

Final Report on 2014 ISSSP Harlequin Duck Monitoring in the Oregon Cascades, Willamette National Forest, with a Proposed Future Monitoring Plan

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Summary: Interagency Sensitive and Strategic Species Program (ISSSP) funding was used to survey potentially occupied reaches on the Sweet Home and Detroit Ranger Districts in 2014 that had not been previously surveyed for harlequin ducks (*Histrionicus histrionicus*-HADU). The purpose of this project was to increase the sample size of stream reaches on the Forest with detectable numbers of birds to aid future monitoring for population changes of this sensitive species. Early season surveys (26 April to 29 May) were conducted on 7 stream reaches totaling about 55 kms on the Detroit Ranger District (DERD) and 5 stream reaches totaling about 17 kms on the Sweet Home Ranger District (SHRD). No HADU were detected during these surveys but a pair was observed incidentally on West Humbug Creek of the DERD on 14 May and 3 immature harlequins were observed incidentally on the Middle Santiam of the SHRD on 2 July. The sampled stream reaches were what local wildlife biologists considered the most likely occupied HADU habitat that had not been surveyed and the lack of detections reinforce how uncommon harlequin ducks are on the Willamette National Forest. The potential for a continuing decline in the population on the Forest remains a management concern and a future monitoring strategy for HADU is proposed (Appendix A). A pair of harlequin ducks was reported and confirmed by the Forest Service on 9 May near the mouth of Salmon Creek in Oakridge which is the verified detection of HADU on the Middle Fork Ranger District area since 2004.

Introduction:

Harlequin duck (*Histrionicus histrionicus*) is a Region 6 Forest Service (FS) and Bureau of Land Management (BLM) sensitive species. In Oregon, the duck winters in rocky areas along the Pacific sea coast and breeds in the summer in limited inland areas along streams and rivers in the Cascade Mountains. Marshall et al. (2003) reported an isolated breeding area in the Umpqua River drainage and limited breeding locations in the upper headwaters of the Middle Fork of the Willamette River. A large breeding area along the west side of the Cascades extends north from the Middle Fork Ranger District across the Willamette National Forest to the Mount Hood National Forest and includes parts of Salem BLM. A smaller breeding area exists along the White River on the east side of the Cascades by Mount Hood (op cit.). Historic surveys and observations have been very limited on Eugene BLM, but include documented occurrences on Bear, Mohawk, Marten, and Winberry Creeks and the McKenzie River (BLM GEOBOB database).

In the early 1990's, harlequin duck was a U. S. Fish and Wildlife Species of Concern for listing and there was much interest in the ecology and abundance of this species. This interest included a FS/BLM Harlequin Duck Working Group in the Pacific Northwest and focused efforts to survey the species on its Oregon breeding grounds and study aspects of its ecology (e.g., Latta 1992, Cassirer et al. 1993, Bruner 1997). In 1993, an extensive survey inventoried populations across the breeding grounds in the Cascades Mountains of Oregon (Thompson et al. 1993). Since

the early 1990's, interest in the conservation of the bird waned, although the species remains a sensitive species for BLM and the Forest Service.

On the Willamette National Forest (NF) and elsewhere, extensive surveys were largely discontinued after 1993. Observations of the species after that time consisted of opportunistic sightings and limited project surveys of select stream reaches. More recently the lack of observed harlequin ducks, led local biologists to speculate that the birds were declining especially in the southern portion of the Forest where they to be absent. As a result of these concerns, the ISSSP funded harlequin duck surveys on the Willamette NF and elsewhere in their Oregon Cascade breeding area in 2012 and 2013 (Doerr 2014).

In 2012, early season surveys found an overall decline in HADU since 1993 on the Willamette NF. On the northern part of the Willamette, represented by the Detroit and Sweet Home Ranger Districts, no decline was apparent, while on the southern portion of the Forest, represented by the McKenzie River (MRRD) and Middle Fork (MFRD) Ranger Districts, HADU were only detected on one MRRD stream (Outlook Creek). In 2013, surveys focused on resampling the MRRD and MFRD with both early and late season surveys in case HADUs had been missed in 2012 surveys. No detections of HADUs were found on the MFRD, but the species was detected at both Outlook Creek and the main stem of the McKenzie River. The 2013 surveys provided further support for a decline of HADUs in the southern Willamette NF.

Project objectives in 2014 were to survey stream reaches on the DERD and SHRD that had not been previously surveyed, but were thought by the local district wildlife biologist to likely have breeding harlequin ducks. These survey data would then be added to the stream reaches that could be periodically sampled to monitor for changes in the breeding population of HADUs on the Willamette National Forest.

Methods:

Thirteen stream reaches on the DERD and SHRD were identified for early season (26 April–29 May) surveys (Table 1) by district wildlife biologists. Early season surveys were used because they match the existing forest survey protocol being used to track population changes since 1993 as described by Doerr (2014). Other incidental sightings of HADUs were recorded on the Forest and entered into NRIS Wildlife along with the survey data.

Results and Discussion:

Difficulty in access prevented one stream from being surveyed on the DERD (Blowout Creek) and one on the SHRD (Middle Santiam). Portion of some planned reaches were also dropped from surveys due to access, impassible canyon walls, and other factors. A total of about 72 kms of streams were sampled on 12 reaches (Table 1). No HADUs were detected during these surveys. However, incidental sightings detected a male-female pair of HADUs on Humbug Creek (a surveyed stream reach) on 14 May and 3 immature HADUs on the Middle Santiam on 2 July. The Middle Santiam reach is not practical to survey in the early season because snow prevents early access to the wilderness trail head.

An exciting detection was that the MFRD confirmed a reported male-female pair of HADUs on lower Salmon Creek by Oakridge on 9 May. This is the first confirmed record of HADU for the MFRD area since 2004. Hypotheses that this was a pair migrating through the area, the female

nests on the Salmon River (possibly of FS lands), or the female nests on the main stem of the Middle Fork of the Willamette River within the Oakridge City boundary are all feasible.

Table 1. Streams Surveyed for Harlequin Ducks (HADUs) During the Early Breeding Season (26 April to 29 May, 2014), Willamette National Forest.			
District/Stream Reach	Kms Planned For Survey	Kms Surveyed	HADUs detected
Detroit Ranger District			
Upper Breitenbush River (4685 bridge to Wilderness)	7.2	7.2	0
North Santiam River (Marion Forks to Wilderness)	19.2	17.2	0
Whitewater Creek	12.8	12.8	0
East Humbug Creek	6.4	2.6	0
West Humbug Creek	4.8	4.8	0*
Upper Blowout Creek	4.8	0.0	Not surveyed
Devils Creek	6.4	2.0	0
South Fork Breitenbush River	8.0	8.0	0
Sweet Home Ranger District			
South Santiam River –upper segment above current survey effort	3.7	3.7	0
Middle Santiam River-upper segment above current survey effort	4.2	0	Not surveyed**
Quartzville Creek-upper segment above current survey effort	4.5	3.7	0
Sevenmile Creek	3	1.2	0
Hackleman Creek	3.5	3.5	0
Park Creek	4.8	4.8	0
* Male-female pair seen incidentally 14 May.			
**3 immature HADUs were seen incidentally 2 July.			

Because, as described in Appendix A, future surveys are proposed on reaches where HADUs are confirmed present (either currently or at the time of the next surveys), the 2014 HADU work added only two streams to the next proposed survey (Humbug and Salmon Creek, both from incidental observations). To that degree, it did not greatly increase the sample size available to detect future population changes on the Forest which was the main purpose of the project. The results of the study do provide additional support for the idea that HADUs are uncommon on the Forest and a potential viability concern as the reaches surveyed were deemed suitable for harlequin ducks and thought reasonably likely to have use by breeding and nesting adults.

Note on Survey on Lower Portion of McKenzie River: Supported by funding from Eugene BLM, the Forest Service conducted a late season survey on 48 kms of the main stem McKenzie River from the Willamette NF downstream to Hendricks Bridge by floating the river on 17-18 July. The 2014 survey was similar to the 2013 survey described by Doerr (2014). One immature harlequin duck was seen just below the Quartz Creek Bridge. This location is upstream of the 2013 sighting of an adult female with three young near the mouth of Deer Creek by BLM land. The 2014 sighting is close to an isolated parcel of FS land by the McMullins boat launch. For the second year, no HADUs were seen in the lower half of the survey reach from Leaburg Dam to Hendricks Bridge. This river segment has a high amount of human activity and it was recommended by the observers that it does not need to be surveyed in future years as it is thought unlikely to be used by HADUs.

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Literature Cited:

- Bruner, H. J. 1997. Habitat use and productivity of harlequin ducks in the Central Cascade Range of Oregon. M. S. Thesis, Oregon State University, Corvallis.
- Cassier, E. F, et al. 1993. Status of harlequin ducks (*Histrionicus histrionicus*) in North America. Unpublished multi-agency report to the Harlequin Duck Working Group. 83 pp. Copy available upon request at Willamette National Forest, Springfield, Oregon.
- Doerr, J. G. 1994. Final Report on 2012 and 2013 ISSSP Harlequin Duck Monitoring in the Oregon Cascades, Willamette and Mt. Hood National Forests and Salem and Eugene Bureau of Land Management Districts. Unpublished report. Willamette National Forest, Springfield, Oregon.
- Latta, S. 1992. Distribution and status of the harlequin duck (*Histrionicus histrionicus*) in Oregon. Unpublished report. Willamette National Forest, Springfield, Oregon. N.p.
- Marshall, D., B., M. G. Hunter, and A. L. Contreras. 2003. Birds of Oregon: A general reference. Oregon State University Press, Corvallis. 752 pp.

Rhodes, J. R., A. J. Tyre, N. Jonzen, C. A. McAlpine, and H. P. Possingham. 2006. Optimizing presence-absence surveys for detecting population trends. *J. Wildlife Management* 70: 8-18.

Thompson, J., R. Goggans, and P. Greenlee. 1993. Abundance, distribution and habitat associations of the harlequin duck (*Histrionicus histrionicus*) in the Cascade Mountains, Oregon, 1993. Unpublished cooperative agreement report. Willamette National Forest, Springfield, Oregon. N.p.

Zar, J. H. Biostatistical analysis (4th ed.). Prentice Hall. Upper Saddle River, NJ.

Appendix A. A Proposed Monitoring Plan for the Harlequin Ducks for the Willamette National Forest.

The time interval 1993 to 2012 represented a 19-year gap in focused surveys for harlequin ducks (HADUs) on the Willamette National Forest. Surveys done in 2012 found a 59% decline in population numbers during that time interval with the near disappearance of the species from the southern part of the Forest (Doerr 2014). Additional survey work funded by the ISSSP in 2013 and 2014 has provided further evidence that HADUs occur on only a few stream reaches on the Forest and have low forest-wide population numbers during the breeding season. The cause of the decline from 1993 to present is unknown and, lacking time sequence data, there is no way to predict if the decline has halted or will still continue until there is no longer a viable breeding population on the Forest. Waiting nearly 20 years between survey efforts seems too long a time period and could result in the population largely disappearing before the next survey interval if the rate of decline were too continue. The author is well aware of the limited funds available for all types of needed wildlife inventory and monitoring work and provides a proposal here for more closely monitoring the population on the Forest in a statistically valid and cost-effective manner.

The proposal is sensitive to costs by 1) addressing only the most critical population trend issue, 2) sampling the stream reaches that are most likely to provide count data that adds to the power of the test, and 3) using paired data (e.g., comparing with past counts on the same reaches) to monitor for changes.

My proposal is that we monitor at about a 5 year interval using the 2012-2014 surveys to reflect the most recent sample in time (most surveys were done in 2012 with a few reaches sampled in 2013 and 2014). The next scheduled survey would be about Year 2018.

Monitoring on the Willamette NF has relied on early season surveys which are stream counts of adult males and females prior to the nesting season (Doerr 2014). The use of early season surveys would continue and would consist of a single survey on each selected stream in 2018. Whether or not additional surveys would be conducted in 2019 would dependent on the 2018 results (discussed later in the proposal). I also favor the use of early season surveys compared to late season counts because brood size can vary widely among females and declines throughout the late season period as some young are lost due to mortality after hatching. Thus, intuitively, it seems that there is more inherent variability in counts that are heavily influenced by the number of young birds present soon after hatching.

I believe that the most critical population issue for HADUs for our Forest that needs to be monitored is “Is the population decline continuing?” This would be tested with a one-tailed Wilcoxon paired-sample test (Zar 1993) comparing a count from the 2012-2014 period with the 2018 count on that same stream reach similar to the 1993 to 2012 comparison (Doerr 2014). To assure that each sampled stream reach has approximately the same importance, longer stream segments would be divided into stream segments approximately 5 kilometers in length. Thus, a 2.5 to 7.49 km long survey reach would be one sample; a 7.5 to 12.49 km survey reach would be divided in half with each half counting as one sample (2 samples total), and so forth.

Sampling theory suggests that population declines are most efficiently monitored by sampling high-quality areas while population increases are best detected by including more marginal habitat in the sampling (Rhodes et al. 2006). I am assuming that the stream reaches where harlequin ducks have been observed are the best quality habitat (similar to the assumption in Doerr 2014) so that surveys would only be conducted on reaches where harlequin ducks have been observed during the 2012-2014 period or where confirmed incidental observations suggest ducks are present at the time of the next surveys. Note that “*have been observed*” includes all verified records of HADUs during the time period and does not automatically exclude surveys with zero detection. Surveys have variability and individual surveys may miss ducks for a variety of reasons.

Table 2 shows the stream surveys for the 2012-2014 period that would be resurveyed in 2018 and the sample count for 2012-2014. Additional streams would be added in 2018 if the local biologist confirms birds present from other observational data.

It is my suggestion that, if the 2018 surveys, find strong evidence for the null hypothesis that HADUs have not declined between the periods 2012-2014 and 2018 ($P \geq 0.50$), including if the 2018 counts are higher, than only one year of surveys are needed. If there is weaker evidence ($0.05 < P < .50$) or, if there is evidence to reject the null hypothesis ($P \leq 0.05$), then I suggest a second year of surveying be done in 2019 and independently tested against the 2012-2014 counts to provide additional evidence to reject or accept the null hypothesis.

Table 2. Streams Reaches for Proposed 2018 Early Season Surveys for Harlequin Ducks (HADUs) and 2012-2014 Sample Counts for those Reaches, Willamette National Forest.

District/Stream Reach	Kms to Survey	HADUs counted*
Detroit Ranger District		
Upper (North Fork) Breitenbush River (4685 bridge to Wilderness)	7.2	0 (2014)
North Santiam River	17.4	1
		0
		6
West Humbug Creek	4.8	0 (2014)
Marion Creek	3.9	4
Sweet Home Ranger District		
Quartzville Creek	5.8	5
South Santiam	11.3	0
		2
Soda Fork	3.7	0
Moose Creek	5.9	2
Canyon Creek	3.2	3
McKenzie River Ranger District		
Lookout Creek	5.9	2 (2013)
Mainstem McKenzie River (Olallie to Hamlin Boat Landing)	32	0 (2013)
		0 (2013)
		0 (2013)
		0 (2013)
		0 (2013)
		0 (2013)
Middle Fork Ranger District		
Salmon Creek	4.8	0
<p>*Number of harlequin ducks counted per roughly 5 km segment. If count is from year other than 2012, the year is shown in parentheses. Where more than one early season survey was conducted, one survey was selected at random. All streams had harlequin ducks observed at some time during the period 2012-2014.</p>		