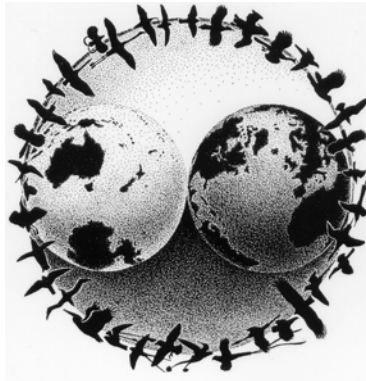


The MAPS Program in the Pacific Northwest: Current Status and Future Direction

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EXECUTIVE SUMMARY

Since 1989, The Institute for Bird Populations has been coordinating the Monitoring Avian Productivity and Survivorship (MAPS) Program, a cooperative effort among public and private agencies and individual bird banders in North America, to annually operate a continent-wide network of nearly 500 constant-effort mist-netting and banding stations. MAPS was designed to provide information on the vital rates (productivity or birth rate, and survivorship or death rate) of landbirds crucial for efforts to identify demographic causes of the severe and sometimes accelerating population declines documented for many North American species. Data on vital rates are also critically needed in efforts to identify management strategies to reverse such population declines.

The goals of MAPS are in agreement with the strategies of the Partners In Flight (PIF) programs as conscribed to by Federal land-holding agencies such as the Bureau of Land Management (BLM), USDA Forest Service (USFS), US Fish and Wildlife Service (FWS), National Park Service (NPS), Bureau of Indian Affairs (BIA), and Department of Defense (DoD). Moreover, because bird populations are excellent indicators of the health of ecological systems, they can serve as sensitive barometers of the effectiveness of management efforts to maintain the biodiversity and ecological integrity of Federal lands. Accordingly, the MAPS program has been implemented on many of these Federal lands and has become one of the focus projects of the Partners In Flight program.

A total of 238 MAPS stations were operated for at least one year during the period 1989-2005 in the Pacific Northwest (defined as Bird Conservation Regions 5, 9, 10, and 15 except for the portions of BCRs 9 and 10 located in central and southern Nevada, western Utah, and extreme northwestern Colorado), of which 138 were active in 2005. Most of these MAPS stations were established opportunistically, with little coordination at the regional or landscape level. We believe that the usefulness of MAPS data can be enhanced by the thoughtful selection of target species and the critical siting of stations with respect to 1) habitats of special concern, 2) species of special concern, 3) geographic areas where gaps exist in MAPS data, and 4) Federal lands where substantial numbers of individuals of the target species can be captured in appropriate habitat types and geographic areas.

2 - The MAPS Program in the Pacific Northwest

To accomplish these objectives we 1) established a list of priority species and habitats within the Pacific Northwest Region; 2) provided advice and recommended targets for optimum station longevity, continuity, and capture rates; 3) suggested species and habitats most in need of enhanced MAPS coverage in the Pacific Northwest; 4) determined the utility of existing MAPS stations in the Pacific Northwest; and 5) considered whether or not Federal agencies should increase efforts toward conservation of western migrants on their wintering grounds.

We have found that 2.5 adults of a given species captured per year at a station is the minimum average annual capture rate needed for analyses of productivity indices, that a minimum average annual capture rate of about 25 adults of a given species captured per year from all stations pooled in any particular area generally allows us to model spatial and temporal variation in productivity for that species in that area using logistic regression, and that four consecutive or near-consecutive years of data are needed to obtain initial estimates of adult survival rates from mark-recapture analyses. This information was used to assess whether or not a given species was being adequately monitored by MAPS at a station or within any particular area.

In order to assess the actual usefulness for management of MAPS data collected at an existing station, or the potential usefulness of such data from a proposed station, it was necessary to consider the importance for management of the habitat in which the station is sited, the importance for management of the bird species sampled at the station, and the geographic location of the station relative to other stations and to the overall MAPS coverage of the geographic area. These considerations led to: 1) the identification of habitats of special concern, 2) the identification of target species of special concern, 3) the identification of geographic areas where gaps exist in MAPS data, and 4) the identification of Federal lands where substantial numbers of individuals of the target species could likely be captured in appropriate habitat types and geographic areas.

We examined 13 published PIF state conservation plans and four PIF habitat designations for Physiographic Areas for the Pacific Northwest to determine potential priority habitats of concern within this geographic region. For each of the four BCRs (5, 9, 10, and 15), we identified three broad target habitats that were found in the BCR and that can effectively be monitored by MAPS stations. Priority habitats included Coniferous Forest (all four BCRs), Riparian Habitats (all four BCRs), Broadleaf Habitats (BCR5 and BCR15), and Scrub and Shrub-Steppe Habitats (BCR9 and BCR10).

At each of 224 MAPS stations operated during the period 1989-2003, we analyzed both the habitat present and species-capture data to categorize them into one of these four broad habitat types, specific to the BCR in which it was located.

We identified 101 bird species captured in the Pacific Northwest during 1989-2003 that could be sampled effectively by MAPS protocol. For each habitat type within the four BCRs, we selected target species as: 1) those identified as priority or focal species (hereafter, “identified species”) in any State Conservation Plan, or any plan for any PIF Physiographic Area or Bird Conservation Region as part of the North American Bird Conservation Initiative (NABCI); 2) species with negative trends according to Breeding Bird Survey (BBS) and/or MAPS data; or 3) certain species with positive trends according to the same two data sets. Targeting a few species with positive population trends will allow us to compare demographic rates between those species and species with negative population trends. To further rank each species and station we assigned a priority score of 3 to a species that was identified as a priority or focal species, a score of 2 if it exhibited a negative trend, and a score of 1 if it exhibited a positive trend; species scores could thus range from 1 to 5.

We superimposed the locations of 234 active or discontinued MAPS stations upon GIS layers of agency landholders in the Pacific Northwest in order to identify geographical gaps in MAPS coverage. From all of the information assembled regarding capture rates of species at stations, priority habitats for monitoring, target species, geographical gaps in MAPS coverage, and monitoring potentials of the various landholders of the Pacific Northwest, we suggest geographic area/habitat combinations in need of additional stations and provide recommendations specific to each Federal agency (BLM, USFS, NPS, FWS, BIA, and DoD) regarding the continuation or re-establishment of both active and discontinued MAPS stations.

Analysis of station and species information within BCRs and habitat types indicated relatively good coverage of all habitat types in BCR5 and of Coniferous Forest in BCR15 but marginal to poor coverage of Riparian and Broadleaf Habitats in BCR15. It also indicated marginally adequate coverage of Coniferous and Riparian Habitats but inadequate coverage of Scrub and Shrub-Steppe Habitats in BCR9 and BCR10.

Recommendations

From the above results, we recommend increasing MAPS coverage of Scrub and Shrub-Steppe Habitats in BCR9 and BCR10, with the goal of targeting several high-priority species within those habitats. Low breeding bird densities coupled with hot temperatures and limited shade increase the difficulty of monitoring this habitat using MAPS protocol. An effort is underway by the PIF Shrub-Steppe Working Group to address some issues related to landbird productivity in this habitat by nest monitoring. We suggest that an additional component in this effort using MAPS stations sited with hypothesis-driven sampling strategies could help achieve some of the research and management goals of this cooperative effort. We believe that extending the MAPS program to complement existing sagebrush avian monitoring efforts for certain species, including Sage Thrasher, Brewer's Sparrow, Vesper Sparrow, and Sage Sparrow, is appropriate.

We also recommend increasing the monitoring coverage of Broadleaf Habitats in BCR5 and BCR15 and targeting selected Coniferous Forest and Riparian habitat species within all four BCRs to increase the capture rates of priority and focal species. These include Nashville Warbler, Black-throated Gray Warbler, and Chipping Sparrow in Broadleaf Habitats; Red-naped Sapsucker, Willow Flycatcher, Red-eyed Vireo, House Wren, Swainson's Thrush (BCR15), Orange-crowned Warbler, Wilson's Warbler, Yellow-breasted Chat, Lincoln's Sparrow, and Mountain White-crowned Sparrow in Riparian Habitats; and Red-breasted Sapsucker, Hammond's Flycatcher, Cordilleran Flycatcher, Cassin's Vireo, Brown Creeper, Golden-crowned Kinglet, Varied Thrush, Black-throated Gray Warbler, Chipping Sparrow, and Cassin's Finch in Coniferous Forest. We further recommend continued operation of most of the active stations to continue the currently adequate coverage of many widespread target species, including Dusky Flycatcher, Black-capped Chickadee, Yellow Warbler, MacGillivray's Warbler, Swainson's Thrush (except BCR15), Song Sparrow, Dark-eyed Junco, and Black-headed Grosbeak) in Coniferous Forest and Riparian Habitats throughout the Pacific Northwest.

We suggest species that each agency could target, given their landholdings, gaps in coverage, and the distribution of priority species that are monitored or could be better monitored by MAPS. We also reviewed data from all active and discontinued stations operated on the lands of each Federal agency and made recommendations to either continue active stations (116 cases), discontinue active stations

in favor of establishing new stations in more productive areas (23 cases), re-establish a discontinued station (28 cases), or not re-establish a discontinued station (71 cases).

Finally, we suggest that not all causes of population declines in Pacific Northwest landbirds can be addressed on the breeding grounds; habitat loss and degradation on the wintering grounds can cause low overwintering survival and poor physical condition that can, in turn, lead to high mortality on spring migration and to poor productivity on the breeding grounds. MAPS data collected at 36 stations between 1992 and 2001 in USFS Pacific Northwest Region Six revealed strong relationships between overwintering weather conditions and subsequent reproductive success (Nott et al. 2002). We suggest that Federal agencies in the Pacific Northwest could contribute to enhancing the operation of two recently developed winter monitoring programs aimed at formulating site-specific and landscape-scale management actions on the wintering grounds of both tropical- and temperate-wintering declining landbird species to increase their overwintering survival and late-winter physical condition. The MoSI (Monitoreo de Sobrevivencia Invernal) Program involves a network of locally-managed mist-netting and banding stations throughout the northern Neotropics, including western Mexico and Central America, where most of the declining Neotropical migrants breeding in the Pacific Northwest spend the winter. The analogous MAWS (Monitoring Avian Winter Survival) Program currently involves an analogous network of stations in the southeastern United States that could be extended to the southwestern states to cover important habitats in southern California, Arizona, New Mexico, and western Texas, where many of the declining temperate migrants breeding in the Pacific Northwest spend the winter.

The Institute for Bird Populations (which created and coordinates the MoSI and MAWS Programs) is interested in exploring ways in which Federal agencies in the Pacific Northwest could facilitate these two important winter demographic monitoring Programs. This, in conjunction with a reorganization of the Pacific Northwest MAPS network, will increase our understanding of the annual life cycle and ecology of priority species. This collaboration with multiple Federal agencies will promote the development of effective species-specific conservation and land management guidelines designed to reverse population declines and maintain stable or increasing populations of many landbird species of concern. A coordinated demographic monitoring approach involving multiple federal agencies and regional offices, as described here, could address many of the species-specific monitoring and research requirements stated in various bird conservation plans for the Pacific Northwest.

INTRODUCTION

Since 1989, The Institute for Bird Populations has been coordinating the Monitoring Avian Productivity and Survivorship (MAPS) Program, a cooperative effort among public and private agencies and individual bird banders in North America, to operate a continent-wide network of over 500 constant-effort mist-netting and banding stations. MAPS was designed to provide information on the vital rates (productivity or birth rate, and survivorship or death rate) of landbirds, crucial for efforts to identify demographic causes of the severe and sometimes accelerating population declines documented for many North American species (Robbins et al. 1989; Terborgh 1989; Peterjohn et al. 1995; DeSante 1992; DeSante et al. 1995, 1999, 2001). Data on vital rates are also critically needed in efforts to identify management strategies to reverse such population declines (DeSante 1995, DeSante and Rosenberg 1998).

The MAPS Program uses a standardized protocol of constant-effort mist netting at a continent-wide network of over 500 stations operated by federal and state agencies, private organizations, and individual bird banders (DeSante et al. 2003). MAPS has proven to be a valuable tool for indexing productivity and estimating adult survival rates of landbirds at several geographic scales, ranging from the local landscape to the entire continent. Avian demographic parameters are assessed and can be related to ecological characteristics and population trends of target species (DeSante et al. 1999, 2001; DeSante 2000), climatic cycles (Nott et al. 2002), and landscape-level habitat conditions (Nott et al. 2003, DeSante et al. in press a). The patterns resulting from these analyses help to focus research and management efforts that are critical for the effective conservation of landbirds and their habitats.

The MAPS program is organized to fulfill three tiers of goals and objectives, monitoring, research, and management:

The specific **monitoring** goals of MAPS are to provide, for over 100 target species, including Neotropical-wintering migrants, temperate-wintering migrants, and permanent residents: (a) annual indices of adult population size and post-fledging productivity from data on the numbers and proportions of young and adult birds captured; and (b) annual estimates of adult population size, adult

survival rates, proportions of residents, and recruitment into the adult population from modified Cormack-Jolly-Seber analyses of mark-recapture data on adult birds.

The specific **research** goals of MAPS are to identify and describe: (a) temporal and spatial patterns in these demographic indices and estimates at a variety of spatial scales ranging from the local landscape to the entire continent; and (b) relationships between these patterns and ecological characteristics of the target species, population trends of the target species, station-specific and landscape-level habitat characteristics, and spatially-explicit weather variables.

The specific **management** goals of MAPS are to use these patterns and relationships, at the appropriate spatial scales, to: (a) identify thresholds and trigger points to notify appropriate agencies and organizations of the need for further research and/or management actions; (b) determine the proximate demographic causes of population change; (c) suggest management actions and conservation strategies to reverse population declines and maintain stable or increasing populations; and (d) evaluate the effectiveness of the management actions and conservation strategies actually implemented through an adaptive management framework.

All of these goals are in agreement with the strategies of the Partners-in-Flight (PIF) programs as conscribed to by Federal land-holding agencies such as the Bureau of Land Management (BLM), USDA Forest Service (USFS), US Fish and Wildlife Service (FWS), National Park Service (NPS), Bureau of Indian Affairs (BIA), and Department of Defense (DoD). Moreover, because bird populations are excellent indicators of the health of ecological systems, they can serve as sensitive barometers of the effectiveness of management efforts to maintain the biodiversity and ecological integrity of Federal lands. Accordingly, the MAPS program has been implemented on many of these Federal lands and has become one of the focus projects of the Partners-in-Flight program. It is expected that information from the MAPS program will continue to be useful in aiding research and management efforts on these Federal lands to protect and enhance both their avifauna and ecological integrity, while allowing the managing agencies to fulfill their multi-use purposes.

For the purposes of this report, we define the “Pacific Northwest” as the entire Northwest MAPS Region (DeSante et al. 2005; see map at <http://www.birdpop.org/nbii/NBIIHome.asp>) except for those portions of the Northwest MAPS Region in Utah, Colorado, and New Mexico that lie in BBS

Physiographic Strata 62 (Southern Rockies). Thus, as here defined, the Pacific Northwest includes all of Washington, Oregon, and Idaho, southeastern Alaska, the southern half of British Columbia, southwestern Alberta, western Montana, western Wyoming, extreme northern Utah, northern and western Nevada, and northern California. A total of 238 MAPS stations were operated for at least one year during the period 1989-2005 in the Pacific Northwest, of which 138 were active in 2005. We superimposed MAPS stations on the four target Bird Conservation Regions within a latitudinal belt between 40 degrees North and 50 degrees North to include Washington, Oregon, and northern to central California (Fig. 1, extends to 30 degrees South). This map (and later maps) extends eastwards to the longitude ~110 degrees West to include western Wyoming and the eastern extent of the Northern Rockies Bird Conservation Region.

Most MAPS stations in the Pacific Northwest were established opportunistically, with little coordination at the regional or landscape level. Among 96 stations in Washington and Oregon, for example, 55 have been operated on National Forests, 13 on National Wildlife Refuges, 11 on lands managed by the BLM, seven on state or county lands, six on private lands, three on Army Installations, and one in a National Park (Fig. 2). We believe that the usefulness of MAPS data can be enhanced by the thoughtful selection of target species and the critical siting of stations with respect to: 1) habitats of special concern, 2) species of special concern, 3) geographic areas where gaps exist in MAPS data, and 4) Federal lands where substantial numbers of individuals of the target species can be captured in appropriate habitat types and geographic areas. DeSante et al. (2004a) performed such an analysis using data from 1989-2001 collected on National Wildlife Refuges in the USFWS Western Region. Here we perform a similar, but more extensive, analysis using data collected during 1989-2003 from all MAPS stations in the Pacific Northwest, with the aim of affecting a greater coordination of MAPS development in the region.

The overall goal of this report is to provide an assessment of the monitoring potential of active and discontinued stations in the Pacific Northwest in order to obtain information specific to North American Bird Conservation Regions (BCRs; see <http://www.nabci-us.org/map.html> and Fig. 1) 5 (Northern Pacific Rainforest), 9 (Great Basin), 10 (Northern Rocky Mountains), and 15 (Sierra Nevada), and Partner's in Flight (PIF) Physiographic areas (see <http://www.blm.gov/wildlife/pifplans.htm>) 93 (Southern Pacific Rainforests), 89 (Columbia Plateau),

64 (Central Rocky Mountains), and 66 (Sierra Nevada). This goal is to be achieved by accomplishing five objectives:

1. Establish a list of priority species and habitats within the Pacific Northwest Region.
2. Provide advice and recommend targets for optimum station longevity, continuity, and capture rates.
3. Suggest species and habitats most in need of enhanced MAPS coverage in the Pacific Northwest, should Federal agencies in the region have the opportunity to re-establish discontinued stations or establish new MAPS stations on their properties or those owned by others.
4. Determine the utility of existing MAPS stations in the Pacific Northwest by:
 - a. Suggesting which stations are most valuable and should be continued (from the standpoint of habitat coverage and capture rates of priority species), and which are least valuable and could be terminated with little consequence, or possibly replaced by new stations in more strategic locations.
 - b. Comparing capture rates and habitats sampled among stations and evaluating the relative contribution of each station in the larger context of habitat- or landscape-level bird conservation; and
5. Comment on whether or not Federal agencies should consider efforts toward conservation of western migrants on their wintering grounds, and how this might be accomplished through MoSI or other efforts.

METHODS

Adult Capture Rates and Station Longevity at MAPS Stations in the Pacific Northwest Region

We have found that 2.5 adults of a given species captured per year at a station is the minimum average annual capture rate needed to include data from the station in logistic regression analyses of spatial and temporal variation in productivity indices (proportion of young in the catch) for that species (DeSante et al. 2003). We have also found that a minimum average annual capture rate of about 25 adults of a given species per year from all stations pooled in any particular area generally allows us to model spatial and temporal variation in productivity for that species in that area using logistic regression. In addition, four consecutive or near-consecutive years of data are needed to obtain initial estimates of adult survival rates from Cormack-Jolly-Seber mark-recapture analyses using transient models (Pollock et al. 1990, Pradel et al. 1997, Nott and DeSante 2002), and the precision of such estimates increases with increasing numbers of years of data, up to at least 12 years (Rosenberg et al. 1999, 2000). Because the breeding productivity of landbirds is very sensitive to weather conditions, including those on the wintering grounds just prior to the breeding season (Nott et al. 2002), our experience is that 10-12 years of data are also necessary to meaningfully monitor the range in annual productivity indices. Thus, a mean capture rate of ≥ 2.5 adults per year of a given species at a given station and a minimum of four consecutive or near-consecutive years of operation was used to assess the monitoring potential of that station for that species, while a mean capture rate of ≥ 25 adults of a given species per year from all stations pooled in any BCR/habitat combination was used to assess the whether or not that species was being adequately monitored by MAPS within that BCR/habitat combination.

We calculated the mean capture rate of adult birds per year of operation for each species captured at each of the 224 stations operated in the region during the years 1989-2003 (the remaining 14 stations were first established in 2004 or 2005). In these calculations, each individual adult bird captured during a year (typically May 31-August 8, but beginning earlier or later at more southerly or northerly stations, respectively) was counted only once, regardless of the number of times it was captured that year. Only species considered regular breeders at each station (species for which at least one territorial male was known to have been a summer resident at the station during at least half of the years the station was operated; DeSante et al. 2005) were considered. These adult capture rates were

used to determine the monitoring potential of various species, and for evaluating the relative contribution of each station to the larger scheme.

In order to assess the actual usefulness for management of MAPS data collected at an existing station, or the potential usefulness of such data from a proposed station, it was necessary to consider several other factors in addition to the number of species and numbers of individuals of each species that could be captured at the station. These additional factors include the importance for management of the habitat in which the station is sited, the importance for management of the bird species sampled at the station, and the geographic location of the station relative to other stations and to the overall MAPS coverage of the geographic area. These considerations led to four additional critical components of this analysis: 1) the identification of habitats of special concern, 2) the identification of target species of special concern, 3) the identification of geographic areas where gaps exist in MAPS data, and 4) the identification of Federal lands where substantial numbers of individuals of the target species could likely be captured in appropriate habitat types and geographic areas.

Identifying Priority Habitats

We examined 13 published PIF state conservation plans for the Pacific Northwest (available at <http://www.blm.gov/wildlife/pifplans.htm>) to determine potential priority habitats of concern within the Northwestern Region. These included five plans covering parts of Washington and Oregon: Conservation Strategy for Landbirds in 1) Coniferous Forest (CF) of Western Oregon and Washington, 2) Lowlands and Valleys (LV) of Western Oregon and Washington, 3) the Cascade Mountains (CM) in Washington and Oregon, 4) the Columbia Plateau (CP) of Eastern Washington and Oregon, and 5) the Northern Rocky Mountains (NR) of Eastern Oregon and Washington. For the broader Northwest Region under consideration, we also consulted the Alaska Bird Conservation Plan (AK - Southeastern Region only), the Idaho Bird Conservation Plan (ID), the Montana Conservation Plan (MT), the Wyoming Conservation Plan (WY), the Utah Conservation Plan (UT), the Nevada Bird Conservation Plan (NV), and four California Bird Conservation Plans for 1) the Sierra Nevada Range (SN), 2) Coniferous Forests (CC), 3) Oak Woodlands (OW), and 4) Riparian Habitats (CR). We also consulted the National PIF priority habitats for Physiographic Areas 93 (Southern Pacific Rainforests), 89 (Columbia Plateau), 64 (Central Rocky Mountains), 66 (Sierra Nevada), and 80 (Basin and Range). Plans for these areas are also available at <http://www.blm.gov/wildlife/pifplans.htm>.

For each of the four BCRs (5, 9, 10, and 15), we identified three broad target habitats that were found in the BCR and that can effectively be monitored by MAPS stations. Priority habitats included Coniferous Forest (all four BCRs), Riparian Habitats (all four BCRs), Broadleaf Habitats (BCR5 and BCR15), and Scrub and Shrub-Steppe Habitats (BCR9 and BCR10). Several more localized habitats (Montane Meadow, Creekside, Aspen, Oak Woodland, Juniper, etc.) were placed into one of these four categories, and considered in combination with target species of concern. Grassland habitats were not included because MAPS is not effective at monitoring grassland species of birds. At each of the 238 MAPS stations we analyzed both habitat and species-capture data to categorize the station into one of the four broad habitat types, specific to the BCR in which it was located (Table 1). In cases where stations spanned one or more of our habitat classifications we chose that which seemed most appropriate given species composition; e.g., we classified most montane-meadow stations into Coniferous Forest rather than Riparian Habitats because more Coniferous Forest species were captured at these stations.

Great Basin Bioregional Boundary Issue

It should be emphasized that we have adhered in this report to established BCR boundaries, despite the fact that some of the boundaries appear to be inappropriate at the bioregional level; e.g., BCR9 (Great Basin) includes a substantial portion of the *west* slope of the Cascade Mountains in northern Washington. Thus, all eight MAPS stations established and operated on the Mt. Baker/Snoqualmie National Forest, that capture large numbers of such typical BCR5 (Northern Pacific Rainforest) species as Swainson's Thrush, Song Sparrow, Pacific-slope Flycatcher, Winter Wren, and Varied Thrush, were evaluated in this report for their effectiveness at capturing focal and priority species for BCR9, species that are typical of much more xeric habitats and that, for the most part, are not even present at those stations. Moreover, these stations were *not* evaluated for their effectiveness at capturing many of the species that are present at those stations, because they are not priority or focal species for BCR9. To correct this problem, we strongly recommend that the boundary between BCR5 and BCR9 be redrawn in northern Washington to better reflect physiological and ecological realities.

Identifying Priority Species

We identified 101 bird species captured in the Pacific Northwest Region during 1989-2003 that could be sampled effectively by MAPS protocol (Table 2; scientific names for all bird species mentioned in this table can be found in Appendix 1). We excluded species that we believed could not be effectively sampled by MAPS. These include waterbirds and marsh species, nocturnal species, raptors, upland gamebirds, highly colonial nesters, aerialist foragers (swallows and swifts), hummingbirds (not banded at most MAPS stations), and local species that are unlikely to be captured in sufficient quantity to be effectively monitored. Thus, a few landbird species of concern in the Pacific Northwest (e.g., Flammulated Owl *Otus flammeolus*, Vaux's Swift *Chaetura vauxi*, Lewis' Woodpecker *Melanerpes lewis*, and Grasshopper Sparrow *Ammodramus savannarum*) were excluded because we believe that MAPS would not provide the most affective means of monitoring the demography of these species. However, we included other target species that were *not* well represented in the existing MAPS database from the Pacific Northwest but were species that we believe could potentially be targeted in future MAPS efforts.

For each habitat type within the four BCRs, we selected a list of target species. Target species were selected as follows:

- 1) All species identified as priority or focal species (hereafter, "identified species") for that BCR and habitat by:
 - a) any of the 13 PIF State Conservation Plans noted above;
 - b) any of the four PIF Physiographic Areas noted above; **or**
 - c) by the USFWS (see <http://migratorybirds.fws.gov/reports/BCC02/BCC2002.pdf>) for Bird Conservation Regions 5 (Northern Pacific Forest), 9 (Great Basin), 10 (Northern Rockies), and 15 (Sierra Nevada) as part of the North American Bird Conservation Initiative (NABCI);
- 2) Species for which a net of two negative trends was observed in at least two of the following:
 - a) Breeding Bird Survey (BBS) data from 1966-2004 (Sauer et al. 2005; <http://www.mbr-pwrc.usgs.gov/bbs/reglist04.html>) in any of nine Physiographic Strata in the USFWS Pacific Region: Southern Pacific Rainforest (PR), Northern Pacific Rainforest (NP), Willamette Lowlands (WL), Cascade Mountains (CM), Pitt-Klamath Plateau (PK), Columbia Plateau (CP), Dissected Rockies (DR), Central Rockies (CR), and Sierra Nevada (SN);

- b) BBS data for 1980-2004 (Sauer et al. 2005; see above) in any of the same nine Physiographic Strata listed above; **or**
 - c) MAPS data from any of eight locations (consisting of six stations per location) operated by the Institute for Bird Populations on National Forests (*cf.* DeSante et al. 2004b) and National Parks as follows: Mount Baker National Forest, Washington (MB); Wenatchee National Forest, Washington (WE); Umatilla National Forest, Oregon (UM); Willamette National Forest, Oregon (WI); Siuslaw National Forest, Oregon (SI); Fremont National Forest, Oregon (FR); Flathead National Forest, Montana (FL); and Yosemite National Park, California (YO);
- 3) **Or** species for which a net of two positive trends was observed in at least two of the above data sets.

A net of two negative or positive trends was defined as at least two more of one trend than the other, using all available BBS and MAPS data specific to each BCR. Statistical cut-offs for positive and negative trends were P -values < 0.1 for BBS trends and absolute r -values > 0.3 using MAPS trends (*cf.* DeSante et al. 2004b). In some cases a net of one or three positive trends was used to ensure that 1-6 increasing species per habitat per BCR were targeted. Targeting species with positive population trends will allow us to compare demographic rates between those species and species with negative population trends in order to gain insight into the proximate demographic cause(s) of the population declines. All information used to select target species is listed in Table 2, with criteria specific to each BCR detailed in the footnotes to Tables 3-6.

To further rank each species and station we assigned a priority score of 3 to a species that was identified as a priority or focal species, a score of 2 if it exhibited a negative trend, and a score of 1 if it exhibited a positive trend. Thus, within each BCR, each target species receives a priority score between 1 (positive trend only) and 5 (identified and showing a negative trend). Non-target species receive scores of 0. We calculated a total species priority score as the sum of the scores for a species from all four BCRs. For each station, we then calculated an adjusted total species priority score for those species where adult capture rates were ≥ 2.5 adults per year, adjusted by BCR. Values potentially could range from 0 (no target species within that BCR caught at sufficient levels) to 100 (all target species within that BCR caught at sufficient levels).

Within each BCR, we assigned target species to one of the four priority habitat types defined above. Species associated with more than one habitat were assigned to the habitat in which we considered their conservation to be most critical.

Identifying Federal Lands for the Operation of MAPS Stations in the Pacific Region

We superimposed the locations of MAPS stations upon GIS layers of for agency landholders in the Pacific Northwest in order to identify geographical gaps in MAPS coverage and indicate where additional stations are needed. We also considered re-establishing stations that were no longer operating (or establishing replacement stations in proximity to those discontinued stations) and establishing additional stations to target priority habitats or priority species that currently are inadequately sampled.

From all of the information assembled regarding capture rates of species at stations, priority habitats for monitoring, target species, geographical gaps in MAPS coverage, and monitoring potentials of the various landholders of the Pacific Northwest, we suggest geographic area/habitat combinations in need of additional stations, should the landholders have resources to aid in that endeavor. We then provide recommendations specific to each Federal agency (BLM, USFS, NPS, FWS, BIA, and DoD) regarding the continued operation of existing MAPS stations, the re-establishment of discontinued stations, and the establishment of additional MAPS stations on those lands that offer the greatest monitoring potential. Finally, we comment on whether or not Federal agencies should consider efforts toward conservation of western migrants on their wintering grounds, and how this might be accomplished through MoSI or other efforts.

RESULTS AND DISCUSSION

Description of Stations in the Pacific Northwest

A list of all 238 stations operated in the Pacific Northwest between 1989 and 2005, arranged by Bird Conservation Region (BCR), state/province, landholder, and latitude, and containing information on years of operation, habitat, capture rates, adjusted priority species score, and recommendations for future operation, is presented in Table 1. Of these 238 stations, 138 are still active (in operation in 2005) whereas 100 have been discontinued. Totals of 101 stations (49 active) were located in BCR5, 60 (44 active) in BCR9, 48 (30 active) in BCR10, and 29 (15 active) in BCR15 (Fig. 2). Overall, the number of stations operated per state or province was: Washington – 36 (21 active), Oregon – 60 (47 active), Idaho – 8 (5 active), southeastern Alaska 6 (1 active), southern British Columbia – 9 (7 active), southwestern Alberta – 3 (all 3 active), western Montana – 19 (11 active), western Wyoming – 10 (5 active), extreme northern Utah – 1 (0 active), northern and western Nevada – 7 (4 active), and northern California – 79 (34 active). The number of stations by landholder was: Bureau of Land Management – 18 (13 active), U.S. Forest Service – 123 (61 active), National Park Service – 16 (12 active), U.S. Fish and Wildlife Service – 19 (7 active), Bureau of Indian Affairs – 9 (6 active), Departments of Defense and Energy – 4 (3 active), State or County Jurisdictions – 16 (11 active), Private Landholders – 21 (15 active), and Canadian Stations – 12 (10 active).

Capture Rates of Adult Birds at MAPS Stations in the Pacific Northwest

The total number of station-years of operation during 1989-2003 for the 224 stations operated during those years, was 1491 (range 1-15 per station; summarized in Table 1), with a mean of 6.66 years of operation per station. The number of those 224 stations with at least four consecutive or near-consecutive years of operation (allowing sufficient data for estimates of survival) was 144. The cumulative number of mean adults captured per year, of breeding species, was 159,454, resulting in an average mean of 104.57 (range 9.00-253.33) individual adults captured per station per year. The cumulative number of species for which a mean of at least 2.5 adults were captured per year, per station, was 2315, resulting in an average of 9.99 (range 2-25) species per station. Adjusted cumulative priority species scores ranged from 0 (three stations) to 49 (one station) with a mean of 17. Thus, stations with >10 species that can be monitored, >104 breeding adults captured per year, and/or species priority scores of 18 or more are considered to be above-average stations for capture rate and general ability to monitor landbirds.

Species Captured and Selection of Target Species

Table 2 provides a listing of the 101 species of landbirds that were captured as breeding species within the Pacific Northwest Region and for which we believe their demographics can be effectively monitored by MAPS. Table 2 also presents capture rates, priority and focal species identifications and population trends used to determine whether or not the species should be selected as a target species within each BCR (see Tables 3-6), and the cumulative species priority score for each of these species. The number of stations at which a mean of at least 2.5 adults per year were captured ranged from 0 (for 23 of the 101 species; Table 2) to 128 (American Robin and Song Sparrow). The 12 most commonly captured species, according to the sum over all stations of the mean number adults captured per year, were Swainson's Thrush (sum of mean adults captured = 1682), Song Sparrow (1553), MacGillivray's Warbler (1052), Dark-eyed Junco (1045), Yellow Warbler (984), American Robin (929), Wilson's Warbler (722), Warbling Vireo (608), Yellow-rumped Warbler (534), Black-headed Grosbeak (534), Lincoln's Sparrow (410), and Purple Finch (404). The 13 least commonly captured species according to this same criterion were Clark's Nutcracker (0.08), Yellow-headed Blackbird (0.18), Rose-breasted Grosbeak (0.33), Ladder-backed Woodpecker (0.50), American Three-toed Woodpecker (0.67), Pygmy Nuthatch (0.82), American Dipper (1.09), Blackpoll Warbler (1.20), Acorn Woodpecker (1.47), Rock Wren (1.50), California Towhee (2.07), Ash-throated Flycatcher (2.14) and Red Crossbill (2.14). Many of these least common species are found only in the periphery of the Pacific Northwest and are thus not species of concern in the BCRs considered here.

Cumulative Species Priority Scores according to our criteria (see Methods) ranged from 0 (24 species that were not identified as priority or focal species [hereafter "identified species"]) and did not have either positive or negative trends in any BCR) to 18 (Olive-sided and Willow flycatchers, each of which was identified in all four BCRs and was declining in BCR5, BCR10, and BCR15) out of a maximum score of 20. The species with the highest priority scores (≥ 12) were Olive-sided Flycatcher (18), Willow Flycatcher (18), Dusky Flycatcher (16), Western Tanager (15), White-headed Woodpecker (13), Hammond's Flycatcher (13), Yellow Warbler (13), MacGillivray's Warbler (13), Chipping Sparrow (13), Brown Creeper (12), Golden-crowned Kinglet (12), and Song Sparrow (12). These generally represent species of concern that are widely distributed throughout the Pacific Northwest. Many more localized species, of equal conservation concern, received lower scores because they were only found in one or two of the BCRs.

MAPS Coverage of Priority Habitats and Target Landbird Species Within Each Bird Conservation Region.

Within each of the four Bird Conservation Regions (BCRs) of the Pacific Northwest (Figure 1), Figure 3 indicates the locations of all stations along with their habitat category and whether or not they are active, while Tables 3-6 present our target species selections by habitat, and give information on their status as priority or focal species, trends, and capture rates. Here we summarize, for each BCR the relative coverage of target species by habitat.

A. Bird Conservation Region 5, Northern Pacific Rainforest

BCR5 extends from southeastern Alaska to northwestern California, along the west slope of the Coast Mountains of British Columbia and Cascade Mountains of Washington (except as noted above) and Oregon, and through the Siskiyou and Coast Ranges of northern California (Fig. 1 shows a portion of this). The three broad habitat types that we have defined within BCR5 are Coniferous Forests, Riparian Habitats, and Broadleaf Habitats. From 1989-2005, 101 MAPS stations were operated in BCR5, of which 49 remained active in 2005 (Table 1). Among the three broad habitat types, 34 stations (15 active) were located in Coniferous Forest, 39 stations (24 active) were located in Riparian Habitats, and 28 stations (10 active) were located in Broadleaf Habitats (Fig. 3), indicating relatively even coverage by habitat in BCR5.

BCR5 is covered by all or part of seven State Conservation Plans, four BBS Physiographic Strata, and three MAPS locations for which population trends are available (Table 3). Based on criteria including identification as a priority or focal species in at least one State, PIF, or NABCI conservation plan for the BCR, and/or a net of two negative or positive trends according to BBS and MAPS data (see Methods and Table 3), we developed a list of 55 target species that we believe should be emphasized by the MAPS program in BCR5. Twenty-four of these species are primarily found in Coniferous Forests, 19 in Riparian Habitats, and 12 in Broadleaf Habitats (Table 3).

Within BCR5, adequate mean capture rates (≥ 25 adults/year) are currently being achieved for 12 of the 24 Coniferous Forest target species, including six of the nine priority 5 or priority 4 species (Table 3). The 12 species with inadequate coverage are: Red-breasted Sapsucker, White-headed Woodpecker, Olive-sided Flycatcher, Cassin's Vireo, Steller's Jay, Red-breasted Nuthatch, Brown

Creeper, Golden-crowned Kinglet, Varied Thrush, Black-throated Gray Warbler, Townsend's Warbler, and Evening Grosbeak. Of these 12 species (Table 3), Olive-sided Flycatcher received a priority score of 5 for BCR5 (identified and declining), Red-breasted Nuthatch and Golden-crowned Kinglet received a priority score of 4 (identified and increasing), Evening Grosbeak received a priority score of 2 (decreasing but not identified), and the remaining eight species received a score of 3 (identified but no trend). When data from discontinued stations are included, five (Red-breasted Sapsucker, Cassin's Vireo, Steller's Jay, Brown Creeper, and Varied Thrush) of these 12 species had adequate capture rates for the region and two others (Black-throated Gray Warbler and Evening Grosbeak) nearly had adequate rates (24.73 and 22.42, respectively). This indicates a good potential to obtain adequate capture rates by re-establishing discontinued stations or establishing replacement stations in appropriate habitats.

Adequate capture rates (≥ 25 adults/year) are also currently being achieved for 15 of the 19 Riparian Habitat target species within BCR5, including all nine priority 5 or priority 4 species (Table 3). The four inadequately covered species are Downy Woodpecker, Red-eyed Vireo, House Wren, and Lincoln's Sparrow, all of which received a priority score of 3 (identified but no trend). Three of these four species (all but the vireo), however, had adequate capture rates when data from discontinued stations were included, indicating a good potential to obtain adequate capture rates by re-establishing discontinued stations or establishing replacements in appropriate habitats.

In contrast, adequate capture rates (≥ 25 adults/year) are currently being achieved for only four of the 12 Broadleaf Habitat target species within BCR5, including one of the two priority 5 species (Table 3). The eight species with inadequate coverage are: Ash-throated Flycatcher, Hutton's Vireo, Western Scrub-Jay, Oak Titmouse, Western Bluebird, Chipping Sparrow, Vesper Sparrow, and House Finch. One of these eight species, Chipping Sparrow, received a priority score of 5 for BCR5 (identified and declining), five species (Hutton's Vireo, Western Scrub-Jay, Oak Titmouse, Western Bluebird, and Vesper Sparrow) received a score of 3 (identified but no trend), one (Ash-throated Flycatcher) received a score of 2 (declining but not identified), and the remaining species (House Finch) received a score of 1 (increasing but not identified). Only the House Finch, however, had an adequate capture rate when data from discontinued stations were included. Clearly, additional stations in Broadleaf Habitat or stations that are capable of capturing Broadleaf Habitat species are needed in BCR5.

B. Bird Conservation Region 9, Great Basin

BCR9 covers much of Eastern Washington and Oregon, including the Pitt-Klamath and Columbia plateaus. It also extends north into central-southern British Columbia and south and west to cover southern Idaho, northeastern and extreme central-eastern California, northern Nevada, and extreme northern Utah (Fig. 1). The three broad habitat types that we have defined within BCR9 are Coniferous Forests, Riparian Habitats, and Shrub-Steppe Habitats. From 1989-2005, 60 MAPS stations were operated in BCR9, of which 44 remained active in 2005 (Table 1, Fig. 1). Among the three broad habitat types, 23 stations (18 active) were located in Coniferous Forest, 32 stations (26 active) were located in Riparian Habitats, and 5 stations (0 active) were located in Shrub-Steppe (Fig. 3), indicating a current dearth of stations in Shrub-Steppe Habitats.

BCR9 is covered by all or part of five State Conservation Plans two BBS Physiographic Strata, and two MAPS locations for which population trends are available (Table 4). Based on criteria including identification as a priority or focal species in at least one State, PIF, or NABCI conservation plan for the BCR, and/or a net of two negative or positive trends according to BBS and MAPS data (see Methods and Table 4), we developed a list of 46 target species that we believe should be emphasized by the MAPS program in BCR9. Fifteen of these species are primarily found in Coniferous Forests, 15 in Riparian Habitats, and 16 in Scrub or Shrub-Steppe habitats (Table 4).

Within BCR9, adequate capture rates (≥ 25 adults/year) are currently being recorded for six of the 15 Coniferous Forest target species (Table 4). The nine species with inadequate coverage are:

Williamson's Sapsucker, White-headed Woodpecker, Olive-sided Flycatcher, Cassin's Vireo, Red-breasted Nuthatch, Brown Creeper, Varied Thrush, Hermit Warbler, and Fox Sparrow. Two of these nine species (Cassin's Vireo and Red-breasted Nuthatch) received a priority score of 1, while Fox Sparrow received a priority score of 2. The remaining six inadequately sampled species received a priority score of 3. Only Red-breasted Nuthatch had very nearly an adequate capture rate (24.99) for the region when data from discontinued stations were included.

Adequate capture rates (≥ 25 adults/year) are currently being recorded for eight of the 15 Riparian Habitat target species within BCR9, including the only species with a priority of 4 (Table 4). The seven species with inadequate coverage are: Red-naped Sapsucker, Willow Flycatcher, Western

Kingbird, Gray Catbird, Orange-crowned Warbler, Wilson's Warbler, and Yellow-breasted Chat. Four of these seven species received priority scores of 3, while one (Orange-crowned Warbler) and two (Western Kingbird and Gray Catbird) received priority scores of 2 and 1, respectively. When data from discontinued stations were included, two (Orange-crowned Warbler and Yellow-breasted Chat) of these seven species had adequate capture rates for the region while one other (Willow Flycatcher) very nearly had an adequate capture rate (24.95). This indicates a good potential to obtain adequate capture rates by re-establishing discontinued stations or establishing replacement stations in appropriate habitats.

Adequate capture rates (≥ 25 adults/year) are currently being recorded for only two (Spotted Towhee and House Finch) of the 16 Scrub and Shrub-Steppe Habitat target species within BCR9 (Table 4). Since there are no active stations in Scrub/Shrub-Steppe Habitats in BCR9, these species are being captured at stations that are located in other habitats. Two of the 14 inadequately sampled species (Brewer's Sparrow and Sage Sparrow) received priority scores of 5 for BCR9, one (Gray Flycatcher) received a priority score of 4, four (Western Bluebird, Mountain Bluebird, Black-throated Gray Warbler, and Vesper Sparrow) received a score of 3, and the remaining seven species received scores of 1 or 2 (Table 4). Three of these 14 species (Bushtit, Brewer's Sparrow, and Sage Sparrow) had adequate capture rates for the region when data from discontinued stations were included, indicating a good potential to obtain adequate capture rates by re-establishing discontinued stations or establishing replacement stations in appropriate habitats.

C. Bird Conservation Region 10, Northern Rocky Mountains

BCR10 extends from central British Columbia and extreme western Alberta, south through northeastern Washington, northern Idaho, and western Montana, to central-eastern Oregon, southern Idaho, and western Wyoming (Fig. 1). As in BCR9, the three broad habitat types that we have defined in BCR10 are Coniferous Forests, Riparian Habitats, and Scrub and Shrub-Steppe Habitats. From 1989-2005, 48 MAPS stations were operated in BCR10, of which 30 remained active in 2005 (Table 1, Fig. 1). Among the three broad habitat types, 16 stations (7 active) were located in Coniferous Forest, 32 stations (23 active) were located in Riparian Habitat, and no discontinued or active stations were located in Scrub and Shrub-Steppe, again documenting the dearth of stations in Shrub-Steppe Habitats (Fig. 3).

BCR10 is covered by all or part of four State Conservation Plans, two BBS Physiographic Strata, and two MAPS locations for which population trends are available (Table 5). Based on criteria including identification as a priority or focal species in at least one State, PIF, or NABCI conservation plan for the BCR, and/or a net of two negative or positive trends according to BBS and MAPS data (see Methods and Table 5), we developed a list of 48 target species that we believe should be emphasized by the MAPS program in BCR10. Twenty-two of these species are primarily found in Coniferous Forests, 17 in Riparian Habitats, and 9 in Scrub and Shrub-Steppe Habitats (Table 5).

Within BCR10, adequate capture rates (≥ 25 adults/year) are currently being recorded for only eight of the 22 Coniferous Forest target species, including only two of the five priority 5 or priority 4 species (Table 5). Two of the 14 inadequately covered species, Olive-sided Flycatcher and Varied Thrush, received a priority score of 5 for BCR10, one species (Winter Wren) received a score of 4, six species (Williamson's Sapsucker, White-headed Woodpecker, Hammond's Flycatcher, "Western" Flycatcher, Brown Creeper, and Hermit Thrush) received a score of 3, and five species received scores of 1 or 2 (Table 5). Only one of these 14 species (Hammond's Flycatcher) had an adequate capture rates for the region when data from discontinued stations are included.

In contrast, adequate capture rates (≥ 25 adults/year) are currently being recorded within BCR10 for all but two (Eastern Kingbird [priority score 1] and Red-eyed Vireo [priority score 5]) of the 17 Riparian target species (Table 5). The vireo, however, had an adequate capture rate for the region when data from discontinued stations are included.

In further sharp contrast, adequate capture rates (≥ 25 adults/year) are currently being recorded for none of the nine Scrub and Shrub-Steppe target species within BCR10 (Table 5). Two of the nine species, Brewer's and Vesper sparrows, received a priority score of 5 for BCR10; the remainder received scores of only 1 or 2 (Table 5). None of these nine species had adequate capture rates for the region when data from discontinued stations are included.

D. Bird Conservation Region 15, Sierra Nevada

BCR15 is restricted to the central-eastern portion of California and extreme central-western Nevada and includes all of the Sierra Nevada Range above the western foothill belt (Fig. 1). The three broad

habitat types that we have defined within BCR15 are Coniferous Forests, Riparian Habitats, and Broadleaf Habitats. From 1989-2005, 29 MAPS stations were operated in BCR15, of which 15 remained active in 2005 (Table 1, Fig. 1). Among the three broad habitat types, 18 stations (10 active) were located in Coniferous Forest, 6 stations (4 active) were located in Riparian Habitats, and 5 stations (1 active) were located in Broadleaf Habitats (Fig. 3), indicating relatively fair coverage of Coniferous Forests but poor coverage of Riparian and Broadleaf Habitats in BCR15.

BCR15 is covered by three State Conservation Plans, one BBS Physiographic Strata, and one MAPS location for which population trends are available (Table 6). Based on criteria including identification as a priority or focal species in at least one State, PIF, or NABCI conservation plan for the BCR, and/or a net of two negative or positive trends according to BBS and MAPS data (see Methods and Table 6), we developed a list of 42 target species that we believe should be emphasized by the MAPS program in BCR15. Twenty-one of these species are primarily found in Coniferous Forests, 14 in Riparian Habitats, and 7 in Broadleaf Habitats (Table 6).

Within BCR15, adequate capture rates (≥ 25 adults/year) are currently being recorded for 10 of the 21 Coniferous Forest target species, including only two (Western Wood-Pewee and Western Tanager) of the seven priority 5 or priority 4 species (Table 6). The 11 species with inadequate coverage are: White-headed Woodpecker, Olive-sided Flycatcher, Hammond's Flycatcher, Cassin's Vireo, Steller's Jay, Brown Creeper, Golden-crowned Kinglet, Ruby-crowned Kinglet, Hermit Thrush, Chipping Sparrow, and Cassin's Finch. Four of these 11 species (Olive-sided Flycatcher, Golden-crowned Kinglet, Chipping Sparrow, and Cassin's Finch) received a priority score of 5 for BCR15, one (White-headed Woodpecker) received a score of 4, and the remaining six (Hammond's Flycatcher, Steller's Jay, Cassin's Vireo, Brown Creeper, Ruby-crowned Kinglet, and Hermit Thrush) each received a score of 3. When data from discontinued stations are included, six (Hammond's Flycatcher, Cassin's Vireo, Brown Creeper, Golden-crowned Kinglet, Chipping Sparrow, and Cassin's Finch) of these 11 species had adequate capture rates for the region, indicating a good potential to obtain adequate capture rates by re-establishing discontinued stations or establishing replacement stations in appropriate habitats.

Adequate capture rates (≥ 25 adults/year) are currently being recorded for eight of the 14 Riparian target species within BCR15, including four of the six priority 5 or priority 4 species (Table 6). The

six species with inadequate coverage are: Downy Woodpecker, Willow Flycatcher, Swainson's Thrush, White-crowned Sparrow, Brewer's Blackbird, and Brown-headed Cowbird. Two of these six species (Willow Flycatcher and Swainson's Thrush) received a priority score of 5, one (White-crowned Sparrow) received a priority score of 3, and the remaining three species received a score of 2. Only one of these six species (White-crowned Sparrow) had adequate capture rates for the region when data from discontinued stations are included.

Within BCR15, adequate capture rates (≥ 25 adults/year) are currently being recorded for none of the seven Broadleaf Habitat target species (Table 6). The seven species with inadequate coverage, therefore, are: Western Scrub-Jay, Wrentit, Nashville Warbler, Black-throated Gray Warbler, Spotted Towhee, House Finch, and Lesser Goldfinch. Two of these seven species (Wrentit and Black-throated Gray Warbler) received a priority score of 3 for BCR15 and the remaining five species received a score of 2 or 1. When data from discontinued stations are included, two (Nashville Warbler and Spotted Towhee) of the six species had adequate capture rates for the region, and another species (Lesser Goldfinch) had nearly an adequate rate (22.60), indicating a good potential to obtain adequate capture rates by re-establishing discontinued stations or establishing replacement stations in appropriate habitats.

MAPS Coverage of Target Species Within Each Habitat Category

Based on the information presented in the previous section, Figure 3, and Tables 3-6, we summarize needs and potential contributions of the MAPS program within our four defined, broad habitat types. We also discuss the potential for monitoring 46 species with inadequate coverage by MAPS in at least one BCR by 1) re-establishing discontinued MAPS stations, 2) establishing additional MAPS stations, or 3) monitoring vital rates of the species by means other than MAPS.

A. MAPS Coverage in Coniferous Forests

Coniferous Forests were selected as an important broad habitat type for all four Bird Conservation Regions (BCRs), Northern Pacific Rainforest (BCR5), Great Basin (BCR9), Northern Rocky Mountains (BCR10), and Sierra Nevada (BCR15). Among the four BCRs there have been a total of 91 MAPS Stations operated in coniferous forests, of which 50 remain active. Of 34 coniferous bird species identified for at least one BCR, 14 species currently have adequate coverage in all or most

BCRs for which they are targeted, including species of widespread concern such as Western Wood-Pewee, Dusky Flycatcher, Swainson's Thrush (in BCR5), Western Tanager, and Dark-eyed Junco. This indicates relatively good coverage of this habitat type by the MAPS program within the Pacific Northwest. Nevertheless, there are 20 target species for which coverage at MAPS stations was deemed inadequate in at least one BCR for which the species-priority score ≥ 3 . Here we summarize the potential for the MAPS program to increase its coverage for each of these species.

Williamson's Sapsucker. This is an identified species (without trends) with inadequate coverage by MAPS stations in both BCR9 (current capture rate 2.09 adults/year) and BCR10 (0.42). In neither BCR did the capture rate improve when data from discontinued stations are included. Because it is nowhere common and appears to be difficult to capture at adequate rates by MAPS, we do not recommend establishing further stations for this species in BCR9 and BCR10. We recommend observational techniques on the breeding grounds (e.g., Vickery et al. 1992) as the best method for monitoring productivity in this species.

Red-breasted Sapsucker. This is a target species in BCR5, BCR9, and BCR15. Adequate capture rates at MAPS stations are currently occurring in BCR9 and BCR15 but not in BCR5, where current rates are 21.57 adults per year, but rates are adequate (38.74) when discontinued stations were included. Discontinued stations from BCR5 with the highest capture rates are the Hoonah station in the Tongass National Forest, AK (3.67 adults per year), and the Emmy's Place station in the Trinity National Forest, Trinity County, CA (5.00 adults per year). We recommend re-establishing these stations or establishing replacement stations.

White-headed Woodpecker. This is an identified priority or focal species for all four BCRs, showing current capture rates of 0.00 in BCR5, BCR9, and BCR10, and a rate of 4.27 in BCR15. Where populations are declining the most (BCR9 and BCR10) we do not believe that it will be captured in sufficient numbers to monitor with MAPS, and thus we recommend observational techniques on the breeding grounds (e.g., Vickery et al. 1992).

Olive-sided Flycatcher. This is an identified species for all four BCRs and shows declining trends in three of the four (all but BCR9). Current capture rates at MAPS stations are low: 1.18 adults per year in BCR5, 0.00 in BCR9, 0.25 in BCR10, and 1.32 in BCR15, with little improvement when data from

discontinued stations are added. Because it is nowhere common and generally remains in the canopy where it cannot be captured at sufficient rates, we do not recommend that additional MAPS stations be established for this species. We recommend instead observational techniques on the breeding grounds (e.g., Vickery et al. 1992) as the best method of monitoring productivity in this species.

Hammond's Flycatcher. This is a target species in all four BCRs. Capture rates are currently adequate in BCR5 and BCR9 but inadequate in BCR10 and BCR15. In both of these latter BCRs, capture rates were adequate when data from discontinued stations are included. Discontinued stations with good capture rates of Hammond's Flycatchers include the Mount Spokane station in Mount Spokane State Park, Spokane County, WA, in BCR10 (4.17 adults per year), and the Yuba Pass (11.38) and Sierra Nevada (4.08) stations in the Tahoe National Forest, Sierra County, California. We recommend re-establishing these stations and/or establishing others within BCRs 10 and 15 to increase the capture rates of this species.

"Western" Flycatcher. This is a target species-group in BCR5 and BCR10. It is identified and showing a declining trend in BCR5; however, it is currently being captured at sufficient rates at MAPS stations (117.72 adults per year) to monitor it here. In BCR10 it is an identified species showing no trend and captured at insufficient rates for monitoring (1.50; the capture rate when discontinued stations are added improves to 4.50). Because the population in BCR10 represents a different species (Cordilleran Flycatcher) from that of BCR5 (Pacific-slope Flycatcher), we recommend establishing additional MAPS stations to target this species. It has only been captured at two MAPS stations, the Beartooth station (active) on state land in the Beartooth Wildlife Management Area, Lewis and Clark County, MT (capture rate 1.50) and the McCullen Unit station (discontinued) on Seedskaadee National Wildlife Refuge, Sweetwater County, WY (3.33). We recommend continuing the Beartooth station, re-establishing the McCullen Unit station, and establishing new stations on BLM, USFS, or BIA lands in BCR10 to further monitor this identified species.

Cassin's Vireo. This species is a target species in all four BCRs; it is an identified species in BCRs 5 and 15 and is increasing in BCRs 9 and 10. In all four BCRs current capture rates are inadequate (9-20 adults per year); however, they were adequate in BCR5 and BCR15 when data from discontinued stations are added, indicating the potential to capture adequate samples by re-establishing or

establishing additional stations. Discontinued stations with the highest capture rates (> 3 adults per year) include the Carberry Creek station in the Rogue River National Forest, Jackson County, OR, the Buck Ranch station in the Siskiyou National Forest, Calaveras County, CA, and the Ramelli Ranch station in the Tahoe National Forest, Plumas County, CA. We recommend re-establishing these stations and establishing others to increase the capture rates of Cassin's Vireos in all four BCRs (Fig. 4).

Steller's Jay. This is an identified species (without trends) for BCR5 and BCR15, and is a target species due to an increasing trend in BCR10. It currently has inadequate capture rates in all three of these BCRs and appears to be nowhere abundant enough to easily capture in adequate numbers. Because it is only targeted due to increasing rates in BCR10 and is more of a focal species than a species of concern in BCRs 5 and 15, we do not recommend establishing additional MAPS stations for this species.

Red-breasted Nuthatch. This is a target species in BCR5 and in BCR9 but is not captured in adequate numbers in either region. Populations of this species fluctuate widely and are somewhat erratic, making them difficult to monitor with MAPS protocol. Because it is increasing and shows near-adequate capture rates in BCR5, we do not recommend establishing or re-establishing additional MAPS stations for this species.

Brown Creeper. This is identified as a focal species in all four BCRs, where it is currently showing inadequate capture rates at MAPS stations. Capture rates were adequate in BCR15 when data from discontinued stations are added, particularly from the Yuba Pass station in Tahoe National Forest, Sierra County, CA, and the Whitmore Meadows station in Siskiyou National Forest, Amador County, CA. We recommend re-establishing these stations and establishing others to increase the capture rates of Brown Creepers in all four BCRs.

Winter Wren – This species is identified (without a trend) for BCR5, where it is captured at adequate rates at MAPS stations (55.38 adults per year) and in BCR10 (where it is also increasing) but is not captured at adequate rates (4.75). No discontinued station in BCR10 captured more than 1.00 adults per year and, because it is generally captured in adequate rates throughout the Pacific Northwest and

is not a declining species, we do not recommend establishing additional MAPS stations for this species in BCR10.

Golden-crowned Kinglet. This is a target species in BCR5, BCR10, and BCR15 but is only captured in adequate numbers in BCR10. Adequate capture rates were obtained in BCR15 when data from discontinued stations are included, particularly the Yuba Pass station in Tahoe National Forest, Sierra County, CA. We recommend re-establishing this station to increase capture rates of Golden-crowned Kinglets. This species appears to be too local in BCR5 to recommend expending more effort for this species in this region.

Ruby-crowned Kinglet. This is a target species only in BCR15 (identified and showing no trend, but there are probably too few BBS routes at the higher elevations where it occurs; we believe that it is decreasing in BCR15), where no individuals have been captured at any active or discontinued MAPS station. It is captured at adequate numbers in BCR9 (59.90) and appears to be too local to capture in significant numbers in BCR15; thus we do not recommend establishing additional MAPS stations for this species in BCR15. Clearly additional trend information for this species in BCR15 is needed.

Hermit Thrush. This is a focal species (without apparent trends, although interior races have shown sharp BBS declines in recent years) being captured at inadequate rates at MAPS stations in BCR10 (6.50 adults per year) and BCR15 (6.53) but adequate rates in BCR5 (32.91) and BCR9 (29.95). All captures in BCR10 have occurred at Umatilla National Forest, OR, so we suggest that it is appropriate to establish additional MAPS stations at other breeding sites in BCR10. In BCR15, moderately good numbers (2.85 adults per year) were captured at the Yuba Pass station in Tahoe National Forest, Sierra County, CA, which was discontinued in 2004. We recommend re-establishing this station and establishing other stations on National Forests in the Sierra Nevada and elsewhere to increase capture rates of Hermit Thrushes in BCR10 and BCR15.

Varied Thrush. This is an identified species in BCR5 (where it shows no trend) and BCR10 (where it is also declining). In neither BCR are there currently adequate capture rates at MAPS stations: 8.66 adults per year in BCR5 and 0.50 adults per year in BCR10. In both regions capture rates were higher when data from discontinued stations are added: 34.87 in BCR5 and 3.51 in BCR10. Because this is a declining species of concern that is specific to the Pacific Northwest and is readily monitored by the

MAPS program, we recommend re-establishing and/or establishing new MAPS stations to increase the capture rate. Discontinued stations with high capture rates include Hoonah, Ward Creek, and Yakutat in the Tongass National Forest, AK (capture rates 6.22, 6.00, and 3.22 adults per year, respectively); Lost Man Creek in Redwood National Park, Humboldt County, CA (3.22), and Mount Spokane in Mount Spokane State Park, Spokane County, WA (1.33). We also recommend looking for other appropriate areas on BLM and USFS lands to establish new MAPS stations for this species (Fig. 5). The discontinued Mike's Meadow station on BLM land in Clakamas County, OR, had capture rates of 0.67 adult Varied Thrushes per year and may be an area in which to investigate the establishment of new stations.

Black-throated Gray Warbler. This species occurs in different habitats in different regions, being identified as a focal Coniferous Forest species for BCR5, a species of juniper habitats (which we classify as Scrub) in BCR9, and a species of Broadleaf Habitats in BCR15. In BCR5 it is currently being captured at inadequate rates (5.63 adults per year) but when all stations are included the rates were nearly adequate (24.73). Discontinued stations with good capture rates of Black-throated Gray Warblers include Kanipe Pass on state land in Douglas County, OR (4.00 adults per year), Pigeon Butte on William L. Finley National Wildlife Refuge, Benton County, OR (3.50), and the Humbug Creek station in Klamath National Forest, Siskiyou County, CA (3.00). We recommend re-establishing these stations or establishing other stations in these or appropriate other areas to increase the capture rate of this species in BCR5 (Fig. 6). See also recommendations for this species under Broadleaf and Scrub/Shrub-Steppe habitats.

Townsend's Warbler. This is identified as a target species in BCR5, where it breeds only in northern portions of the region, and in BCR10, where it is more widespread. Adequate capture rates are currently being obtained at MAPS stations in BCR10 (67.86 adults per year) but not in BCR5 (1.00 adults per year). When all BCR5 stations are included the capture rate increased only to 10.67, primarily due to the addition of stations from Alaska. Because it only breeds in the northern sections of this BCR, we do not recommend re-establishing or establishing additional MAPS stations to capture more Townsend's Warblers in BCR5.

Hermit Warbler. This is a target species in BCR5 (63.33 adults per year), BCR9 (13.00 both currently and when data from discontinued stations are added), and BCR15 (45.63). Because it is

found only peripherally in BCR9 and has adequate capture rates in the two BCRs within the heart of its range, we do not recommend establishing additional stations for this species in BCR9.

Chipping Sparrow. This is a target species in coniferous habitats of BCR10 (where there are currently adequate capture rates: 43.33 adults per year) and BCR15 (where current rates are not quite adequate: 22.08 adults per year). We recommend re-establishing the Buck Ranch, Morrison, and the Ramelli Ranch stations in the Tahoe and Siskiyou National Forests, CA, to increase the capture rates of Chipping Sparrows in BCR 15. See also recommendations (below) for this species in Broadleaf Habitats.

Cassin's Finch. This is a target species in BCR10 (where no birds have been caught at MAPS stations) and BCR15 (where the capture rate is currently inadequate, 19.84, but was adequate, 40.97, when data from discontinued stations are added). We recommend re-establishing the Yuba Pass (former capture rate 3.46 adults per year), Freeman Meadow (3.50), Perazzo Meadow (4.17), and especially the Morrison (11.00) stations, in the Tahoe and Siskiyou National Forests, CA, to increase the capture rate of Cassin's Finches in BCR15.

Evening Grosbeak. This species has not been identified as a priority or focal species but is declining in both BCR5 and BCR10. Capture rates at MAPS stations are inadequate in both BCRs both currently (3.00-7.14 adults per year), and when data from discontinued stations are added (8.14-22.42). Populations of this species fluctuate widely and are somewhat erratic, making them difficult to monitor with MAPS protocol; thus, we do not recommend establishing or re-establishing additional MAPS stations for this species.

B. MAPS Coverage in Riparian Habitats

Riparian Habitats were selected as an important broad habitat type for all four Bird Conservation Regions (BCRs), Northern Pacific Rainforest (BCR5), Great Basin (BCR9), Northern Rocky Mountains (BCR10), and Sierra Nevada (BCR15). Among the four BCRs there have been a total of 109 MAPS Stations operated in Riparian Habitats, of which 77 remain active. Of 31 riparian bird species targeted for at least one BCR, 20 of them currently have adequate coverage in all or most targeted BCRs, including focal species or species of concern such as Black-capped Chickadee, Bushtit, Yellow Warbler, MacGillivray's Warbler, Black-headed Grosbeak, and Song Sparrow. This

indicates relatively good coverage of this habitat type by the MAPS program within the Pacific Northwest. There are 11 target species for which coverage at MAPS stations was deemed inadequate in at least one BCR for which the species-priority score ≥ 2 . Here we summarize the potential for the MAPS program to increase its coverage for each of these species.

Red-naped Sapsucker. This is an identified species in BCR9 where current capture rates at MAPS stations are inadequate (10.43 adults per year), and BCR10 where they are adequate (44.61). The rate in BCR9 when data from discontinued stations are added was not improved substantially, being 11.03 adults per year. Nevertheless, we recommend considering the establishment of additional stations in BCR9 to increase the capture rate of this focal species.

Downy Woodpecker. This is an identified species in both BCR5 and BCR15. In both regions the current capture rate at MAPS stations is inadequate: 18.44 adults per year and 3.36 adults per year, respectively. In BCR5 the capture rate when data from discontinued stations is added was adequate (34.41); however, at no discontinued station in either BCR were more than 3.00 adults captured per year, so we do not recommend establishing extra MAPS stations for this species.

Willow Flycatcher. This species is identified for all four BCRs and shows declining trends in BCR5 and BCR10, and has very nearly been extirpated from BCR15 (Fig. 7). Capture rates at MAPS stations are adequate in BCR5 (41.37 adults per year) and BCR10 (145.75) but inadequate in BCR9 (23.75) and BCR15 (2.00). Because populations of this species show geographic variation, we recommend re-establishing or establishing new MAPS stations on USFS or BLM lands in BCR9. The species may now be too rare in BCR15 to monitor effectively with MAPS stations, but we recommend re-establishing the Perazzo Meadow station in Tahoe National Forest, Sierra County, CA (capture rate 3.50) and perhaps establishing new stations elsewhere on National Forests in BCR15 where the species still exists in order to link data from these stations to other data being collected on this species in the Sierra Nevada.

Red-eyed Vireo. This is a target species (no trend) in BCR5 and BCR10. Its current capture rate at MAPS stations in both regions is inadequate (1.71 adults per year in BCR5 and 15.17 in BCR10). Because it is nowhere common and the populations being monitored are on the periphery of this species widespread range, we do not recommend increasing effort for this species in BCR5. In

BCR10 we recommend re-establishing the Skunk Cabbage station near Albert Canyon, BC, where capture rates were 5.80 adults per year, and considering the establishment of other stations to increase capture rates in this region.

House Wren. This is an identified species (without trend) only in BCR5, where there currently is an inadequate capture rate at MAPS stations (6.07 adults per year); current capture rates are adequate in BCR9 (174.20) and BCR10 (72.82). Discontinued stations in BCR5 with high capture rates of House Wrens include Bachelor Point on Ridgefield National Wildlife Refuge, Clark County, WA (12.70 adults per year) and Oak Island on state land in the Sauvie Island Management Area, Multnomah County, OR (9.20). We recommend re-establishing these two stations to capture more House Wrens in BCR5.

Swainson's Thrush. This is a target species in BCR9 (where it is declining but currently has adequate capture rates on MAPS stations: 105.02 adults per year) and BCR15, where it is identified and declining but currently has inadequate capture rates (1.83 adults per year). As for Willow Flycatcher, MAPS and other data collected during the past 15 years have documented the near-extirpation of Swainson's Thrushes from BCR15; thus, it is unlikely that increased MAPS effort will result in adequate capture rates here. However, the Sierra Nevada station in the Tahoe National Forest, Sierra County, CA, discontinued in 2004, had a capture rate of 3.54 adult Swainson's Thrushes per year. We recommend re-establishing this station and considering the establishment of other stations on National Forests in the Sierra Nevada where this species still exists in order to link data from these stations to other data being collected on this species in the Sierra Nevada.

Orange-crowned Warbler. This species is declining throughout the Pacific Northwest and is identified as a target species in BCR9 and BCR10. MAPS stations are currently capturing adequate or near-adequate rates of this species in BCR5 (93.14 adults per year) and BCR10 (31.16) but not BCR9 (4.50). Capture rates in BCR9 when data from discontinued stations are added improve to 27.16, so we recommend re-establishing the discontinued Independence Creek station on Inyo National Forest, Inyo County, CA (capture rate 13.33 adult Orange-crowned Warblers per year) to increase the capture rate of this species at MAPS stations in BCR9.

Wilson's Warbler. This is an identified species for BCR5, BCR9, and BCR15. Capture rates at MAPS stations are excellent in BCR5 (191.30 adults per year) and BCR15 (114.84) but inadequate in BCR9 (13.96). Because this species shows geographic variation in the region we recommend re-establishing discontinued stations and/or establishing new stations in BCR9 to increase the capture rates of Wilson's Warblers. A majority of captures for this species in BCR9 occurred in Mount Baker National Forest, WA, which should probably be considered part of BCR5 rather than BCR9. Thus, we recommend seeking other areas in BCR9 to increase the capture rate of Wilson's Warblers in this region.

Yellow-breasted Chat. This is a target species in BCR5 (where it is currently captured at adequate rates at MAPS stations: 81.22 adults per year) and in BCR9, where rates were adequate when data from discontinued stations are added (30.32) but not adequate currently (18.72). We recommend re-establishing the Mary's River Ranch station on private land in Elko County, NV (capture rate 9.00 adults per year), to increase the capture rates of Yellow-breasted Chats in BCR9, and to attempt to establish new stations on BLM or USFS lands to help increase the capture rate of this riparian species.

Lincoln's Sparrow. This is a target species in BCR5, BCR10, and BCR15. It is currently captured at MAPS stations at adequate rates in BCR10 (43.33) and BCR15 (89.83) but falls just short in BCR5 (23.05). We recommend re-establishing the Yakutat station in the Tongass National Forest, AK, and the Plaskett Meadows and Masterson Campground stations in the Mendocino National Forest, Glenn County, CA, to obtain adequate rates of Lincoln's Sparrows in BCR5.

White-crowned Sparrow. This species is identified only for BCR15 (without trend, but the altitudinal range of this species in the Sierra Nevada has shrunk recently and currently is limited to high elevations where BBS coverage is generally lacking), where capture rates at MAPS stations are currently inadequate (2.00 adults per year) but were more than adequate when data from discontinued stations are added (33.17 adults per year). The stations in BCR15 that captured the most White Crowned Sparrows by far, Perazzo Meadow (22.75) and Freeman Meadow (8.42) in Tahoe National Forest, Sierra County, CA, were discontinued in 2004. We recommend re-establishing these stations and establishing other stations in BCR15 to increase capture rates of this species.

C. MAPS Coverage in Broadleaf Habitats

Broadleaf Habitats were selected as an important broad habitat type for Bird Conservation Regions 5 (Northern Pacific Rainforest) and 15 (Sierra Nevada). Among these two BCRs there have been a total of 33 MAPS Stations operated in Broadleaf Habitats, of which 11 remain active. Of 14 bird species identified for at least one of the two BCRs, only 5 of them currently have adequate coverage in both BCRs. This indicates only marginally adequate coverage of this habitat type by the MAPS program within the Pacific Northwest. There are 9 target species for which coverage at MAPS stations was deemed inadequate in at least one of the two BCRs and for which the species-priority score ≥ 2 . Here we summarize the potential for the MAPS program to increase its coverage for each of these species.

Hutton's Vireo. Hutton's Vireo is a target species in BCR5 (identified, no trend), where current capture rates at MAPS stations are inadequate (3.69 adults per year) but are higher when data from discontinued stations are added (8.22). Because this species is nowhere common (the highest rate for any active or discontinued station in BCR5 was 1.00) we do not recommend increasing MAPS coverage for this species in the Pacific Northwest.

Western Scrub Jay. This is identified as a focal oak-woodland species for BCR5 (where it is showing no trend) and is identified as a target species in BCR15, where it is increasing. Capture rates are currently inadequate in both BCRs (3.17 and 0.00 adults per year, respectively). This species is nowhere captured in high numbers at MAPS stations (the highest rate being 2.00 adults per year at the discontinued Aikens Creek station in Six Rivers National Forest, Humboldt County, CA) and because of lower-priority status we do not recommend establishing new stations for this species.

Oak Titmouse. This is a target species in BCR5 primarily because it is a focal species for oak-woodlands in southern Oregon and California. It has only been captured at one station: Whetstone Savannah (active) on private land in Jackson County, OR, where the capture rate is 0.86. Thus, we do not recommend establishing new stations for this species.

Western Bluebird. This is an identified species (no trend) for broadleaf habitat in BCR5. It has an inadequate capture rate of 1.36, both current and when all stations are combined. This open-county

species is difficult to capture in sufficient numbers with MAPS protocol; therefore, we do not recommend establishing additional stations for this species.

Wrentit. This species is identified as a focal species (no trend) in BCR15, where peripheral populations are local and may be declining. Capture rates at MAPS stations are currently 0.00 adults per year, although 4.38 adults per year were captured when data from discontinued stations from Tahoe and Lassen National Forests, CA, are included. The current capture rate for this species in BCR5 is adequate (69.95); thus, we do not recommend increasing MAPS effort in BCR15 for this species.

Nashville Warbler. This is a target species in BCR5 (identified and currently with adequate capture rates at MAPS stations) and BCR 15 (declining and currently with inadequate rates but with adequate rates when data from discontinued stations are included). We recommend re-establishing the KKDZ station in the Tahoe National Forest, Nevada County, CA, and the Morrison station in the Siskiyou National Forest, El Dorado County, CA, to increase the capture rates of Nashville Warblers in BCR15.

Black-throated Gray Warbler. This is identified as a target species in BCR15, where it inhabits broadleaf woodlands (as opposed to coniferous forests in BCR5 and Juniper scrub in BCR9). Current capture rates at MAPS stations in BCR15 are inadequate (2.50 adults per year); however, this rate increases to 10.26 adults per year when data from the discontinued stations are included, primarily those from the KKDZ station on Tahoe National Forest, Nevada County, CA (capture rate 7.33 adults per year). We recommend re-establishing this station or establishing others on this forest or on BLM land in the area to increase the capture rate for Black-throated Gray Warbler in BCR15. See also recommendations for this species under Coniferous Forests and Scrub/Shrub-Steppe habitats.

Chipping Sparrow. This species is identified in Broadleaf Habitats and is declining in BCR5. Its current capture rate at MAPS stations is inadequate (7.17 adults per year), although it has adequate capture rates in BCR9 (34.46), BCR10 (43.33) and nearly adequate rates in BCR15 (22.08). The Plaskett Meadows station in Mendocino National Forest, Glenn County, CA, discontinued in 2003, had a capture rate of 4.50 adults per year and could be re-established and we recommend establishing

additional stations in Broadleaf Habitats of BCR5 to increase capture rates in this region. See also recommendations (above) for this species in Coniferous Forests.

Vesper Sparrow. This is primarily a grassland-breeding species that is identified for BCR5 (in the Lowlands and Valleys Plan for western Oregon and Washington) and is included in our database because of potential capture rates in BCR9 and BCR10 (see Scrub and Shrub-Steppe section, below). No MAPS stations have captured Vesper Sparrows in BCR5 and we do not recommend establishing additional stations for this species in this BCR.

D. MAPS Coverage in Scrub and Shrub-Steppe Habitats

Scrub and/or Shrub-Steppe Habitats were selected as an important broad habitat type for Bird Conservation Regions 9 (Great Basin) and 10 (Northern Rocky Mountains). Among these two BCRs there have been a total of 5 MAPS Stations operated in scrub/shrub-steppe habitats, of which no stations remain active. Of 17 bird species targeted for at least one of the two BCRs, only 1 of them (Spotted Towhee) currently has adequate coverage in all listed BCRs. This indicates completely inadequate coverage of this habitat type by the MAPS program within the Pacific Northwest. There are 8 target species for which coverage at MAPS stations was deemed inadequate in at least one of the two BCRs and for which the species-priority score ≥ 2 . Here we summarize the potential for the MAPS program to increase its coverage for each of these species.

Gray Flycatcher. This is identified as a target species in BCR9, where BBS and MAPS data also indicate an increasing trend. Surprisingly, no Gray Flycatchers have been captured at discontinued or active MAPS stations in this region. The only captures within the Pacific Northwest were at the Carman Valley station (active) in Tahoe National Forest, Sierra County, CA (capture rate 4.00 adults per year), in BCR15. This is an adequate capture rate at the station level, indicating the potential to monitor this species with the MAPS program. However, because this species appears to be localized and difficult to monitor using MAPS stations, we do not recommend expanded effort for this species. Observational techniques on the breeding grounds (e.g., Vickery et al. 1992) may be the best method of monitoring productivity in this species.

Western Bluebird. This is identified as a focal species (without trends) for open habitats in both BCR9 and BCR10; however, capture rates at MAPS stations are low (0.30 in BCR9 and 0.00 in

BCR10, both currently and when data from discontinued stations are included). As mentioned under broadleaf species above, this open-county species is difficult to capture in sufficient numbers with MAPS protocol, and we do not recommend establishing additional stations for it in BCR9 or BCR10.

Mountain Bluebird. This is identified as a focal species (without trends) in BCR9 and shows an increasing trend in BCR10; however, current capture rates at MAPS stations are inadequate in both BCRs (0.25 in BCR9 and 0.00 in BCR10). The best capture rates were obtained at the discontinued McCullen Unit station on Seedskafee National Wildlife Refuge, Sweetwater County, WY (7.00). We recommend re-establishing this station to increase capture rates of this species but, otherwise, we do not recommend establishing additional stations due to the difficulty in capturing good numbers of Mountain Bluebirds and their relatively low status as compared with other scrub and shrub-steppe species.

Sage Thrasher. This is a target species because of declining populations in BCR9, the only region in which it is found. Current capture rates for MAPS stations in this BCR are 0.00; however the capture rate was much higher (11.00) when data from discontinued stations are included. The discontinued station capturing this species was the Arco Desert station on DoE land in Bingham County, ID. This indicates the potential to capture adequate numbers at MAPS stations in general, and we recommend that additional stations for this species be established at appropriate BLM or USFS lands in BCR9.

Black-throated Gray Warbler. This species is identified (no trend) for BCR9 due to concern for populations that inhabit juniper scrub habitats in this region. Current capture rates at MAPS stations in this BCR are inadequate (1.56 adults per year; 2.48 when data from discontinued stations are included). The only stations to capture this species in BCR9 were in Mount Baker National Forest, WA, which, considering its western slope of the Cascades aspect and associated forested habitat, should be in BCR5. Because this species is of widespread priority in the Pacific Northwest, we recommend establishing additional stations on BIA, BLM, or USFS lands to monitor Black-throated Gray Warblers in juniper scrub habitats in BCR9 (Fig. 6). Monitoring efforts could also be increased within suitably forested areas among the tribal lands of the Yakama Indian Reservation (western portion) in south central Washington, and juniper scrub habitat within lands managed by the Confederated Tribes of the Warm Springs Reservation in north central Oregon.

Brewer's Sparrow. This species is suffering widespread declines throughout its range and is identified and declining in both BCR9 and BCR10. In BCR9, current capture rates at MAPS stations are nearly adequate (19.25 adults per year) and the capture rate was 117.75 when data from discontinued stations are included. In BCR10 current capture rates are 0.00 but were 7.00 when data from discontinued stations are included. Due to concern for this species, we strongly recommend establishing additional MAPS stations on BLM and/or USFS lands for Brewer's Sparrows in both BCR9 and BCR10. In BCR9 the Arco Desert Station on DoE land in Bingham County, ID, captured a remarkable 80.00 adult Brewer's Sparrows per year. Other discontinued stations in BCR9 with good capture rates include the Mary's River Ranch station on private land in Elko County, NV (11.50), and the Hart Mountain station on the Hart Mountain National Antelope Refuge, Lake County, OR (7.00). We recommend re-establishing these stations and establishing new stations in similar habitats to these stations on BLM and USFS lands of BCRs 9 and 10 (Fig. 8). In BCR10, the only station that has captured Brewer's Sparrows was the McCullen Unit station on Seedskaadee National Wildlife Refuge, Sweetwater County, WY (7.00 adults per year). We recommend re-establishing this station.

Vesper Sparrow. This species is also identified for both BCR9 (where it shows no trends) and BCR10 (where it is declining). Current capture rates at MAPS stations in these BCRs are inadequate (0.00 adults per year in BCR9 and 1.89 in BCR10); however, in both BCRs higher rates were obtained when data from discontinued stations are included (20.00 in BCR9 and 9.89 in BCR10), indicating the potential for successful monitoring using the MAPS protocol. By far the highest capture rate from a discontinued station, 19.00 adults per year, was achieved at the Hart Mountain station on Hart Mountain National Antelope Refuge, Lake County, OR. Other discontinued stations in BCR9 and BCR10 with good capture rates include the McCullen Unit station on Seedskaadee National Wildlife Refuge, Sweetwater County, WY (7.00); the Hunter Mesa station on Bighorn National Forest, Johnson County, WY (4.67 adults per year); and the Ramelli Ranch station on the Tahoe National Forest, Plumas County, CA (3.17). We recommend re-establishing these stations and/or establishing new stations in similar habitats to these stations on BLM and USFS lands to obtain higher capture rates of Vesper Sparrows (Fig. 9).

Sage Sparrow. This species is both identified and declining in BCR9, where current capture rates at MAPS stations are 0.00 adults per year, but where capture rates were adequate (38.33 adults per year)

when data from discontinued stations are included, indicating the potential for the MAPS program to monitor this species. Sage Sparrows have been captured at three discontinued MAPS stations in BCR9: the Arco Desert station on DoE land in Bingham County, ID (20.00 adults per year) and the Bair's Creek (9.00) and Taboose Creek (5.33) stations on BLM land in Inyo County, CA. We recommend establishing new stations in similar habitats to these stations on BLM and USFS lands of BCR9, to capture and better monitor the vital rates of this species (Fig. 10).

Gaps in the Coverage of MAPS Stations in the Pacific Northwest

Our analyses and examination of MAPS data reveal gaps in the demographic monitoring coverage of many species of conservation concern that breed in important habitat types across the four BCRs considered here. We found that the largest habitat-specific gap in MAPS coverage was in shrub-steppe habitat throughout the Great Basin and Columbia Plateau of BCR9 and in BCR10. Low breeding bird densities coupled with hot temperatures and limited shade increase the difficulty of monitoring this habitat using MAPS protocol. An effort is underway by the PIF Shrub-steppe Working/ Group to address some issues related to landbird productivity in this habitat by nest monitoring. We suggest that an additional component in this effort, using MAPS stations (which assess productivity at larger spatial scales than nest-monitoring and can effectively monitor survival, given adequate capture rates) sited with hypothesis-driven sampling strategies, could help achieve some of the research and management goals of this cooperative effort. Based on capture rates at several discontinued stations, we believe that extending the MAPS program to complement other existing sagebrush avian monitoring efforts for certain species, including Sage Thrasher, Brewer's Sparrow (Fig. 8), Vesper Sparrow (Fig. 9), and Sage Sparrow (Fig. 10) is appropriate.

We also recommend increasing the monitoring coverage of Broadleaf Habitats in BCR5 and BCR15, and targeting selected Coniferous-Forest and Riparian-Habitat species within all four BCRs. Many opportunities exist for initiating, reestablishing, or redirecting monitoring efforts among important habitats on Federally-owned lands within these regions, as detailed below.

Recommended Changes in MAPS Coverage, by Landholder and Station

Given all of the above recommendations, we now consider the best ways that each Federal agency can contribute to the MAPS Program in the Pacific Northwest. We begin by suggesting species that each agency could target, given their landholdings, geographical gaps in coverage identified above

(Figs. 2 and 3), gaps in coverage by habitats, and the distribution of priority species that are monitored or could be better monitored by MAPS. We also review the lists of active and discontinued stations operated on the lands of each Federal agency and make recommendations to: 1) continue an active station, 2) discontinue an active station in favor of establishing new stations in more productive areas, 3) re-establish a discontinued station, or 4) not re-establish a discontinued station. Recommendations for each of the 238 stations are presented in Table 1. Finally, in order to identify areas in which future MAPS stations could be established, we overlaid maps of the distribution of lands held by six different federal agencies (Fig. 2) onto the breeding distributions (Figs. 4-10) of seven species of particular conservation concern for which we believe that an increased MAPS coverage will be beneficial. So, although we may recommend discontinuing a station on a particular federal land, or not reactivating an inactive station there, this mapping process (with reference to checklists and agency natural resource plans) revealed opportunities to monitor priority species on other parts and/or habitats on the same land.

For all Federal landholders we recommend the following list of priorities:

1) Continue the operation of most (118) of the currently active stations (138) in order to continue the adequate coverage of many widespread target species (such as Dusky Flycatcher, Black-capped Chickadee, Yellow Warbler, MacGillivray's Warbler, Swainson's Thrush (except BCR15), Song Sparrow, Dark-eyed Junco, and Black-headed Grosbeak) in Coniferous Forest and Riparian Habitats throughout the Pacific Northwest.

2) Consider the feasibility of establishing new stations in Scrub and Shrub-Steppe Habitats in BCR 9 and BCR 10 to increase capture rates of target species that can apparently be monitored by MAPS. These include Black-throated Gray Warbler in juniper woodlands (Fig. 6) and Brewer's Sparrow (Fig. 8), Vesper Sparrow (Fig. 9), and Sage Sparrow (Fig. 10) in Shrub-Steppe habitats. Locate areas or stations that could capture adequate (> 2.5 adults per year) rates of more than one of these species, such as the vicinity of the Hart Mountain National Antelope Refuge in Lake County, OR; the Arco Dessert region in Bingham County, ID; and/or the Bair's Creek and Taboose stations in Inyo County, CA.

3) Establish new stations and re-establish certain discontinued stations in selected Riparian Habitats to increase the capture rates of priority and focal species. These include Red-naped Sapsucker in BCR 9; Willow Flycatcher in BCR9 and BCR15 (Fig. 7); Red-eyed Vireo in BCR 10; House Wren in BCR 5; Swainson's Thrush in BCR 15, Orange-crowned Warbler in BCR 9, Wilson's Warbler in BCR9, Yellow-breasted Chat in BCR9, Lincoln's Sparrow in BCR5, and White-crowned Sparrow in BCR15.

4) Establish new stations and re-establish certain discontinued stations in selected Broadleaf Habitats to increase the capture rates of priority and focal species. These include Nashville Warbler in BCR15, Black-throated Gray Warbler in BCR15 (Fig. 6), and Chipping Sparrow in BCR5.

5) Establish new stations and re-establish certain discontinued stations in selected Coniferous Forests to increase the capture rates of priority and focal species. These include Red-breasted Sapsucker in BCR5, Hammond's Flycatcher in BCR15; Cordilleran Flycatcher in BCR10; Cassin's Vireo in all four BCRs (Fig. 4); Brown Creeper in all four BCRs; Golden-crowned Kinglet in BCR15; Hermit Thrush in BCR10 and BCR15; Varied Thrush in BCRs 5, 9, and 10; Black-throated Gray Warbler in BCR 5 (Fig. 6); Chipping Sparrow in BCR 15; and Cassin's Finch in BCR15.

A. Analysis of individual stations on Bureau of Land Management (BLM) Lands.

Our first recommendation to the BLM is to consider establishing new stations in Scrub and Shrub-Steppe Habitats on BLM lands in BCR9 and BCR10. Considerable BLM landholdings exist in appropriate habitats in these regions, for example, in the vicinity of the Hart Mountain National Antelope Refuge in Lake County, OR (*cf.* Fig. 2) and the Arco Desert region in Bingham County, ID (*cf.* Fig. 2). We also recommend re-establishing the Bair's Creek and Taboose stations on BLM land in Inyo County, CA, to increase capture rates of Sage Sparrow.

There have been 18 MAPS stations operated on BLM lands in the Pacific Northwest in 1989-2005, of which 13 are active and 5 have been discontinued (Figure 1, Table 1). Adjusted species priority scores for these stations ranged from a high of 27 for the Wildlife Images station in Gerber County, OR, to 4 for the discontinued Tuttle Creek station in Inyo County, CA.

Despite a low score of 6 for both the discontinued Bair's Creek and Taboose stations in Inyo County we continue to recommend re-establishing these important sage-scrub stations in order to increase capture rates of the critical Sage Sparrow. We also recommend the re-establishment of the Mike's Meadow station in Clackamas County, OR, due to captures of Varied Thrushes there, and a high species priority score of 22. This station ran for six years (1997-2002), had an overall capture rate of 101 adults per year, and had adequate capture rates of such species of concern as Willow Flycatcher (10.83 adults per year), Swainson's Thrush (16.33), and MacGillivray's Warbler (7.17). The final two discontinued stations, Little Applegate in Jackson County, OR, and Tuttle Creek in Inyo County, CA, were only in operation for short periods and had low to moderate species priority scores (4-14), so we do not recommend spending effort re-establishing these stations.

We recommend continued operation of six stations with species priority scores of 18 or more (Table 1): the Neotropical Bird Sanctuary of Roseburg, Douglas County OR (species priority score 18); the Applegate River Station (18) and Wildlife Images (27) stations in Josephine County, OR (18); the Johnson Creek station in Klamath County, OR (20); the Topsy station in Siskiyou County, CA (22), and the Pattee Creek in Lemhi County, ID (18).

The remaining six active stations received species priority scores of 4-15. Of these we recommend the continued operation of two of them: Douglas Creek in Douglas County, WA (active since 1993, species priority score 13, adult capture rate 101.91, monitorable species 11, substantial capture rates of Yellow-breasted Chat, Black-headed Grosbeak, Lazuli Bunting, and Bullock's Oriole); and Wood River in Klamath County, OR (active since 1997, species priority score 12, adult capture rate 183.14, monitorable species 11, substantial capture rates of Willow Flycatcher, Yellow Warbler, and Song Sparrow).

The four remaining stations generally have been in operation since 1998 or later and had capture rates < 100 adults per year, < 10 monitorable species, and/or few adult captures of priority species. If no other specific projects are being undertaken by the operation of these stations, we recommend that they be considered for discontinuation in favor of the establishment of stations in more productive locations. These four stations are: the Snow Cow and Boulder Creek stations in Douglas County, OR; the Gerber Reservoir station in Klamath County, OR; and the Ambrose Nature Study Area station in Carson City, NV.

Overall, it is difficult to mention specific tracts of BLM land, other than those mentioned above, on which to monitor priority species. Probably over 25% of Oregon's area is arid BLM land in the Great Basin ecoregion; most of these lands are confined to central and southeastern Oregon. Monitoring coverage is very poor in these areas. Other scattered parcels of BLM land in central Washington, western Oregon, and southeastern Idaho also offer opportunities for extending the MAPS program to monitor priority species.

B. Analysis of individual stations on U.S. Forest Service (USFS) Lands

Our first recommendation to the USFS is to consider re-establishing several important stations in the Tahoe, Siskiyou, Klamath, and Rogue River, and Mendocino National Forests of Oregon and California. These include the Yuba Pass, Sierra Nevada, Perazzo Meadow, and KKDZ stations in Tahoe National Forest; the Buck Ranch, Whitmore Meadows, and Morrison stations in the Siskiyou National Forest, and the Humbug Creek station on Klamath National Forest, the Carberry Creek station in the Rogue River National Forest, and the Masterson Campground station on Mendocino National Forest. Re-establishing these stations would help elevate the capture rates of several priority target species within BCR5 and BCR15 such as Willow Flycatcher, Hammond's Flycatcher, Cassin's Vireo, Brown Creeper, Golden-crowned Kinglet, Swainson's Thrush, Hermit Thrush, Black-throated Gray Warbler, Chipping Sparrow, Lincoln's Sparrow, and Cassin's Finch. We also recommend re-establishing the Plaskett Creek station on the Inyo National Forest, Inyo County, CA, to increase capture rates of Orange-crowned Warblers in BCR 9.

There have been 123 MAPS stations operated on USFS lands in the Pacific Northwest in 1989-2005, of which 61 are active and 62 have been discontinued (Table 1). Of these 123 stations, 50 have been operated by the Institute for Bird Populations on the Mount Baker, Wenatchee, Umatilla, Willamette, Siuslaw, Fremont, and Flathead National Forests as related to specific habitat-management studies and will not be considered further here. Species priority scores for the remaining 73 stations (25 active, 48 discontinued) ranged from a high of 46 for the active Carman Valley station on the Tahoe National Forest, Sierra County, CA to a low of 1 for the discontinued Grouse Creek station on the Trinity National Forest in Humboldt County, CA.

We recommend continued operation of 14 active stations with species priority scores of 18 or more (Table 1): the Skeeter Swamp station, Rouge River National Forest, OR; the Horse Creek Meadows

station, Siskiyou National Forest, OR; the Odessa Creek station, Fremont/Winema National Forest, OR; the Lady and Grove's Prairie stations, Six Rivers National Forest, CA; the White's Bar station, Shasta-Trinity National Forest, CA; the Indian Valley station, Trinity National Forest, CA; the Gurnsey Creek station, Lassen National Forest, CA; the Carman Valley, Kiln Meadow, Sagehen Creek, and Taylor Meadow stations, Tahoe National Forest, CA; the Wildlife Research station, Lolo National Forest, MT; and the Lower Rock Creek station, Bitterroot National Forest, MT.

The remaining 11 active stations received species priority scores of 8-17. Of these we recommend the continued operation of two of them: the Seven Mile Creek station, Fremont/Winema National Forest, OR (active since 1997, species priority score 14, adult capture rate 100.86, monitorable species 12, substantial capture rates of Red-breasted Sapsucker, Western Wood-Pewee, Nashville Warbler, MacGillivray's Warbler, and Lazuli Bunting); and the Pacific Crest Trail station, Klamath National Forest, CA (active since 1993, species priority score 15, adult capture rate 135.00, monitorable species 10, substantial capture rates of Swainson's Thrush, Yellow-breasted Chat, MacGillivray's Warbler, Yellow Warbler, and Song Sparrow).

The nine remaining active stations generally had capture rates < 100 adults per year, < 10 monitorable species, and/or few adult captures of priority species. If no other specific projects are being undertaken by the operation of these stations, we recommend that they be considered for discontinuation in favor of the establishment of stations in more productive locations. These nine stations are: the St. Cloud station, Gifford Pinchot National Forest, WA; the Williamson River station, Fremont/Winema National Forest, OR; the Long Ridge, Bear Camp, and Grayback Creek stations, Siskiyou National Forest, OR, although the latter two stations have been operated for 14 and 15 years, respectively, and such long time series of data are extremely valuable for long-term monitoring; the Cap D station, Six Rivers National Forest, CA; the Antelope Creek station, Klamath National Forest, CA; the Mendenhall station, Tongass National Forest, AK; and the Lick Creek station, Bitterroot National Forest, MT.

We strongly recommend the re-establishment, if feasible, of nine discontinued stations with species priority scores of 18 or more and that would increase the capture rates of many target species. The re-establishment of most of these has already been recommended to increase the capture rates of individual species. These stations are: the Sierra Nevada, Yuba Pass, Freeman Meadow, and Perazzo

Meadow stations, Tahoe National Forest, CA; the Morrison and Buck Ranch stations, Siskiyou National Forest, CA; the Mill Creek station, Lassen National Forest, CA; the Ramelli Ranch station, Plumas National Forest, CA; and the Hoonah station, Tongass National Forest, AK. We also recommend re-establishing the Independence Creek station on the Inyo National Forest, Inyo County, CA, to increase capture rates of Orange-crowned Warblers in BCR 9.

Of 39 discontinued stations with species priority scores of 17 or less, we recommend the re-establishment of only five, if feasible, as previously suggested concerning the capture rates of individual species. These stations are: the Plaskett Meadow station, Mendocino National Forest, CA; the Aikens Creek station, Six Rivers National Forest, CA; the KKDZ station, Tahoe National Forest, CA; and the Yakutat and Ward's Creek stations, Tongass National Forest, AK. We do not recommend re-establishing any of the remaining 34 stations with species priority score < 18 (Table 1).

There are several important gaps in the monitoring coverage of Pacific Northwest national forests. The Colville National Forest (and bordering Kaniksu National Forest) offer opportunities to monitor breeding vesper sparrows. However, because Colville National Forest represents the largest growth of virgin forest left in eastern Washington (western red cedar, western hemlock, Douglas fir, grand fir, and larch) it represents an important gap in monitoring of forest birds in BCR 10. The MAPS program is also absent from other national forests in Oregon and Washington, several of which NABCI recognizes as Important Bird Areas (IBA). MAPS coverage could be extended throughout the Pacific Northwest Region Six, beyond the forests currently monitored (of which Wenatchee, Willamette, Siuslaw national forests are IBAs), to include Olympic National Forest (IBA) in northwest Washington, Okanogan National Forest in central Washington, the Whitman (IBA) and Wallowa National Forests (IBA) of northeast Oregon (these support habitats more typical of BCR 10), the Umpqua National Forest (IBA) of southeast Oregon, and Malheur National Forest in central Oregon. Generally, demographic avian monitoring is very sparse on BLM and USFS lands in central Oregon, and nearly absent from large tracts of Forest Service land in central and northern Idaho.

C. Analysis of individual stations on National Park Service (NPS) Lands

Few National Parks exist in BCRs 9 and 10, relative to BLM and USFS lands, with which to increase capture rates of focal Scrub and Shrub-Steppe species; however, Great Basin National Park in eastern

Nevada would be an excellent location to establish MAPS species for Shrub-Steppe species targeted by this report (see <http://www.nps.gov/grba/birdlist.htm>).

There have been 16 MAPS stations operated on NPS lands in the Pacific Northwest in 1989-2005, of which 12 are active and 4 have been discontinued (Table 1). Of these 16 stations, 8 have been operated by the Institute for Bird Populations in Yosemite and Sequoia-Kings Canyon National Parks as related to long-term ecological monitoring and will not be considered further here. Species priority scores for the remaining eight stations (five active, three discontinued) ranged from a high of 22 for the active Drakesbad station in Lassen Volcanic National Park, CA to a low of 5 for the discontinued Grand Teton station in Grand Teton National Park, WY.

We recommend continued operation of two active stations with species priority scores of 18 or more (Table 1): the Devil's Postpile station in Devil's Postpile National Monument, and the Drakesbad station in Lassen Volcanic National Park, CA. We recommend not re-establishing three discontinued stations (in Redwood and Grand Teton National Parks) that had species priority scores of 5-13 (Table 1).

The remaining three active stations had species priority scores of 7-16. Of these we recommend the continued operation of two of them: the Teton Science School station in Grand Teton National Park, WY (active since 1991, species priority score 16, adult capture rate 76.54 adults per year, monitorable species 8, substantial capture rates of Red-naped Sapsucker, Hammond's Flycatcher, and Dusky Flycatcher), and the Schwaubacker's Landing station, also in Grand Teton National Park, WY (active since 2001, species priority score 12, adult capture rate 70.00, monitorable species 9, substantial capture rates of Hammond's Flycatcher, Dusky Flycatcher, and Chipping Sparrow). The remaining active station, Oregon Caves on Oregon Caves National Monument, OR, has been in operation since 2002, had a capture rate of 34.00 adults per year, has 3 monitorable species, and has low adult captures of priority species. If no other specific projects are being undertaken by the operation of this station, we recommend that it be considered for discontinuation in favor of the establishment of stations in more productive locations.

Overall, in Washington and Oregon, MAPS coverage aimed at monitoring priority species could be extended to include four national parks: Olympic, North Cascades, Mount Rainier, and Crater Lake National Parks.

D. Analysis of individual stations on U.S. Fish and Wildlife Service (FWS) Lands

There have been 20 MAPS stations operated on FWS lands in the Pacific Northwest in 1989-2005, of which seven are active and 13 have been discontinued (Table 1). DeSante et al. (2004a) have already provided detailed recommendations for the continued operation of MAPS stations on FWS lands in Washington, Oregon, Idaho, Nevada, and California. Our recommendations here are very similar for FWS lands located in the Pacific Northwest. Few National Wildlife Refuges exist in BCRs 9 and 10, relative to BLM and USFS lands, with which to increase capture rates of focal Scrub and Shrub-Steppe species; however, we strongly recommend re-establishing the Hart Mountain station and/or establishing other stations on the Hart Mountain National Antelope Refuge, OR, to increase the capture rates of several Scrub/Shrub-Steppe and Riparian species found there. Other specific recommendations from this analysis would be to re-establish the Bachelor Point station, Ridgefield NWR, WA, to increase capture rates of House Wren and Red-eyed Vireo in BCR 5; to re-establish the Pigeon Butte station on William L. Finley NWR, OR, to increase capture rates of Black-throated Gray Warblers in BCR 5; and to re-establish the McCullen Unit station, Seedskaadee NWR, WY, to increase the capture rates of Cordilleran Flycatcher and Mountain Bluebird in BCR 10.

We recommend continued operation of five of the seven active stations: the Snagboat Bend station on William L. Finley NWR, OR, with a species priority score of 23; the Turnbull station on Turnbull NWR, WA; the Cabin station on Upper Klamath Lake NWR, OR; the Sub-headquarters station on Modoc NWR, CA; and the Lee Metcalf station on Lee Metcalf NWR, MT. The remaining two active station, the Wallula station on McNarry NWR, WA, had capture rates ≤ 100 adults per year, ≤ 10 monitorable species, and/or few adult captures of priority species. If no other specific projects are being undertaken by the operation of this station, we recommend that they be considered for discontinuation in favor of the establishment of stations in more productive locations. We recommend the re-establishment of four discontinued stations (Hart Mountain, Bachelor Point, Pigeon Butte, and McCullen Unit), as mentioned above. Finally, we recommend not re-establishing nine discontinued stations (on Nisqually, Julia Butler Hansen, Ruby Lake, Bear River, and Little Pend

Oreille NWRs) that had species priority scores of 5-15. Similar recommendations, along with many more details, can be found in Table 1 of DeSante et al. (2004a).

Despite recommending that stations remain inactive on five NWRs, monitoring opportunities may exist for other species in different habitats or areas within those same refuges. Opportunities also exist on other NWRs with no history of MAPS monitoring. Examination of the breeding range maps (Figs. 4-10), available checklists, and NWR publications reveal some of these opportunities. Several refuges, including four where MAPS stations were discontinued, offer opportunities to effectively monitor our priority species. Hart Mountain NWR (as already mentioned) and Malheur NWR (IBA) in southeast Oregon offer opportunities to monitor Brewer's, Vesper, and Sage Sparrows. Vesper Sparrows could also be targeted on Little Pend Orielle NWR in northeast Washington. The primary objective of the FWS-managed Saddle Mountain NWR is to ensure that the area is operated and managed for the protection and preservation of the native shrub-steppe habitat and its associated wildlife species. Two priority species, Sage Sparrow and Brewer's Sparrow, overlap with those considered shrub-steppe obligates in the Columbia Basin Ecoregion. To the northeast, Columbia NWR (IBA) supports occasional breeding activity of Willow Flycatchers, Vesper, Sage, and Brewer's Sparrows.

E. Analysis of individual stations on Bureau of Indian Affairs (BIA) Lands

Several Reservations exist in BCRs 9 and 10 that could be investigated for the establishment of MAPS stations. In particular, the Fort McDermitt Reservation of the Paiute and Shoshone Tribes in southeastern Oregon, the Summit Lake Reservation of the Paiute Tribe in northern Nevada, and the Duck Valley Reservation of the Shoshone and Paiute Tribes on the Idaho-Nevada border are located in habitats that potentially could include some Scrub and Shrub-Steppe target species. Several other reservations exist in Washington, northern Oregon, and northwestern Idaho that could be investigated for the possibility of increasing capture rates of target species using the MAPS program. We suggest, therefore, that the MAPS coverage should be extended to include tribal lands in the Pacific Northwest to facilitate demographic monitoring of avifauna in important remnants of the shrub-steppe ecosystem.

There have been 9 MAPS stations operated on BIA lands in the Pacific Northwest in 1989-2005, of which 6 are active and 3 have been discontinued (Table 1). Of these 9 stations, 6 have been operated

by the Institute for Bird Populations on the Flathead Reservation of the Confederated Salish and Kootenai Tribes, MT, as related to specific habitat-management studies and will not be considered further here. The three remaining stations have all been discontinued. Of these, the most valuable stations to re-establish in terms of priority species would be the Mud Springs and Red Rock stations on Hoopa Tribal Lands in Humboldt County, CA, which had priority scores of 19 and 13, respectively, and had substantial capture rates of Dusky Flycatchers, Yellow Warblers, and MacGillivray's Warblers. The other station, Numana on the Pyramid Lake Reservation, NV (priority score 12), had lower capture rates of priority species and is probably not worth re-establishing.

Generally speaking, many ecological monitoring, research, and restoration projects are conducted on lands owned by various confederated tribes and bands of native American Indians in the Pacific Northwest. These lands feature some of the largest remnants of shrub-steppe habitat (and associated avifauna) in the region. For example, the spatial extent of the disjunct breeding population of Sage Sparrows present in central Washington (Ridgley et al. 2003) overlaps the eastern half of the Yakama Indian Reservation and barely overlaps the southwestern tip of the Colville Indian Reservation. Maintenance and/or restoration of sagebrush would benefit the Sage Sparrow and other sagebrush dependent species. Improving management of sagebrush habitats on these tribal lands are consistent with the goals of two major grants awarded by the U.S. Fish and Wildlife Service under the Tribal Landowner Incentive (TLI) Program in 2004.

1) Colville Business Council established a Shrub Steppe Habitat Conservation and Sustainability Project in 2004, a program designed to inventory, map and analyze shrub- steppe habitat for the sustainability and conservation of sagebrush, bunch grass and riparian communities on the reservation. Also, the Tribe leads efforts to prevent a declining Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus*) population from extirpation.

2) The Confederated Tribes and Bands of the Yakama Nation established a Wildlife Plan Groundwork Program, which began in 2004 (funded by 2003 Tribal Wildlife Grant dollars from the U.S. Fish and Wildlife Service). The focus of this program is to enhance the long-term comprehensive Forest and Range Wildlife Management Plan towards improving the management of wildlife and wildlife habitats on the 1.2 million-acre Yakama Indian Reservation in south central Washington.

Three other extensive federal lands, Yakima Training Center, Saddle Mountain NWR, and Columbia NWR offer opportunities for monitoring in this portion of the Sage Sparrow's breeding range.

In the Idaho, Oregon and Washington, TLI grants also funded Rare Plant Surveys for three rare plant species inhabiting grassland and dry forest habitats on the Nez Perce Tribe Fee and Trust Lands. Hopefully, ongoing management actions and those resulting from evaluations of these surveys will restore the natural habitats to benefit both forest and grassland bird populations.

The largest area of tribal land in Oregon, the Confederated Tribes of the Warm Springs Reservation in north central Oregon, has implemented a riparian restoration program to improve the quality of habitat for fish and wildlife and protecting their water, archeological and geological resources. For example, on recently acquired ranchland the tribes removed livestock from the damaged streamside areas and are working to control noxious weeds and juniper trees, which consume groundwater year-round. Approximately 50% of these lands are shrub-steppe habitat and the other 50% is forested.

Lands managed of Coeur d' Alene Tribe occupy 345,000 acres of northern Idaho includes about 180,000 acres of forest and 150,000 acres of farmland. The tribal economy is partially dependent upon logging revenues. However, the fact that clear cuts are banned, and only selective cutting of forests is undertaken on tribal land, should benefit many forest-associated bird species.

In northeastern Oregon, the Confederated Tribes of the Umatilla Indian Reservation (aided by the US Army Corps of Engineers) are focusing on the restoration and management of a viable ecosystem within the Walla Walla River Basin. A feasibility and environmental report will evaluate and recommend those alternatives that will: 1) contribute significantly to established restoration objectives; 2) benefit biological resources and natural ecosystem functions and processes; and 3) be technically feasible and cost effective. The Tribe has been successful in restoring salmon populations in the Umatilla River and is actively involved in the restoration efforts of many other river basins. Consequently, the quality of riparian habitat is improving on these tribal lands.

Overall, although tribal authorities are implementing extensive programs for the restoration of shrub-steppe and Riparian Habitats, those lands are not monitored by MAPS. An exception has been the six

MAPS stations currently being operated on the Flathead Indian Reservation to monitor ongoing riparian restoration. Unfortunately, we understand that the operation of these six stations will be discontinued for the 2006 season, although habitat restoration efforts will continue.

F. Analysis of individual stations on Department of Defense (DoD) and Department of Energy (DoE)

Lands

Few DoD and DoE parcels exist in BCRs 9 and 10, relative to BLM and USFS lands, with which to increase capture rates of focal Scrub and Shrub-Steppe species; however, we strongly recommend re-establishing and/or establishing additional stations near the Arco Desert Station, Idaho National Engineering and Environmental Lab, in Bingham County, ID, to substantially increase capture rates of Sage Thrashers, Brewer's Sparrows, and Sage Sparrows.

There have been 4 MAPS stations operated on DoD and DoE lands in the Pacific Northwest in 1989-2005. All three of the active stations, the Fort Lewis and Benston station on the Fort Lewis Military Reservation, WA, and the Rose Amazon station on the Rose Prairie Unit of Fern Ridge, OR, have priority species scores of 16-22 and should be continued. We have already recommended the re-establishment of the discontinued Arco Desert station, as noted above.

Three extensive DoD lands exist in Oregon upon which MAPS monitoring might be established. Yakima Firing Center (500 square miles) in south central Washington (BCR9) represents one of the biggest areas of shrub-steppe habitat in the state. Western Sage Grouse and passerines, including Vesper Sparrow, Sage Sparrow, and Sage Thrasher, are specifically mentioned as a group of species of concern in the Cultural and Natural Resource Management Plan. In north central Oregon, abutting the Washington border, two adjacent parcels (totaling approximately 69,000 acres) comprise the Boardman Grasslands IBA: the Boardman Conservation Area and the Boardman Bombing Range (Naval Weapons Systems Training Facility Boardman). This landholding contains some of the largest remnants of native grasslands and shrub steppe in public ownership. Finally, the Cusick Survival Training Center (adjacent to Colville National Forest lands and Little Pend Orielle NWR) in the northeast corner of Washington offers opportunities to monitor vesper sparrow.

G. Analysis of individual stations on State, County, Private, and Canadian Lands

In our species-specific analyses, we recommended re-establishing the Mt. Spokane station in Mount Spokane State Park, WA; the Kanipe Pass station on state land in Douglas County, OR; the Oak Island station in the Sauvie Island Management Area, Multnomah County, OR; the Skunk Cabbage station near Albert Canyon, BC; the Beartooth station in Beartooth Wildlife Management Area, MT; and the Mary's River Ranch station on private land in Elko County, NV. We also recommended continuing the Whetstone Savannah station on private land in Jackson County, OR, and the Home station on private lands in Arcata, Humboldt County, CA. Otherwise, we have not analyzed each station in these categories as we have those run by Federal agencies under consideration here.

A total of 49 MAPS stations operated on State, County, Private, or Canadian lands in the Pacific Northwest in 1989-2005, of which 36 are active and 13 have been discontinued (Table 1). We have already recommended the re-establishment of six discontinued stations (above) and have no recommendations to re-establish any of the other nine discontinued stations. Of the 36 active stations, we followed the same strategies used on federal lands to recommend the continuation of 27 of these stations and the discontinuation of 9 stations. Our recommendations for these stations can be found in Table 1.

Problems on the Wintering Grounds of Migratory Species

Recent evidence suggests that population declines in a number of Neotropical-wintering migratory landbird species are caused by habitat loss and degradation on their wintering grounds (DeSante et al. 2001). Such habitat loss and degradation can lower over-winter survival rates and cause surviving birds to leave their wintering grounds in poor physical condition, leading to high mortality during spring migration and low breeding productivity (Nott et al. 2002). Large-scale, long-term data on winter demographic parameters of these species and linkages between those parameters and winter habitat characteristics are urgently needed to understand the population dynamics of these migratory landbirds and guide management and conservation efforts for them.

In response to these needs, IBP established the MoSI (Monitoreo de Sobrevivencia Invernal) Program to fill this data gap (DeSante et al. in press b). The objectives of MoSI are: 1) to assess habitat-, age-, and sex-specific over-winter survival rates and late winter physical condition for a suite of target species in a variety of winter habitats by applying state-of-the-art mark-recapture models to data

collected from a network of standardized mist-netting and bird-banding stations throughout Mexico, Central America, and the Caribbean; 2) to use these data to formulate management plans for these species on their winter grounds; and 3) to use the MoSI network to facilitate feather collection for DNA and stable isotope analyses that aim to link breeding and wintering populations of these species. IBP initiated a five-year pilot project aimed at evaluating, enhancing, and expanding the MoSI Program, and has created partnerships with 20 organizations and individuals in Mexico, Central America, and the Caribbean who operated 29 MoSI stations during the winter of 2002-03 and 63 stations during the winter of 2003-04. We suggest that the Federal agencies in the Pacific Northwest could contribute in various ways to enhance the operation of MoSI stations in western Mexico and Central America, the major wintering grounds for Neotropical migrants from the Pacific Region. We also suggest that the MoSI protocol could be integrated into an analogous program in the southern United States to address these same issues in temperate-wintering migratory species. If this were to happen (in fact, 24 such stations are currently being operated on military installations in southeastern United States), such stations on BLM, USFS, NPS, FWS, BIA, and DoD lands in southern California, Arizona, New Mexico, and western Texas could provide important information on the overwintering survival of a number of declining sparrows that breed in the USFWS Pacific Region.

SUMMARY AND CONCLUSIONS

Based on a thorough review of state conservation plans we identified four major priority habitat types of conservation concern among four Bird Conservation Regions (BCR5, BCR9, BCR10, and BCR15) in the Pacific Northwest that are relatively widespread on Federal lands: 1) Coniferous Forest, 2) Riparian Habitats, 3) Broadleaf Habitats, and 4) Scrub and Shrub-Steppe Habitats. One other major habitat of conservation concern for landbirds, Grasslands, is not included in this report because the population demographics of its breeding landbirds cannot easily be monitored using MAPS protocol.

We developed a list of 101 species that had previously been captured at MAPS stations in the Pacific Northwest and that we believed could be sampled effectively by MAPS protocol. Within each BCR, we selected target species that were 1) identified as priority or focal species by state, PIF, or NABCI conservation plans; 2) were declining in the BCR according to BBS and MAPS data; or 3) were increasing in the BCR according to BBS and MAPS data. Targeting species with positive population trends allows us to compare demographic rates between those species and species with negative population trends to gain insight into proximate cause(s) of population declines.

We identified 55 target species within BCR5 (24 associated with coniferous forest, 18 with Riparian Habitats, and 13 with Broadleaf Habitats), 46 target species within BCR9 (15 associated with Coniferous Forests, 15 with Riparian Habitats, and 16 with Scrub/Shrub-Steppe Habitats), 48 target species within BCR10 (22 associated with Coniferous Forests, 17 with Riparian Habitats, and 9 with Scrub/Shrub-Steppe Habitats), and 42 target species within BCR15 (22 associated with Coniferous Forests, 13 with Riparian Habitats, and 7 with Scrub/Shrub-Steppe Habitats). We assigned each species a “species priority score” specific to each BCR, which ranged from 0 (not a target species within that BCR) to 5 (identified as a listed or focal species and showing declining trends within that BCR).

We superimposed the locations of 238 discontinued and active MAPS stations upon GIS layers of for agency landholders in the Pacific Northwest in order to identify geographical gaps in MAPS coverage. From all of the information assembled regarding capture rates of species at stations, priority habitats for monitoring, target species, geographical gaps in MAPS coverage, and monitoring potentials of the various landholders of the Pacific Northwest, we suggest BCR/habitat combinations

in need of additional stations and provide recommendations specific to each Federal agency (BLM, USFS, NPS, FWS, BIA, and DoD) regarding the continuation or re-establishment of both active and discontinued MAPS stations.

Within BCR5 and BCR15 the three broad habitat types that we selected are Coniferous Forests, Riparian Habitats, and Broadleaf Habitats. From 1989-2005, 101 MAPS stations were operated in BCR 5, of which 49 remained active in 2005: 34 stations (15 active) in Coniferous Forest, 39 stations (24 active) in Riparian Habitats, and 28 stations (10 active) in Broadleaf Habitats. From 1989-2005, 29 MAPS stations were operated in BCR 15, of which 15 remained active in 2005: 18 stations (10 active) in Coniferous Forest, 6 stations (4 active) in Riparian Habitats, and 5 stations (1 active) in Broadleaf Habitats (Fig. 5). This indicates relatively good coverage of all habitat types in BCR5 and of Coniferous Forests in BCR15 but marginal to poor coverage of Riparian and Broadleaf Habitats in BCR15.

Within BCR 9 and BCR10 the three broad habitat types that we have defined are Coniferous Forests, Riparian Habitats, and Shrub-Steppe Habitats. From 1989-2005, 60 MAPS stations were operated in BCR9, of which 44 remained active in 2005: 23 stations (18 active) in Coniferous Forest, 32 stations (26 active) in Riparian Habitats, and 5 stations (0 active) in Shrub-Steppe Habitats. From 1989-2005, 48 MAPS stations were operated in BCR 10, of which 30 remained active in 2005: 16 stations (7 active) in Coniferous Forest, 32 stations (23 active) in Riparian Habitats, and no stations in Scrub and Shrub-Steppe Habitats. This indicates marginally adequate coverage of Coniferous Forests and Riparian Habitats but inadequate coverage of Scrub and Shrub-Steppe Habitats in BCR9 and BCR10.

We summarize needs and potential contributions of the MAPS program within our four defined, broad habitat types and discuss the potential for monitoring 46 species with inadequate coverage by MAPS in at least one BCR by 1) re-establishing discontinued MAPS stations, 2) establishing additional MAPS stations, or 3) monitoring vital rates of the species by means other than MAPS. Among the four BCRs there have been a total of 91 MAPS stations operated in Coniferous Forests (of which 50 remain active), 109 MAPS stations operated in Riparian Habitats (of which 77 remain active), 33 MAPS stations operated in Broadleaf Habitats (of which 11 remain active) and 5 MAPS stations operated in Scrub and Shrub-Steppe Habitats (of which none remain active). This indicates an overall generally adequate coverage of Coniferous Forests and Riparian Habitats, relatively

inadequate coverage of Broadleaf Habitats, and completely inadequate coverage of Scrub and Shrub-Steppe Habitats by the MAPS program within the Pacific Northwest.

Thus, we recommend increasing MAPS coverage of Scrub and Shrub-Steppe Habitats in BCR 9 and BCR 10, with the goal of targeting several high-priority species within those habitats. Low breeding bird densities coupled with hot temperatures and limited shade increase the difficulty of monitoring this habitat using MAPS protocol. An effort is underway by the PIF Shrub-steppe Working Group to address some issues related to landbird productivity in this habitat by nest monitoring. We suggest that an additional component in this effort using MAPS stations sited with hypothesis-driven sampling strategies could help achieve some of the research and management goals of this cooperative effort. We believe that the MAPS program can contribute to ongoing efforts to monitor certain species, including Sage Thrasher, Brewer's Sparrow, Vesper Sparrow, and Sage Sparrow.

We also recommend increasing the monitoring coverage of Broadleaf Habitats in BCR5 and BCR15, and targeting selected Coniferous Forest and Riparian Habitat species within all four BCRs to increase the capture rates of priority and focal species including Nashville Warbler, Black-throated Gray Warbler, and Chipping Sparrow in Broadleaf Habitats; Red-naped Sapsucker, Willow Flycatcher, Red-eyed Vireo, House Wren, Swainson's Thrush, Orange-crowned Warbler, Wilson's Warbler, Yellow-breasted Chat, Lincoln's Sparrow, and Mountain White-crowned Sparrow in Riparian Habitats; and Red-breasted Sapsucker, Hammond's Flycatcher, Cordilleran Flycatcher, Cassin's Vireo, Brown Creeper, Golden-crowned Kinglet, Varied Thrush, Black-throated Gray Warbler, Chipping Sparrow, and Cassin's Finch in Coniferous Forests. We further recommend continued operation of most of the active stations to continue the currently adequate coverage of many widespread target species, including Dusky Flycatcher, Black-capped Chickadee, Yellow Warbler, MacGillivray's Warbler, Swainson's Thrush (except BCR15), Song Sparrow, Dark-eyed Junco, and Black-headed Grosbeak) in Coniferous Forest and Riparian Habitats throughout the Pacific Northwest.

In addition, we suggest species that each federal agency could target, given their landholdings, gaps in coverage identified above, and the distribution of priority species that are monitored or could be better monitored by MAPS. We also reviewed each of the active and discontinued stations operated on the lands of each Federal agency and made recommendations either to continue an active station

(116 cases), discontinue an active station in favor of establishing new stations in more productive areas (23 cases), re-establish a discontinued station (28 cases), or not re-establish a discontinued station (71 cases).

Finally, we suggest that not all causes of population declines in Pacific Northwest landbirds can be addressed on the breeding grounds; habitat loss and degradation on the wintering grounds can cause low over-winter survival and poor physical condition that can, in turn, lead to high mortality on spring migration and to poor productivity on the breeding grounds. We suggest that Federal agencies in the Pacific Northwest can contribute to enhancing the operation of MoSI (Monitoreo de Sobrevivencia Invernal) stations in western Mexico and Central America, where most of the declining Neotropical migrants breeding in Pacific Region spend the winter, as well as analogous MAWS stations in southern California, Arizona, New Mexico, and western Texas where many of the declining temperate migrants breeding in the Pacific Northwest spend the winter. The Institute for Bird Populations (which created and helps coordinate the MoSI and MAWS Program) is very interested in exploring ways in which Federal agencies in the Pacific Northwest Region could help facilitate these Programs.

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Table 1. Stations operated in the Pacific Northwest between 1989 and 2005.

Location	Station	Name	State	Land-holder ¹	Years of operation 1989-'03	History ²	Elev.	Habitat	Monitor-able species ³	Mean number adults ⁴	Priority species score ⁵	Rec. for sta. ⁶
A. Bird Conservation Region 5, Northern Pacific Rainforest												
WENA	DECR	Deep Creek	WA	USFS	12	92-04	1195	coniferous	8	87.08	12	N
COLR	STCL	St. Cloud	WA	USFS	7	97-	25	riparian	7	93.57	10	D
NISQ	REST	Restoration	WA	FWS	3	00-02	10	riparian	8	64.33	13	N
NISQ	SURG	Surge Plain	WA	FWS	3	00-02	10	riparian	6	80.00	10	N
NISQ	RIVR	Riverine	WA	FWS	3	00-02	9	riparian	9	94.67	14	N
COLR	RNWR	Bachelor Point	WA	FWS	10	93-02	3	riparian	16	206.30	24	R
NISQ	DIKE	Dike	WA	FWS	1	00	5	riparian	10	69.00	10	N
COLR	JBHR	Julia Butler Hansen W.R.	WA	FWS	5	98-02	7	riparian	10	170.40	13	N
FTLE	FTLE	Fort Lewis	WA	DoD	10	94-	107	broadleaf	9	65.20	16	C
FTLE	BENS	Bensten	WA	DoD	6	97-99,01-	107	riparian	14	96.33	22	C
FTLE	MORS	Morse	WA	PRIV	8	96-	190	broadleaf	13	78.75	21	C
BAIS	PSEL	Puget Sound Environ. LC.	WA	PRIV	1	02,04	74	broadleaf	9	94.00	12	N
ROSE	NBSR	Neotrop. Bird Sanc. Roseb	OR	BLM	5	99-	488	broadleaf	10	64.60	18	C
ROSE	BOUL	Boulder Creek	OR	BLM	11	93-	378	coniferous	7	52.64	13	D
UKLA	LIAP	Little Applegate	OR	BLM	1	01	494	riparian	8	51.00	14	N
MIME	MIME	Mike's Meadow	OR	BLM	6	97-02	1200	riparian	13	101.00	22	R
UKLA	SNCO	Snow Cow	OR	BLM	4	00-	1585	riparian	10	57.25	15	D
SISK	APRI	Applegate River	OR	BLM	7	97-	360	broadleaf	13	100.71	18	C
GRPA	WIIM	Wildlife Images	OR	BLM	9	95-	244	broadleaf	14	119.78	27	C
LORI	LORI	Long Ridge	OR	USFS	10	92-	518	coniferous	9	59.10	11	D
WILL	IKEN	Ikenik	OR	USFS	12	92-	1006	coniferous	14	104.25	25	C
WILL	FIPR	Fingerboard Prairie	OR	USFS	12	92-	1195	coniferous	14	97.42	23	C

Table 1. (cont.) Stations operated in the Pacific Northwest between 1989 and 2005.

Location	Station	Name	State	Land- holder ¹	Years of operation History ² 1989-'03	Elev.	Habitat	Monitor- able species ³	Mean number adults ⁴	Priority species score ⁵	Rec. for sta. ⁶	
WILL	STFL	Strube Flat	OR	USFS	12	92-04	488	riparian	4	39.00	4	N
WILL	CLCU	Clear Cut	OR	USFS	12	92-	1292	coniferous	8	66.83	14	C
SIUS	MAPE	Mary's Peak	OR	USFS	12	92-03	274	coniferous	6	57.42	10	N
SIUS	NECR	Nettle Creek	OR	USFS	1	92	256	coniferous	7	105.00	12	N
SIUS	HOME	Homestead	OR	USFS	12	92-	207	coniferous	7	72.00	12	C
SIUS	BERI	Beaver Ridge	OR	USFS	12	92-	158	coniferous	5	79.92	8	C
SIUS	SAME	Salvation Meadow	OR	USFS	11	93-	122	riparian	7	98.27	13	C
SIUS	CRCR	Crab Creek	OR	USFS	12	92-	219	coniferous	5	59.33	8	C
WILL	MOCR	Mosquito Creek	OR	USFS	0	05-	1381	coniferous	- ⁷	— ⁷	- ⁷	C
WILL	MAPR	Major Prairie	OR	USFS	12	92-	701	coniferous	8	64.83	15	C
SWOR	CARB	Carberry Creek	OR	USFS	5	93-97	566	broadleaf	12	61.80	16	R
WILL	BRCR	Brock Creek	OR	USFS	12	92-	792	riparian	10	72.08	18	C
SISK	BCBA	Bear Camp	OR	USFS	13	91-03, 05-	1341	coniferous	5	36.31	8	C
SIUS	COUC	Cougar Creek	OR	USFS	12	92-	259	coniferous	7	101.42	11	C
SIUS	CCRE	Cape Creek	OR	USFS	0	04-	274	coniferous	- ⁷	— ⁷	- ⁷	C
SWOR	SKSW	Skeeter Swamp	OR	USFS	10	94-	1067	riparian	15	122.40	27	C
SISK	HCME	Horse Creek Meadows	OR	USFS	15	89-	664	riparian	15	120.13	25	C
SISK	GBCR	Grayback Creek	OR	USFS	13	91-	634	riparian	8	50.23	13	D
UKLA	ORCA	Oregon Caves	OR	NPS	2	02-	1597	coniferous	4	34.00	7	D
FNLY	PIBU	Pigeon Butte	OR	FWS	5	98-02	300	broadleaf	13	108.80	19	R
FNLY	SNBE	Snagboat Bend	OR	FWS	3	01-	73	riparian	15	222.67	23	C
FERI	ROAM	Rose Amazon	OR	DoD	0	04-	98	broadleaf	- ⁷	— ⁷	- ⁷	C
ROSE	KANI	Kanipe Ranch	OR	S/C	1	94	146	broadleaf	7	31.00	9	R

Table 1. (cont.) Stations operated in the Pacific Northwest between 1989 and 2005.

Location	Station	Name	State	Land- holder ¹	Years of operation History ² 1989-'03	Elev.	Habitat	Monitor- able species ³	Mean number adults ⁴	Priority species score ⁵	Rec. for sta. ⁶	
SWOR	BRCR	Bear Creek	OR	S/C	3	97-99	41	riparian	13	93.33	17	R
ASHL	NOMO	North Mountain Park	OR	S/C	7	97-	540	riparian	4	38.00	5	D
UKLA	WIWI	Willow Wind	OR	S/C	3	01-	549	riparian	9	81.67	10	D
OAIS	OAIS	Oak Island	OR	S/C	5	94-98	3	broadleaf	10	72.00	15	N
SISK	WHSA	Whetstone Savannah	OR	PRIV	7	97-	425	broadleaf	7	51.29	6	D
TRLK	CHWD	Cheerwood	OR	PRIV	2	99-00	378	coniferous	15	216.00	23	R
RFSL	LADY	Lady	CA	USFS	12	92-	122	riparian	11	68.33	21	C
RFSL	CAPD	Cap D	CA	USFS	12	92-	98	riparian	10	58.08	17	D
SIXR	H-2	H-2	CA	USFS	1	91	829	coniferous	4	21.00	5	N
SIXR	H-3	H-3	CA	USFS	1	91	1103	coniferous	2	11.00	3	N
SIXR	H-1	H-1	CA	USFS	1	91	829	coniferous	6	31.00	8	N
RFSL	RED2	Red 2	CA	USFS	5	92-96	98	broadleaf	10	58.60	17	N
SIXR	M-1	M-1	CA	USFS	1	91	1103	coniferous	3	19.00	3	N
BIGB	WHBA	Whites Bar	CA	USFS	9	91-98,02-	110	riparian	12	99.22	19	C
RFSL	PLME	Plaskett Meadows	CA	USFS	2	02-03	1838	coniferous	8	49.50	8	R
RFSL	MAST	Masterson Campground	CA	USFS	2	02-03	1841	coniferous	10	105.50	12	R
SIXR	M-2	M-2	CA	USFS	1	91	1103	coniferous	3	21.00	4	N
SIXR	M-3	M-3	CA	USFS	1	91	1103	coniferous	3	17.00	4	N
RFSL	CAMP	Camp Creek	CA	USFS	11	92-02	122	broadleaf	9	56.91	16	N
SIXR	P-1	P-1	CA	USFS	1	91	1103	coniferous	2	9.00	3	N
SIXR	P-2	P-2	CA	USFS	1	91	1103	coniferous	5	17.00	8	N
RFSL	AKEN	Aikens Creek	CA	USFS	1	92	152	riparian	8	42.00	12	R
SIXR	P-3	P-3	CA	USFS	1	91	1103	coniferous	4	21.00	4	N

Table 1. (cont.) Stations operated in the Pacific Northwest between 1989 and 2005.

Location	Station	Name	State	Land-holder ¹	Years of operation History ² 1989-'03	Elev.	Habitat	Monitor-able species ³	Mean number adults ⁴	Priority species score ⁵	Rec. for sta. ⁶	
RFSL	WHIT	Whitmore Creek	CA	USFS	1	92	122	broadleaf	6	42.00	9	N
RFSL	BOND	Bondo Mine	CA	USFS	7	92-98	122	broadleaf	3	22.86	5	N
RFSL	MOLI	Molier	CA	USFS	5	92-96	91	riparian	8	56.00	15	N
SACR	SIMS	Sims	CA	USFS	1	98	500	riparian	5	19.00	10	N
UKLA	ANT1	Antelope Creek	CA	USFS	10	94-	1646	riparian	13	65.60	17	C
RFSL	INVA	Indian Valley	CA	USFS	10	94-	1219	riparian	18	158.40	27	C
RFSL	GRCR	Grouse Creek	CA	USFS	1	94	610	broadleaf	2	14.00	1	N
RFSL	GROV	Grove's Prairie	CA	USFS	10	94-	1250	riparian	17	108.40	25	C
RFSL	EMMY	Emmy's Place	CA	USFS	5	94-98	610	broadleaf	10	64.60	17	R
KLAM	WEST	Humbug Creek 2	CA	USFS	2	95-96	610	broadleaf	8	46.00	11	N
KLAM	HUM1	Humbug Creek	CA	USFS	1	94	610	broadleaf	7	44.00	5	R
KLAM	PCT1	Pacific Crest Trail	CA	USFS	11	93-	421	riparian	9	135.00	15	C
RFSL	RECR	Redwood Creek	CA	NPS	8	94-01	9	riparian	8	79.50	13	N
RNP-	LLMC	Lost Man Creek	CA	NPS	7	93-99	46	riparian	6	68.14	10	N
LBJ-	RERO	Red Rock	CA	BIA	1	98	110	broadleaf	10	75.00	19	R
LBJ-	MUSP	Mud Springs	CA	BIA	1	98	1292	coniferous	9	97.00	13	R
ARCA	SALC	Salmon Creek	CA	S/C	2	02-	3	riparian	6	40.00	8	D
NAVR	NAVR	Navarro Rivermouth	CA	S/C	3	97-99	5	broadleaf	14	104.00	25	R
LBJ-	YACR	Yager Creek	CA	PRIV	10	94-	37	riparian	10	77.50	18	C
EURK	REF-	Wright Refuge	CA	PRIV	11	93-	15	coniferous	7	65.82	13	C
EURK	MARI	Mad River	CA	PRIV	8	96-	30	riparian	12	97.75	19	C
LBJ-	LELA	Leland Rock	CA	PRIV	7	97-	20	riparian	11	91.14	17	C
ARCA	PARK	Park	CA	PRIV	12	92-	3	riparian	12	98.50	17	C

Table 1. (cont.) Stations operated in the Pacific Northwest between 1989 and 2005.

Location	Station	Name	State	Land- holder ¹	Years of operation History ² 1989-'03	Elev.	Habitat	Monitor- able species ³	Mean number adults ⁴	Priority species score ⁵	Rec. for sta. ⁶
ARCA	HOME	Home	CA	PRIV	14	90-	10 riparian	19	187.86	21	C
CHAT	YAKU	Yakutat	AK	USFS	9	94-02	6 broadleaf	9	104.22	7	R
CHAT	HOON	Hoonah	AK	USFS	9	94-02	152 broadleaf	14	102.11	21	R
MFNM	PBOG	Oldgrowth	AK	USFS	4	93-96	15 coniferous	4	16.25	4	N
MFNM	MUSK	Muskeg	AK	USFS	4	93-96	46 coniferous	4	25.50	5	N
KETC	WACR	Ward Creek	AK	USFS	1	92	6 coniferous	5	26.00	9	R
CHAT	MEND	Mendenhall	AK	USFS	10	94-	18 broadleaf	8	63.60	8	D
BURB	BURB	Burns Bog	BC	CAN	1	02	10 broadleaf	8	46.00	11	N
VICT	RPBO	Rocky Point Bird Observ.	BC	CAN	1	03-	15 broadleaf	9	88.00	14	C
VICT	RRUN	Royal Roads University	BC	CAN	1	03-	10 broadleaf	7	48.00	10	D
B. Bird Conservation Region 9, Great Basin											
DOUG	DOUG	Douglas Creek	WA	BLM	11	93-	463 riparian	12	101.91	13	C
MTBA	SKCR	Skull Creek	WA	USFS	0	05-	1810 coniferous	- ⁷	— ⁷	- ⁷	C
MTBA	FRLA	Frog Lake	WA	USFS	12	92-	317 coniferous	7	42.08	8	C
WENA	QUCR	Quartz Creek 1	WA	USFS	1	92	853 coniferous	8	57.00	12	N
MTBA	BELA	Beaver Lake	WA	USFS	12	92-	299 riparian	10	78.58	8	C
WENA	LIRA	Little Rattlesnake	WA	USFS	0	05-	1280 coniferous	- ⁷	— ⁷	- ⁷	C
MTBA	MCLA	Monte Cristo Lake	WA	USFS	12	92-	610 riparian	14	84.08	20	C
MTBA	MUCR	Murphy Creek	WA	USFS	12	92-04	244 coniferous	4	53.17	3	N
MTBA	COPC	Copper Creek	WA	USFS	1	92	512 coniferous	5	29.00	5	N
WENA	TWPO	Two Point	WA	USFS	12	92-	1512 coniferous	12	99.00	12	C
WENA	PLVA	Pleasant Valley	WA	USFS	12	92-	1000 coniferous	14	78.42	14	C
WENA	RASP	Rattlesnake Spring	WA	USFS	12	92-	817 coniferous	14	88.33	12	C

Table 1. (cont.) Stations operated in the Pacific Northwest between 1989 and 2005.

Location	Station	Name	State	Land- holder ¹	Years of operation History ² 1989-'03	Elev.	Habitat	Monitor- able species ³	Mean number adults ⁴	Priority species score ⁵	Rec. for sta. ⁶
WENA	QCR2	Quartz Creek 2	WA	USFS	11	93-	853 riparian	15	121.09	18	C
MTBA	BETH	Bench Thin	WA	USFS	11	93-	354 coniferous	6	43.27	5	C
MTBA	PECR	Perry Creek	WA	USFS	12	92-	512 coniferous	4	35.00	5	C
WENA	TIME	Timothy Meadow	WA	USFS	12	92-	951 coniferous	11	64.50	11	C
WALL	WALL	Wallula - McNarry NWR	WA	FWS	3	01-	106 riparian	11	104.00	11	D
TBWR	TBWR	Turnbull NWR	WA	FWS	10	94-	695 riparian	11	53.20	11	C
MYRC	MYRC	Myer Creek	WA	PRIV	5	93-97	671 coniferous	9	72.60	9	N
DOUG	MCCA	McCarteney Creek	WA	PRIV	2	02-	503 riparian	10	58.00	5	D
UKLA	WOOD	Wood River	OR	BLM	7	97-	1270 riparian	13	183.14	12	C
UKLA	JOHN	Johnson Creek	OR	BLM	7	97-	1554 coniferous	12	85.14	20	C
UKLA	GERB	Gerber Reservoir	OR	BLM	6	98-	1174 coniferous	7	43.00	4	D
FREM	SWCR	Swamp Creek	OR	USFS	12	92-	1658 coniferous	6	50.50	5	C
UKLA	WILL	Williamson River	OR	USFS	6	98-	1281 riparian	11	69.50	13	D
UKLA	ODES	Odessa Creek	OR	USFS	7	97-	1286 riparian	18	151.57	18	C
FREM	SYRI	Sycan River	OR	USFS	12	92-	2003 coniferous	13	118.33	10	C
FREM	ISLA	Island	OR	USFS	12	92-	1628 coniferous	8	64.58	6	C
FREM	DCRK	Deer Creek	OR	USFS	0	05-	1724 riparian	- ⁷	— ⁷	- ⁷	C
FREM	DEAD	Deadhorse	OR	USFS	12	92-	1944 coniferous	14	114.50	11	C
FREM	COLC	Cold Creek	OR	USFS	12	92-04	1926 coniferous	5	51.33	0	N
FREM	AUCR	Augur Creek	OR	USFS	12	92-	1847 coniferous	9	77.33	8	C
UKLA	7MIL	Seven Mile Creek	OR	USFS	7	97-	1277 riparian	13	100.86	14	C
UKLA	CABN	Cabin	OR	FWS	7	97-	1266 coniferous	14	157.71	15	C
HART	HART	Hart Mountain	OR	FWS	1	89	1712 scrub/shrub-steppe	15	133.00	15	R

Table 1. (cont.) Stations operated in the Pacific Northwest between 1989 and 2005.

Location	Station	Name	State	Land- holder ¹	Years of operation History ² 1989-'03	Elev.	Habitat	Monitor- able species ³	Mean number adults ⁴	Priority species score ⁵	Rec. for sta. ⁶
UKLA	TOPS	Topsy	CA	BLM	6	98-	960 riparian	16	253.33	22	C
INYO	TUTT	Tuttle Creek	CA	BLM	3	98-00	1925 scrub/shrub-steppe	6	30.33	4	N
INYO	TABO	Taboose Creek	CA	BLM	3	98-00	1435 scrub/shrub-steppe	6	30.00	6	R
INYO	BAIR	Bair's Creek	CA	BLM	3	98-00	1800 scrub/shrub-steppe	5	33.00	6	R
INYO	INDE	Independence Creek	CA	USFS	3	98-00	1820 riparian	11	87.33	12	R
MODO	SUBH	Subheadquarters	CA	FWS	9	94-01, 03-	1331 riparian	9	124.78	9	C
MONO	RCRK	Rush Creek	CA	S/C	4	00-	2963 riparian	10	84.25	17	C
MONO	LEEV	Lee Vining Creek	CA	S/C	4	00-	1960 riparian	11	99.25	14	C
MONO	WILS	Wilson Creek	CA	PRIV	4	00-	2073 riparian	6	49.00	10	C
MONO	MILL	Mill Creek	CA	PRIV	4	00-	2036 riparian	10	60.75	9	C
ARCO	ARCO	Arco Desert	ID	DoD	1	99	1500 scrub/shrub-steppe	5	116.00	11	R
IBO-	LUCK	Lucky	ID	S/C	4	00-	1845 coniferous	16	202.50	26	C
SILV	SILV	Silver Creek	ID	PRIV	2	98-99	1633 riparian	7	49.50	5	N
CARR	ANSA	Ambrose Nature Study Area	NV	BLM	2	02-	1402 riparian	13	124.50	7	D
RUBY	CACR	Cave Creek - Ruby Lake	NV	FWS	8	96-03,05	1829 riparian	9	100.63	15	N
NUMA	NUMA	Numana	NV	BIA	5	98-02	1190 riparian	12	105.40	12	D
CARR	DAYT	Dayton State Park	NV	S/C	2	02-	1341 riparian	12	88.50	8	D
NUMA	MCAR	McCarran Ranch	NV	PRIV	3	01-04	1312 riparian	8	83.67	5	N
MARY	AIRF	Mary's River Ranch	NV	PRIV	4	98-01	1650 riparian	8	84.25	15	N
OKAN	SOWM	SOWM	BC	CAN	0	04-	- riparian	- ⁷	____ ⁷	- ⁷	C
OKAN	VASW	VASW	BC	CAN	0	04-	- riparian	- ⁷	____ ⁷	- ⁷	C
OKAN	VASE	VASE	BC	CAN	0	04-	- riparian	- ⁷	____ ⁷	- ⁷	C
OKAN	VENN	VENN	BC	CAN	0	04-	- riparian	- ⁷	____ ⁷	- ⁷	C

Table 1. (cont.) Stations operated in the Pacific Northwest between 1989 and 2005.

Location	Station	Name	State	Land-holder ¹	Years of operation 1989-'03	History ²	Elev.	Habitat	Monitor-able species ³	Mean number adults ⁴	Priority species score ⁵	Rec. for sta. ⁶
OKAN	PRK-	Park	BC	CAN	0	04-	-	riparian	- ⁷	— ⁷	- ⁷	C
BEAR	BEAR	Bear River Refuge	UT	FWS	5	93-97	1292	riparian	11	126.00	15	N
C. Bird Conservation Region 10, Northern Rocky Mountains												
EWAS	KFGC	Growden	WA	USFS	5	97-01	792	riparian	7	52.80	10	N
EWAS	LPOW	Lower Manz - Little Pend	WA	FWS	5	97-01	701	riparian	6	66.00	5	N
SPOK	LISP	Little Spokane	WA	S/C	8	96-	470	riparian	14	136.50	16	C
EWAS	MTSP	Mt. Spokane	WA	S/C	6	96-01	1100	coniferous	9	55.33	8	N
UMAT	FRME	Fry Meadow	OR	USFS	12	92-	1280	coniferous	11	68.92	14	C
UMAT	BMME	Buck Mountain Meadow	OR	USFS	12	92-	1378	coniferous	16	125.58	22	C
UMAT	PHCR	Phillips Creek	OR	USFS	12	92-	975	coniferous	12	77.75	17	C
UMAT	CORI	Coyote Ridge	OR	USFS	12	92-	1341	coniferous	12	85.42	21	C
UMAT	BRME	Brock Meadow	OR	USFS	12	92-	1244	coniferous	14	116.67	18	C
UMAT	BUCR	Buzzard Creek	OR	USFS	12	92-	1524	coniferous	10	60.42	11	C
PATT	PATT	Pattee Creek	ID	BLM	5	99-	1585	riparian	14	133.60	18	C
CDAB	PNCK	Pine Creek	ID	BLM	0	04-	2445	riparian	- ⁷	— ⁷	- ⁷	C
BCC-	45--	Boise Cascade	ID	USFS	2	95-96	1676	coniferous	10	69.50	16	N
CDAB	SPST	Springston	ID	S/C	0	04-	2138	riparian	- ⁷	— ⁷	- ⁷	C
POTL	VASS	Vassar Meadows	ID	PRIV	7	97-	975	riparian	22	226.29	31	C
SKUN	SKUN	Skunk Cabbage	BC	CAN	10	93-02	610	riparian	9	80.20	14	N
RANG	RANG	Ranger Creek	AB	CAN	5	99-	1400	riparian	15	117.40	15	C
JNP-	JNP-	Pyramid Lake, Jasper	AB	CAN	0	04-	1000	riparian	- ⁷	— ⁷	- ⁷	C
WISH	WISH	Wishbone	AB	CAN	2	02-	1300	riparian	14	77.50	9	C
FLAT	HIME	Hillary Meadow	MT	USFS	12	92-03	1109	coniferous	9	71.33	8	N

Table 1. (cont.) Stations operated in the Pacific Northwest between 1989 and 2005.

Location	Station	Name	State	Land- holder ¹	Years of operation 1989-'03	History ²	Elev.	Habitat	Monitor- able species ³	Mean number adults ⁴	Priority species score ⁵	Rec. for sta. ⁶
LKCR	LKCR	Lick Creek	MT	USFS	11	93-	1341	coniferous	8	60.27	12	D
SWA1	SWA1	Swan Oxbow 1	MT	USFS	2	90-91	940	coniferous	6	26.00	5	N
FLAT	SICR	Simpson Creek	MT	USFS	12	92-03	1195	coniferous	4	45.42	4	N
FLAT	SRNA	Swan	MT	USFS	12	92-03	943	riparian	10	91.67	10	N
FLAT	SWOX	Swan Oxbow 2	MT	USFS	12	92-03	939	riparian	14	99.50	16	N
FLAT	SIMO	Sixmile Mountain	MT	USFS	12	92-03	1067	coniferous	9	76.92	14	N
FLAT	CEFO	Coram Forest	MT	USFS	12	92-03	1244	coniferous	3	25.50	2	N
SEVE	SEVE	Seventeen Mile Creek	MT	USFS	3	89-91	792	coniferous	9	66.00	12	N
SEEL	SEEL	Wildlife Research	MT	USFS	3	01-	1200	riparian	19	253.00	22	C
LKCR	RKCR	Lower Rock Creek	MT	USFS	10	94-	1219	riparian	11	112.20	18	C
LMWR	LEEM	Lee Metcalf	MT	FWS	11	93-03, 05-	975	riparian	15	149.36	12	C
FIRS	SCHA	Schall	MT	BIA	1	03-	870	riparian	14	142.00	16	C
FIRS	SPCK	Spring Creek	MT	BIA	1	03-	853	riparian	14	162.00	15	C
FIRS	WOHA	Woodpecker Haven	MT	BIA	1	03-	920	riparian	11	79.00	10	C
FIRS	CWCR	Crow Creek	MT	BIA	11	93-	786	riparian	9	61.36	10	C
FIRS	SHMA	Safe Harbor Marsh	MT	BIA	11	93-	881	riparian	9	70.45	10	C
FIRS	JORI	Jocko River	MT	BIA	2	02-	825	riparian	11	138.00	8	C
GRFA	BWMA	Beartooth	MT	S/C	12	92-	1158	riparian	19	184.58	22	C
BIGH	HUME	Hunter Mesa	WY	USFS	3	94-96	2347	riparian	6	38.33	8	N
BIGH	NFPR	Powder River	WY	USFS	3	94-96	2682	riparian	5	31.33	2	N
GRAN	GRAN	Grand Teton	WY	NPS	1	90	2036	coniferous	5	62.00	5	N
TSS-	TSS-	Teton Science School	WY	NPS	13	91-	2100	riparian	9	76.54	16	C
TSS-	SCHW	Schwaubacker's Landing	WY	NPS	3	01-	1980	riparian	9	70.00	12	C

Table 1. (cont.) Stations operated in the Pacific Northwest between 1989 and 2005.

Location	Station	Name	State	Landholder ¹	Years of operation 1989-'03	History ²	Elev.	Habitat	Monitor-able species ³	Mean number adults ⁴	Priority species score ⁵	Rec. for sta. ⁶
SEED	MCCU	McCullen Unit (NWR)	WY	FWS	3	93-95	1920	riparian	17	128.00	18	R
OXBO	OXBO	Oxbow Bend	WY	FWS	1	98	2057	riparian	14	144.00	14	N
TSS-	TOWN	Jarvis Lane Housing Dev.	WY	PRIV	3	01-	1888	riparian	8	42.00	6	D
TSS-	JACK	Jackson Campus	WY	PRIV	1	03-	1862	riparian	11	165.00	5	D
RDCR	DPCR	Deep Creek	WY	PRIV	9	95-	1859	riparian	16	163.11	15	C
D. Bird Conservation Region 15, Sierra Nevada												
TAHO	SNFC	Sierra Nevada	CA	USFS	13	91-04	1780	coniferous	13	110.08	25	R
LASS	SAVE	Savercool Place	CA	USFS	1	97	800	broadleaf	8	62.00	10	N
MART	MORR	Morrison	CA	USFS	1	96	1615	coniferous	16	141.00	34	R
LASS	GU CR	Gurnsey Creek	CA	USFS	7	97-	1524	riparian	15	165.57	30	C
TAHO	YUBA	Yuba Pass	CA	USFS	13	91-04	2040	coniferous	20	161.54	42	R
LASS	MICR	Mill Creek	CA	USFS	3	98-00	1402	riparian	9	91.67	22	R
TAHO	FREE	Freeman Meadow	CA	USFS	12	92-04	2042	coniferous	14	132.50	35	R
TAHO	CAVA	Carman Valley	CA	USFS	12	92-	1494	coniferous	25	188.08	46	C
TAHO	PZAZ	Perazzo Meadow	CA	USFS	12	92-04	2012	riparian	16	125.50	35	R
SBNE	KILN	Kiln Meadow	CA	USFS	2	98-99,04-	1976	coniferous	10	90.50	25	C
TAHO	RARA	Ramelli Ranch	CA	USFS	6	98-04	1554	coniferous	23	169.67	44	R
TAHO	KKDZ	KKDZ	CA	USFS	3	95-97	914	broadleaf	8	54.33	11	R
MART	BUCK	Buck Ranch	CA	USFS	1	96	1554	coniferous	10	72.00	18	R
FHRD	BGOK	Big Oak Flat	CA	USFS	7	95-01	1400	broadleaf	9	81.57	16	N
SBNE	SCRE	Sagehen Creek	CA	USFS	11	92-00,02-	1920	coniferous	11	82.91	23	C
SBNE	TMEA	Taylor Meadow	CA	USFS	9	93-00,03-	1920	riparian	11	55.00	23	C
FHRD	BIGO	Big Oak Flat 2	CA	USFS	6	96-01	1300	broadleaf	7	54.17	10	N

Table 1. (cont.) Stations operated in the Pacific Northwest between 1989 and 2005.

Location	Station	Name	State	Landholder ¹	Years of operation History ² 1989-'03		Elev.	Habitat	Monitor-able species ³	Mean number adults ⁴	Priority species score ⁵	Rec. for sta. ⁶
MART	WHIT	Whitmore Meadows	CA	USFS	1	96	1158	coniferous	6	41.00	10	R
YOSE	HODG	Hodgdon Meadow	CA	NPS	14	90-	1408	coniferous	22	237.14	49	C
MADE	DEPO	Devil's Postpile NM	CA	NPS	2	02-	2350	coniferous	9	77.00	20	C
SEKI	ZUME	Zumwalt Meadow	CA	NPS	6	91-93,01-	1280	coniferous	13	105.00	29	C
SEKI	LIME	Lion Meadow	CA	NPS	6	91-93,01-	1853	coniferous	13	96.67	21	C
YOSE	WHWO	White Wolf	CA	NPS	11	93-	2402	coniferous	9	70.73	12	C
YOSE	BIME	Big Meadow	CA	NPS	11	93-	1311	broadleaf	16	123.36	29	C
YOSE	TAME	Tamarack Meadow	CA	NPS	4	93-96	2024	coniferous	14	100.00	30	C
LASS	DRAK	Drakesbad	CA	NPS	7	97-	1859	riparian	11	81.86	22	C
YOSE	GFEM	Gin Flat East Meadow	CA	NPS	6	98-	2073	coniferous	11	100.67	21	C
YOSE	CRFL	Crane Flat	CA	NPS	11	93-	1875	coniferous	17	191.55	31	C
LIVA	FROF	Little Valley	NV	S/C	9	95-	1890	riparian	15	156.00	30	C

¹ The owner of the land on which the station is located. BLM - Bureau of Land Management, USFS - U.S. Forest Service, NPS - National Park Service, FWS - U.S. Fish and Wildlife Service, DoD - Department of Defence, BIA - Bureau of Indian Affairs, S/C - State or County Jurisdictions, PRIV - Private Landholder, CAN - Canada.

² The years in which the station was operated. If the groupings ends in a dash the station is expected to continue operations through at least the 2006 MAPS season.

³ Number species for which the mean number of adults captured for the species was ≥ 2.5 individuals per year and the species was either a regular breeder (we had positive or probable evidence of breeding or summer residency within the boundaries of the MAPS station *during all years* that the station was operated) or usual breeder (we had evidence of breeding *during more than half but not all of the years* that the station was operated).

⁴ Cumulative mean number of breeding adults per year at the station over all the years the station was operated, of all species, including breeding species with a mean of < 2.5 adults per year.

Table 1. (cont.) Stations operated in the Pacific Northwest between 1989 and 2005.

- ⁵ Adjusted cumulative species priority scores (see text) for those species where adult capture rates were ≥ 2.5 adults per year, adjusted by BCR. Values range from 0 (no target species within that BCR caught at sufficient levels) to 100 (all focal species within that BCR caught at sufficient levels). See Tables 3-6 for priority species scores and lists of target species by BCR.
- ⁶ Recommendations for both active and discontinued stations: C - Continue, D - Consider discontinuing, R - Re-establish, N - No need to re-establish
- ⁷ This station began operation after 2003 so no values are available.

Table 2. Breeding species captured at the 224 MAPS stations combined, that were operated in the Pacific Northwest during 1989-2003 which are effectively monitored by MAPS¹; and criteria on which the selection of target species was based.

Species	Number stations ²	Num. stas. ≥ 2.5 ads./year ³	Cumul. ads./year ⁴	Priority or Focal Species			BBS Trends ⁸		MAPS trends	Cumul. Species Priority Score
				State Cons. Plans ⁵	PIF Physiogr. Areas ⁶	NABCI BCRs ⁷	1966-2004	1980-2004	1992-2001 ⁹	
Acorn Woodpecker	3	0	1.47							0
Williamson's Sapsucker	10	1	8.85	CM ID MT	89 64	9 10 15				9
Red-naped Sapsucker	39	14	75.72	CP NV NR MT	64	10			UM- FL-	6
Red-breasted Sapsucker	58	22	120.34	AK SN	80 66		PK+	SP+ PK+		7
Ladder-backed Woodpecker	1	0	0.50							0
Downy Woodpecker	73	6	92.50				PK+ CP+ SN-	PK+ CP+ SN-		5
Hairy Woodpecker	70	2	45.68	LV						0
White-headed Woodpecker	10	1	11.04	CM ID MT SN	93 89 64 66	5 9 10 15	SN+			13
American Three-toed Woodp.	1	0	0.67				CR+	CR+		1
Red-shafted Flicker	70	3	41.11				SP- CM+	NP-		0
Olive-sided Flycatcher	15	0	5.35	CF LV AK ID NV NR	66	5 15	SP- NP- CM- CR- SN-	SP- NP- CM- CR- SN-		18
Western Wood-Pewee	88	42	261.74	LV AK SN			SN-		YO-	8

Table 2. (cont.) Breeding species captured at the 224 MAPS stations combined, that were operated in the Pacific Northwest during 1989-2003 which are effectively monitored by MAPS¹; and criteria on which the selection of target species was based.

Species	Number stations ²	Num. stas. ≥ 2.5 ads./year ³	Cumul. ads./year ⁴	Priority or Focal Species			BBS Trends ⁸		MAPS trends	Cumul. Species Priority Score
				State Cons. Plans ⁵	PIF Physiogr. Areas ⁶	NABCI BCRs ⁷	1966-2004	1980-2004	1992-2001 ⁹	
Willow Flycatcher	50	32	280.66	LV CR CP ID NV NR MT	93		SP- NP- DR-	NP- CP- DR-	WI+ FL- YO-	16
Least Flycatcher	6	1	15.88							0
Hammond's Flycatcher	62	26	161.12	CF AK ID MT SN	93 66	15	CM+ PK-	CM+	WI+ FR+ WE+ UM- YO-	13
Gray Flycatcher	1	1	4.00	CP ID NV	89 80		PK+ CR+	CP+		4
Dusky Flycatcher	58	34	336.00	ID SN			SP- DR- CR-	DR+ CR-	WI- WE- UM- YO-	16
Western Flycatcher	84	51	308.70	CF AK MT	93		SP- NP+ PK+ CR+	SP-	SI- MB- FR- FR-	8
Say's Phoebe	2	0	2.18				CP+ DR+ CR+	CP+ DR+ CR+		2
Ash-throated Flycatcher	1	0	2.14				SP-	SP- PK+ CP+		3
Western Kingbird	5	0	2.52				CP+	CP+		1
Eastern Kingbird	14	1	15.98				DR+	NP- DR+		1
Cassin's Vireo	41	12	90.40	SN	93 66		NP- PK+ CR+	NP- CM+ PK+ CR+		8

Table 2. (cont.) Breeding species captured at the 224 MAPS stations combined, that were operated in the Pacific Northwest during 1989-2003 which are effectively monitored by MAPS¹; and criteria on which the selection of target species was based.

Species	Number stations ²	Num. stas. \geq 2.5 ads./year ³	Cumul. ads./year ⁴	Priority or Focal Species			BBS Trends ⁸		MAPS trends	Cumul. Species Priority Score
				State Cons. Plans ⁵	PIF Physiogr. Areas ⁶	NABCI BCRs ⁷	1966-2004	1980-2004	1992-2001 ⁹	
Hutton's Vireo	14	0	10.22	CF OW SN	93 66					3
Warbling Vireo	121	74	607.78	CR			CM+ PK+ DR+ CR+	CM+ PK+ DR+ CR+	WI+ MB- UM- FL- YO-	8
Red-eyed Vireo	11	4	32.57	LV NR MT			PK- CR-	DR- CR-		8
Gray Jay	10	0	6.51				SP+ DR+	DR+ CR-		0
Steller's Jay	70	0	41.11	AK SN	66		SP+ DR+ CR+ SN-	SP+ NP- DR+ CR+		7
Western Scrub-Jay	16	0	9.34	OW				PK+ SN+		4
Clark's Nutcracker	1	0	0.08				CR+			0
Black-capped Chickadee	67	37	246.50	LV			NP-	NP-	FL+	5
Mountain Chickadee	59	26	174.16	SN	66		SN-	CR- SN-	YO+	3
Chestnut-backed Chickadee	59	22	151.40	AK	93		SP-			3
Oak Titmouse	2	0	3.19	LV OW	93		SP-			3
Bushtit	25	13	80.62	LV			SP- NP+ PK+	SP- WL- PK+		6
Red-breasted Nuthatch	81	6	78.45	CC			SP+ PK+ CR+	SP+ PK+ CR+	FR+ UM-	5
Pygmy Nuthatch	2	0	0.82				DR+	CM-		0

Table 2. (cont.) Breeding species captured at the 224 MAPS stations combined, that were operated in the Pacific Northwest during 1989-2003 which are effectively monitored by MAPS¹; and criteria on which the selection of target species was based.

Species	Number stations ²	Num. stas. ≥ 2.5 ads./year ³	Cumul. ads./year ⁴	Priority or Focal Species			BBS Trends ⁸		MAPS trends	Cumul. Species Priority Score
				State Cons. Plans ⁵	PIF Physiogr. Areas ⁶	NABCI BCRs ⁷	1966-2004	1980-2004	1992-2001 ⁹	
Brown Creeper	67	6	88.34	CF CM CC ID MT SN	66		NP+ CM-	CR-	FR+	12
Rock Wren	1	0	1.50				CP- DR-	SP- CP- DR-		4
Bewick's Wren	39	20	134.61	LV OW			CP+	NP- PK-		3
House Wren	36	22	241.74	LV				SP-	FR-	3
Winter Wren	50	23	161.52	CF MT			CM+ PK+ DR+ CR+	PK+ DR+ CR+	SI- WI+ MB-	7
American Dipper	2	0	1.09					DR-		0
Golden-crowned Kinglet	63	10	103.15	CC SN	93 66		SP- SN-	SP- CR-	WI- WE- UM+ YO-	12
Ruby-crowned Kinglet	22	12	100.83				SN-		UM-	3
Blue-gray Gnatcatcher	2	0	1.30							0
Western Bluebird	5	0	3.88	CF OW NV			CR+	CR+		7
Mountain Bluebird	2	1	7.25				CP+ DR+ CR+	CP+ DR+		4
Townsend's Solitaire	4	0	4.00				PK+ DR+	CR-		0
Veery	6	4	41.68	MT						3

Table 2. (cont.) Breeding species captured at the 224 MAPS stations combined, that were operated in the Pacific Northwest during 1989-2003 which are effectively monitored by MAPS¹; and criteria on which the selection of target species was based.

Species	Number stations ²	Num. stas. ≥ 2.5 ads./year ³	Cumul. ads./year ⁴	Priority or Focal Species			BBS Trends ⁸		MAPS trends	Cumul. Species Priority Score
				State Cons. Plans ⁵	PIF Physiogr. Areas ⁶	NABCI BCRs ⁷	1966-2004	1980-2004	1992-2001 ⁹	
Swainson's Thrush	118	101	1682.37	LV CR	93		SP- PK-		WE- UM- YO-	10
Hermit Thrush	46	18	145.78	NR			PK- CP+	CP+	FR- UM+ YO-	6
American Robin	182	128	928.79				CM+ SN-	DR- SN-	MB+ FR+ WE+ FL-	5
Varied Thrush	35	9	58.86	CF AK ID NR				CM- DR- CR-	MB+	11
Wrentit	35	17	119.22	LV SN	93 66		SP- PK+	SP-		8
Gray Catbird	15	13	175.04				CP+ DR+ CR+	PK+ CP+ CR+	FL+	2
Sage Thrasher	1	1	11.00	CP ID NV	89		CP-	CP-		2
Cedar Waxwing	46	26	260.29				WL-	SP+ NP- WL- CM+	FL+	0
Orange-crowned Warbler	48	30	259.39	CF NV			SP- NP-	SP- NP- CP-	WI- UM- FL-	9
Nashville Warbler	34	20	137.45	LV CM			SN-	SP- CR+ SN-		5
Yellow Warbler	89	69	984.40	LV ID CR			NP-	NP- SN-	WE- FL+ YO-	13

Table 2. (cont.) Breeding species captured at the 224 MAPS stations combined, that were operated in the Pacific Northwest during 1989-2003 which are effectively monitored by MAPS¹; and criteria on which the selection of target species was based.

Species	Number stations ²	Num. stas. ≥ 2.5 ads./year ³	Cumul. ads./year ⁴	Priority or Focal Species			BBS Trends ⁸		MAPS trends	Cumul. Species Priority Score
				State Cons. Plans ⁵	PIF Physiogr. Areas ⁶	NABCI BCRs ⁷	1966-2004	1980-2004	1992-2001 ⁹	
Yellow-rumped Warbler	78	62	534.40				WL- PK+ CP+		WE- YO+	1
Black-throated Gray Warbler	26	5	37.47	CF CC ID NV UT SN	93 66				SN-	9
Townsend's Warbler	27	15	111.05	AK ID			DR+	DR+	UM-	6
Hermit Warbler	48	21	160.29	CF SN	93 89 66				SP+ YO-	9
Blackpoll Warbler	1	0	1.20							0
American Redstart	9	6	89.34				DR-	DR-		2
Northern Waterthrush	11	6	48.05						FL+	0
MacGillivray's Warbler	117	101	1052.43	CC AK ID NV NR	93		SP- WL- CM- PK+	SP- NP- PK+	UM- YO+	13
Common Yellowthroat	41	30	338.05	CR			SP+ WL- CM+ CP+ DR- CR+	SP+ WL- CM+ DR- CR+	WI- MB- UM- FL-	5
Wilson's Warbler	85	70	721.50	CR NV			SP- DR+ SN-	SP- CR- SN-	WI+	11
Yellow-breasted Chat	29	22	194.21	LV CR CP NV						6
Western Tanager	100	36	267.61	CC ID SN	66		DR+	SP+ NP+ DR+	WE+	15

Table 2. (cont.) Breeding species captured at the 224 MAPS stations combined, that were operated in the Pacific Northwest during 1989-2003 which are effectively monitored by MAPS¹; and criteria on which the selection of target species was based.

Species	Number stations ²	Num. stas. \geq 2.5 ads./year ³	Cumul. ads./year ⁴	Priority or Focal Species			BBS Trends ⁸		MAPS trends	Cumul. Species Priority Score
				State Cons. Plans ⁵	PIF Physiogr. Areas ⁶	NABCI BCRs ⁷	1966-2004	1980-2004	1992-2001 ⁹	
Green-tailed Towhee	10	7	49.40	LV			CR-			0
Spotted Towhee	85	55	353.22				CM+ PK+ CP+ NR+ SN+	SN+		2
California Towhee	2	0	2.07							0
Chipping Sparrow	51	26	155.65	LV CM NR SN			SP- CM- CP- SN-	SP- SN-	UM- YO-	13
Brewer's Sparrow	11	9	130.67	CP ID UT MT WY	89	9 10	PK- CP- DR-	CP- DR-		10
Vesper Sparrow	7	5	35.64	LV NV NR		5	DR- CR-	CP-		11
Lark Sparrow	3	1	6.25				SP-			0
Sage Sparrow	3	3	34.33	CP ID NV UT	89 80	9	PK-	PK-		5
Fox Sparrow	29	17	112.87	CC			CM- PK-	CM- PK-		2
Song Sparrow	158	128	1553.36	CR			SP- NP- CM+ CR+	NP- CM+ DR+ CR+	WI+ SI- MB- WE- FL-	12
Lincoln's Sparrow	50	42	409.83	CF			DR+ CR+	DR+ CR+	WI+ WE- UM- YO-	7

Table 2. (cont.) Breeding species captured at the 224 MAPS stations combined, that were operated in the Pacific Northwest during 1989-2003 which are effectively monitored by MAPS¹; and criteria on which the selection of target species was based.

Species	Number stations ²	Num. stas. ≥ 2.5 ads./year ³	Cumul. ads./year ⁴	Priority or Focal Species			BBS Trends ⁸		MAPS trends	Cumul. Species Priority Score
				State Cons. Plans ⁵	PIF Physiogr. Areas ⁶	NABCI BCRs ⁷	1966-2004	1980-2004	1992-2001 ⁹	
White-crowned Sparrow	21	13	100.75				SP- CM+	SP- CM+ PK-	FR+	3
Dark-eyed Junco	119	94	1045.15	CC			NP- CR- SN-	NP- CR-	MB- WE+ FR+ UM- FL+	9
Rose-breasted Grosbeak	1	0	0.33							0
Black-headed Grosbeak	113	64	533.51	CR SN	93 66		SP+ CM+ CP+ DR+ CR+ SN-	SP+ PK+ CP+ DR+ CR+	YO-	11
Lazuli Bunting	40	29	240.61	CP MT				CM+	YO-	6
Yellow-headed Blackbird	1	0	0.18							0
Brewer's Blackbird	18	2	22.54				WL- CP- DR- SN-	WL- CM+ CP- DR- SN-		6
Brown-headed Cowbird	96	26	189.34				SP- NP- CR- SN-	NP- PK+ CR- SN-		6
Bullock's Oriole	35	24	182.19	LV CP			SP- SN-			6
Purple Finch	46	30	404.24				SP- NP- PK- SN-	SP- PK- SN-	YO-	6
Cassin's Finch	23	11	69.60	SN	66		CP+ DR- CR- SN-	CP+ DR- CR- SN-	FR-	7

Table 2. (cont.) Breeding species captured at the 224 MAPS stations combined, that were operated in the Pacific Northwest during 1989-2003 which are effectively monitored by MAPS¹; and criteria on which the selection of target species was based.

Species	Number stations ²	Num. stas. ≥ 2.5 ads./year ³	Cumul. ads./year ⁴	Priority or Focal Species			BBS Trends ⁸		MAPS trends	Cumul. Species Priority Score
				State Cons. Plans ⁵	PIF Physiogr. Areas ⁶	NABCI BCRs ⁷	1966-2004	1980-2004	1992-2001 ⁹	
House Finch	15	10	89.54				NP+ CP+ DR+	NP+ PK+ CP+ DR+ CR+ SN+		4
Red Crossbill	3	0	2.14				NP-	NR- SN-		0
Pine Siskin	51	28	248.04				SP- NP- PK- CR-	SP- NP- PK- DR- CR- SN-	WI- FR- UM- YO-	8
Lesser Goldfinch	15	9	88.41	LV				SN+		4
American Goldfinch	32	24	289.66				SP- NP- PK+ DR-	SP- NP- DR-		4
Evening Grosbeak	9	7	51.12				DR-	NP- WL- DR- SN-		4

¹ This list excludes waterbirds and marsh species, nocturnal species, raptors, gamebirds, highly colonial nesters, aerialist foragers (swallows and swifts), hummingbirds (not banded at most MAPS stations), and local species that we would be unlikely to capture in sufficient quantity to monitor (see text). See Tables 3-6 for use of listing and trends criteria to determine target species by BCR.

² Number of stations operated in 1989-2003 where species was captured and was considered either a regular breeder (we had positive or probable evidence of breeding or summer residency within the boundaries of the MAPS station *during all years* that the station was operated) or usual breeder (we had evidence of breeding or summer residency *during more than half but not all of the years*).

³ Number of stations where the mean number of adults captured for the species was ≥ 2.5 individuals per year and the species was a regular or usual breeder at the station.

⁴ Cumulative mean number of breeding adults per year per station over all of the 235 stations operated in 1989-2003

Table 2. (cont.) Breeding species captured at the 224 MAPS stations combined, that were operated in the Pacific Northwest during 1989-2003 which are effectively monitored by MAPS¹; and criteria on which the selection of target species was based.

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- ⁵ State conservation plans in which the species was listed as priority or focal species. Plans include: CF - Coniferous Forest of Western Oregon and Washington; LV - Lowlands and Valleys of Western Oregon and Washington; CM - Cascade Mountains in Washington and Oregon; CP - Columbia Plateau of Eastern Washington and Oregon; NR - Northern Rocky Mountains of Eastern Oregon and Washington; AK - Alaska Bird Conservation Plan (Southeastern Region only); ID - Idaho Bird Conservation Plan; MT - Montana Conservation Plan; WY - Wyoming Conservation Plan; UT - Utah Conservation Plan; NV - Nevada Bird Conservation Plan; SN - California Bird Conservation Plan (CBCP) for the Sierra Nevada Range; CC - CBCP for Coniferous Forests; OW - CBCP for Oak Woodlands; and CR - CBCP for Riparian Habitats. See text for on-line availability of these plans and for other information.
- ⁶ National Partners in Flight (PIF) Physiographic Areas in which the species was listed as priority or focal species. Areas include: 93 - Southern Pacific Rainforests; 89 - Columbia Plateau; 64 - Central Rocky Mountains; 66 Sierra Nevada; and 80 Basin and Range. See text for on-line references to these areas and for other information.
- ⁷ Bird Conservation Regions (BCRs) in which the species was listed by the USFWS as priority or focal species as part of the North American Bird Conservation Initiative (NABCI). BCRs include: 5 - Northern Pacific Rainforest, 9 - Great Basin, 10 - Northern Rockies, 15 - Sierra Nevada. See text for on-line references to these regions and for other information.
- ⁸ Adult population trends for 1966-2004 or 1980-2004 according to Breeding Bird Survey (BBS) data by BBS Physiographic Strata. Strata include: PR - Southern Pacific Rainforest; NP - Northern Pacific Rainforest; WL - Willamette Lowlands; CM - Cascade Mountains; PK - Pitt-Klamath Plateau; CP - Columbia Plateau; DR - Dissected Rockies; CR - Central Rockies; and SN - Sierra Nevada. See text for on-line references defining these strata, calculating these trends, and for other information. Directions "-" and "+" indicate negative and positive trends, respectively, of $P < 0.1$ within the indicated strata.
- ⁹ Adult population trends from 1992-2001 according to MAPS data at specific locations in the Pacific Northwest. Locations include: MB - Mount Baker National Forest, Washington; WE - Wenatchee National Forest, Washington; UM - Umatilla National Forest, Oregon; WI - Willamette National Forest, Oregon; SI - Siuslaw National Forest, Oregon; FR - Fremont National Forest, Oregon; FL - Flathead National Forest, Montana; and YO - Yosemite National Park, California. Trends using constant-effort, year-to-year comparisons: directions "-" and "+" indicate negative ($r < -0.3$) and positive ($r > 0.3$) trends, respectively, at the indicated locations. See text and DeSante et al. (2004) for more information.
- ¹⁰ Cumulative species priority score according to listing status among State Conservation Plans, PIF Physiographic Areas, and NABCI Bird Conservation Regions, and population trends (negative or positive) as summed across the four Bird Conservation Regions. See text and Tables 3-6.

Table 3. Target species within Bird Conservation Region 5, Northern Pacific Rainforest.

Species	Focal Species ¹	Trend ²	Priority Score ³	Capture Status ⁴				
				Num. stas. cap.	Num. monitor. stas.	Num. active monitor. stas.	Cumul. ads/year all stas	Cumul. ads/year active stas.
A. Coniferous								
Red-breasted Sapsucker	X		3	26	7	4	38.74	21.57
White-headed Woodp.	X		3	1	0	0	1.00	0.00
Olive-sided Flycatcher	X	-	5	6	0	0	3.12	1.18
Western Wood-Pewee	X		3	24	6	2	51.26	25.07
Hammond's Flycatcher	X	+	4	16	6	5	35.12	27.23
Dusky Flycatcher	X	-	5	12	7	3	68.40	30.90
Western Flycatcher	X	-	5	62	41	21	255.11	117.72
Cassin's Vireo	X		3	17	3	1	28.80	16.53
Steller's Jay	X		3	39	0	0	25.29	10.88
Chestnut-backed Chick.	X		3	47	18	11	122.75	72.41
Red-breasted Nuthatch	X	+	4	20	0	0	11.58	9.33
Brown Creeper	X		3	27	0	0	25.40	10.59
Winter Wren	X		3	33	17	8	123.66	55.38
Golden-crowned Kinglet	X	-	5	21	1	1	14.73	11.88
Swainson's Thrush	X	-	5	70	61	32	1189.80	628.55
Varied Thrush	X		3	20	5	1	34.87	8.66
Black-thr. Gray Warbler	X		3	20	3	0	24.73	5.63
Townsend's Warbler	X		3	4	2	0	10.67	1.00
Hermit Warbler	X		3	29	11	10	80.03	63.33
Western Tanager	X	+	4	33	10	5	62.62	36.76
Dark-eyed Junco	X	-	5	42	33	20	334.62	183.13
Purple Finch		-	2	31	21	13	176.49	141.92
Pine Siskin		-	2	8	5	4	43.32	26.88
Evening Grosbeak		-	2	2	2	1	22.42	3.00
B. Riparian								
Downy Woodpecker	X		3	34	2	1	34.41	18.44
Willow Flycatcher	X	-	5	22	12	6	94.53	41.37
Warbling Vireo	X	+	4	36	15	9	116.20	66.47

Table 3. (cont.) Target species within Bird Conservation Region 5, Northern Pacific Rainforest.

Species	Focal Species ¹	Trend ²	Priority Score ³	Capture Status ⁴				
				Num. stas. cap.	Num. monitor. stas.	Num. active monitor. stas.	Cumul. ads/year all stas	Cumul. ads/year active stas.
Red-eyed Vireo	X		3	3	0	0	3.01	1.71
Black-capped Chickadee	X	-	5	29	17	7	81.26	34.30
Bushtit	X	-	5	19	8	5	47.09	31.66
House Wren	X		3	7	4	1	32.17	6.07
Wrentit	X	-	5	33	17	10	114.89	69.95
Yellow Warbler	X	-	5	27	14	9	164.24	123.71
MacGillivray's Warbler	X	-	5	44	35	24	326.73	247.09
Common Yellowthroat	X		3	16	12	6	131.30	83.46
Wilson's Warbler	X		3	53	44	24	443.47	191.30
Yellow-breasted Chat	X		3	19	16	7	142.41	81.22
Song Sparrow	X	-	5	74	61	34	775.01	429.09
Lincoln's Sparrow	X		3	10	10	4	68.91	23.05
Black-headed Grosbeak	X	+	4	59	30	15	241.13	108.95
Brown-headed Cowbird		-	2	26	6	4	45.45	26.82
Bullock's Oriole	X		3	12	8	5	44.05	25.98
American Goldfinch		-	2	15	12	6	147.80	85.36
C. Broadleaf forest or area								
Ash-throated Flycatcher		-	2	1	0	0	2.14	2.14
Hutton's Vireo	X		3	13	0	0	8.22	3.69
Western Scrub-Jay	X		3	15	0	0	9.01	3.17
Oak Titmouse	X		3	1	0	0	0.86	0.86
Bewick's Wren	X		3	24	11	5	72.34	31.70
Western Bluebird	X		3	2	0	0	1.36	1.36
Orange-crowned Warbler	X	-	5	31	21	13	183.75	93.14
Nashville Warbler	X		3	22	10	6	77.15	46.29
Chipping Sparrow	X	-	5	3	2	1	11.67	7.17
Vesper Sparrow	X		3	0	0	0	0.00	0.00
House Finch		+	1	7	5	3	26.70	15.47
Lesser Goldfinch	X		3	7	4	3	42.87	27.87

Table 3. (cont.) Target species within Bird Conservation Region 5, Northern Pacific Rainforest.

- ¹ Species listed as of concern or focal in at least one state conservation plan within BCR 5, for PIF Physiographic Area 93, and/or by NABCI for BCR 5 are indicated by (X). State Conservation Plans within BCR 5 include Coniferous Forest of Western Oregon and Washington (CF), Lowlands and Valleys of Western Oregon and Washington (LV), Cascade Mountains in Washington and Oregon (CM; for selected western-slope species), Alaska Bird Conservation Plan (AK; Southeastern Region only), California Bird Conservation Plan (CBCP) Coniferous Forests (CC), CBCP for Oak Woodlands (OW), and CBCP for Riparian Habitats (CR). See text for more information and Table 1 for the plans or areas for which each species is listed.
- ² Negative (-) or positive (+) trend according to a net of at least two (e.g., two more of one trend than the other) according to the following data from BCR 5: BBS trends ($P < 0.1$) during 1966-2004 in Physiographic Strata Southern Pacific Rainforest (SP), Northern Pacific Rainforest (NP), Willamette Lowlands (WL), and Cascade Mountains (CM); BBS Trends ($P < 0.1$) during 1980-2004 for the same four strata; and MAPS trends ($r \leq -3.0$ or $r \geq +3.0$) at MAPS Locations at Wenatchee National Forest, Washington (WE; part), Willamette National Forest, Oregon (WI), and Siuslaw National Forest, Oregon (SI). See text for more information and Table 1 for trends of each species according to BBS Physiographic Strata and MAPS Locations.
- ³ Sum of points given to species as an indication of priority concern. Points are awarded as follows: 3 points for being a focal species, 2 points for having a declining trend, and 1 point for having a positive trend within the BCR.
- ⁴ Monitorable species include those with cumulative mean numbers of adults captured ≥ 2.5 per year. An active station is considered as any station operated in 2005 although the data included in the cumulative score only includes data from 1989-2003. Cumulative values are sums of the mean number of adults per year, not just those mean numbers of adults ≥ 2.5 per year.

Table 4. Target Species within Bird Conservation Region 9, Great Basin

Species	Focal Species ¹	Trend ²	Priority Score ³	Capture Status ⁴				
				Num. stas. cap.	Num. monitor. stas.	Num. active monitor. stas.	Cumul. ads/year all stas	Cumul. ads/year active stas.
A. Coniferous								
Williamson's Sapsucker	X		3	2	0	0	2.09	2.09
Red-breasted Sapsucker		+	1	14	6	6	34.68	33.26
White-headed Woodp.	X		3	0	0	0	0.00	0.00
Olive-sided Flycatcher	X		3	0	0	0	0.00	0.00
Hammond's Flycatcher	X		3	19	9	8	53.20	43.52
Dusky Flycatcher	X		3	9	6	6	83.82	80.34
Cassin's Vireo		+	1	4	2	2	14.65	14.25
Red-breasted Nuthatch		+	1	18	3	2	24.99	19.16
Brown Creeper	X		3	11	1	1	17.95	16.20
Varied Thrush	X		3	9	4	3	20.48	13.15
Hermit Warbler	X		3	2	2	2	13.00	13.00
Western Tanager	X		3	20	8	7	83.62	73.89
Fox Sparrow		-	2	2	2	1	5.92	2.67
Purple Finch		-	2	3	2	2	132.29	132.29
Pine Siskin		-	2	10	7	6	68.62	52.74
B. Riparian								
Red-naped Sapsucker	X		3	8	2	2	11.03	10.43
Willow Flycatcher	X		3	8	5	5	24.95	23.75
Western Kingbird		+	1	4	0	0	2.23	0.70
Swainson's Thrush		-	2	14	11	7	160.72	105.02
American Robin		+	1	45	38	29	293.05	222.94
Gray Catbird		+	1	1	0	0	1.80	0.00
Orange-crowned Warbler		-	2	3	3	1	27.16	4.50
Yellow Warbler	X		3	22	22	17	333.12	244.82
MacGillivray's Warbler	X	+	4	23	23	20	224.78	195.91
Wilson's Warbler	X		3	7	3	2	20.79	13.96
Yellow-breasted Chat	X		3	5	4	2	30.32	18.72
Song Sparrow		-	2	35	28	24	322.26	284.80
Black-headed Grosbeak		+	1	22	15	12	146.06	98.86

Table 4. (cont.) Target Species within Bird Conservation Region 9, Great Basin

Species	Focal Species ¹	Trend ²	Priority Score ³	Capture Status ⁴				
				Num. stas. cap.	Num. monitor. stas.	Num. active monitor. stas.	Cumul. ads/year all stas	Cumul. ads/year active stas.
Lazuli Bunting	X		3	14	10	8	110.46	83.26
Bullock's Oriole	X		3	16	14	10	124.75	75.42
C. Scrub or Shrub-Steppe								
Gray Flycatcher	X	+	4	0	0	0	0.00	0.00
Say's Phoebe		+	1	2	0	0	2.18	2.18
Ash-throated Flycatcher		+	1	0	0	0	0.00	0.00
Bushtit		+	1	5	5	1	32.86	13.00
Rock Wren		-	2	1	0	0	1.50	1.50
Western Bluebird	X		3	2	0	0	0.30	0.30
Mountain Bluebird	X		3	1	0	0	0.25	0.25
Sage Thrasher		-	2	1	1	0	11.00	0.00
Black-thr. Gray Warbler	X		3	3	0	0	2.48	1.56
Spotted Towhee		+	1	20	15	10	102.56	62.43
Brewer's Sparrow	X	-	5	7	7	4	117.75	19.25
Vesper Sparrow	X		3	2	1	0	20.00	0.00
Black-throated Sparrow		-	2	0	0	0	0.00	0.00
Sage Sparrow	X	-	5	3	3	0	34.33	0.00
Brewer's Blackbird		-	2	7	1	1	10.52	8.52
House Finch		+	1	7	5	3	61.84	54.11

¹ Species listed as of concern or focal in at least one state conservation plan within BCR 9, for PIF Physiographic Area 89, and/or by NABCI for BCR 9 are indicated by (X). State Conservation Plans within BCR 9 include Cascade Mountains in Washington and Oregon (CM; for selected eastern-slope species), Columbia Plateau of Eastern Washington and Oregon (CP), Idaho Bird Conservation Plan (ID; for selected southwestern species), Utah Conservation Plan (UT), and Nevada Bird Conservation Plan (NV). See text for more information and Table 1 for the plans or areas for which each species is listed.

² Negative (-) or positive (+) trend according to a net of at least two (e.g., two more of one trend than the other) according to the following data from BCR 9: BBS trends ($P < 0.1$) during 1966-2004 in Physiographic Strata Pitt-Klamath Plateau (PK) and Columbia Plateau (CP); BBS Trends ($P < 0.1$) during 1980-2004 for the same two strata; and MAPS trends ($r \leq -3.0$ or $r \geq +3.0$) at MAPS Locations at Mount Baker National Forest, Washington (MB), Wenatchee National Forest, Washington (WE; part), and Fremont National Forest, Oregon (FR). See text for more information and Table 1 for trends of each species according to BBS Physiographic Strata and MAPS Locations.

Table 4. (cont.) Target Species within Bird Conservation Region 9, Great Basin

- ³ Sum of points given to species as an indication of priority concern. Points are awarded as follows: 3 points for being a focal species, 2 points for having a declining trend, and 1 point for having a positive trend within the BCR.
- ⁴ Monitorable species include those with cumulative mean numbers of adults captured ≥ 2.5 per year. An active station is considered as any station operated in 2005 although the data included in the cumulative score only includes data from 1989-2003. Cumulative values are sums of the mean number of adults per year, not just those mean numbers of adults ≥ 2.5 per year.

Table 5. Target Species within Bird Conservation Region 10, Northern Rocky Mountains

Species	Focal Species ¹	Trend ²	Priority Score ³	Capture Status ⁴				
				Num. stas. cap.	Num. monitor stas.	Num. active monitor stas.	Cumul. ads/year all stas	Cumul. ads/year active stas.
A. Coniferous								
Williamson's Sapsucker	X		3	1	0	0	0.42	0.42
White-headed Woodp.	X		3	0	0	0	0.00	0.00
Am. Three-toed Woodp.		+	1	0	0	0	0.00	0.00
Olive-sided Flycatcher	X	-	5	2	0	0	0.25	0.25
Hammond's Flycatcher	X		3	16	8	4	42.02	23.82
Dusky Flycatcher	X	-	5	20	11	8	94.66	63.41
Western Flycatcher	X		3	2	1	0	4.83	1.50
Cassin's Vireo		+	1	6	2	2	11.22	9.15
Steller's Jay		+	1	4	0	0	0.75	0.34
Brown Creeper	X		3	9	0	0	9.25	7.75
Winter Wren	X	+	4	7	1	1	6.12	4.75
Golden-crowned Kinglet		-	2	18	5	5	44.18	36.07
Hermit Thrush	X		3	3	1	1	6.50	6.50
Varied Thrush	X	-	5	6	0	0	3.51	0.50
Townsend's Warbler	X		3	17	9	8	80.04	67.86
Western Tanager	X	+	4	22	6	4	45.52	30.28
Chipping Sparrow	X		3	26	13	8	67.88	43.33
Lincoln's Sparrow		+	1	15	12	6	130.67	43.50
Dark-eyed Junco		-	2	25	16	9	95.41	58.84
Cassin's Finch		-	2	0	0	0	0.00	0.00
Pine Siskin		-	2	19	9	6	85.66	53.32
Evening Grosbeak		-	2	2	1	1	8.14	7.14
B. Riparian								
Red-naped Sapsucker	X		3	30	12	10	64.19	44.61
Willow Flycatcher	X	-	5	18	14	13	155.68	145.75
Eastern Kingbird		+	1	8	0	0	8.84	7.84
Warbling Vireo		+	1	30	16	11	120.93	91.73
Red-eyed Vireo	X	-	5	8	4	2	29.56	15.17

Table 5 (cont). Target Species within Bird Conservation Region 10, Northern Rocky Mountains

Species	Focal Species ¹	Trend ²	Priority Score ³	Capture Status ⁴				
				Num. stas. cap.	Num. monitor stas.	Num. active monitor stas.	Cumul. ads/year all stas	Cumul. ads/year active stas.
American Robin		-	2	43	29	21	231.52	181.09
Gray Catbird		+	1	14	13	12	173.24	170.07
Orange-crowned Warbler		-	2	12	5	5	38.81	31.16
American Redstart		-	2	9	6	3	89.34	66.84
MacGillivray's Warbler	X		3	29	25	12	286.29	140.85
Common Yellowthroat		-	2	17	13	9	156.40	100.70
Song Sparrow		+	1	28	22	15	260.68	193.79
Black-headed Grosbeak		+	1	18	10	8	57.16	45.11
Lazuli Bunting	X		3	6	6	6	33.42	33.42
Brown-headed Cowbird		-	2	26	5	4	50.91	45.04
American Goldfinch		-	2	10	5	5	71.78	70.11
C. Scrub or Shrub-Steppe								
Say's Phoebe		+	1	0	0	0	0.00	0.00
Plumbeous Vireo		-	2	0	0	0	0.00	0.00
Rock Wren		-	2	0	0	0	0.00	0.00
Western Bluebird		+	1	0	0	0	0.00	0.00
Mountain Bluebird		+	1	1	1	0	7.00	0.00
Brewer's Sparrow	X	-	5	1	1	0	7.00	0.00
Vesper Sparrow	X	-	5	3	2	0	9.89	1.89
Brewer's Blackbird		-	2	3	1	0	6.00	2.00
House Finch		+	1	1	0	0	1.00	1.00

¹ Species listed as of concern or focal in at least one state conservation plan within BCR 10, for PIF Physiographic Area 64, and/or by NABCI for BCR 10 are indicated by (X). State Conservation Plans within BCR 10 include Northern Rocky Mountains of Eastern Oregon and Washington (NR), Idaho Bird Conservation Plan (ID; for selected northern and central species), Montana Conservation Plan (MT), and Wyoming Conservation Plan (WY). See text for more information and Table 1 for the plans or areas for which each species is listed.

Table 5 (cont). Target Species within Bird Conservation Region 10, Northern Rocky Mountains

- ² Negative (-) or positive (+) trend according to a net of at least two (e.g., two more of one trend than the other) according to the following data from BCR 10: BBS trends ($P < 0.1$) during 1966-2004 in Physiographic Strata Dissected Rockies (DR) and Central Rockies (CR); BBS Trends ($P < 0.1$) during 1980-2004 for the same two strata; and MAPS trends ($r \leq -3.0$ or $r \geq +3.0$) at MAPS Locations at Umatilla National Forest, Oregon (UM) and Flathead National Forest, Montana (FL). See text for more information and Table 1 for trends of each species according to BBS Physiographic Strata and MAPS Locations.
- ³ Sum of points given to species as an indication of priority concern. Points are awarded as follows: 3 points for being a focal species, 2 points for having a declining trend, and 1 point for having a positive trend within the BCR.
- ⁴ Monitorable species include those with cumulative mean numbers of adults captured ≥ 2.5 per year. An active station is considered as any station operated in 2005 although the data included in the cumulative score only includes data from 1989-2003. Cumulative values are sums of the mean number of adults per year, not just those mean numbers of adults ≥ 2.5 per year.

Table 6. Target Species within Bird Conservation Region 15, Sierra Nevada

Species	Focal Species ¹	Trend ²	Priority Score ³	Capture Status ⁴				
				Num. stas. cap.	Num. monitor. stas.	Num. active monitor. stas.	Cumul. ads/year all stas	Cumul. ads/year active stas.
A. Coniferous								
Red-breasted Sapsucker								
White-headed Woodpeck.	X		3	18	9	6	46.92	32.77
Olive-sided Flycatcher	X	+	4	9	1	0	10.04	4.27
Western Wood-Pewee	X	-	5	7	0	0	1.98	1.32
Hammond's Flycatcher	X	-	5	21	12	7	57.01	32.42
Dusky Flycatcher	X		3	11	3	1	30.78	11.93
Cassin's Vireo	X		3	17	10	6	91.12	58.82
Steller's Jay	X		3	14	5	2	35.73	19.94
Mountain Chickadee	X		3	16	0	0	10.14	4.59
Brown Creeper	X		3	25	15	9	89.13	57.51
Golden-crowned Kinglet	X		3	20	5	2	35.74	18.81
Ruby-crowned Kinglet	X	-	5	11	4	3	29.79	23.29
Hermit Thrush	X		3	0	0	0	0.00	0.00
Yellow-rumped Warbler	X		3	6	2	1	9.38	6.53
Hermit Warbler		+	1	23	23	13	242.54	157.87
Western Tanager	X		3	17	8	4	67.26	45.63
Chipping Sparrow	X	+	4	25	12	5	75.85	34.36
Dark-eyed Junco	X	-	5	14	7	4	41.44	22.08
Purple Finch		-	2	28	26	13	411.86	203.07
Cassin's Finch		-	2	12	7	5	95.46	60.46
Pine Siskin	X	-	5	10	6	2	40.97	19.84
		-	2	14	7	4	50.44	29.29
B. Riparian								
Downy Woodpecker								
Willow Flycatcher		-	2	6	0	0	5.29	3.36
Warbling Vireo	X	-	5	2	1	0	5.50	2.00
Swainson's Thrush	X		3	26	20	12	211.06	129.65
American Robin	X	-	5	2	1	0	5.37	1.83
Yellow Warbler		-	2	28	26	12	134.87	61.53
MacGillivray's Warbler	X	-	5	14	12	8	106.98	62.82
		+	1	21	18	12	214.63	159.81

Table 6 (cont). Target Species within Bird Conservation Region 15, Sierra Nevada

Species	Focal Species ¹	Trend ²	Priority Score ³	Capture Status ⁴				
				Num. stas. cap.	Num. monitor. stas.	Num. active monitor. stas.	Cumul. ads/year all stas	Cumul. ads/year active stas.
Wilson's Warbler	X	-	5	19	17	10	211.67	114.84
Song Sparrow	X	+	4	21	17	11	195.41	133.88
Lincoln's Sparrow	X		3	18	14	9	154.47	89.83
White-crowned Sparrow	X		3	3	2	0	33.17	2.00
Black-headed Grosbeak	X	-	5	14	9	4	89.16	29.95
Brewer's Blackbird		-	2	6	0	0	5.44	5.19
Brown-headed Cowbird		-	2	13	1	0	10.88	6.09
C. Broadleaf forest or area								
Western Scrub-Jay		+	1	1	0	0	0.33	0.00
Wrentit	X		3	2	0	0	4.33	0.00
Nashville Warbler		-	2	8	7	3	34.55	14.88
Black-thr. Gray Warbler	X		3	3	2	1	10.26	2.50
Spotted Towhee		+	1	8	5	1	35.79	7.41
House Finch		+	1	0	0	0	0.00	0.00
Lesser Goldfinch		+	1	3	3	1	22.60	9.27

¹ Species listed as of concern or focal in at least one of the California Sierra Nevada Conservation Plan (SN), for PIF Physiographic Area 66, and/or by NABCI for BCR 15 are indicated by (X). See text for more information and Table 1 for the plans or areas for which each species is listed.

² Negative (-) or positive (+) trend according to a net of at least two (e.g., two more of one trend than the other) according to the following data from BCR 15: BBS trends ($P < 0.1$) during 1966-2004 in Physiographic Stratum Sierra Nevada (SN); BBS Trends ($P < 0.1$) during 1980-2004 for the same stratum; and MAPS trends ($r \leq -3.0$ or $r \geq +3.0$) at the MAPS Location at Yosemite National Park, California (YO). See text for more information and Table 1 for trends of each species according to BBS Physiographic Strata and MAPS Locations.

³ Sum of points given to species as an indication of priority concern. Points are awarded as follows: 3 points for being a focal species, 2 points for having a declining trend, and 1 point for having a positive trend within the BCR.

⁴ Monitorable species include those with cumulative mean numbers of adults captured ≥ 2.5 per year. An active station is considered as any station operated in 2005 although the data included in the cumulative score only includes data from 1989-2003. Cumulative values are sums of the mean number of adults per year, not just those mean numbers of adults ≥ 2.5 per year.

The MAPS Program in the Pacific Northwest: Current Status and Future Direction

Maps and Map Legends

Nine of the ten maps presented in these figures portray a latitudinal belt between ~40 degrees North and ~50 degrees North to include Washington, Oregon, and northern California (Figure 1 extends to 35 degrees). The maps extend eastwards to the longitude ~107 degrees West to include western Wyoming and the eastern extent of the Northern Rockies Bird Conservation Region (Figure 1 extends to 102 degrees West).

Figure 1. Map of the northwestern United States featuring four NABCI Bird Conservation Regions (BCR). Superimposed on this map are the locations of active (colored) or inactive (white) MAPS stations classified by the federal agency landholder with which they are affiliated. MAPS station affiliations are colored; BLM (Yellow circles); USFS (Green dotted circles); FWS (Brown squares); DoD (Gray dotted squares); BIA (White stars denoting all inactive); NPS (Blue crossed circles); and all other landholder affiliations (Black filled triangles).

Figure 2. Map of the northwestern United States featuring federal land ownership. Superimposed on this map are the locations of active (colored) or inactive (white) MAPS stations classified by one of six federal agency landholders with which they may be affiliated. Federal agency lands and MAPS station affiliations are similarly colored and shaped; BLM (Orange/Yellow circles); USFS (Green/Green dotted circles); FWS (Brown/Brown squares); DoD (Gray/Gray dotted squares); BIA (Red/White stars denoting all inactive); NPS (Blue/Blue crossed circles); and all other landholder affiliations (Black filled triangles).

Figure 3. Map of the northwestern United States featuring four NABCI Bird Conservation Regions (BCR). Superimposed on this map are the locations of active (colored) or inactive (white) MAPS stations classified by one of four main habitat types with which the station is associated. MAPS station habitat associations are colored; Broadleaf (Light green open circles); Coniferous (Dark green circles with black dot); Riparian (Blue squares); and shrub-steppe (Red circles but all inactive).

The following seven figures depict federal ownership of portions of the breeding ranges of seven priority species. In each, federal agency lands and MAPS station (active or inactive) affiliations are similarly colored ; BLM (Orange/Yellow circles); USFS (Green/Green circles); FWS (Brown/ Brown circles); DoD (Gray/Gray circles); BIA (Red/Coral circles); NPS (Blue/Blue circles).

Figure 4. Map of the northwestern United States featuring the Cassin's Vireo (*Vireo cassini*) breeding range (grey hatched area, blue outline), MAPS stations and federal land ownership. The locations of active or inactive MAPS stations are classified by one of six federal agency landholders with which they may be affiliated.

Figure 5. Map of the northwestern United States featuring the Varied Thrush (*Ixoreus naevius*) breeding range (grey hatched area, blue outline), MAPS stations and federal land ownership. The locations of active or inactive MAPS stations are classified by one of six federal agency landholders with which they may be affiliated.

Figure 6. Map of the northwestern United States featuring the Black-throated Gray Warbler (*Dendroica nigrescens*) breeding range (grey hatched area, blue outline), MAPS stations and federal land ownership.

Figure 7. Map of the northwestern United States featuring the Willow Flycatcher (*Empidonax traillii*) breeding range (grey hatched area, blue outline), MAPS stations and federal land ownership. The locations of active or inactive MAPS stations are classified by one of six federal agency landholders with which they may be affiliated

Figure 8. Map of the northwestern United States featuring the Brewer's sparrow (*Spizella breweri*) breeding range (grey hatched area, blue outline), MAPS stations and federal land ownership. The locations of active or inactive MAPS stations are classified by one of six federal agency landholders with which they may be affiliated.

Figure 9. Map of the northwestern United States featuring the Vesper Sparrow (*Pooecetes gramineus*) breeding range (grey hatched area, blue outline), MAPS stations and federal land ownership. The locations of active or inactive MAPS stations are classified by one of six federal agency landholders with which they may be affiliated.

Figure 10. Map of the northwestern United States featuring the Sage Sparrow (*Amphispiza belli*) breeding range (grey hatched area, blue outline), MAPS stations and federal land ownership. The locations of active or inactive MAPS stations are classified by one of six federal agency landholders

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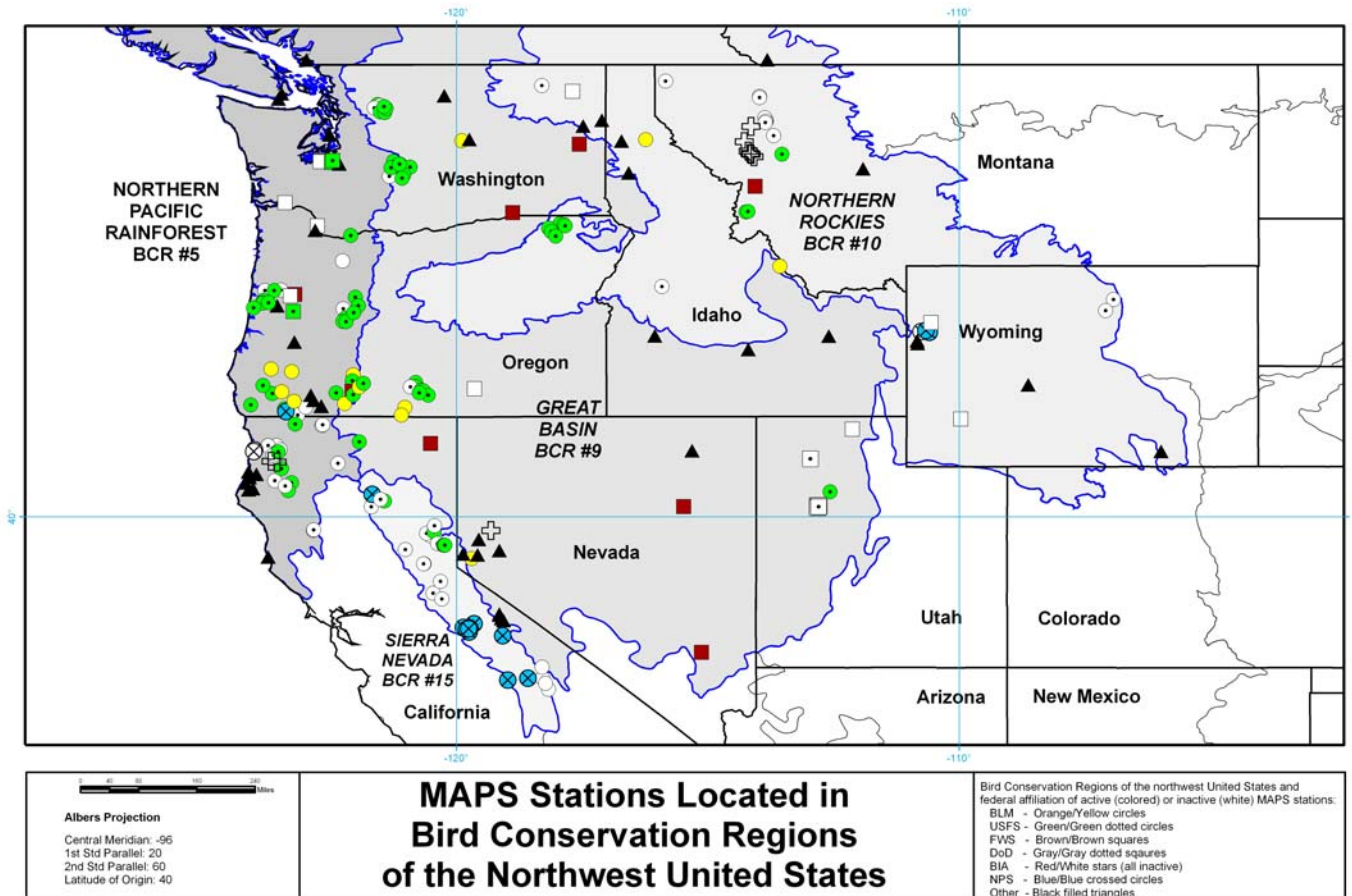


Figure 1

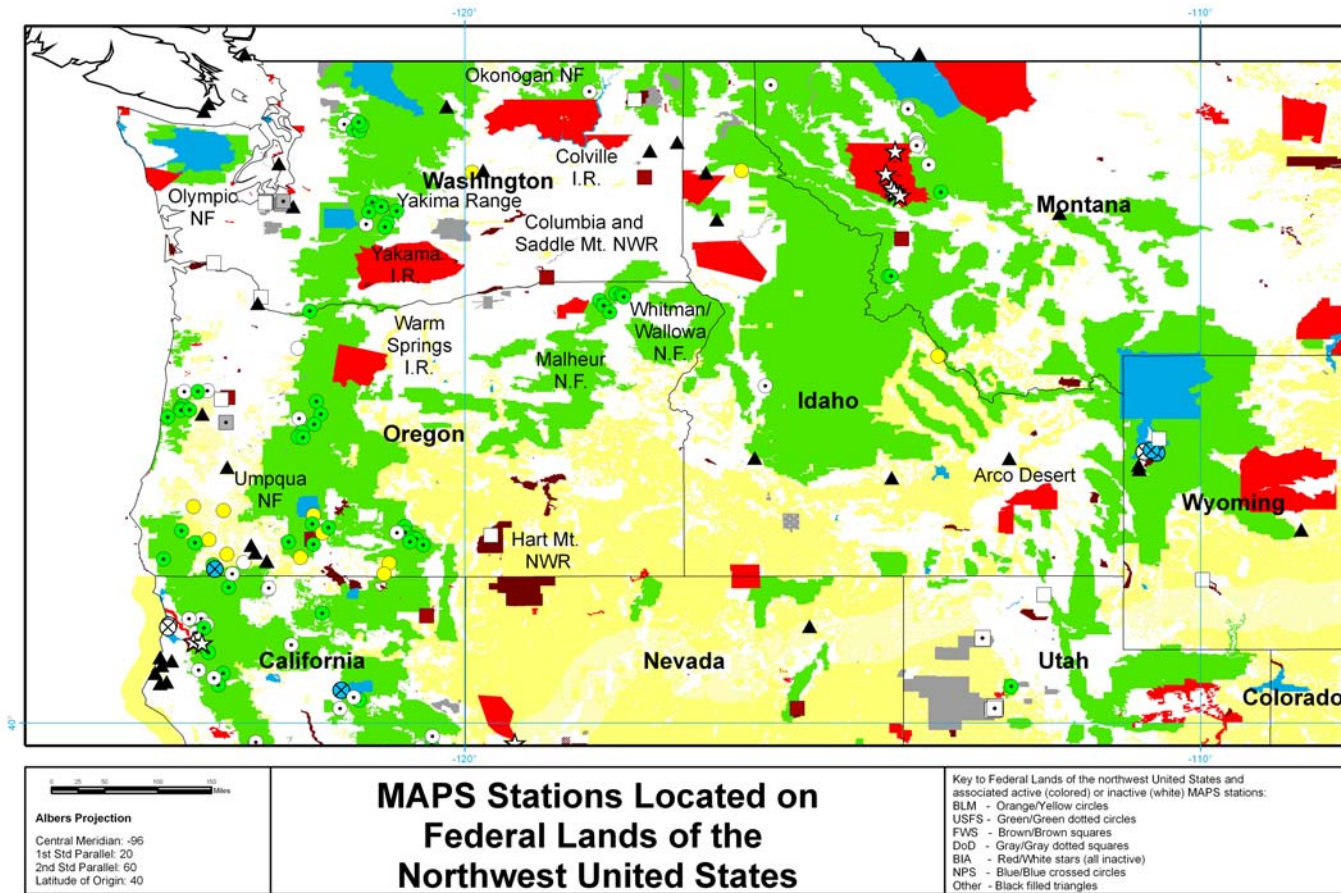


Figure 2

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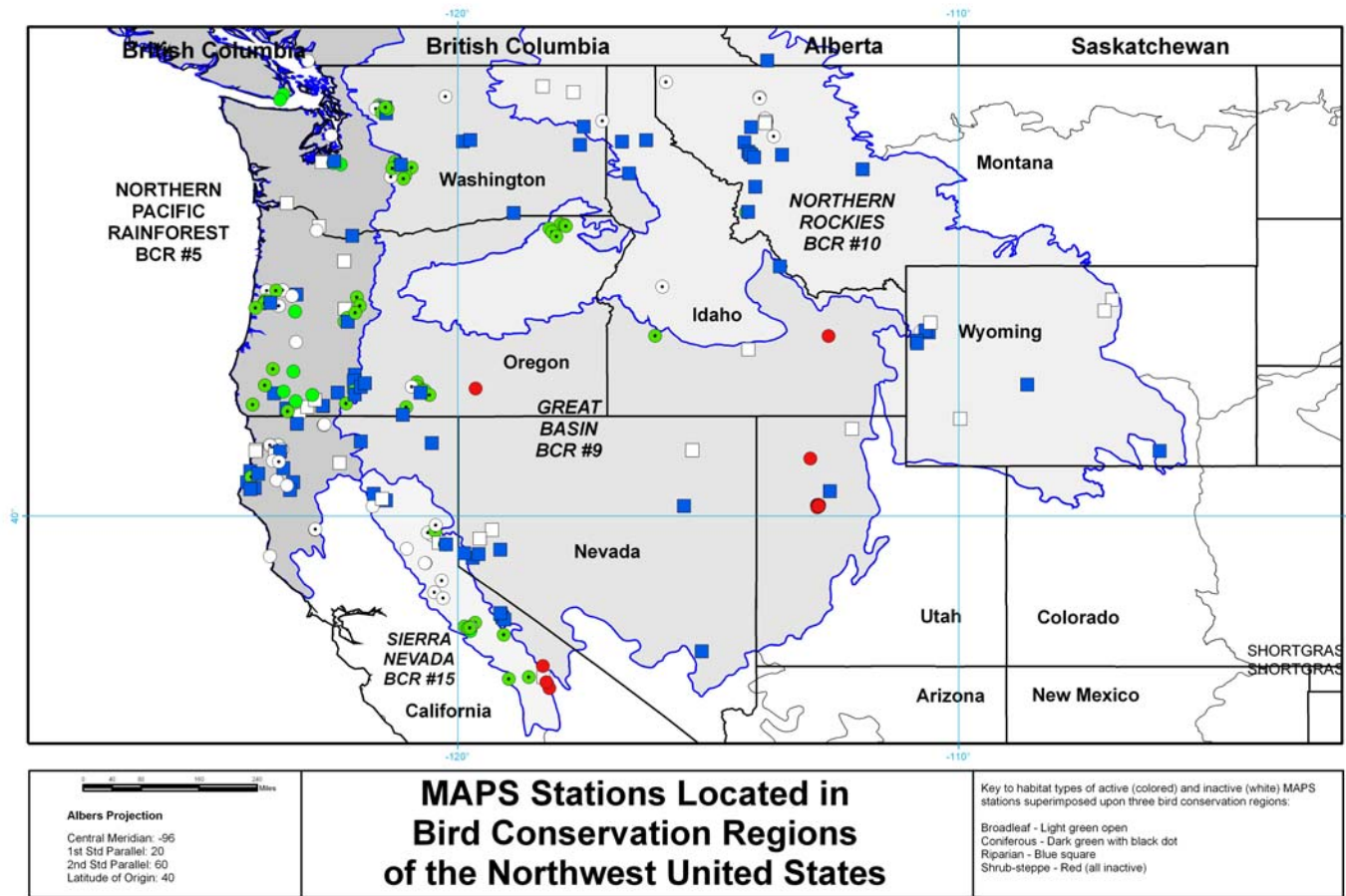


Figure 3.

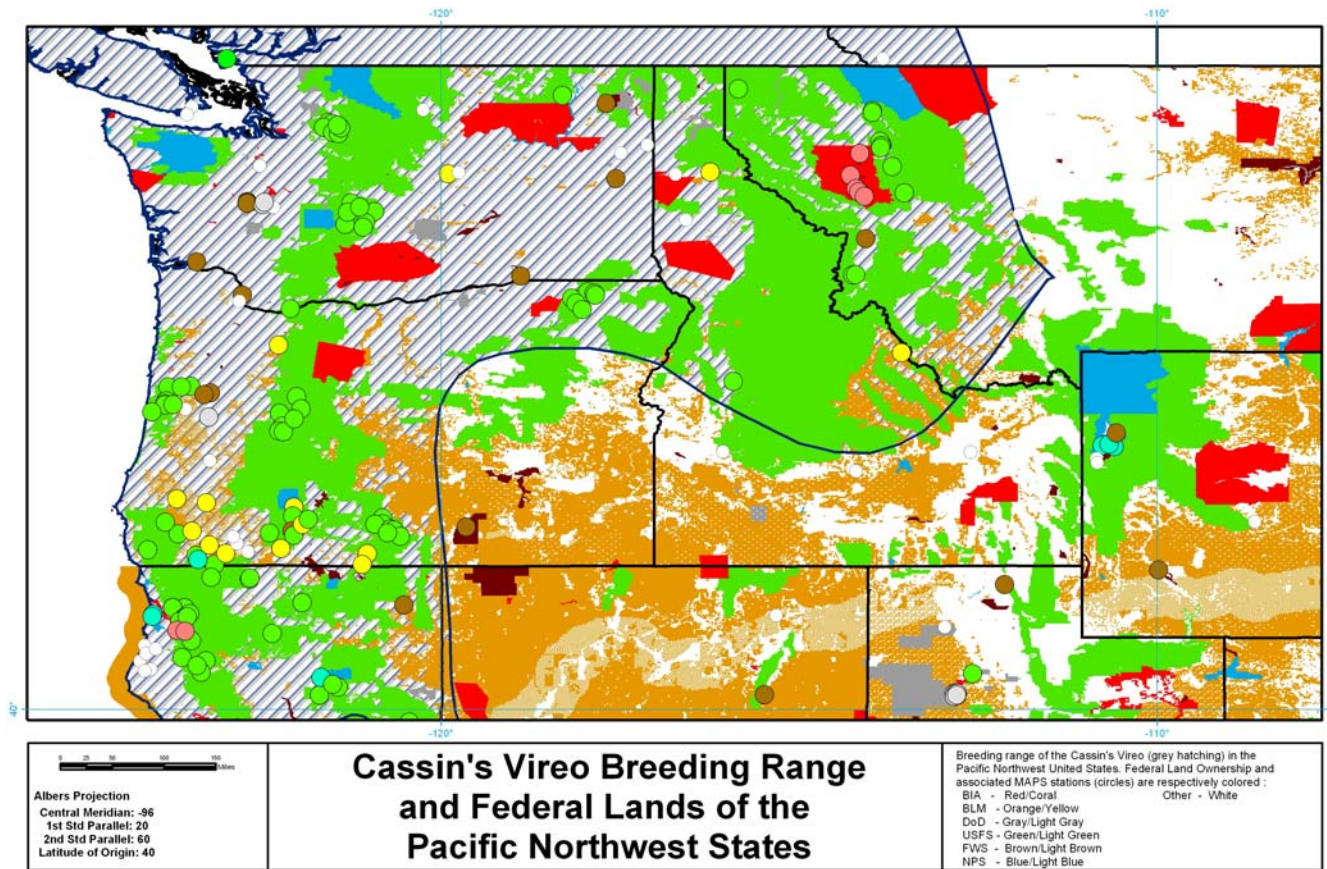


Figure 4

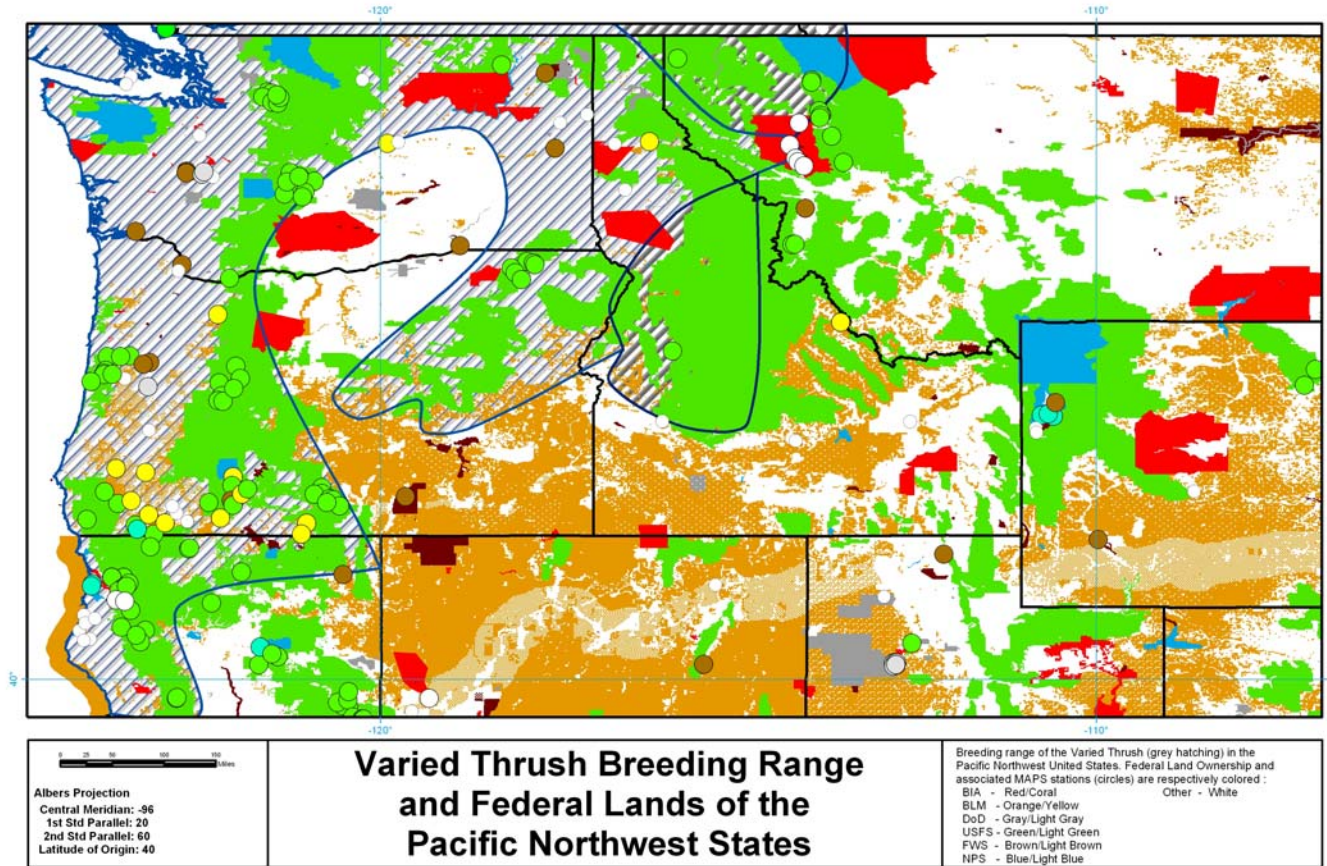


Figure 5

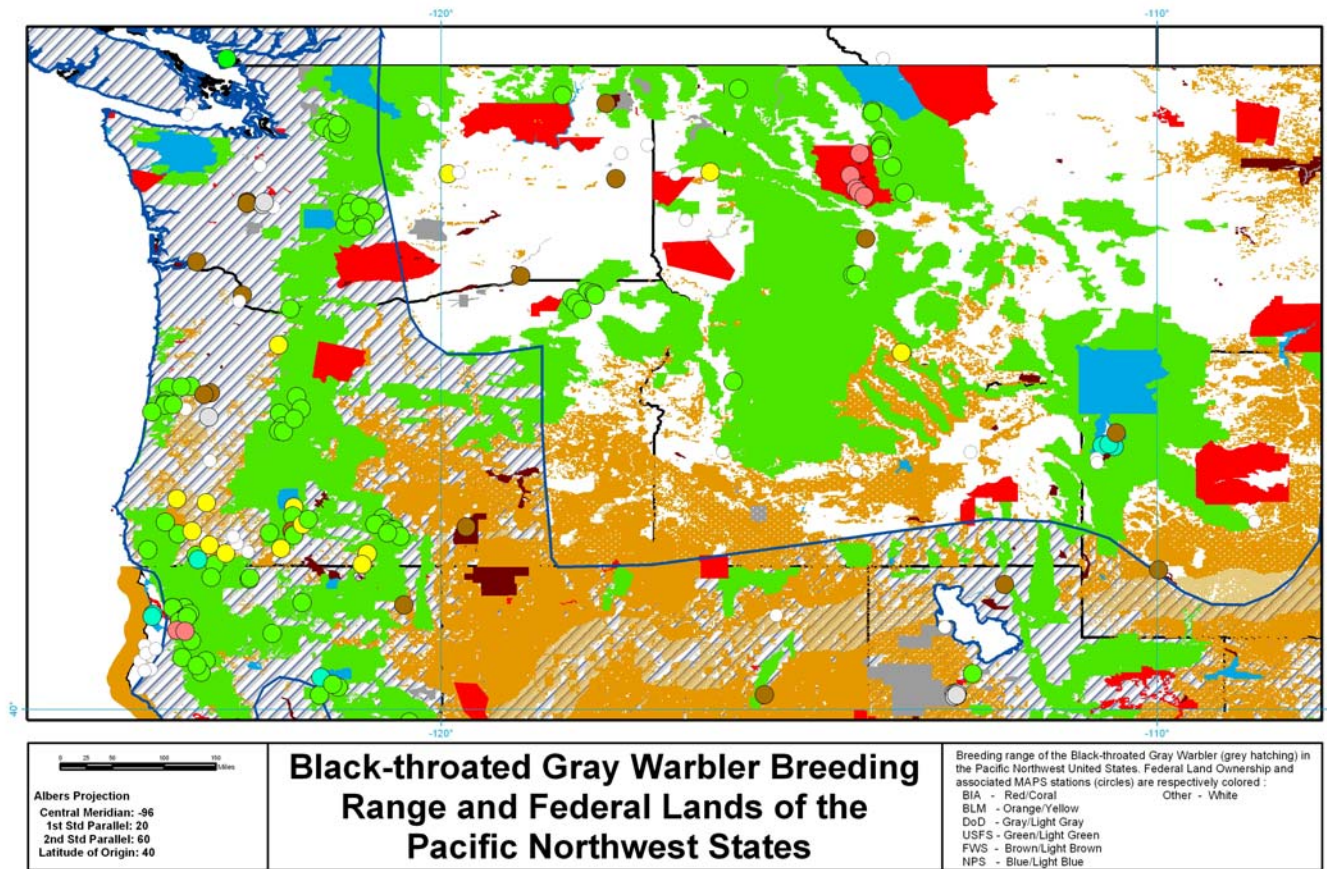


Figure 6

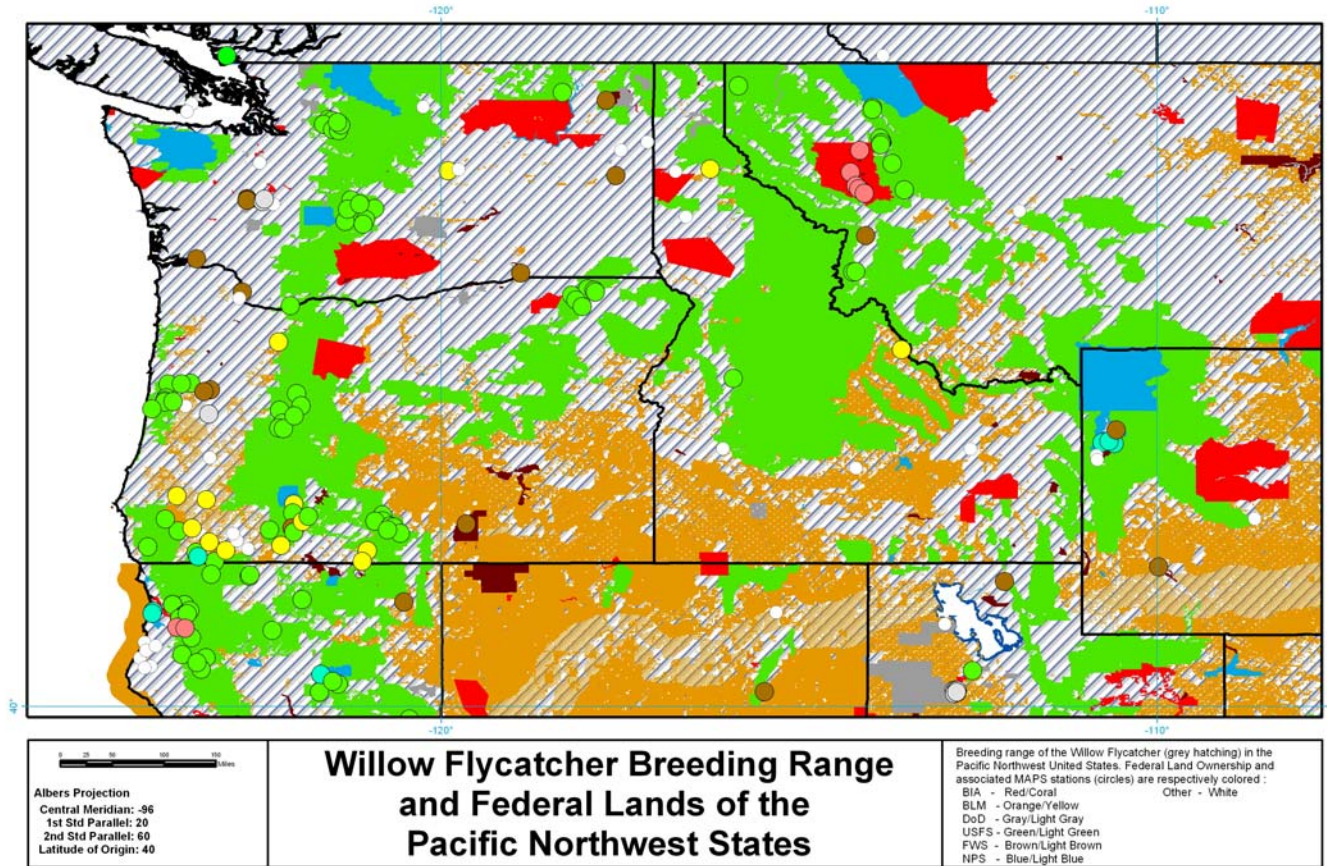


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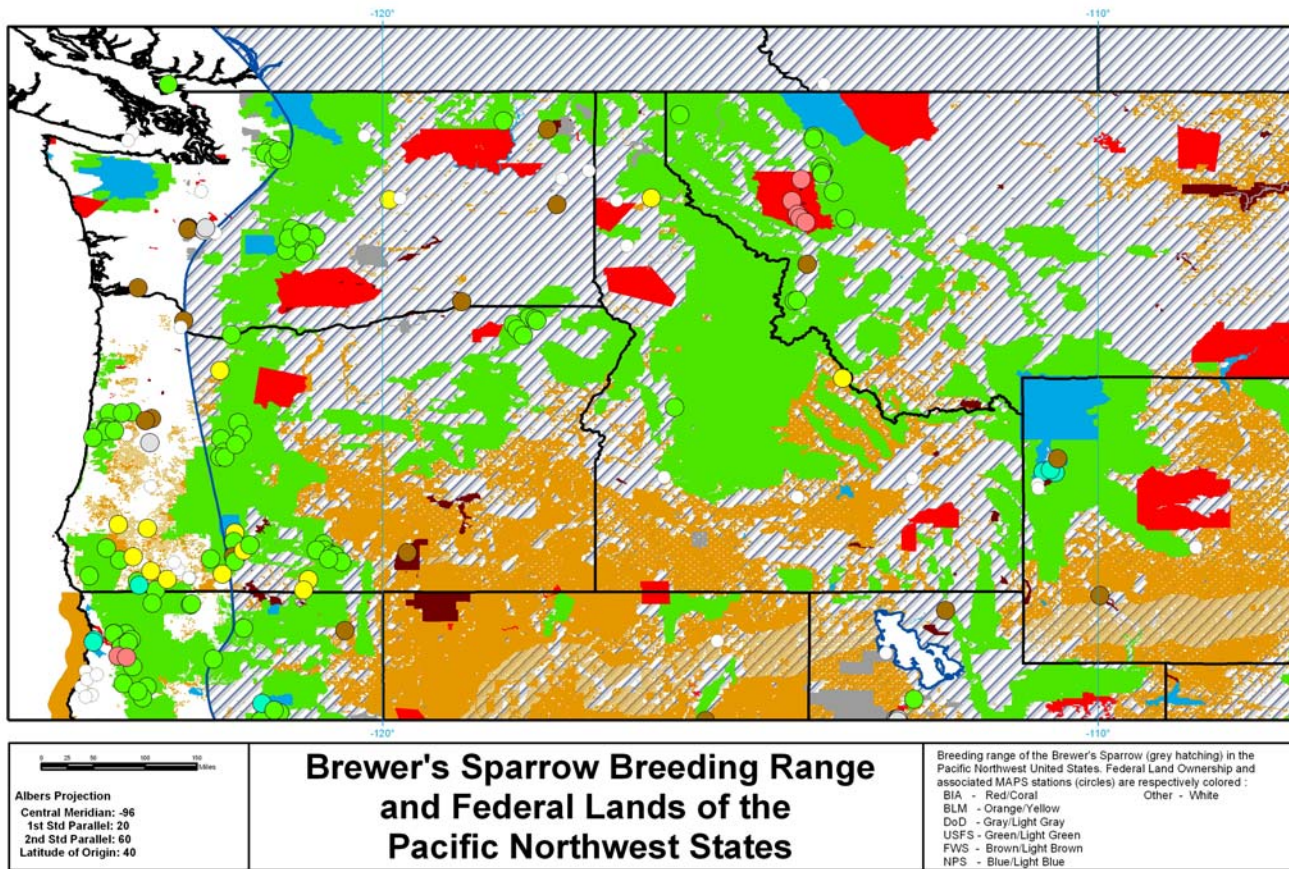


Figure 8

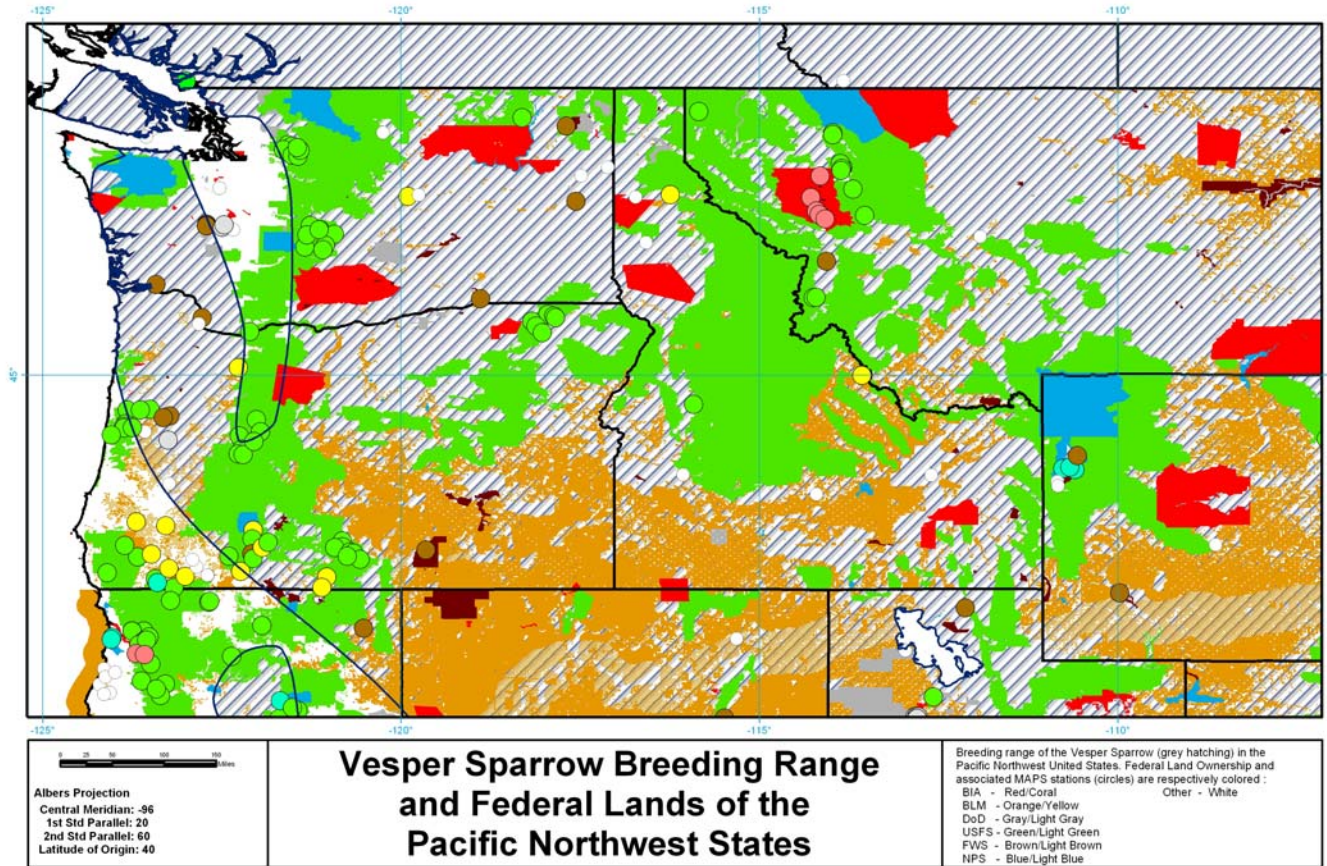


Figure 9

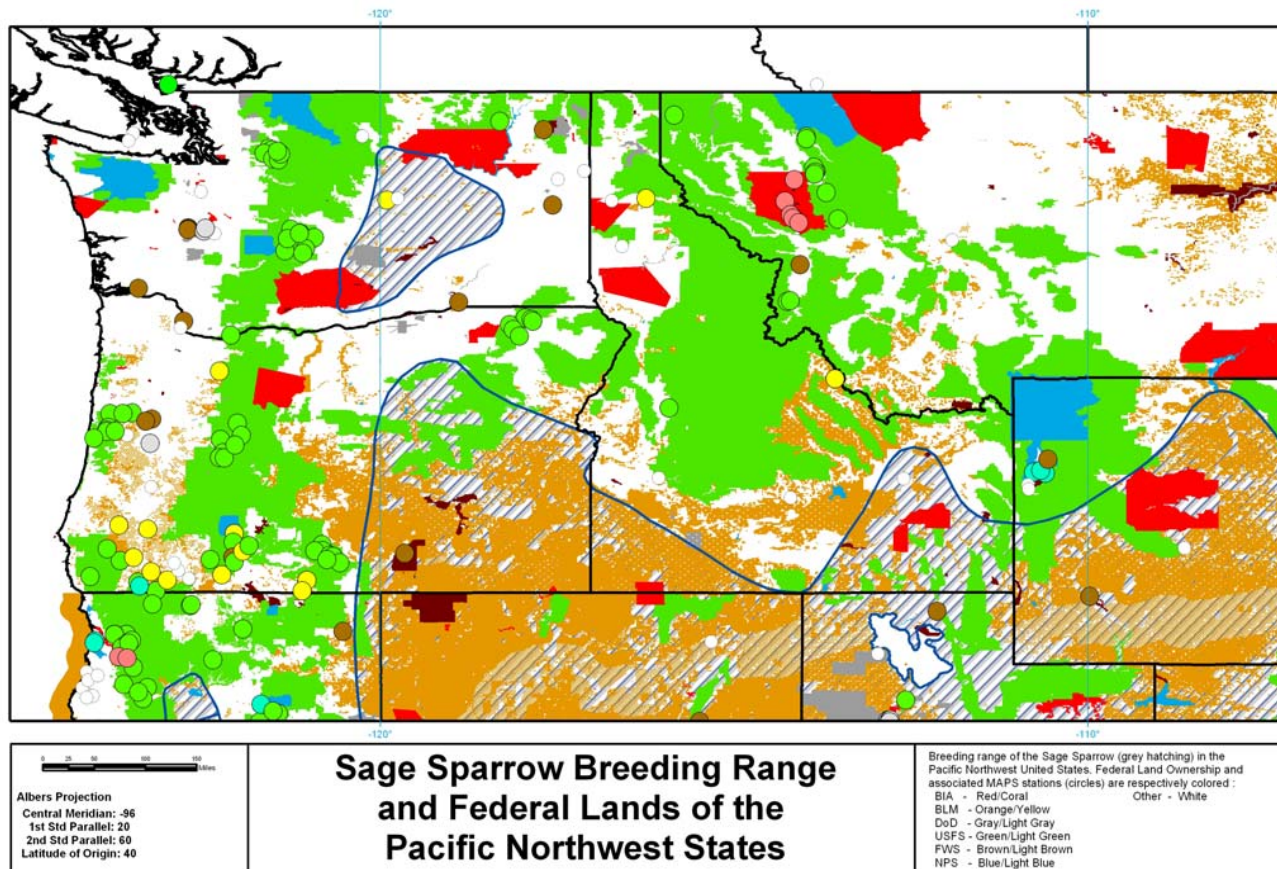


Figure 10