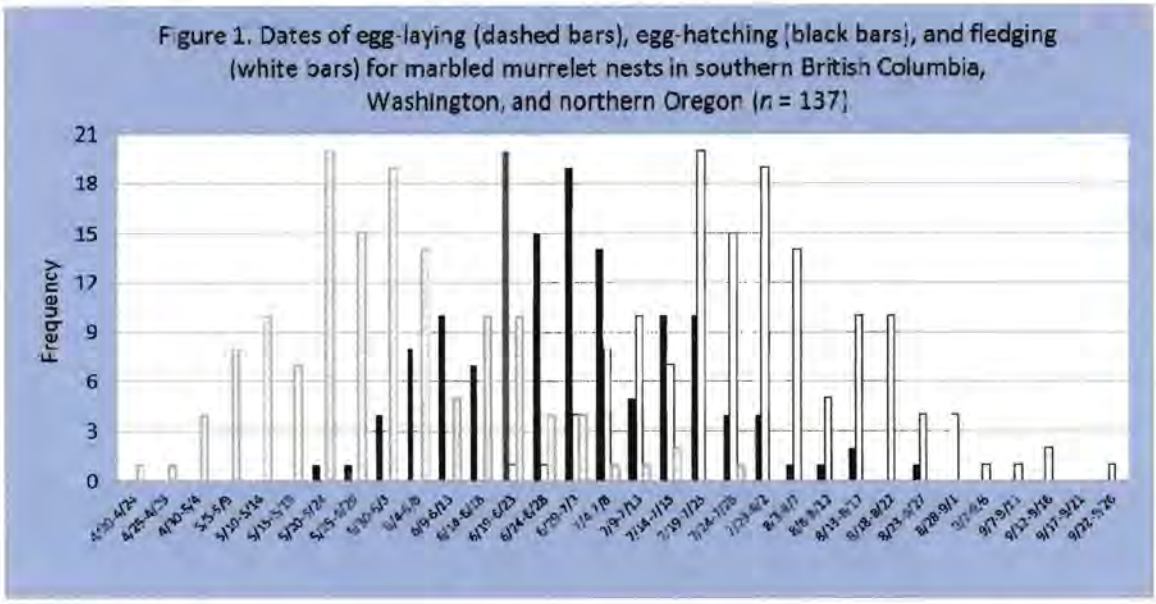
Here we analyze best-available information to help us (1) select the best data to use to estimate the timing of the murrelet nesting season; (2) decide whether it is biologically informative to break the nesting season into two parts; and (3) choose the dates to use for the beginning and end of the nesting season(s).

Selection of data. We gathered all data available to us from researchers conducting studies of nesting murrelets (unpublished data on file in WFWO, Lacey). Two data sets were applicable to Washington: radio-telemetry and nest site data from Washington only ($n = 27$) and similar data from Desolation Sound, British Columbia (BC) to Newport, Oregon ($n = 137$). The larger area brackets the State of Washington to the north and south, including nests in latitudes with similar habitat types and day length to those in Washington. Mean hatching date for the Washington-only data was June 29 and the mean for the BC-to-Oregon data was only 2 days later (July 1).

Decision: We had the option of using Washington-only data or the combined dataset. Due to the similarity in these datasets and our desire to make our estimates more robust and more broadly applicable, we chose to use the combined dataset.

One- or two-season nesting period. Based on the dataset, the complete murrelet nesting period lasts approximately 5 months (Figure 1). During the first month, only eggs are in the nests; during the middle 3 months, either eggs or nestlings are present; and during the last month, only nestlings are present (Figure 1). Adults are present throughout the nesting season.

Decision: Due to the large overlap between the incubation and nestling periods, we chose to view the complete nesting period as one season.



Beginning of the nesting season. Both incubation and nestling phases last about 30 days (Nelson and Hamer 1995, p. 59; Nelson 1997, p. 17). The earliest egg-hatching day in our data was May 23, which places the earliest egg-laying day at April 24. Hamer et al. (2003, p. 10) stated "Incubation was estimated to begin 26 April and end 30 July." Murrelets in British Columbia have been captured with fully developed brood patches as early as March 20 (Tranquilla et al. 2005, p. 365). We determined the nesting season should start several weeks before commencement of egg-laying to capture the time during which murrelets establish their nest sites.

Decision: Assuming several weeks are needed for murrelets to establish nest sites before they begin laying eggs on April 24, we chose April 1 as the beginning of the nesting period.

End of the nesting season. The last known fledging of a murrelet in our dataset is on September 23. The distribution of our dataset is normal with a median ordinal date of 181, mode of 181, and mean of 181.6 (rounded to 182 or July 1; standard deviation (SD) = 17.7 days). Assuming our dataset is representative of the population, 95.45 percent (2 SDs above the mean) of murrelets in our area fledge by September 4, 99.73 percent (3 SDs above the mean) fledge by September 22, and 99.99 percent (4 SDs above the mean) fledge by October 9.

Decision: We consider the end of the murrelet nesting season to be September 23, which includes the fledging of all murrelets in our dataset and, assuming our dataset is representative of the population, includes 99.73 percent (3 SDs above the mean) of the murrelets in our area.

II. Timing of feedings during the day and Limited Operating Periods

Background. We previously assumed that adult murrelets make only a small number of prey delivery trips during the middle of the day (described as the period from 2 hours after sunrise to 2 hours before sunset). The primary source of information we used for these times was the histogram presented in Nelson and Hamer (1995, p. 62) which, depending on the time of year, indicates that approximately 5 to 6 percent of feedings took place between 9 am and 6 pm.

The 2-hour diurnal periods subsequently were corroborated by radar and audio-visual surveys that found murrelets attending nests and nest stands from 1 hour, 45 minutes before sunrise to 1 hour, 50 minutes after sunrise (with a few detections at 2 hours, 30 minutes after sunrise), and from 30 minutes prior to sunset to 1 hour, 10 minutes after sunset (Burger 1997, pp. 213 and 219; Burger 2001, p. 701; Cooper et al. 1999, pp. 18–25; Cooper et al. 2001, p. 223; Cooper et al. 2003, p. 9; Meekins and Hamer 2000, p. 17; Naslund and O'Donnell 1995, pp. 130–132) (Table 1). However, these studies typically did not gather data beyond the dusk and dawn periods.

Table 1. Daily timing of trips to nesting stands by marbled murrelets

Reference	**Page: Figure**	**Dawn** (study area, year, sample size, timing of detections)	**Dusk** (study area, year, sample size, timing of detections)
Burger (1997)	213: Fig. 3		Carmanah BC, 13 Jun 1995, *n*=48; no data before to 1 hr 10 min after sunset
Burger (1997)	213: Fig. 3		Bedwell-Ursus BC, 20 Jun 1995 *n*=213; 30 m before to 1 hr 10 min after sunset
Burger (1997)	213: Fig. 3		Bedwell-Ursus BC, 21 Jun 1995 *n*=288; 30 m before to 1 hr 5 min after sunset
Burger (1997)	219: Fig. 6[1]	Carmanah BC, 6–15 Jun 1995, *n*=330; 1 hr 15 min before to 1 hr 45 min after sunrise	
Burger (1997)	219: Fig. 6[1]	Bedwell-Ursus BC, 19–24 Jun 1995, *n*=2647; 1 hr 25 min before to 2 hr after sunrise	
Burger (2001) (*n*=150 for all 3 days)	701: Fig. 2	Moyeha BC, 14 Jun 1997; 1 hr 10 min before to 1 hr after sunrise	
Burger (2001) (*n*=150 for all 3 days)	701: Fig. 2	Moyeha BC, 15 Jun 1997; 1 hr 10 min before to 1 hr 30 min after sunrise	

Reference	**Page: Figure**	**Dawn** (study area, year, sample size, timing of detections)	**Dusk** (study area, year, sample size, timing of detections)
Burger (2001) (n=150 for all 3 days)	701: Fig. 2	Moyeha BC, 6 Jul 1998; 1 hr 40 min before to 2 hr 30 min after sunrise	
Cooper et al. (1999)	18: Fig. 2	Olympic Peninsula WA, 1996–1998, n=5163; 1 hr 45 min before to 1 hr 25 min after sunrise	
Cooper et al. (2001)	223: Fig. 2	Olympic Peninsula WA, 1996–1999, n=8653; 1 hr 45 min before to 1 hr 25 min after sunrise	
Cooper et al. (2003)	9: Fig. 2	Olympic Peninsula WA, 1996–2002, n=23,510; 1 hr 45 min before to 1 hr 50 min after sunrise	
Meekins and Hamer (2000)	8	Mendocino County CA, 2000, n=193; 1 hr 29 min before to 1 hr 11 min after sunrise	
Naslund and O'Donnell (1995)	130: Fig. 1	Big Basin Redwoods SP CA (n=9764), Phantom Creek BC (n=2142), Naked Island AK (n=1649), 1989–1991; 1 hr 45 min before to 1 hr 45 min after sunrise	

[1] We presented the summarized data in Fig. 6 of Burger (1997), rather than those in Fig. 2, for the Carmanah study area because Fig. 6 included earlier and later detections, probably generated from the larger sample size presented in Fig. 6.

To reduce the risk of disturbance to nesting murrelets, we used these estimates to establish limited operating periods (LOPs) that allowed action agencies to work only from 2 hours after sunrise to 2 hours before sunset. Application of these LOPs was required during the early nesting season (April 1 to August 5). In the late nesting season (August 6 to September 15), with these LOPs in place, we typically did not anticipate that disturbance would result from activities such as the use of heavy equipment. Here we analyze the best available information on feeding frequency throughout the day to better document the value of and basis for the LOPs and to decide whether adjustments in their timing are warranted.

New information. We obtained preliminary results from two studies pertinent to this issue. In the first, Rick Golightly (5/19/2010 in litt. to Kim Flotlin) sent us the following summary of his work from northern California:

> "We conducted the analysis to look for mid-day flyins from our data logger recordings (24h) of radioed birds in northern California (see Hébert and Golightly 2006). The 2002 year had the best productivity, and thus the most potential for mid-day flyins. We used breeders (not necessarily confirmed to have chicks) in the period 15 June to 31 July. We stratified the data into time blocks, and assigned the period of 0801 to 1500 as outside the night, morning, or evening periods (this was somewhat arbitrary, but we had logic for the time division). Of the 16 breeders, 9 had flights during the mid day period. The average percent of daily flights per bird that occurred in this period was 3.13 +/- 1.05%. For 2003, with only 4 birds available, the average was 1.9 +/- 1.9%."

Golightly's use of 08:01 to 15:00 as the midday period excluded several hours of the day, depending on the time of sunrise and sunset. Consequently, it is very likely that a higher percentage of murrelets they studied fed their young during what we consider to be "midday." Detailed analysis of these data cannot be done until this work is published.

In the second set of preliminary data, Alan Burger provided information from three survey periods during which he and his crew observed marbled murrelets making feeding trips to their nests in southern British Columbia (5/11/ 2010 in litt. to Kim Flotlin, from Jones 2001, appendix). We estimated sunrise and sunset times for each date and placed the feedings into midday (from 2 hours after sunrise to 2 hours before sunset) vs. morning/evening periods (other times). It is impossible to compare number of feedings per hour in midday vs. morning/evening periods because the information provided to us presented the total number of hours of observation per day, not the starting and ending times for each period of observation. The most feedings observed per day were 7 (during 7.5 hours of observation), 7 (during 17 hours of observation), and 8 (during 8 hours of observation). Hours of observation per day ranged from 1 to 17 (typically 3–5), with an emphasis on the morning and evening hours. For example, on June 29, 1997, they observed a nest for 5.5 hours in the morning (with feedings at 5:42, 6:05, 7:12, 8:17, 10:09) and 1.5 hours in the evening (with a feeding at 21:01). This was done, presumably, to optimize the chance of witnessing feedings. Even with this emphasis, midday feedings comprised 46 percent (22 of 48 feedings; 73.5 hours of observation; Aug 7–20, 1993), 31 percent (5 of 16; 36.5 hours; Jun 9–Jul 3, 1994), and 46 percent (19 of 41; 101.5 hours; Jun 14–Jul 1, 1997) of observed feedings in 1993, 1994, and 1997, respectively.

III. Summary and application of this best available science in the context of a section 7 consultation

1. Using data from 137 nests from southern British Columbia to northern Oregon, the nesting season of marbled murrelets in Washington is best defined as the period from April 1 to September 23.

2. Due to the large overlap in time when murrelets have eggs vs. young on their nests throughout the nesting season, we consider the nesting season to be one season that is not divided into two nesting periods.
3. Due to the high proportion of feedings during the morning and evening hours, LOPs remain an appropriate measure to reduce exposure of nesting murrelets to disturbance from activities during those times; therefore, we will continue to recommend or require LOPs.
4. Given the large variability in the distribution of observed feedings, we are not proposing to refine the timing of LOPs. Therefore, they remain from 2 hours after sunrise to 2 hours before sunset.
5. Due to the large proportion of feeding that occurs during the middle of the day (during the LOPs) in some areas, we cannot assume that implementation of LOPs will avoid adverse effects to murrelets, eggs, or chicks.
6. After September 4, when all incubation has been completed and less than 5 percent of murrelets are still nesting, the potential to encounter a murrelet during the implementation of a single action may be extremely low. It may therefore be feasible, with implementation of an LOP, to justify that the risk of exposure of murrelets is discountable after September 4. Factors that could support a discountable determination during this time period include low habitat quality (based on consideration of tree size, platform numbers, location, stand size, disturbance history), type of the activity, and duration of the activity. When projects are considered programmatically, the additive risk may not be discountable. These decisions are most appropriately made through the consultation process, during which site- and project-specific information can be evaluated.

LITERATURE CITED

Bloxton, T.D., Jr. and M.G. Raphael. 2009. Breeding ecology of the marbled murrelet in Washington State. Five year project summary (2004–2008). May 2009. USDA Forest Service, Pacific Northwest Research Station, Olympia, Washington.

Burger, A.E. 1997. Behavior and numbers of marbled murrelets measured with radar. Journal of Field Ornithology 68:208–223.

Burger, A.E. 2001. Using radar to estimate populations and assess habitat associations of marbled murrelets. Journal of Wildlife Management 65:696–715.

Cooper, B.A., D.M. Evans, and M.G. Raphael. 1999. Radar studies of marbled murrelets on the Olympic Peninsula, Washington, 1996-1998. ABR, Inc., Forest Grove, Oregon and USFS Pacific Research Station, Olympia, Washington. 62 pp.

Cooper, B.A., M.G. Raphael, and D. Evans Mack. 2001. Radar-based monitoring of marbled murrelets. Condor 103:21–229.

Cooper, B.A., M.G. Raphael, and D. Evans Mack. 2003. Refining a landscape-scale habitat model and inland monitoring program for marbled murrelets in the Olympic Peninsula. ABR, Inc., Forest Grove, Oregon and USFS Pacific Research Station, Olympia, Washington. 44 pp.

Hamer, T.E. and S.K. Nelson. 1995. Nesting chronology of the marbled murrelet. In: C.J. Ralph, G.L. Hunt, M.G. Raphael, and J.F. Piatt (Tech. eds.), Ecology and Conservation of the Marbled Murrelet. Gen. Tech. Rept. PSW-GTR-152. Albany, California: Pacific Southwest Experiment Station, Forest Service, U.S. Dept. of Agriculture. 420 pp.

Hamer, T.E., S.K. Nelson, and T.I. Mohagen, II. 2003. Nesting chronology of the marbled murrelet in North America. Unpublished report. 22 pp.

Hébert, P.N. and R.T. Golightly. 2006. Movements, nesting, and response to anthropogenic disturbance of marbled murrelets (*Brachyramphus marmoratus*) in Redwood National and State Parks, California. Unpublished report, Department of Wildlife, Humboldt State University, Arcata, California and California Department of Fish and Game Report 2006-02, Sacramento, California.

Meekins D.J. and T.E. Hamer. 2000. Use of radar to determine the presence of marbled murrelets within selected watersheds of Mendocino County, California. Hamer Environmental, Mount Vernon, WA.

Jones, P.H. 2001. The marbled murrelets of the Caren Range and Middlepoint Bight. Vancouver, BC: Western Canada Wilderness Committee. 150 pp.

Meekins, D.J. and T.E. Hamer. 2000. Use of radar to determine the presence of marbled murrelets within selected watersheds in Mendocino County, California. Final report prepared for Mendocino Redwood Company. 35 pp.

Naslund, N.L. and B.P. O'Donnell. 1995. Daily patterns of marbled murrelet activity at inland sites. *In*: C.J. Ralph, G.L. Hunt, M.G. Raphael, and J. F. Piatt (Tech. eds.), Ecology and conservation of the marbled murrelet. Gen. Tech. Rept. PSW-GTR-152. Albany, California: Pacific Southwest Research Station, Forest Service, U.S. Dept. of Agriculture. 420 pp.

Nelson, S.K. 1997. Marbled murrelet *(Brachyramphus marmoratus)*. Birds of North America, No. 276. 32 pp.

Nelson, S.K. and T.E. Hamer. 1995. Nesting biology and behavior of the marbled murrelet. In: C.J. Ralph, G.L. Hunt, M.G. Raphael, and J.F. Piatt (Tech. eds.), Ecology and Conservation of the Marbled Murrelet. Gen. Tech. Rept. PSW-GTR-152. Albany, California: Pacific Southwest Experiment Station, Forest Service, U.S. Dept. of Agriculture. 420 pp.

Tranquilla L.M., N.R. Parker, R.W. Bradley, D.B. Lank, E.A. Krebs, L. Lougheed, and C. Lougheed. 2005. Breeding chronology of marbled murrelets varies between coastal and inshore sites in southern British Columbia. Journal of Field Ornithology 76:357–367.