# ARIZONA GAME AND FISH DEPARTMENT
# HERITAGE DATA MANAGEMENT SYSTEM

**Animal Abstract** **Element Code:** ABNSB12012
**Data Sensitivity:** Yes

## CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

**NAME:** *Strix occidentalis lucida* (Nelson) Ridgway
**COMMON NAME:** Mexican Spotted Owl
**SYNONYMS:** *Syrnium occidentale lucidum* Nelson, *Strix occidentalis huachucae* Monson and Phillips
**FAMILY:** Strigidae

**AUTHOR, PLACE OF PUBLICATION:** Nelson. 1903. Descriptions of new birds from southern Mexico. Proc. Biol. Soc. Wash. 16: 151-160.

**TYPE LOCALITY:** Mount Tancitaro, Michoacan, Mexico.

**TYPE SPECIMEN:** *Syrnium occidentale lucidum*: USNM 185269 (complete female adult skin). E.W. Nelson 9179 and E.A. Goldman, 27 Feb 1903.

**TAXONOMIC UNIQUENESS:** Approximately 20 species in the genus *Strix* worldwide, 3 of which occur north of Mexico in North America, *S.o. lucida* is the only species of *Strix* in Arizona. The Mexican Spotted Owl (MSO), *Strix occidentalis lucida*, is 1 of 3 subspecies in the species *S. occidentalis*. The other 2 subspecies include the Northern Spotted Owl (*S. o. caurina*) and the California Spotted Owl (*S. o. occidentalis*). Studies suggest that the Mexican spotted owl is genetically isolated from the other subspecies (Barrowclough and Gutierrez 1990, Funk et al. 2008).

**DESCRIPTION:** The Spotted owl is a medium sized owl without ear tufts (although the spotted owl ranks among the largest owls in North America (NA) where only 4 species among the 19 in NA are larger), Average size is 41-48 cm (16.1-18.9 in) long with a wingspan of 101-114 cm (39.8-44.9 in). Females are larger than males - males weigh 449-625 g (16-22 oz), females 480-680 g (17-24 oz). The MSO is a brown colored owl with large, irregular and numerous white spots on the head, neck, back, and underparts, giving it a lighter appearance than the other two subspecies. The sexes are nearly identical, but females have darker head and face color, and breeding females have brood patches. The remiges and rectrices of both sexes are dark brown and barred with light brown and white; tail has about ten light bands. MSO has a round face that lacks ear tufts. The large, round, brownish facial disks are concentrically barred with dark brown, with a dark brown border. Their dark brown eyes appear almost black. The beak is a pale yellowish green color, and their legs and feet are fully feathered. Juvenile spotted owls (hatchling to approximately 5 months) have a white downy appearance. Subadults (5 to 26 months) possess adult plumage but have pointed rectrices with white tips. The rectrices of adults (>27 months) have rounded and mottled tips.

**AIDS TO IDENTIFICATION:** MSO is similar to the Barred Owl (*Strix varia*), but is slightly smaller, tends to be more brown, while Barred Owls tend grey, and has white spotting on head, back, and underparts rather than streaking. The Barred Owl is the only other large owl with dark eyes and concentric rings on facial disk. Both owls show strong orange-red eye shine when illuminated by direct light. MSO has a distinctive main call, a series of three or four hesitant, dog like barks and cries. The background coloration of MSO is generally darker brown than the other subspecies with plumage spots larger, more numerous and whiter, which gives a lighter appearance.

**ILLUSTRATIONS:**

Color drawing (Scott 1987: 240)
Color drawing (Peteron 1990: 205)
Color photo (Terres 1980: 658-659)
Color drawing (Sloan, in Glinski 1998: plate 39)
Color photo (Fink, *in* Johnsgard 2002: plate 24)

**TOTAL RANGE:** The historic range of the Mexican Spotted Owl occurred in forested mountains and canyon lands extending from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah, southward through Arizona, New Mexico, and far western Texas, through the Sierra Madre Occidental and Oriental, to the mountains at the southern end of the Mexican Plateau. The present range is thought to be similar to the historic range. The MSO currently occupies a broad geographic area, but does not occur uniformly throughout its range.

**RANGE WITHIN ARIZONA:** Patchily distributed in forested mountains statewide, along with steep canyons on the Colorado Plateau including the Grand Canyon. They have been found in the following counties: Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, and Yavapai.

## SPECIES BIOLOGY AND POPULATION TRENDS

**BIOLOGY:** Mexican Spotted owls are mostly solitary outside the breeding season. They roost during the day, and hunt at dusk and at night. They are intolerant of moderately high temperatures, thus, often selecting daytime summer roosts on north facing slopes with dense overhead canopy. Lifetime nest site fidelity has been observed by pairs. "Some owls remain year-round in the same general areas but exhibit seasonal shifts in habitat use pattern (USFWS 1995). Some MSOs undergo altitudinal migrations between summer and winter ranges (USFWS 1995)." (NatureServe 2005). Seasonal migration of some individuals occurs in many or most MSO populations, and in both sexes, but not always year to year. Reasons why only some owls migrate are unknown. When migration occurs to wintering areas, it generally is from higher to lower elevations, and to more open habitats. Examples of known wintering areas in Arizona include the Verde Valley, Tonto Creek, and Sabino Canyon (Ganey, in Glinski 1998). Further, owls use these areas at a time when they are unlikely to vocalize (Ganey 1990), making it difficult to locate such areas through calling surveys. It is presently unknown how and why migrating owls select particular wintering areas. (Ganey and Block, 2005).

Adults are generally long-lived, however, there is a low survival of young to breeding age. Based on banding studies, the species often live for 16-17 years. Exploitive competition (where individuals compete for similar resources such as prey and nest sites) may occur with Great Horned owl (*Bubo virginianus*). They are not a fast flier, but are very agile and maneuverable. Their flight consists of quick wingbeats interspersed with gliding flight. Observed actively defending nest sites and fledged young against Common Raven (*Corvus corax*), Northern Goshawk (*Accipiter gentiles*), Cooper's Hawk (*A. cooperi*), and Golden Eagle (*Aquila chrysaetos*). Starvation is likely another common source of mortality. Juveniles are more vulnerable to starvation because of their poor hunting skills. Both adults and juveniles may be affected by starvation in those years when there is a low abundance or availability of prey.

MSO call mainly from March through November, although calling has been heard during all months in Arizona (USFWS 2012). Calling activity increases from March through May, except for nesting females, who are largely silent, and declines from June through November. On a daily basis, calling activity is greatest during the 2-hour period following sunset, with smaller peaks 4-8 hours after sunset and just before sunrise (USFWS 1995). They communicate using a variety of hoots, barks, and whistles. Sexes can be distinguished based on pitch of the call; females are consistently have higher-pitched calls. Besides having lower pitched calls, males generally call more frequently than females. The most common call is the Four-note Location Call, described phonetically as *hoo—hoo-hoo—hoo*. This call is used by males and females to announce territory occupancy and in territorial disputes. It is also used by the male when nearing the nest with food, and after copulation. The Contact Call is a hollow whistle ending in an upward inflection phoneticized as *cooo-weep!* It usually serves to establish and maintain contact between a pair. The Bark Series is used primarily by females during territorial disputes, and sometimes between pairs to maintain contact. It consists of a rapid series of 3-7 loud barking notes phoneticized as *ow!-ow!-ow!-ow!-ow!* Or *yenk!-yenk!-yenk!-yenk!* Both fledged young and adults use beak clicking, which occurs when birds are agitated, excited, or threatened. (Gutiérrez et al. 1995).

Northern spotted owls are known to hybridize with barred owls, however, hybridization has not been reported in the Mexican subspecies. The possibility of hybridization exists in Mexico where barred owls, fulvous owls, and spotted owls overlap in distribution. No evidence exists documenting actual sympatry among these species, however. (USFWS 1995).

**REPRODUCTION:** MSO's do not build their nests. In Arizona, they use cavity or abandoned platform nests about 80 feet up in coniferous tree, however, they also use ledges on cliffs or pothole sites, and mistletoe clusters. They are monogamous, breeding sporadically, and generally not nesting every year (Ganey 1988, in USFWS 1995). In good years most of the population will nest, whereas in other years only a small proportion of pairs will nest (Fletcher and Hollis 1994, in USFWS 1995). They have one brood, with egg laying peaking sometimes as early as early March in Arizona and New Mexico. They lay 1-3 (usually 2) faintly buff, unmarked eggs that are 5.0 cm (2.0 in.) long. Incubation by female lasts 28-32 days. Hatching usually occurs in late April to early May. Young have eyes closed at hatching, are immobile and downy. Females leave nest only to regurgitate pellets, defecate, and receive prey from male during the incubation period and first half of the brooding period. Male feeds female and young

until young are two weeks old, when both parents begin prey delivery. Young leave the nest at about 5 weeks (June), and fly at about 6-7 weeks of age. They stay near the nest for several weeks, and are fed by the adults until late summer, typically staying with adults through August. Adults breed at 2-3 years of age, but may not breed every year. Reproductive success is generally low (USFWS 1993), with average number of young fledged per pair at about 1.0 (USFWS 1995). (NatureServe 2005).

**FOOD HABITS:** MSO regularly caches excess food, usually on tree branches. Prey is snatched from the ground in talons after gliding descent from a perch. In Arizona: most common prey includes woodrats, deer mice, lagomorphs, and voles (Ganey et al. 1988); but also may prey upon various birds, bats, lizards, and snakes (Duncan 1992, Herpetol. Rev. 23:81). (NatureServe 2005). Over most of the MSO range, *Neotoma* species dominate diets in terms of biomass (Kertell 1977, Wagner et al. 1982, Ganey 1992, *in* Gutiérrez et al. 1995). Woodrats were generally more abundant in pellet samples collected in northern latitudes, and peromyscid mice and birds were generally more abundant in southern regions of the owl's range. Regional differences in the owl's diet likely reflect geographic variation in population densities and habitats of both the prey and the owl.

**HABITAT:** In the 1993 Federal Register, the USFWS estimated the total suitable MSO habitat in the U.S. at 5,589,734 to 5,714,734 acres. They primarily breed in dense old-growth mixed-conifer forests with complex structure. Forests used by spotted owls are typically uneven-aged and multistoried (USFWS 2012). These sites have high canopy closure, high basal area, many snags, and many downed logs. For foraging, multistoried forest with many potential patches is desirable, but owls forage in a variety of habitats: managed and unmanaged forests, pinyon-juniper woodlands, mixed-conifer and ponderosa pine forests, cliff faces and terraces between cliffs, and riparian zones (Ganey and Balda 1994, Willey 1998a,b; Ganey et al. 2003, Willey and Van Riper 2007). In Arizona, they occur primarily in mixed-conifer, pine-oak, and evergreen oak forests; also occurs in ponderosa pine forest and rocky canyonlands (Ganey and Balda 1989). Radio-marked owls in Arizona foraged more than expected in proportion to availability in unlogged forests (Ganey and Balda 1994).

MSO nest and roost primarily in closed-canopy forests or rocky canyons. In the northern portion of the range (southern Utah and Colorado), most nests are in caves or on cliff ledges in steep-walled canyons. Elsewhere, nests appear to be in trees (Fletcher and Hollis 1994, USFWS 1995). Nest trees are usually large in size, whereas roosting occurs in both large and small trees. Nest tree species vary somewhat among areas and habitat types, but available evidence suggests that Douglas-fir is the most common species of nest tree (SWCA 1992, Fletcher and Hollis 1994, Seamans and Gutiérrez, in press; *in* USFWS 1995).

Based on the Recovery Plan's established Ecological Management Units (EMU's) for Arizona (USFWS 2012), the major landforms of the Colorado Plateau EMU includes interior basins and high plateaus dissected by deep canyons, including the canyons of the Colorado River and its tributaries. Grasslands and shrub-steppes dominate at lower elevations, but woodlands and forests dominate the higher elevations. The Upper Gila Mountains EMU consists of steep mountains and deep entrenched river drainages dissecting high plateaus. The Mogollon Rim, a prominent fault scarp, bisects the unit. The vegetation is a zonal pattern of grasslands at lower

elevations upward through pinyon-juniper woodlands, ponderosa pine, mixed-conifer, and spruce-fir forests at higher elevations. Many canyons contain stringers of deciduous riparian forests. The Basin and Range – West EMU exhibits horst and graben faulting with numerous fault-block mountains separated by valleys. Complex faulting and canyon carving define the physical landscape within these mountains. Vegetation ranges from desert scrubland and semi-desert grassland in the valleys upwards to montane forests. The montane vegetation includes interior chaparral, encinal woodlands, and Madrean pine-oak woodlands at lower and middle elevations, with ponderosa pine, mixed-conifer, and spruce-fir forests at higher elevations. Riparian forests may also function as important components of ecosystems supporting spotted owls. They may serve as direct avenues of movement between mountain ranges or as stopover sites where drainages bisect large expanses of landscape that otherwise would be inhospitable to dispersing owls. Many of the riparian ecosystems have deteriorated in the Southwest, and the loss of riparian habitat was another reason for listing the MSO (USFWS 1995).

**ELEVATION:** 4,500 - 10,000 ft. (1373-3050 m); Ganey (*in* Glinski 1998) reports elevations in Arizona as 3,700 – 9,600 feet (1128-2926 m); while the HDMS reports the elevation range from 2,720 – 9,600 ft. (829-2926 m) based on unpublished records (AGFD, accessed 2005).

**PLANT COMMUNITY:** Mixed-conifer forests are commonly used throughout most of the range. These forests are generally dominated by Douglas-fir (*Pseudotsuga menziesii*) and/or white fir (*Abies concolor*), with codominant species including southwestern white pine (*Pinus strobiformis*), limber pine (*Pinus flexilis*), and ponderosa pine (*Pinus ponderosa*) (Brown et al. 1980, *in* USFWS 1995). The understory often contains the above coniferous species as well as broadleaved species such as Gambel oak (*Quercus gambelii*), maples (*Acer* sp.), boxelder (*Acer negundo*), and/or New Mexico locust (*Robinia neomexicana*). In southern Arizona and Mexico, Madrean pine-oak forests are also commonly used, and are typically dominated by an overstory of Chihuahuan pine (*Pinus leiophylla*) and Apache pine (=Engelmann pine, *Pinus engelmannii*), in conjunction with Douglas-fir, ponderosa pine, and Arizona cypress (*Cupressus arizonica*). Evergreen oaks are typically prominent in the understory. (Brown et al. 1980, *in* USFWS 1995).

**POPULATION TRENDS:** Mexican spotted owl population trends are unclear. Surveys since the implementation of the 1995 Recovery Plan have increased knowledge of owl distribution, but not necessarily owl abundance, as an increase in number of known owl sites is mainly due to new areas being surveyed (USFWS 2012).

Population size for a specific area and time can be modeled by examining birth, death, immigration, and emigration rates, which influence population viability and persistence. Data on trends in populations or occupancy rates must encompass at least 10 years, as owls are long lived, and such studies are few, with varying sample sizes and methods, making statistical comparisons difficult. Most studies of the owl have been descriptive rather than experimental. However, results from such studies have all noted that study populations have declined in the recent past, though range-wide conclusions cannot be inferred from this limited data (Seamans et al. 1999, Stacey and Peery 2002, Gutiérrez et al. 2003, USFWS 2012).

## SPECIES PROTECTION AND CONSERVATION

**ENDANGERED SPECIES ACT STATUS:**
Final Recovery Plan, First Revision (USDI, FWS November 2012)
Critical Habitat Listed (USDI, FWS 2004)
LT (USDI, FWS 1993), without Critical Habitat
[PT USDI, FWS 1991]
[C2 USDI, FWS 1985, 1989]

**STATE STATUS:**
1 (AZGFD, AWCS 2022)
[1A (AGFD SWAP 2012)]
[WSC (species level) (AGFD, WSCA 1996 in prep)]
[Threatened (species level) (AGFD, TNW 1988)]

**OTHER STATUS:**
Bureau of Land Management Sensitive (USDI, BLM Arizona, 2017)
Not Forest Service Sensitive (USDA, FS Region 3 2013, 2007)
[Forest Service Sensitive, USDA, FS Region 3 1988, 1999]
Group 3 (NNDFW, NESL 1994, 2005, 2008)
A, Determined Threatened in Mexico (NORMA Oficial Mexicana NOM-059-SEMARNAT-2010).

**MANAGEMENT FACTORS:** Two primary reasons were cited for the original listing of the Mexican spotted owl; the historical alteration of habitat as the result of timber management practices, specifically the use of even-aged silviculture, and the threat of these practices continuing, as provided in National Forest Plans. Since listing, threats have transitioned from commercial timber harvesting to the risk of stand-replacing fire. Recent forest management emphasizes ecological function and a return toward pre-settlement fire regime, as opposed to former commodity focused management. Fire intensity, in severity and size of fires, has increased in Southwestern forest since 1995.

The risk of catastrophic fires is widespread in Southwestern forests and woodlands. Fuel accumulations and forests overstocked with trees place spotted owl habitat at risk with respect to stand-replacing fires. After a large crown fire, habitat components for nesting, roosting, and foraging are reduced or eliminated. Small-scale natural fires and prescribed burns, however, can reduce fuel loadings and create small openings and thinned stands that increase horizontal diversity and reduce the spread of catastrophic fire. (USFWS 1995). Natural disturbances such as the western spruce budworm, or the bark beetle, are also a concern especially during long outbreaks (usually following droughts). Bark beetles are important wood-boring insects in pinyon, ponderosa pine, Douglas-fir, and Engelmann spruce. During long outbreaks, they can

kill large groups of mature trees over widespread areas, which can alter MSO habitats. These disturbance agents should be considered in developing management strategies for owl recovery. Several vegetation management tools, including various kinds of silviculture, risk-abatement for fire or insect/disease damage, prescribed burning, and direct population control are appropriate in various combinations. (USFWS 1995).

MSO habitats continue to be lost or degraded by anthropogenic uses (timber, oil, gas, grazing, recreation, fuels reduction treatments, and development) and forest fragmentation. Also, according to USFWS (1995), "The potential for grazing to influence various components of spotted owl habitat cannot be ignored. However, current predictions of grazing effects on plant communities as they relate to the owl are inexact. Thus, the integration of spotted owl needs and grazing management will require coordination, and an interactive and adaptive approach between protection, restoration, and management." In addition, there is the "potential for competition with and/or predation by other raptors, including great horned owl and red-tailed hawk (USFWS 1993)." (NatureServe 2005). AGFD (in prep) also reports possible competition problems from great horned owls, in forests that have been thinned.

General recommendations from the Recovery Plan, are proposed for three levels of management: 1) Protected Areas – include a 243 ha (600 ac) "Protected Activity Center" (PAC) placed at known or historical nest and/or roost sites, with slopes >40% in mixed-conifer and pine-oak forests that have not been harvested within the past 20 years. Harvest of trees >22.4 cm dbh (diameter at breast height) is not allowed, but light underburning is permitted on a case-specific basis as needed to reduce fuels. 2) Restricted Areas – include ponderosa pine-Gambel oak and mixed-conifer forests and riparian environments. 3) Other Forest and Woodland Types – include ponderosa pine and spruce-fir forests, pinyon-juniper woodlands, and aspen groves that are not included within PACs. (USFWS 1995).

The MSO inhabits diverse forest types scattered across a physically diverse landscape. In order to approach a status assessment on a rangewide basis, the Recovery Plan divided their range into 11 geographic areas called "Ecological Management Units" (EMU's), six of which occur in the U.S. Three EMU's occur in Arizona: Colorado Plateau (includes portions of northern Arizona), Upper Gila Mountains (along the Mogollon Rim/Plateau in Arizona, SE into New Mexico), and Basin and Range – West (southern Arizona where it geographically exhibits horst and graben faulting with numerous fault-block mountains separated by valleys). The EMU's were identified based on (in order of importance): 1) Physiographic provinces, 2) biotic regimes, 3) perceived threats to owls or their habitats, 4) administrative boundaries, and 5) known patterns of owl distribution. (USFWS 1995).

**PROTECTIVE MEASURES TAKEN:** A high profile species to which apply a large number of policies and regulations. Critical Habitat was designated in 2004 (Federal Register 66(22): 8530-8553). About 90% of the U.S. population occurs on lands administered by the U.S. Forest Service (USFWS 1995). Region 3 of the Forest Service manages under the 1996 Record of Decision, and deviations require Section 7 consultation. The Region has conducted spotted owl inventories since 1988, and established approximately 1,061 PACs at all MSO sites known from 1989 to the present (USFWS 2012). The National Park Service has conducted owl surveys in many national parks with suitable habitat. Designation of PACs has been inconsistent on

National Park Service land, as much of the acreage in parks is wilderness, proposed wilderness, or backcountry land, and have little potential for most management impacts to owls. Generally, the most pressing issue in national parks is the need to manage fuel loads and fire regimes while maintaining owl habitat. Fire Management Plans commonly include owl habitat management as a focus. The Bureau of Land Management in Arizona orients recovery considerations toward the vicinity of steep-walled rock canyons. The Bureau avoids habitat-altering projects within 1.6 km (1 mi) of canyons that could support breeding or roosting owls. The BLM continues to periodically survey for MSOs, no birds have been found. The Department of Defense manages several PACs on military land throughout Arizona. The Arizona Game and Fish Department has managed for spotted owls by: 1. Participating in the Forest Service sponsored Mexican Spotted Owl Task Force 2. Participating as a member of the USFWS sponsored Mexican Spotted Owl Status Review Team 3. Participating as a member of the Mexican Spotted Owl Recovery Team, 4. Participating as a member of three Mexican Spotted Owl EMU Working Teams, 5. Funding research and surveys to determine the status of MSO in Arizona, and 6. Continuing to review and offer technical guidance on projects that might impact Mexican spotted owl occupied or potential habitat.

Logging is restricted in a number of areas in national forests, national parks, wilderness areas, and BLM lands." (NatureServe 2005). Owl surveys at Grand Canyon National Park in 2001 and 2002, uncovered 53 MSO in rugged, rocky canyon habitat. Roosts and nests were generally located on rock shelves. These findings resulted in the establishment of 39 Protected Activity Centers surrounding the owl locations, ranging from 700 to 1,000 acres and subject to the management recommendations contained in the Mexican Spotted Owl Recovery Plan. (Ward 2002).

The Recovery Plan for the Mexican Spotted Owl, First Revision, published in 2012, lists six key elements designed to conserve the MSO throughout its range: 1. Protect existing owl sites (PACs), 2. Manage for recovery nesting and roosting habitat to replace that lost to fire and other events, as well as to provide additional sites for an expanding population, 3. Manage threats, 4. Monitor population trends and habitat, 5. Implementation of monitoring plan, and, 6. Building partnerships to facilitate recovery. Objective and Measureable Recovery Criteria determined in the Revised Recovery Plan include: 1. Owl occupancy rates must show a stable or increasing trend after 10 years of monitoring, and, 2. Indicators of habitat conditions (key habitat variables) are stable or improving for 10 years in roosting and nesting habitat.

**SUGGESTED PROJECTS:** According to the Revised Recovery Plan, "Research is needed to develop long-term management strategies that assure predominant threats to the persistence of MSO will be alleviated. The primary focus of such research should elucidate factors that influence change in Mexican spotted owl distribution and abundance. Emphasis should be placed on identifying those factors that can be manipulated through social or natural resource management. Major research topics include Habitat and Demography, Biological Interactions, Population Structure, and Ecosystem Function" (USFWS 2012).

At this time a Program of Conservation Actions (PACE, similar to a recovery plan) has not been developed for the MSO in Mexico. Commitment and coordination among the Mexican

Government, U.S. Federal and state land-management organizations, sovereign Indian nations, and the private sector is important to the success of the plan.

**LAND MANAGEMENT/OWNERSHIP:** Primarily national forests in Arizona including: Apache-Sitgreaves, Coconino, Coronado, Kaibab, Prescott, and Tonto National Forests. Other ownerships/managements include: BIA – Havasupai and Fort Apache Reservations, Navajo Nation, and Navajo Hopi Joint Use Area; BLM – Kingman and Safford Field Offices; DOD - Fort Huachuca Military Reservation and Navajo Army Depot; NPS – Chiricahua, Coronado and Walnut Canyon National Monuments, and Grand Canyon and Saguaro National Parks; AGFD Lamar Haines Wildlife Area; State Land Department; TNC – Muleshoe Ranch and Ramsey Canyon Preserves; Private.

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**ADDITIONAL INFORMATION:**

*Strix occidentalis* translates as “owl of the west”; *lucida* means “light” or “bright.”

Habitat connectivity, buffers a population from stochastic variability through time by providing the opportunity for local population failures to be “rescued” by immigration from other populations (USFWS 1995).

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