LETTERS

J Raptor Res. 39(1):102–103

IVERSON (2004) ON SPOTTED OWLS AND BARRED OWLS: COMMENTS ON METHODS AND CONCLUSION[1]

The late W.F. Iverson recently examined whether reproductive success of northern Spotted Owls (*Strix occidentalis caurina*) was negatively associated with the presence of northern Barred Owls (*Strix varia varia*) during 1990–92 in the Mt. Baker-Snoqualmie National Forest, Washington (Iverson 2004, *J. Raptor Res.* 38:88–91). He compared reproduction at six Spotted Owl territories where no Barred Owls were detected versus 13 Spotted Owl territories where Barred Owls were detected within 2.5 km of the activity centers. He concluded that Spotted Owl reproductive success (defined as having fledged ≥1 young in 3 yr) was unaffected by Barred Owl presence. However, Iverson used statistical analysis procedures that rendered the conclusion questionable.

Specifically, the sample size of 19 was too small to subject to the statistical test used—the *G*-test. The *G*-test uses the chi-square distribution for null-hypothesis expectations (Zar 1984, Biometrics, Prentice Hall, Inc., Englewood Cliffs, NJ U.S.A; Sokal and Rohlf 1995, Biometry, W.H. Freeman and Co., New York, NY U.S.A.). Biometricians commonly state that the *G*-test should not be used if any expected value for a given category <1 or if >20% of the expected categorical values <5 (e.g., Zar 1984). Sokal and Rohlf (1995) further recommend that each expected value should be ≥5 when using a *G*-test. The expected categorical values based on Table 1 in Iverson (2004), obtained by dividing the product of the corresponding row and column totals by *N*, yields: 6.84 sites with reproduction and with ≥1 Barred Owl detection; 6.16 sites without reproduction and with ≥1 Barred Owl detection; 3.16 sites with reproduction and without a Barred Owl detection; and 2.84 sites without reproduction and without a Barred Owl detection. Two (50%) of the four expected values <5; consequently, the sample size was too small to compare reliably against the chi-square distribution.

Furthermore, approximately one-third of the sites should have been excluded from testing. Iverson (2004) "defined reproductive success as the production of young in one or more survey years" (p. 88) and "compared reproductive success of Spotted Owl pairs with and without Barred Owls" (p. 89). However, six of the 19 sites were not occupied by potential breeding pairs of Spotted Owls during any of the 3 yr of study (Iverson 2004:Table 1). Four sites had single Spotted Owls for all 3 yr, one site had a single Spotted Owl in the first 2 yr and was unoccupied in the third yr, and the sixth site was unoccupied by Spotted Owls for all 3 yr. Excluding these six sites in which there was no opportunity for Spotted Owl reproduction, whether or not Barred Owls were present, would reduce the sample size from 19 to 13.

Putting aside Iverson's statistical methods, it is possible that Barred Owls truly did not have a negative effect on reproduction of Spotted Owls in his study area during 1990–92. The four long-term demography studies of Spotted Owls in Washington (e.g., Forsman et al. 2003, Demographic characteristics of northern Spotted Owls (*Strix occidentalis*) on the Olympic Peninsula Study Area, WA, 1987–2002, Pacific Northwest Research Station, Corvallis, OR U.S.A., Hicks and Herter 2003, Northern Spotted Owl research in the central Cascade Range, WA, Plum Creek Timber Co. and Raedeke Associates, Inc., Seattle, WA U.S.A.) documented that Spotted Owl reproduction was high in 1990 and was very high in 1992. Consequently, it is likely that the factors that contributed to high reproductive success during these years, such as winter and spring weather patterns and prey abundance and availability, would have ameliorated or obscured effects of Barred Owls on reproduction of Spotted Owls during Iverson's study. Analysis of such a complex issue may require inclusion of many years of data to capture more reproductively stressful, competitive years.

Barred Owls have been increasing dramatically in numbers and distribution in Washington since their first detection in 1965 (Rogers 1966, *Aud. Field Notes* 20:74). For example, the percent of Barred Owl detections relative to all Spotted and Barred owl detections in the Gifford Pinchot National Forest—the forest immediately south of the Mt Baker-Snoqualmie National Forest—increased 8.6% annually from 1982–2000 (Pearson and Livezey 2003, *J. Raptor Res.* 37:265–276). The range of the Barred Owl now nearly completely overlaps that of the northern Spotted Owl in Washington, Oregon, and California. So even if the presence of Barred Owls had not significantly affected Spotted Owl reproduction in the early 1990s, this may have changed over the past decade. Two more-recent studies have attempted to address this.

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[1] The views herein reflect those of the author and are not necessarily those of the U.S. Fish and Wildlife Service.

First, Kelly (2001, The range expansion of the northern Barred Owl: an evaluation of the impact on Spotted Owls. M.S. thesis, Oregon State Univ., Corvallis, OR U.S.A.) addressed whether Barred Owls affected reproduction of northern Spotted Owls in five long-term Spotted Owl demographic study areas in Washington and Oregon from 1974–98. She found no significant difference in reproduction in Spotted Owl territories with versus without Barred Owl detections within 0.8 km of the activity centers. However, Kelly (2001) allowed that "it is possible that the only reason that spotted owls were able to persist after barred owls were detected was because the barred owls moved on and settled elsewhere." She suggested that a "multivariate model that included the number of years the barred owls were present and the actual distance between the barred owls and spotted owls in each year" (p. 37), and "the number and reproductive status of barred owls that were detected each year, might better explain relationships between the species" (p. 38).

Second, Anthony et al. (2004, Status and trends in demography of northern Spotted Owls, 1985–2003, U.S. Geological Survey, Corvallis, OR U.S.A.) tested whether the presence of Barred Owls affected reproduction of northern Spotted Owls in 14 study areas in Washington, Oregon, and California from 1985–2003. Their "exploratory," "coarse-scale" (p. 19) Barred Owl covariate was the proportion of Spotted Owl territories in which Barred Owls were detected annually by study area. Their results also did not show any negative effects of Barred Owls on Spotted Owl reproduction. However, they recognized that even though "the impacts of barred owls were more likely to occur at the territory level, the only data that were available from all of the study areas was this year-specific covariate" (p. 19), and recommended that "[a]ny barred owl covariate should be territory-specific and should be used to look at the barred owl effect on territory occupancy as well as fecundity and survival of spotted owls" (p. 69).

Recent studies have shown negative effects of Barred Owls on northern Spotted Owl survival (Anthony et al. 2004) and territory occupancy (Gremel 2003, Spotted Owl monitoring in Olympic National Park: 2003 annual report, Olympic National Park Service, Port Angeles, WA U.S.A.; Kelly et al. 2003, *Condor* 105:45–53; Pearson and Livezey 2003). To test whether Barred Owls also negatively affect the reproductive success of Spotted Owls who survive and stay on their territories despite the presence of Barred Owls may require long-term studies with sufficient sample sizes employing methods such as those recommended by Kelly (2001) and Anthony et al. (2004).

I thank B. Livezey, E. Forsman, E. Kelly, S. Gremel, S. Courtney, R. Pearson, T. Fleming, D. Laye, and D. Varland for encouragement and review.—**Kent B. Livezey (e-mail address: kent_livezey@fws.gov), U.S. Fish and Wildlife Service, Western Washington Fish and Wildlife Office, 510 Desmond Drive, Lacey, WA 98503 U.S.A.**

Received 28 June 2004; accepted 27 December 2004

J Raptor Res. 39(1):103–106

USING A PORTABLE, ANCHOR-BOLT LADDER TO ACCESS ROCK-NESTING OSPREY

Successful and safe captures of raptors, and access to nestlings is an important component of long-term ecological studies. Capture of adults and nestling Ospreys (*Pandion haliaetus*) and Bald Eagles (*Haliaeetus leucocephalus*) at the nest site can be quite difficult. Often, it involves climbing tall, solitary structures to access nests. Capture methods for these species are usually dictated by the type of nesting structure, which include trees, transmission line structures, utility poles, artificial platforms, and towers (Bent 1937, Life histories of North American birds of prey, Part 1, *Natl. Mus. Bull.* 170, Washington, DC U.S.A.; Poole 1989, Ospreys: a natural and unnatural history, Cambridge Univ. Press, Cambridge, U.K.). Rock islands, isolated boulders, and inland rock pillars are used to a lesser extent by both species (Bent 1937, Bider and Bird 1983, Pages 223–230 *in* D.M. Bird [ED.], Biology and management of Bald Eagles and Ospreys, Harpell Press, Ste. Anne de Bellevue, Québec, Canada). However, because Bald Eagles and Ospreys have high nest-site fidelity (Buehler 2000, *In* A. Poole and F. Gill [EDS.], The birds of North America, No. 506. The Birds of North America, Inc., Philadelphia, PA U.S.A.; Poole et al. 2002, *In* A. Poole and F. Gill [EDS.], The birds of North America, No. 683. The Birds of North America, Inc., Philadelphia, PA U.S.A.), nests established on rock structures are potential candidates for the installation of permanent access equipment.

Herein, we describe a technique that we developed to quickly and safely access raptor nests built on large rock structures to capture and tag adult and nestling Ospreys. Specifically, we describe the use of a portable, anchor-bolt ladder to access an Osprey nest on a 10-m high inland-rock pinnacle.