Re-introduction of the western bluebird to oak-prairie habitats in Pacific Northwest, USA

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Introduction

The Western bluebird (*Sialia mexicana*) occurs throughout much of western North America and breeds in a variety of open habitats where nest cavities, low perches, and an open understory are present. In the Pacific Northwest, west of the Cascade crest, the northern edge of the bluebird's range has undergone large-scale retraction due to the loss, fragmentation, and degradation of oak-prairie habitats, where they most commonly occur (Altman, 2011). Coastal mainland breeding populations of bluebirds disappeared from British Columbia, Canada and Washington, USA in the 1970s, while island populations in the San Juan and Gulf Islands archipelagos began disappearing in the 1960s. The last observed breeding in the region occurred in 1995 on Vancouver Island, BC. Because the species occupies a broad array of open habitats, the primary cause of their decline was apparently the loss of a critical habitat element, nesting cavities. In some areas, such as in the Willamette Valley, OR and south Puget Sound, WA, nearly extirpated populations have recovered following the establishment of nestboxes programs. This case study reports on the 6-year (2007 - 2012; 5 yrs. translocation, 1 yr. post-translocation) re-introduction of the bluebird to San Juan Island, WA.

Western bluebird male in aviary © Gary Slater

Goals

- Goal 1: Capture >90 wild adults from donor sites and safely transport and release on San Juan Island during a 5-year period.
- Goal 2: Monitor reproduction and survival rates in the re-introduced population to evaluate translocation methods and re-introduction success.
- Goal 3: Establish a self-sustaining breeding population on San Juan Island and adjacent islands.

- Goal 4: Use the bluebird as a flagship emblem for oak-prairie conservation.

Success Indicators

- Indicator 1: Released individuals and their offspring breed successfully and reestablish migratory pathways between wintering grounds and the re-introduction site.
- Indicator 2: Population size increases annually.
- Indicator 3: Demographic measures (reproduction and survival) in the re-introduced population are similar to other Pacific Northwest populations.

Project Summary

Feasibility: The re-introduction of bluebirds to San Juan Island was considered appropriate and timely for several reasons. First, the likelihood of bluebirds re-establishing a population on San Juan Island without assistance appeared low. The long distance (165 km) and large area of unsuitable habitat (i.e., urban Seattle and Puget Sound) between San Juan Island and the closest source population (south Puget Sound) apparently hindered dispersal, because there was no evidence of successful colonization in the three decades since the species was extirpated, even though the source population showed substantial growth. Second, a pre-project assessment indicated that sufficient habitat was available in north Puget Sound, centered on San Juan Island, to support a bluebird population. Local conservation organizations (e.g., San Juan Preservation Trust, San Juan County Audubon Society) promoted the protection and restoration of the prairie-oak ecosystem, ensuring that habitat would be available in the future. Third, the cause of their extirpation was considered to be the loss of a particular habitat element, cavities for nesting, rather than a more complex set of issues unable to be addressed through management. Nest boxes have been used as management tool to increase the availability of cavities for many cavity-nesting species and they have played a critical role in the recovery of Eastern and Western bluebird populations in many parts of North America. Local conservation partners encouraged the placement of nestboxes, and over 500 were established during the course of the project. Finally, successful translocation methodologies had been developed for Eastern bluebirds in Florida and these methodologies were believed to be transferrable to a re-introduction of Western bluebirds (Slater, 2001).

Implementation: We translocated bluebirds to San Juan Island in each breeding season (March - June) from 2007 to 2011. The source population was Joint Base Lewis-McChord Military Base, approximately 165 km from the re-introduction site; several pairs were translocated from Oregon (450 km away). Most translocations involved breeding pairs, although we moved some pairs with dependent young later in the breeding season. In 2010 - 2011, we translocated a few single females because we observed a higher ratio of males to females in the re-introduced population. At the release site, bluebirds were placed in outdoor aviaries, which allowed open views, yet provided protection from the elements. Aviaries contained multiple perch choices, a nest box for roosting, and food (mealworms and crickets) and water *ad libitum*. Initial releases were conducted in the San Juan Valley, which historically held the most oak habitat on the island.

Release sites were selected based on the presence of suitable habitat (e.g., proximity to oaks, appropriate foraging habitat), the willingness of landowners to host an aviary and place nest boxes on their property, and, upon establishment, the proximity of bluebird territories. Release sites for single females were selected based on the presence of a single territorial male.

We captured and translocated 102 adults and 35 juveniles; 2 adults and 1 juvenile died in the aviary, but the remaining were released in good condition. In 2007, we placed 8 adult pairs in 1 m x 1 m x 2 m aviaries (small), releasing them after 4 - 5 days. We discontinued this strategy following low establishment (only 1 pair) and high rate of dispersal (45%) back to the source population. In the following 4 years, we placed breeding pairs, captured early in the breeding season, in 2 m x 2 m x 2 m aviaries (large), holding them for 1 - 3 weeks. Twenty seven of 65 (42%) individuals released as pairs (one with a resident bird) established a breeding territory. Pairs translocated with dependent young (10 - 12 days old) were placed in a large aviary (the young in a nestbox) and were released 1 - 10 days after nestlings fledged. Six of 15 (40%) adults established a breeding territory; 7 of 35 (20%) juveniles returned the following year to breed. Single females were placed in a small aviary and released after 3 - 5 days in the presence of a free-living male; 3 of 5 (60%) single females established a breeding territory. On all established territories, we provided supplemental food (mealworms) to birds during periods of cool (<16° C), windy, and rainy weather and when pairs were feeding nestlings.

Post-release monitoring: We found evidence of successful breeding in each year of the project and both translocated individuals and their locally-produced offspring reproduced successfully. Annual counts of adults indicated that the re-introduced bluebird population grew in each year of the project during the translocation period, and at the end of the 2011 breeding season the minimum estimate of population size was 38 individuals (14 breeding territories).

Constructing aviary © Gary Slater

In 2012, we found fewer individuals, but there were still 14 breeding territories. From 2007-2012, we monitored 87 nests, which fledged 274 juveniles. Fecundity and survival estimates in the re-introduced population did not differ significantly from reference populations in the Pacific Northwest (Keyser *et al.*, 2004; Kozma & Kroll, 2010).

Major difficulties faced

Typical habitat in release area © Gary Slater

- In 2007, our attempt to use a smaller, and easier to move, aviary and a shorter holding period proved ineffective, and thus we returned to larger aviaries and longer holding periods, techniques used for Eastern bluebirds.
- Initially, annual return rates for juvenile males were higher than females producing a male-biased sex ratio in the nascent population.
- Nest predation by house sparrows and other mammals is a leading factor in nest failures.
- Poor reproduction in 2011 and 2012, due to unusually cold and rainy breeding seasons, is a significant concern to this small and vulnerable population.

Major lessons learned

- Holding bluebird pairs for longer periods (1 - 3 weeks) in large aviaries appeared more effective than short holding periods (3 - 5 days) in small aviaries.
- Breeding pairs captured earlier in the breeding season (before mean incubation date) were more likely to establish a territory than pairs captured later in the breeding season.
- Similarly, translocating and releasing pairs with juveniles earlier in the season to allow pairs time to re-nest was more successful than later releases.
- Releasing family groups when young are 2 - 4 days old appears to reduce dispersal from the release site, although aviary sites need to include patches of shrubby vegetation to provide cover for juveniles.
- Translocations of single females was highly effective and thus provides evidence of a technique to successfully address biased sex ratios in small re-introduced populations.
- In contrast to the re-introduction of Eastern bluebirds in South Florida, paired individuals typically maintained pair bonds, providing support for translocating pairs rather than single individuals.

Success of project

Highly Successful	Successful	**Partially Successful**	Failure
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Reason(s) for success/failure:

- A dedicated partnership of conservation groups that provided the full spectrum of expertise, from administration to technical to local knowledge, necessary for a successful re-introduction project.
- The ability to adapt and modify translocation strategies during the project.
- Participation by local conservation organizations, San Juan Preservation Trust and San Juan Audubon Society, who actively engaged the local community in participating and supporting the re-introduction project.
- The presence of a large donor population, which allowed us to reach our target release number within our proposed timeframe.
- While we successfully established a small population on San Juan Island, further monitoring will be required to evaluate population persistence and determine whether the re-introduction can be considered “successful”.
- The success of the re-introduction effort on San Juan Island spurred the expansion of the project to Vancouver Island, 25 miles away. The creation of another local population should increase the likelihood of long-term persistence for the regional population.

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