

To: Donita Cotter, Monarch Conservation Strategy Coordinator
From: Dr. Benjamin N. Tuggle, Regional Director, Southwest Region (R2)
Subject: Region 2 Monarch Butterfly Conservation Strategy and Action Plan Template
Date: November 12, 2014

On 4 September 2014, the U.S. Fish and Wildlife Service (USFWS) Director issued a memorandum to the Service Directorate to develop a Service strategy for monarch conservation addressing plans for habitat restoration and enhancement, education and outreach, and monitoring and research needs. On October 7, the Director sent an email to all Regional Directors challenging them to commit to a goal of 100 Million Monarchs by 2020, and for Region 2 to provide a goal of 20,000 acres of new habitat for monarchs.

The Director's requests followed an agreement among President Obama, President Peña Nieto of Mexico, and Prime Minister Harper of Canada to "*establish a working group to ensure the conservation of the Monarch butterfly, a species that symbolizes our association.*" Also, on June 20, 2014, President Obama signed a Presidential Memorandum, "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators," outlining an expedited agenda to address the devastating declines in honey bees and native pollinators, including the monarch butterfly. Secretary Jewell tasked the Director with convening an interagency High Level Working Group to develop and implement a U.S. strategy for monarch conservation, coordinate our efforts with Mexico and Canada through the Trilateral Committee, and ensure that the monarch strategy is coordinated with development of the Federal Pollinator Strategy and DOI assignments in the Presidential Memo.

To accomplish these initiatives and provide information to update the 2008 North American Monarch Conservation Plan by March 2015 and completion of the Federal Pollinator Strategy due to the White House mid-December 2014, the following tasks were specifically requested in the Director's memorandum:

- I. Designate a Regional and program point of contact to serve on the Service Monarch Conservation Team. Team members will participate in synthesis of the Service-wide Monarch Conservation Strategy, and assist in coordinating our response to the DOI Pollinator Task Force (POC information due September 10).
- II. Develop a Regional list of monarch habitat creation and restoration projects for immediate implementation in Fall 2014 and Spring 2015 on Service lands and facilities, and on state and private lands through partnership projects (due October 8).
- III. Undertake outreach and engagement activities to support pollinator education for schools, nature centers, and other citizen involvement activities.
- IV. Use the monarch butterfly as a flagship species, as we continue our surrogate species approach.

In response, the Southwest Region drafted a preliminary strategy for the Southwest Region, addressing these tasks, each with actions to implement our Southwest Monarch Conservation Strategy, submitted to Headquarters on October 15 (with time extension).

Subsequently, the USFWS National Monarch Coordinator, Donita Cotter, issued a Regional Monarch Conservation Action Plan Template, which divided the national monarch conservation strategy into two parts: Part I covering actions to accomplish with existing resources, and Part II describing actions to accomplish with additional funding available. Each part was divided into six sections:

- A. FY 2015 Habitat Restoration and Enhancement Commitments
- B. Best Management Practices
- C. Native Seed Strategies
- D. Inventory and Monitoring
- E. Research
- F. Education and Outreach/In-reach

Preliminary findings of the recent (2014) USGS Powell Report indicate that at least 300 million monarchs by 2024 will be needed to sustain the Eastern monarch population in the long term. Demographic and extinction risk models reveal that the overwintering population size in Mexico would need to reach 6 hectares, with a delivery of 1 million acres of monarch habitat within the range of the Eastern monarch population in the US. With this recent information in mind, the Southwest Monarch Conservation Team has updated our Southwest Region Monarch Conservation Strategy to address Parts I and II, addressing these six components below.

SOUTHWEST REGION MONARCH CONSERVATION STRATEGY

Background

Southwest Region and Monarchs

The Southwest Region is deeply invested in the conservation of pollinators and welcomes this opportunity to step up for monarch conservation. The monarch butterfly is found throughout the Southwest Region. Our location, bordering Mexico and home to a diversity of Tribal Nations, offers us unique opportunities to incorporate a variety of cultural perspectives and actions involving the monarch. Texas and Oklahoma are situated in the core of the migratory flyway for the Eastern monarch population, Arizona is largely affiliated with the Western monarch population, and New Mexico potentially hosts monarchs from the Eastern and Western populations. Texas has the highest native diversity of milkweed species in the US, (37 known species); Arizona, New Mexico, and Oklahoma each support at least 25 milkweed species. Although the largest numbers of monarchs typically occur in Texas and secondarily Oklahoma and many conservation actions will be prioritized for these states, the geography of the Southwest Region invites consideration of Eastern and Western monarch populations in habitat management, collaborations with Mexico and Tribal cultures, and the preservation of native milkweed diversity in habitat restoration efforts.

Land Ownership and the Monarch Butterfly Sister Protected Area (SPA) Network

Each of our four states in the Southwest Region has a different ratio of privately owned land. Texas and Oklahoma are approximately 95% privately owned and/or controlled, so in these states, our strategy would involve a large role for the Partners for Fish and Wildlife Program. National Wildlife Refuges and Fish Hatcheries are also distributed sparsely along the main migratory routes of the monarch. Balcones Canyonlands NWR, located in central-Texas in the

heart of the monarch migratory corridor, is the only location within the Southwest Region that is a designated site within the Monarch Butterfly Sister Protected Area (SPA) Network. Thirteen locations in Mexico, Canada, and the U.S. were selected as SPAs in 2006 by the Trilateral Committee to conduct restoration, research, education, and monitoring of monarchs. The remaining 12 sites are located on protected areas administered by the U.S. National Park Service, Canadian Wildlife Service, Parks Agency Canada, and Mexico's National Commission of Natural Protected Areas (CONAMP).

Native Milkweed Diversity

Each state within the Southwest Region hosts its own array of native milkweed species, and some milkweed species are found in all four states. Texas contains 37 recognized milkweed species, while Arizona has 30 species, New Mexico has 28 species, and Oklahoma has 25 native species of *Asclepias*, the genus of milkweeds in the US. Texas and Arizona (along with UT, CA, and FL) are the only states that are home to endemic species. Welsh's milkweed (*Asclepias welshii*), found at the Utah-Arizona border, is a federally threatened species. There is interest in maintaining these genetic distinctions in native milkweed species; thus, the goal is to plant native milkweed species within their known ecotypes and ranges, and avoid mass propagation and planting of non-native milkweed species in areas outside of their ranges that could genetically swamp the native species. In many areas of south and central Texas, and some in Arizona and New Mexico, native milkweeds are now scarce, likely due to agricultural and urban development, pesticide use, and drought. South Texas is critical to monarch migration, serving as the location of the first reproductive cycle after overwintering, and the geographic funnel of monarch travel. Furthermore, rainfall may not be sufficient to stimulate flowering and seed set in any given year. Because butterflies evolve close relationships to their host plants, egg-laying female monarchs may recognize cues from native milkweeds along their journey in specific locations and seasons that we do not entirely comprehend. Thus maintaining and planting endemic milkweeds may benefit monarchs in unseen ways, which further drives our strategy to use local milkweed species.

Native Milkweed Availability

At this time there is a paucity of available and affordable native milkweed seed throughout the Southwest Region; therefore, part of our strategy involves collecting, growing, and distributing milkweed seed and plants. As milkweed is a perennial plant with seeds that must be hand-harvested, cold stratified, and often scarified to germinate, providing abundant amounts of milkweed seed and stock for restoration projects should be continued for multiple years to increase the chance of success. Our strategy seeks to partner with USFWS Refuge lands, agencies, states, Tribes, landowners, NGOs, and citizens in the US and Mexico to identify, collect, grow, and provide as much milkweed seed and plant plugs as possible to increase milkweed availability to restore habitat in areas most important for monarch breeding. If mass propagation becomes an obvious need in Texas, monarch experts believe that three species are the most important for monarchs: *Asclepias asperula* (antelope horns), *A. viridis* (green milkweed), and *A. oenotheroides* (hierba de zizotes). Collectively, these species cover the entire Texas migration route, are relatively abundant, and have high levels of cardiac glycosides that protect monarchs from predators.

Southwest Region Monarch Conservation Strategy

Our Regional Monarch Conservation Team has coordinated with all Regional Programs to gather information and encourage Programs to incorporate monarch and pollinator conservation measures, outreach, and monitoring into the day to day endeavors of our work. The goal of the Southwest Region monarch conservation strategy is to help the Service and our many external stakeholders achieve the 100 Million Monarchs by 2020, by addressing the biological needs of the monarch throughout all of its life stages. We will emphasize areas within the migratory range of the Eastern population at first, followed by an extension of focus on the Western population and any direct migratory relationships with Mexico.

Regional Monarch Conservation Action Plans Template

Part I. FY 2015 Commitments

A. FY 2015 Habitat Restoration & Enhancement Commitments

USFWS Lands – To create and enhance habitat for monarchs, we are engaged in forming and restoring habitat on National Wildlife Refuges (NWRs) and National Fish Hatcheries (NFHs), by removing invasive plants, conducting prescribed burns, and managing farmland and areas for native wildflowers. We are developing and maintaining pollinator gardens, and incorporating a variety of milkweed species to use as educational displays in areas with frequent human use on NWRs and NFHs. On NWRs, we are promoting the development of way-stations on NWRs using local, native milkweed to attract migrating monarchs and offer egg-laying and larval food resources. If land containing known monarch habitat is available for acquisition, particularly if it is adjacent to a NWR, we are interested in exploring NWR and NFH land purchases, provided acreage is significant and partners are aligned to assist with funding (Land & Water Conservation Fund, Land Trusts, Migratory Birds, NGOs, etc.). Our Recovery Land Acquisition process of receiving and reviewing proposals through Nontraditional Section 6 funds begins in January of each year, and, if applicable, projects with habitat overlap for monarchs and pollinators will be added to this table by April 2015.

Restoration:

1. Aransas NWR – Restored native wildflowers and removed invasive plants to increase pollinator habitat for resident and migratory pollinators in 2012.
2. Balcones Canyonlands NWR – From fall 2014 to fall 2015, 4.5 acres of monarch and pollinator habitat will be restored by removing and reducing invasives using fire and herbicides, and planting with seed mix with nectar plants (forbs) and milkweed to add additional habitat and provide for outreach and education to the public.
3. Hagerman NWR – Maintains a native prairie 20-acre restored site. In 2012, a mixture of native wildflowers and grasses were drilled throughout this site at various locations.
4. Las Vegas NWR – In 2013 created a monarch waystation consisting of nectar bearing plants and milkweed, covering 1 acre. In 2015, the Refuge plans to create a new 3 acre habitat to plant a milkweed demonstration area with the help of youth, and restore monarch habitat.
5. Muleshoe NWR – Has implemented habitat restoration, some of which contains wildflowers beneficial to pollinators.

6. Tishomingo NWR – In 2013, planted a 7 acre field of sunflowers, and a 3 acre and 1.5 acre field of native wildflowers. In 2012, 75 acres of black oil sunflowers were planted.
7. Laguna Atascosa NWR – Serves as an important refugium for the federally threatened Pecos sunflower, providing permanent water access in order for this native sunflower species to recover. Many native pollinators are attracted to the Pecos sunflower.

Enhancement:

1. Attwater Prairie Chicken NWR – Maintains 3000 acres of wildflowers interspersed with native grasses planted to provide forage for the APC and also to benefit pollinators.
2. Inks Dam NFH – in partnership with the Balcones Canyonland NWR Fire Management Team will conduct fire protection of critical habitat in the Monarch butterfly migratory route. Understory cutting should reduce fire risks to this critical roosting habitat damage by climate change and the worsening drought in central Texas (45 acres).

Private Lands - On private lands, we are continuing to reach out to landowners in the Partners for Fish & Wildlife program to inform them of monarch needs and work to enhance monarch habitat with the planting of native milkweed seeds and/or plants. As we have been promoting for several years, we will encourage and plant wildflower seed mixes to benefit all pollinators and other wildlife, and to promote biodiversity in PFW projects. As Mitigation/Conservation Banks develop in Region 2, we will assess the habitat for compatibility with monarchs/pollinators. If additional pollinator habitat can be negotiated with these banks to create a win-win, or if these if these banks are already preserving or managing for wildflowers, these pollinator acres will be included in our strategy.

1. Texas PFW – Texas Parks and Wildlife Department (TPWD). These agencies will continue their ongoing Cooperative Agreement for their Landowner Incentive Program but will now include planting of appropriate milkweed plants on grassland restoration projects. This effort will lead to the enhancement of an estimated 100 acres of monarch habitat in 2015.
2. Refuges, PFW, ES, Migratory Birds – Coordinate with Oaks and Prairies Joint Venture (JV), one of the bird conservation JVs -- (<http://www.opjv.org/>). This JV covers a huge area, 60 million acres from Tulsa, OK in the north to San Antonio in the south, including the Edwards Plateau. Almost all of the land is privately owned and about 85% is agricultural land. Monarchs migrate through it. They have a grassland restoration incentives program (GRIP) which should also benefit the monarchs as well as birds. The Coordinator for the Oaks and Prairies JV, Dr. Jim Giocomo, works for the American Bird Conservancy has agreed to help promote monarch conservation in JV projects; (he is already involved in the Gulf Coast Prairie LCC and works with Bill Bartush). What's good for birds is also good for monarchs. Could enhance 1000s of acres (estimating 3000 for 2015).
3. Texas PFW – Texas Prairie Wetlands Project. FWS is a partner with NRCS, TPWD, and Ducks Unlimited in this cooperative conservation effort. An emphasis on the planting of pollinator plants on the uplands adjacent to the restored wetlands has been ongoing for several years. Starting in FY15, milkweed seeds will be incorporated into the seeding mixtures. It is estimated that this will involve 6 to 10 projects/year, covering 100-300 acres annually.

4. Texas PFW, Austin ES – Private landowner. New and enhanced wildflower plantings for Texas pollinators via amendment of existing, funded PFW project (F12AC00359) to create nectar plant and native *Asclepias* restoration on 5 acres within a 56-acre fenced enclosure, with enhanced habitat. Private landowner will provide \$1,950, to begin fall 2014 through spring 2015.
5. Partners for Fish and Wildlife – Biologists in the field can educate partners in previously funded programs to incorporate milkweed incorporated into planting and restoration projects, along with other forb seed for all pollinators and nectar sources.
6. ES, PFW – Investigate using native seeds with regional milkweed to restore areas disturbed by oil and gas wells and 60-foot-wide right-of-ways for pipeline (over the last few years more than 10,000 oil and gas wells have been permitted in Texas, and approximately 10,000 linear miles of pipeline have been laid). – Industry, private lands.
7. Oklahoma PFW – Oklahoma Conservation Commission and several USDA Soil and Water Conservation Districts. Under several Cooperative Agreements between the PFW Program and the Oklahoma Conservation Commission (OCC), several native grass drills have been purchased and made available for use by private landowners. The drills are located within USDA Soil and Water Conservation District offices through the State and made available to private landowners to utilize to plant seeds of native grasses and forbs, including many pollinator plants on their property, impacting 3000 ac from 2010-2017.
8. Texas Coastal ES, PFW – Burris Property. Habitat restoration started in fall 2014, ongoing. Restored 30 acres for pollinators using native wildflower seed mix for region.
9. Texas Coastal ES, PFW – CBBEP Property. Habitat restoration started in fall 2014, ongoing. Restored 15 acres for pollinators using native wildflower seed mix for region.
10. Texas Coastal ES, PFW – Harrison Property. Habitat restoration started in fall 2014, ongoing. Restored 150 acres for pollinators using native wildflower seed mix for region.
11. Texas Coastal ES, PFW – Wilkinson Property. Habitat restoration started in fall 2014, ongoing. Restored 2 acres for pollinators using native wildflower seed mix for region.
12. Texas Coastal ES, PFW – McAnnelly Property. Habitat restoration started in fall 2014, ongoing. Restored 34 acres for pollinators using native wildflower seed mix for region.
13. Texas Coastal ES, PFW – Harrison Property. Habitat restoration started in fall 2014, ongoing. Restored 22 acres for pollinators using native wildflower seed mix for region.
14. Texas Coastal ES, PFW – Lucci Property. Habitat restoration started in fall 2014, ongoing. Restored 8 acres for pollinators using native wildflower seed mix for region.
15. Texas PFW, Austin ES – Bastrop County property, private landowner. Brush management project land enhancement – thinning to promote wildflower growth using natural seed bank of native forbs for wildflower generation. 40 acres.
16. Texas PFW, Austin ES – Bell County property, private landowner. Brush management project land enhancement – juniper thinning to promote wildflower growth using natural seed bank of native forbs for wildflower generation. 121 acres.
17. Texas PFW, Austin ES – Bastrop County property, private landowner. Brush management project land enhancement – thinning to promote wildflower growth using natural seed bank of native forbs for wildflower generation. 45 acres.
18. Texas PFW, Austin ES – Hamilton County property, private landowner. Habitat restoration with landowner planting wildflowers and native grasses. 20 acres.
19. Texas PFW, Austin ES – Milam County property, private landowner. Habitat restoration with landowner planting wildflowers and native grasses. 1 acre.

20. Texas PFW, Austin ES – Columbus, Texas property, private landowner. Prescribed fire treatment of 400 acres for land enhancement – regeneration will promote wildflower growth using natural seed bank of native forbs for wildflower generation. 400 acres.
21. Texas PFW, Austin ES – Columbus, Texas property, private landowner. Prescribed fire treatment of 400 acres for land enhancement – regeneration will promote wildflower growth using natural seed bank of native forbs for wildflower generation. 600 acres.
22. Texas PFW, Austin ES – Columbus, Texas property, private landowner. Prescribed fire treatment of 400 acres for land enhancement – regeneration will promote wildflower growth using natural seed bank of native forbs for wildflower generation. 400 acres.
23. Texas PFW, Austin ES – Columbus, Texas property, private landowner. Prescribed fire treatment of 400 acres for land enhancement – regeneration will promote wildflower growth using natural seed bank of native forbs for wildflower generation. 400 acres.
24. Balcones NWR – Habitat restoration. Conducted prescribed fire and wildflower plantings and planted milkweed on 3 acre plot in fall 2014.
25. Festina Lente Conservation Bank Agreement (CBA) – The proposed bank would include approximately 1,332 credits for protection of approximately 1,147 acres of existing golden cheeked warbler habitat and buffer habitat. The Service area for the CBA includes 13 counties in central Texas. Established in 2012 and contains preserved, native grassland habitat, which supports native wildflowers, managed to remove invasive plants and maintain native grassland conditions.
26. Hickory Pass CBA – 3,003 acres for GCW. The Conservation Bank provides for the permanent conservation of habitat Important to the golden-cheeked warbler (*Dendroica chrysoparia*) ("GCW) and numerous other species of plants and wildlife endemic to Central Texas. Established in 2012 and contains preserved, native grassland habitat, which supports native wildflowers, managed to remove invasive plants and maintain native grassland conditions.
27. Bandera Corridor CBA – The bank proposal includes a request that 4,506 credits for the golden-cheeked warbler (*Dendroica chrysoparia*) be awarded for the protection of approximately 4,657 acres. This equates to one credit awarded per acre of existing golden-cheeked warbler habitat, and one-half credit awarded per acre of habitat buffer placed under conservation easement. The Bandera Corridor Conservation Bank proposal represents multiple properties enrolled under one bank agreement and with a single service area. The service area includes Bandera, Medina, Uvalde, Real, Kerr, Kendall, Bexar, Kinney, Edwards, Kimble, Gillespie, Blanco, and Comal counties. Activities that may cause a materially adverse effect on the conservation value of a property are prohibited including, for example, construction, excavation, and surface mining. 2011
28. LPC Programmatic Conservation Bank Agreement – Programmatic is designed to streamline conservation banking process and establish conservation banks across the current range of Lesser Prairie-Chicken (LPC) in portions of Texas, Oklahoma, and New Mexico (also in Kansas and Colorado) for the benefit of the LPC. The purpose of this PCBA is to set forth the agreement of the parties regarding the establishment, use, operation, and maintenance of the PCBA to compensate for impacts to, and conserve and protect LPC. The PCBA will consist of one or more bank parcels established and operated within the Range for the benefit and conservation of the LPC.

State Lands –

1. PFW, ES, WSFR, NWRs – Contact state wildlife agencies to share information about FWS’s Monarch Conservation Initiative and explore opportunities for monarch conservation outreach. WSFR will inform State partners of the new national pollinator guidance developed specifically for States to incorporate pollinator conservation into their State Wildlife Action Plan (SWAP) updates, due to be completed by Oct 2015. In Region 2, Texas and Arizona have already completed their SWAPS. At upcoming regional meetings, pollinator information will be shared with States to use at all stages of SWAP development and implementation.
2. PFW, ES, NWRs, WSFR – Investigate TX-DOT and other State DOT possibilities for milkweed plantings, native forbs. We plan to contact and work with State Departments of Transportation and public and private managers/owners of ROWs to discuss planting and managing for wildflowers along these habitats, including those of State-operated utility or transport lines.

Tribal Lands –

1. New Mexico PFW – Santo Domingo Pueblo, NM. This project is located in the unique riparian forest (bosque) along the Rio Grande River on Tribal land. Native plants will be selected for monarchs and other pollinators. The project will cover 38 acres in area.
2. New Mexico PFW – Cochiti Pueblo, NM. This habitat restoration project includes riparian and upland restoration features on Tribal land. In addition, a native plant pollinator garden will be established and will be maintained for the next 10 years. Native plants will be selected for monarchs and other pollinators. The project will cover 19 acres in area.
3. Ohkay Owingeh Tribe, NM – Received a Tribal Wildlife Grant in 2010 for a proposal entitled “Increasing habitat value for pollinators and other wildlife species at Ohkay Oqingeh” to restore fallow agricultural riparian areas that had become overgrown by invasive plants. The study involved mechanical removal of invasive vegetation, rehabilitation of ditches and irrigation, and construction of suitable nesting sites for pollinators. Once the area was cleared, it was replanted with native forbs, grasses, shrubs, and trees to support pollinators. Each phase included monitoring. Area of restoration project is 26 acres.

Other Lands (City, County, ROWs, Roads) -

1. Arizona PFW – Partnered with the Hummingbird Monitoring Network to restore Harshaw Creek in 2013. Project involves installation of erosion control structures and planting of native plants in and around Harshaw Creek in southern Arizona. Approximately 500 native plants were planted in the summer and fall of 2014 to support pollinators, including *Asclepias angustifolia*, *Anisacanthus thurberi*, *Aquilegia deserti*, *Lobeliza cardinalis*, *Mimulus guttatus*, *Monarda citriodora*, *Oenothera elate*, *Penstemon barbatus*, *Rhus aromatica*, *Rhus microphylla*, and *Ribes aureum*. We estimate that approximately 25 acres of pollinator habitat were enhanced through this effort. The total cost of the project was \$23,000.
2. Arizona PFW – Rio Solado Nature Center partnership. A pollinator garden in southern AZ will be finalized at the Rio Solado Nature Center during Fall 2014 and Spring 2015. The garden features 1 acre of native plants and milkweed.

3. New Mexico PFW – Bernalillo County, NM. As part of a Cooperative Agreement, the PFW program will work with the County and landowners to improve water availability for wildlife in the East Mountains of Albuquerque. Native pollinator gardens will also be planted on properties of interested landowners using native plants selected for monarchs and pollinators. This project will cover 117 acres.
4. Arizona PFW – Audubon/City of Phoenix/Monarch Watch are all partnering to plant vegetation for monarch habitat (milkweed and flowering native forbs and cacti) under a Cooperative Agreement. This project is part of a nature area that is maintained by the City of Phoenix. This project entails forming two 5-acre habitat areas and also has an educational component.

Table 1. FY 2015 - Habitat Restoration & Enhancement Commitments

	Ownership	Acres Existing or Planned for FY15 Using Existing Funds	Partners
Restoration	Service owned lands	40	Schools
	Easements	0	Plans for outreach
	State lands	0	Plans for outreach
	Private Lands	5	Private landowners
	ROWS, roadsides	0	Plans for outreach
	Mitigation Bank	0	Plans for outreach
	Tribal lands	98	Santo Domingo Pueblo, Cocti Pueblo, Ohkay Owingeh
	Corporate	0	Plans for outreach
	Other	33	Harshaw Creek, Hummingbird Monitoring Network, Rio Solado Nature Center, Audubon, City of Phoenix (all in AZ)
Subtotal Acres Restoration		176	
Enhancement	Service owned lands	3120	
	Easements	0	Plans for outreach
	State lands	100	TPWD
	Private lands	8687	Oaks & Prairies Joint Venture, NRCS, TPWD, DU, Oklahoma Conservation Commission (OCC), several USDA Soil & Water Conservation Districts, Private landowners in PFW program
	ROWS, roadsides	0	TX-DOT, OK-DOT
	Mitigation Bank	8807	Private landowners in TX, OK
	Tribal	0	Plans for outreach
	Corporate	0	Plans for outreach
	Other	117 Several HCPs under development; current HCPs not yet included here	Bernalillo County, private landowners
Subtotal Acres Enhancement		20,831	
Land acquisition	Service owned lands	TBD	To be determined for FY15 in April for our NonTraditional Section 6 RLA process
Total Acres FY 15		21,007	

B. Best Management Practices

In consultation with Fire Management and Range Management Specialists, we will develop guidance for best management practices in grasslands, timing and frequency of mowing, and prescribed burning to enhance monarch habitat and maintain monarch refugia throughout the migratory route in Oklahoma and Texas. Our strategy would balance short- and long-term benefits for monarch habitat to maintain grasslands, milkweeds, and nectar plants. We will use in-reach to communicate BMPs to NWRs and NFHs to incorporate monarch habitat in landscaping maintenance to encourage native forbs (nectar plants) by reducing mowing frequencies during migration in the spring and fall. Managed landscapes at NWRs and NFHs will serve as demonstrations of practices and their impact on native pollinators. We will reach out to our partners to promote BMPs for monarchs and pollinators. Our BMPs will also incorporate native milkweed species suggestions and seed mix formulas that incorporate other functional groups (native grasses, native forbs, local legumes) and contain 0.11% to 14% milkweed seed. Information on the timing of milkweed seeding that adjusts to regional precipitation patterns and drought tolerance will be included.

1. National Wildlife Refuges and Fish Hatcheries – Develop guidance for a maintenance strategy that outlines best times to mow and conduct prescribed burning throughout the year, in specific areas across the Southwest Region. This schedule would reduce untimely mowing of nectar plants in areas visited by monarchs, limit prescribed burning in monarch habitat during the spring and fall migration, and maintain some monarch refugia each year. The strategy would balance the need for some mowing and burning to maintain grasslands and future nectar plants and milkweed. The following Refuges and Hatcheries will adopt this maintenance strategy to consider monarch conservation in land management: Aransas, Atwater, Balcones, Buffalo Lake, Muleshoe, Hagerman, South Texas Complex, Chenier Plains Complex, Midcoast Complex, and Wichita NWRs, and Fish Hatcheries (San Marcos Aquatic Resource Center, Inks Dam NFH, Uvalde NFH).
2. Region 2 Partners for Fish and Wildlife Program– Across the Region, PFW will adopt the same guidance mentioned in item 4 above for projects involving private landowners in order to benefit pollinators and pollinator habits in Landowner Agreements, as appropriate. Fire and mechanical/chemical treatments will be designed with pollinators and pollinator habitat requirements in mind. Some treatments may be necessary in “migratory habitat,” but adjacent “refugia” for pollinators will be maintained. While implementing these techniques, PFW biologists can share information with partners to encourage incorporating milkweeds into planting for habitat creation and restoration projects, in addition to other forb seed for all pollinators as nectar sources.
3. Refuges, PFW – Continue phasing out of all neonicotinoid insecticide use and GMO crops on NWRs, with any remaining use to be phased out completely by 2015.
4. ES, PFW, Refuges – Contact utility corridor companies to discuss incorporation of native forb and milkweed seeds into their restoration efforts and minimizing of mowing at times of year that could be detrimental to wildflower blooms for all pollinators and milkweed growth.

C. Native Seed Strategies

The high number of monarchs, high diversity of native milkweed species in each state, and low availability of milkweed seed and plants in our region behooves us to strategize on how to provide native, local milkweed to areas important to monarchs, while educating the public about the importance of using native plants. Efforts are underway to build a supply of milkweed species native to regions within states to supply habitat improvements for monarchs and eventually to increase the availability of native, regional milkweed and lower the cost to be more appealing to landowners. To do this, we will: 1) obtain seed while maintaining regional milkweed ecotypes; 2) revive un-used greenhouses to grow native varieties of milkweed; 3) develop strategies to engage the public in local milkweed collection and propagation; 4) consider growing less common, more endemic milkweeds to maintain their genetics and improve their conservation status; and 5) work to promote the use and propagation of pesticide-free milkweed.

1. Balcones and Lower Rio Grande Valley NWRs, Austin ES – Will produce 1,000 seedlings of native milkweed species and ecotypes for planting in butterfly gardens and small-scale prairie restorations at National Wildlife Refuges and Fish Hatcheries in Texas. These seedlings will be grown at the existing Revegetation Nursery at LRGV NWR and at an existing nursery at Balcones NWR and will be ready to plant in fall 2015. Refuge Friends organizations and other partners will assist with the seed collection of locally-adapted milkweed ecotypes.
2. Austin ES and Texas PFW funds/staff time will be used to assist with the development of seed sources of native milkweed species and ecotypes. The Service will partner with U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Plant Materials Centers (PMCs), Texas A&M University – Kingsville, Lady Bird Johnson Wildflower Center, and Texas Native Prairies Association, among others, to establish a “Citizen Scientist” network for the exchange of native milkweed seeds and information related to their propagation. Currently, there are no sources of any milkweed species in Texas at a scale needed for grassland restoration. Mass propagation and planting of non-native milkweed species and ecotypes are not likely to persist, and may harm remnant native milkweed populations through the swamping of maladapted genes. As an alternative, this project will collect and propagate locally-adapted milkweed ecotypes for use in prairie restoration within their ranges of adaptation.
3. Region 2 Partners for Fish and Wildlife – Within each State in the Southwest Region, work with USDA-PMC, State Agencies, local organizations, commercial seed companies, and species experts to identify important features of monarch conservation specific to each State/geographic region for the most effective habitat restoration. Depending on available supplies and cost, PFW funding will be used to purchase locally adapted/appropriate milkweed seeds for planting on PFW habitat restoration projects.
4. Inks Dam NFH – Once surveys are conducted of native vegetation (see section D below), nectar, and milkweed needed for monarch butterflies, partners will flag native species of milkweed plants so seed collections can take place and be delivered to Balcones Canyonland NWR
5. Oklahoma PFW – USDA Plant Materials Center, other stakeholders. PFW funds/staff time will be used to assist with the development of a milkweed seed/plant increase program.

6. Oklahoma PFW – Johnson Seed Company, various school districts. The PFW staff will work with a seed company to produce milkweed seed. Once available we will make arrangements to purchase (\$5000 estimated) and distribute the seeds to Outdoor Classroom projects who are interested in the Monarch efforts and to private landowners who may be using our grass drills on their properties. We will also work with FSA to try to incorporate the milkweed seeds into the CRP program. This discussion will happen at our next wildlife sub-committee meeting in late 2014.
7. Texas PFW – Stephen F. Austin State University, Nacogdoches, TX – Native Plant Center. PFW funds/staff time will be used to increase the amount of milkweed seeds/plants available for habitat restoration projects in east Texas, impacting ~100 acres.
8. New Mexico PFW – USDA Plant Materials Center and other stakeholders. Continue existing Agreement with USDA-New Mexico State University, Los Lunas Plant Material Center (PMC) to grow a series of native pollinator plants, including growing out milkweed and other plant species specifically used by the monarch.
9. Partners for Fish and Wildlife – Will consider developing a Native Pollinator Initiative to support a relatively large number of citizen scientists spread out over a wide geographic area, with a focus on Texas. This effort can emphasize collection and planting of local milkweed ecotypes, but would not have to be limited to milkweeds and monarchs. The scope of these projects could range from backyard butterfly gardens to larger-scale grassland restoration. This initiative should coordinate closely with ongoing efforts being led by NGOs. We could pursue a Cooperative Agreement with the Native Plant Society of Texas or other NGOs to fund this effort.
10. Arizona ES – Flagstaff ESFO will collect regional milkweed seed, identify species, and make seeds available for restoration projects, beginning in fall 2014.

D. Inventory and Monitoring

To promote public engagement in monarch monitoring, we are promoting the development of way-stations on NWRs and NFHs using local, native milkweed to attract migrating monarchs and offer egg-laying and larval food resources. These can be as small as 10ft x 10ft, and can be used as vital stepping-stones to connect to areas of larger habitat along the journey. Based on the time when monarchs are expected to be in an area, we are developing outreach programs with partners and educational groups to monitor their visitation, thereby providing habitat and monitoring in one spot.

1. Engage in monitoring at monarch way-stations, using national protocols, to provide annual data about location and phenology of monarch migration behavior.
2. Initiate pilot monitoring events on NWRs to demonstrate how to recognize monarchs as eggs, larvae, pupae, and adult females and males, and teach Citizen Scientists how to annually survey and monitor larvae and adults, using standardized monarch monitoring protocols.
3. Inks Dam NFH - Surveys of native vegetation will be conducted seasonally, primarily of nectar plants, shrubs, and native milkweed, needed for monarch butterflies. These will be conducted on the facility's 141 acres with the aid of Highland Lakes Bird and Wildflower Society, Highland Lakes Master Naturalists, FOIDNFH, Texas Native Plant Society, and numerous local conservation groups.

4. National Wildlife Refuges, ES – will begin standardized monitoring of monarchs at Balcones Canyonlands NWR (TX). Other possible stations for monitoring include Hagerman NWR (TX border with OK), NWR located along the Mid-Texas Coast or Lower Rio Grande Complex along the border with Mexico. Ecological Services will work with the Regional Inventory and Monitoring program to refine existing monitoring protocols and initiate annual monarch monitoring. To assist with this endeavor, hiring a Student Conservation Association intern would be helpful to achieve the goal of training citizen scientists to monitor monarchs over the long term.
5. Texas Coastal ES, PFW - Monarch Watch Program. ES and PFW staff participated in national program for pollinator inventory and monitoring at Fennessy Ranch. Tagged monarch butterflies as part of Monarch Watch Program in fall 2014.
6. Tishomingo NWR – North American Butterfly Association (NABA), Monarch Watch. USFWS staff participate in national, annual butterfly surveys. In spring 2014, participated in NABA survey, which will be ongoing based on NABA survey times throughout the year. Surveys include monarchs. In Fall 2014, staff participated in Monarch Watch annual surveys to tag and monitor for monarchs during their fall migration.

E. Research

1. Experiment with milkweed species on FWS lands to determine which are the most robust growers, which are favored the most by monarchs in regional zones, what plot size is optimum to attract monarchs, and optimal milkweed density.
2. Develop an easy habitat assessment tool that adequately measures can measure the quality and quantity of monarch habitat or the amount of milkweed present for reproduction (to be used with the Monarch JV Habitat Assessment Breeding Tool). This measurement would allow for more focused and strategic restoration and enhancement of habitat and the use of Best Management Practices for prescribed burning, mowing, seeding, etc., and would be regionally appropriate for drier conditions in the Southwest Region.
3. Science Applications and Desert LCC – NPS, EPA, CONAMP, INECC, Commission for Environmental Conservation (CEC). In October 2014, this research project will begin in Texas and in Coahuila and Chihuahua, Mexico, and will be completed in June 2015. The project is entitled: North American Collaboration for Conservation of Transboundary Protected Areas: Monarch Habitat Mapping and Milkweed Seed Collection. This project has been funded by the CEC, which currently has an RFP open for implementing this project. Its purpose is to identify, map, and collect seeds of native milkweeds (*Asclepias* spp.) and other plants that support the monarch butterfly in the Big Bend–Río Bravo (BBRB) region, on the United States–Mexico border. This activity is part of a trilateral effort to conserve the region and increase habitat availability for monarch butterflies across North America. The goal of this study is to provide improved understanding of the location and condition of monarch habitat in the Big Bend-Rio Bravo region. Collection of milkweed seeds for propagation and restoration to improve monarch habitat is an integral and important part of this project.
4. Science Applications and Desert LCC – NPS, EPA, CONAMP, INECC, Commission for Environmental Conservation. In spring of 2015, this research project will build on the

previous work to include Texas and Coahuila and Chihuahua, Mexico, and also Alberta, Canada. The title of the project is: North American Collaboration for Conservation of Transboundary Protected Areas: Monarch habitat restoration and conservation outreach. The purpose is to build upon a successful Sister Parks program through the National Park Service (NPS) to engage conservation partners in Mexico, the U.S., and Canada (e.g., the Monarch Joint Venture (<http://www.monarchjointventure.org/>), the High-Level Working Group on the Monarch Butterfly, the Landscape Conservation Cooperatives, the Monarch Sister School Program) in identifying and implementing monarch and pollinator conservation activities and demonstration projects appropriate to the region and within the context of trilateral efforts to recover these rapidly declining species. The WG will expand the existing US-Mexico student internship program in place in the Big Bend-Rio Bravo Sister Parks to include participation by Canadian interns, particularly at the Waterton-Glacier International Peace Park. Student interns will be recruited and administered by the Student Conservation Association (SCA); managers and scientists on the BBRG WG have used this SCA partnership extensively in the past. The students will develop and implement outreach programs (including workshops) that will communicate the tools and techniques of restoration (CCAM) to local communities in the borderlands of all three nations, to benefit pollinators and monarchs, and increase resiliency of pollinator-rich habitats to climate change. This project is in the proposal stage and has been submitted to the Commission for Environmental Cooperation for funding; if funded, it would be completed by summer 2016.

5. Migratory Birds and Sonoran Joint Venture – Garden, Inc., Borderlands Restoration, and Udall Center. This research project will be conducted in northern Mexico. The purpose is to build capacity for monarch butterfly monitoring, milkweed seed collection, propagation, and outplanting in northern Mexican Ramsar protected areas, with the overall goal of habitat restoration and identifying the status of the monarch in northern Mexico. This project is expected to start in 2015 and be completed in 2017.

F. Education and Outreach/In-reach

Outreach/In-reach: Collaboration among FWS divisions and programs to share resources and engage in spreading information and inciting passion about monarchs and pollinators among the Field Offices and Regional Office programs has been ongoing since the initiation of the Pollinator Challenge in Region 2, including: Partners for Fish and Wildlife-PFW, National Wildlife Refuge System-NWRS, Division of Migratory Birds-MB, National Fish Hatcheries-NFH, Science Applications-SA, and Ecological Services-ES. We are also engaged in collaboration with Mexico, Tribes, and agencies to engage conservation communities in creating and conserving habitat, with whom we aim to conduct more monarch conservation. Other valuable partners in the Southwest Region are: Joint Ventures, USDA-NRCS and Plant Materials Centers, NPS, USFS, USGS, Department of Defense, Bureau of Land Management, Texas Parks and Wildlife Department, Oklahoma Department of Wildlife Conservation, New Mexico Department of Game and Fish, Arizona Game and Fish Department, Department of Transportation, Universities, Commission for Environmental Cooperation, National Commission for the Protection of Natural Areas-CONAMP in Mexico. To achieve our goals of habitat information, preservation, and restoration, we will be dependent upon collaboration with NGOs, universities, schools, and local organizations, such as: Land Trusts, Citizen Scientists, Friends of

NWRs, Monarch Watch, Journey North, Monarch Joint Venture, Forests for Monarchs, Xerces Society, Monarch Live, Master Naturalists, Master Gardeners, farmers markets, Audubon, Sierra Club, Plant Societies, North American Pollinator Protection Campaign (NAPPC), among others.

1. Refuges, PFW – Land Trusts. Partner with Land Trust organizations in each state. Collaborate to get information about monarch conservation into their newsletters and provide the most useful information to this group, in brochures, etc. Consider hosting a booth at the March 2015 Land Trust conference to showcase the monarch issue, representing USFWS. Provide conservation information about monarchs and pollinator conservation.
2. Friends organizations can purchase native wildflower seeds and distribute them as membership gifts.
3. PFW, Refuges – Contact the Extension Service for each state to communicate the messages about monarch conservation.
4. Texas PFW – Collaborate with South Texas Natives Initiative – this NGO has access to large, private lands.
5. PFW, ES, Refuges – Contact local Gardening Clubs, Native Plant Societies, Native Prairie Society, Master Gardeners, Master Naturalist groups and offer/plan to come speak about monarchs and their conservation.
6. PFW, ES, Refuges – Contact the Austin Butterfly Forum to form partnerships and outreach opportunities.
7. PFW, ES, Refuges – Contact the Cockrell Butterfly Conservatory affiliated with the Houston Museum of Natural History. Provide information on monarch conservation or develop other opportunities for outreach or citizen science.
8. PFW, Refuges – Contact agricultural groups, ranching groups to share information about monarch conservation and offer to provide information.
9. ES, PFW – November 15 Austin Pollinator PowWow (Master Naturalists, TPWD, NRCS, universities, Lincoln Brower will be keynote participants) – Regional Lead for the PFW program will attend this event and collaborate with participants.
10. ES, PFW - Next Pollinator PowWow is in February 2015 – the USFWS Texas State botanist is presenting on monarchs, milkweed, and important habitat variables. Event is open to Texas FWS employees in the monarch arena (Visitor Services, Refuges, ES, Hatcheries, etc.) as well as many other agencies and organizations.
11. ES, PFW, Refuges – Investigate activities of NGOs working on the monarch issue and dovetail with their efforts. Xerces Society, Monarch Watch, and other NGOs are currently promoting seed collection and propagation of native milkweeds for butterfly gardens and restoration programs; look into how best to partner for a larger conservation impact.

Outreach materials: classroom curricula; brochures; webpages; news articles; signage for pollinator gardens, monarch gardens, outdoor classrooms; monarch pins and certificates to acknowledge private landowners; posters; contests have been and will be developed for the Southwest Region.

1. NWR, Fisheries, PFW, ES, MB, SA – Incorporate the monarch butterfly “Mission Fly Away” curriculum at all NWRs and Fish Hatcheries, and encourage outreach to schools to use this lesson plan. The curriculum is targeted for 7th grade, and includes 10 lessons on monarchs, with a hands-on element of obtaining chrysalises and observing them also as adults. Biology and conservation topics are covered. This program has been piloted in

R2 over the past year, with a few schools in the Las Vegas, NM, area finding great success with its implementation. Friends of Las Vegas NWR have raised several hundred dollars to support the school engagement.

2. Las Vegas NWR – Video production of Monarch Mission Fly Away Program. Six minute video coordination, direction, and execution in late Oct 2014, involving classrooms, teachers, and students using the program. Available now to post nationally.
3. ES Pollinator Coordinator, Botanists, Refuges – Produce a Southwest Regional brochure about monarch needs and conservation. Modify this brochure to create four state-specific brochures addressing habitats particular to Arizona, New Mexico, Oklahoma, and Texas.
4. ES - Regional Pollinator Website was went on-line in early November 2014. Website will be updated by December 2014 to include information on monarch needs, threats, and what the public can do to conserve the monarch.
5. ES, NWR, Fisheries, SA, MB – Develop Regional pollinator garden and monarch garden signage to be produced at the Regional Office and shared among Field Offices.
6. ES botanists, Refuges – Develop maps or lists of maps for each state of where each milkweed species is found to share with interested parties (completed in Oct 2014).
7. ES, PFW, Refuges – Develop a list of NGOs, agencies, etc. by state that already have monarch programs or would be interested in partnering for monarchs (spreadsheet). Draft letters to these parties explaining our agency and role, and what the Monarch Initiative is. Partnering with these parties within the area, each FWS division could come up with a way to get a waystation, butterfly gardens, etc. at their office if possible and/or work with someone to put gardens, outdoor classrooms with a monarch slant at local schools, using appropriate partners (part-way complete).
8. NWR – Las Vegas NWR plans to purchase a large screened-in tent that can be erected in the classroom as a portable “butterfly pavilion” (large mesh tent) to take to schools. Tent will be used in conjunction with a presentation about monarchs and accompany use of the Mission Fly Away program, modified to reach the K-2 grade levels, with a simple hands-on lesson. The pavilion will offer kids the experience of raised monarch butterflies flying around them and experience monarchs up close.

Pollinator Gardens: Refuges, Fisheries, ES – Inspire Refuges and Hatcheries that have Visitor Centers, outreach programs, or available land areas to consider installing native pollinator gardens (if they have not already done so). Provide brochures, regionally-developed signage, and other teaching materials. In addition, include ES to work with a local school or park adjacent to the refuge to provide connectivity and expand the habitat footprint.

1. Hagerman NWR – Friends of Hagerman NWR have collected over \$60,000 in contributions to go toward planting a butterfly garden covering about .25 acre. This garden will feature regional milkweed plants and other native flowering/nectar-providing plants for monarchs and other pollinators. Development of this garden will begin in October 2014.
2. Anahuac NWR – Maintains a 0.5 acre butterfly garden containing milkweed.
3. Aransas NWR – Restored native wildflowers and removed invasive plants to increase pollinator habitat for resident and migratory pollinators in 2012.
4. Arlington ESFO – Members of this office are currently creating a small pollinator garden adjacent to the office building, to be completed Fall 2014. It will feature native perennials and a monarch component. The area is small, 2m x 4m in area.

5. Balcones NWR – Maintains a way-station with milkweed plantings to support monarchs; also has a pollinator garden that is maintained.
6. Bitter Lake NWR – Has created a butterfly walk composed of a 1.2 mile trail covering 0.5 acre.
7. Bosque del Apache NWR – Maintains a cactus garden with native wildflowers interspersed that covers about 0.5 acre. With help from 70 students from the San Antonio Elementary School, a new pollinator garden with 100 plants of 10 different native species was planted outside the Visitor Center in 2013. It includes a permanent water feature for pollinators.
8. Brazoria NWR – Maintains a 0.25 acre pollinator garden at the Education Center; these are enhanced with new native butterfly host plants and nectar plants regularly. In 2014, constructed a pollinator garden behind the Discovery Center.
9. Buenos Aires NWR – Maintains a pollinator garden around the Visitor’s Center about 1/8 acre in area.
10. Cabeza Prieta NWR – In 2012 planted 30 native milkweed plants for monarchs within an existing pollinator garden at the Visitor’s Center to create a monarch waystation. Permanent signage at the garden educates visitors about monarchs and the waystation, as well as hummingbirds. The refuge also has a nature trail lined with pollinator plants.
11. Deep Fork NWR – Maintains a pollinator garden planted with 35 students during a summer camp event in June 2013.
12. Hagerman NWR – A 1/8 acre pollinator garden with host plants for Lepidoptera is tended at the Visitor Center. This pollinator garden displays permanent signage to educate visitors about pollinators.
13. Laguna Atascosa NWR – Maintains a 1/8 acre pollinator garden and serves as an important refugium for the federally threatened Pecos sunflower, providing permanent water access in order for this native sunflower species to recover.
14. Laguna Atascosa NWR – In 2014 a YCC crew planned, planted, and mulched 15 native plants to create a butterfly garden near the Visitor’s Center.
15. Las Vegas NWR – In 2013 created a 0.25 acre pollinator garden containing milkweed.
16. Maxwell NWR – In 2012, the refuge collaborated with Master Gardeners to plan, plant, and continue to maintain a new pollinator garden with native species in front of the Visitor’s Center. The garden is about 0.25 acres in area.
17. Muleshoe NWR – Has implemented habitat restoration, some of which contains wildflowers beneficial to pollinators.
18. Mescalero Apache National Fish Hatchery – Created by YCC program Mescalero Apache youth, the 1 acre pollinator garden has a raised, wooden walkway coursing through a flourishing native wildflower area along a small creek on Tribal land.
19. Salt Plains NWR – Maintains a 1/8 acre pollinator garden.
20. San Bernadino NWR – Established a pollinator garden at the Refuge headquarters in 2012, planted by 12 college students and refuge staff.
21. Santa Ana NWR – Maintains a 0.5 acre pollinator garden and a native plant nursery to supply plants for restoration projects, including pollinator plantings.
22. Southwest Arizona NWR Complex – Has a pollinator garden with permanent signage and irrigation in operation to maintain perennials.
23. Texas Mid-coast NWR Complex – Existing pollinator garden was enhanced with native milkweed in spring 2014.

24. Tishomingo NWR – In 2014, wildflowers were planted near the refuge residence to provide pollinator habitat.
25. Trinity River NWR – Established a pollinator garden in 2012 planting over 75 native plants for butterflies and hummingbirds, including hundreds for monarchs covering about 1/8 acre. The garden surrounds the headquarters building and plants were paid for by their Friends Group. This garden is dutifully maintained by local volunteers and staff.
26. Washita NWR – Has a restored pollinator habitat area, maintained by children’s camps during the summer.

Education/Schoolyard Habitats/Outdoor Classrooms: The Partners for Fish and Wildlife program, NWRs, and ES are partnering with local schools, camps, Tribes, and educational centers to create schoolyard habitats and outdoor classrooms. Depending on available supplies and cost, PFW funding will be used to purchase locally adapted/appropriate milkweed seeds for planting on PFW outdoor classrooms. These serve to create islands of habitat while engaging students in learning about monarchs and pollinators and how to care for a garden and maintain areas for wildlife.

1. Balcones NWR – Lago Vista ISD, Liberty Hill ISD, Bertram Elementary, Marble Fall ISD, & Burnet ISD. Balcones presents EE programs to 4th-5th graders at all surrounding schools to about 1,000 students per year. Teachers have a choice of programs and about half pick Going Buggy.
2. Las Vegas NWR - East Memorial Middle School. In fall 2014, LVNWR established a greenhouse at East Memorial Middle School to grow milkweed for restoration garden. Garden and greenhouse comprise 2.5 acres.
3. Las Vegas NWR – Anto Chico Middle School. Schoolyard habitat project created a pollinator garden at East Memorial Middle School in fall 2014, with maintenance ongoing into spring 2015.
4. Oklahoma PFW – Oklahoma Department of Wildlife Conservation (ODWC). At least four outdoor classrooms/schoolyard habitats will be constructed via the Service’s PFW Cooperative Agreement with ODWC. These habitats will include a monarch education and outreach component and cover 8-10 acres.
5. New Mexico PFW – Santo Domingo Pueblo, NM. This project is located in the unique riparian forest (bosque) along the Rio Grande River and will feature an outdoor classroom with native plants for monarchs and other pollinators on Tribal land.
6. Arizona PFW – Watershed Management Group (WMG). Partnering together, PFW and WMG will develop four outdoor classrooms that have an emphasis on supporting pollinators. Native plant selection will focus on monarchs and pollinators. Each habitat will be less than 1 acre in area.
7. Arizona PFW program will partner with two schools in 2015 to develop new outdoor classrooms that will support pollinators. The habitat will cover <1 acre.
8. New Mexico PFW program will fund four outdoor classrooms. Each habitat will include a monarch education component. Collectively these habitats will cover <5 acres.
9. New Mexico PFW program will develop an outdoor classroom at an Albuquerque elementary school as part of a Cooperative Agreement. This project will create a pollinator garden in which native plants will be selected for monarchs and pollinators. It will cover 1 acre.

10. New Mexico PFW program will help develop an outdoor classroom in Las Vegas, NM, as part of a Cooperative Agreement. This project includes a pollinator garden of 1 acre in area that will feature native plants for monarchs and pollinators.
11. New Mexico PFW program – Montessori of the Rio Grande Elementary School. The PFW program will help develop a wetland/riparian area as part of a Cooperative Agreement in Albuquerque, NM. This project also includes an outdoor classroom and the creation of a pollinator garden. Native plants will be selected for monarchs and pollinators. The project covers approximately 5 acres. Texas PFW program plans to develop 8 outdoor classroom projects over 2015, starting in the early spring. Some existing projects have a monarch outreach component (all have a pollinator component), but all constructed in 2015 will include plants and education for monarch conservation.
12. Texas PFW, Balcones Canyonlands NWR – Texas PFW will collaborate with Schools, nature centers, etc. located in close proximity to Balcones NWR will be targeted for PFW funding to develop outdoor classrooms (planning for 2 in FY15) where monarch education/outreach will be emphasized.
13. Oklahoma PFW – Partner with schools to create an environment where teachers can take kids for a hands-on experience with our natural resources. Project will contain planting areas where teachers plant native plant species that benefit the monarchs. We will provide seeds or plants that are beneficial to the monarchs, reaching potentially 100s of children and teachers.
14. Utilize schoolyard habitat programs currently being used – revisit them to produce milkweed gardens at schools and local community gardens.
15. Texas Coastal ES, PFW – Portland Middle School. Spring 2014 established schoolyard habitat project and created a new pollinator garden.
16. Texas Coastal ES, PFW – Carrol High School. Spring 2014 established schoolyard habitat project and created a new pollinator garden.
17. Las Vegas NWR, NM PFW – Casa de Cultura La Milpa Community Garden in Las Vegas, NM. Contains a 0.25 acre native wildflower demonstration area.
18. Texas Coastal ES, Texas PFW – Lindale Community Garden, Corpus Christi, TX. Pollinator garden enhancement in summer 2014 by planting milkweed and other pollinator host plants and installing long-term signage.
19. Texas Coastal ES, Texas PFW – Bill Witt Community Garden, Corpus Christi, TX. Pollinator garden enhancement in summer 2014 by planting milkweed and other pollinator host plants and installing long-term signage.
20. Texas Coastal ES, Texas PFW – Sunnyside Community Garden, Arlington, TX. Pollinator garden enhancement in summer 2014 by planting milkweed and other pollinator host plants and installing long-term signage.
21. Texas Coastal ES, Texas PFW – Fondren Middle School, Arlington, TX. Pollinator garden enhancement in summer 2014 by planting milkweed and other pollinator host plants and installing long-term signage.
22. Texas Coastal ES, Texas PFW – Dogan Elementary School, Arlington, TX. Pollinator garden enhancement in summer 2014 by planting milkweed and other pollinator host plants and installing long-term signage.
23. Tishomingo NWR – Victory Life Academy. Created a new community garden with native pollinator plants.

Urban Pollinator Gardens:

1. Southwest Region NWR Urban Initiative in South Texas – Initiated the planting of 24 acres of school yard habitat with native trees and plants to continue over the next 18 months. This effort was initiated in early October 2014 during the Urban Refuge Partnership kickoff event between South Texas Refuges and the Pharr-San Juan-Alamo ISD. One hundred children and their parents planted 130+ native plants (33 species) on 10 acres, within the play area of McKeever Elementary. The completed design will incorporate walkways along patches of flowering plants, including milkweed species.
2. Southwest Region NWR Urban Initiative in Houston – Currently is working with three partners to install five native habitat gardens in Houston, including some along Buffalo Bayou, on Houston Parks and Recreation lands, and some in the Greater East End Management District. These will all be planted in November 2014.
3. Valle de Oro NWR – Mountain View Community Center. A pollinator garden has recently been created in late summer of 2014 at the nearby Community Center, located in Albuquerque, covering approximately .25 acre. This project involves habitat creation for pollinators, ongoing participation by the community in maintenance of the garden, interpretive signage, and an educational component as visitors learn about pollinators and native gardening.

School yard Habitats and Pollinator Gardens

	# Existing	# Enhanced or Planned for FY15 Using Existing Funds	Partners
Schoolyard Habitats and Outdoor Classrooms	300 in R2 (23 during 2014-2015)	2	Many
Pollinator Gardens/Trails/landscaping on Service Facilities (NWRs, NFHs, other field offices)	26	Several, as opportunities for partnerships arise.	Many
Urban pollinator gardens	3	Several in Texas	Many

G. Other Plans Not Addressed in the Above Sections –

Tribal Coordination and Traditional Ecological Knowledge (TEK) – The Southwest Region Tribal Liason, Joe Early (a member of our Region 2 Monarch Conservation Team), composed an email and sent it out to each of the 84 Tribes in the Southwest. We were reaching out to Tribes to ask, from a Tribal standpoint, of the significance of pollinators, and in particular, if monarch butterflies are important to the Tribe? We posed four questions:

1. Is there any cultural significance (i.e. songs, dances, clans, societies...use within cultural items like pottery, jewelry, clothing, etc.); Traditional Ecological Knowledge?
2. Have you seen Monarch butterflies within your tribal lands? If so, when? On an annual basis? For the past 5, 10, 20 years? And if you have seen them, have you noticed a stable population...increase or decrease?
3. Do you have milkweed present? If so, do your tribal lands have at least 20 milkweeds/acre? Do you know what species of milkweed you have?

4. Have you had any tribal projects that have helped increase Monarch butterfly populations and/or habitat?

We hope to explore Tribal culture and TEK about pollinators through this outreach, and include Tribes and Tribal lands in pollinator conservation to the greatest degree we can.

Part II. Monarch Projects and Opportunities for FY 15 and Beyond (in Priority Order) that Could Be Realized with Additional Funding

A. Large Partnership Initiatives

Texas Native Pollinator Initiative

Texas is exceedingly important to the Eastern population of monarchs, as it is the cradle for the early generations of the multiple monarch life cycles as they migrate north in the spring and the geographical funnel for Eastern monarchs as they return to Mexico in the fall. Moreover, Texas has the largest land area of any state in the lower 48, the highest native milkweed diversity, the highest Lepidoptera (order of butterflies and moths) diversity, and is ~95% privately owned. To optimize these conditions, we propose the formation of a grand Native Pollinator Initiative in Texas, centered in Austin. The goal of this Initiative would be to obtain the broadest base of partners possible to identify priority habitats, conduct habitat restoration at every scale, collect and distribute native milkweed seed, engage in inventory and monitoring of monarchs, provide educational opportunities and materials. Available/in-kind resources, volunteers, and additional funding will be used to promote this Initiative. Corporate support would be sought (by volunteers) to donate generously toward habitat inventory and restoration, educational materials, outdoor classrooms, pollinator/monarch workshops, research projects, and to sponsor sections of Interstate-35 as the “Monarch Highway,” that will be lined with wildflowers, including milkweed. The Monarch Highway is being promoted nationally, and the Lady Bird Johnson Wildflower Center is interested in playing a role, providing expertise, seed mixes, and possibly funding. Along I-35, which connects Mexico to Canada, at every rest area, a pollinator garden will be created, with long-term, educational signage about monarchs and BMPs. Oklahoma would be linked in to this Initiative via the I-35 corridor, and would also benefit from trainings and workshops, to implement similar strategies in Oklahoma.

This Initiative would seek to partner with entities involved in the Travis County Habitat Conservation Plan, as these entities represent a diversity of partners participating in conservation, who may also be interested in protecting the monarch. Moreover, in 2009 the Cibola Nature Center held a workshop in Austin to train citizen scientists, master naturalists/gardeners, and others to conserve monarchs. Many of these trained individuals likely still live in the area, and could be tapped for their experience with monarch conservation. A product of the 2009 meeting was the collection of years of data on monarchs in Texas, available on monarch.net, the North American network of monarch butterfly monitoring programs. Monarch.net data provide a longer, existing dataset from which monarch trends can be monitored in Texas. Balcones Canyonlands NWR is a Monarch Butterfly Sister Protected Area (SPA) within the international network of locations selected to promote monarch conservation. BCNWR is actively enhancing monarch and pollinator habitat, maintains educational pollinator gardens, is growing milkweed species in the revived greenhouse, and could be a hub for this Initiative. Hence there is ample opportunity to create a grand partnership among the City of Austin, Texas Parks & Wildlife Department (TPWD), Lady Bird Johnson Wildflower Center, Texas Department of

Transportation, Native Plant Societies, Zoos, Botanic Gardens, Austin Butterfly Forum, master naturalists, citizen scientists, amateur naturalists, universities, schools, museums, etc. to converge to discuss ideas, channel resources, and act to conserve monarchs.

This endeavor will require funding to launch the Texas Native Pollinator Initiative by holding a series of workshops and trainings, and devising a master plan from these meetings. Seed money will be needed to establish large-scale outreach, provide milkweed seed and plants, and to fund a coordinator to spearhead this Initiative. Total requested: \$200,000.

B. Smaller Discrete Projects

1. Habitat Restoration & Enhancement Opportunities

1. Enhance 1,000 acres of planned grassland restoration in south Texas with seeds of native pollinator plants. Natural Resources Conservation Service and Texas A&M University. Funding Requested: \$30,000. Funds would be used to provide commercially-available seed of regionally adapted native pollinator plants, free of charge, to private landowners implementing native grassland restoration efforts. Due to the relatively higher costs, many private landowners do not include these pollinator species in native grass seed mixes. Using existing opportunities and relationships with seed companies and restoration consultants to provide seed mixture guidance through the South Texas Natives Program, we will offer free pollinator seed to practitioners to utilize in planned native grassland restoration. Potential areas of use include in EQIP plantings, private rangeland restoration efforts, wildlife habitat restoration plantings, and reclamation of sites disturbed by oil and gas development and other forms of energy exploration in South Texas. The existing commercial seed supply of local ecotypes of Rio Grande clammyweed, awnless bushsunflower, prairie acacia, and prostrate bundleflower is sufficient to enhance up to 1,000 acres of grassland restoration. At an estimated cost of \$30/acre, the requested funds (\$30,000) would support enhancement of 1,000 acres of planned, ongoing native grassland restoration. Seeds will be purchased from commercial seeds producer through the regional Soil and Water Conservation District. Project sites will serve as demonstration sites to promote additional pollinator habitat restoration and improvement. Contacts: John Reilley, Plant Materials Center Manager, E. "Kika" de la Garza PMC, 3409 North FM 1355, Kingsville, Texas 78363. Forrest S. Smith, Dan L. Duncan Endowed Director, South Texas Natives & Texas Native Seeds Projects, Caesar Kleberg Wildlife Research Institute.
2. Texas PFW – Texas Native Pollinator Initiative – in partnership with NRCS, TPWD, NWTF, TNC, Native Plant Society of Texas, etc. The Texas PFW program will engage private landowners to conduct grassland restoration or enhancement projects (to include practices such as prescribed fire, mechanical/chemical control of exotic plants, etc.) but also with an emphasis on the usage/planting of pollinator plants/seeds (at higher planting rates than generally used in traditional grassland restoration projects) including locally adapted milkweed(s). These projects will be designed with monarch conservation as one of the primary conservation goals - to include strategically placing these projects in Monarch focal areas (in development) and using the most appropriate and beneficial

plants/seeds. 1000-3000 acres will be restored or enhanced. \$100,000 requested to implement these habitat improvement activities.

3. Science Applications - Gulf Coast Prairie LCC; Arlington, Austin, Texas Coastal, and Tulsa ESFOs - Oaks & Prairies JV collaboration to restore native grasslands for birds and butterflies. Involves large-scale habitat enhancement for monarch and grassland restoration incentives through the GRIP Program to promote monarch conservation. Additional funding will provide "pollinator seeds" to the Grassland Restoration and Enhancement Program (GRIP). GRIP is administered mainly by the TPWD and the Oaks and Prairies JV, with a goal of improving grassland habitat across select areas in Texas and Oklahoma to benefit bobwhite quail and other grassland dependent species. Service funding would be used to purchase additional forb/pollinator seeds and applied to existing projects (approximately 1,000 acres in FY15) and then more into the future. (up to 10,000 acres annually). Cost requested: \$50,000.
4. Tishomingo NFH, Oklahoma – partnering with the landowner holding the conservation easement to enhance monarch habitat. Initiate assessment of available habitat on hatchery and adjoining conservation easement property for Monarch breeding and migration. Identify and map areas holding milkweed and nectar producing wildflowers to obtain baseline information for future habitat enhancement. Cost: \$5000.
5. Balcones Canyonlands NWR – partnering with Trust for Public Lands, Damuth Foundation, Travis Audubon, Univ. of Texas-LBJ Wildflower Center, Friends of Balcones and private donors. Balcones is trying to acquire the 525 acre Peaceful Spring Ranch that has 200 acres of grasslands that support BCVI and provide nectar plants and milkweeds for monarchs. The remainder of the property is GCWA habitat. Balcones NWR is in the 2015 and 2016 LWCF budgets, but allocations are doubtful. Acquiring this parcel would conserve important habitat. If the ranch is not purchased, the developable portions (grasslands) will most likely be sold to a developer for a rural subdivision. Cost: \$300,000-\$500,000 for the 200 acres.
6. Sonoran Joint Venture, DMB – AGFD, Sonoran Institute, Gary Nabhan. Borderland habitat acquisition to protect habitat with 5-8 native milkweed species in southern Arizona. Cost of \$100,000 would purchase 40 acres of land currently owned by SI.

Habitat Restoration & Enhancement Opportunities

	Ownership	Additional Acres Requiring Additional (new) funds	Partners
Restoration	Service owned lands		
	Easements		Exploring opportunities
	State lands		Exploring opportunities
	Private Lands		Exploring opportunities
	ROWS, roadsides		Exploring opportunities
	Mitigation Bank		Exploring opportunities
	Tribal lands		Exploring opportunities
	Corporate		Exploring opportunities
	Other		
Subtotal Acres Restoration			
Enhancement	Service owned lands		
	Easements		Tishomingo NWR consulting with landowner
	State lands		Exploring opportunities
	Private lands	3720 - 4720	Many private landowners
	ROWS, roadsides		Exploring opportunities
	Mitigation Bank		Several due from TX in 2015 with minimum of 9000 ac each
	Tribal		Exploring opportunities
	Corporate		Exploring opportunities
	Other		
Subtotal Acres Enhancement			
Land acquisition	USFWS NWRs- Balcones NWR	240 (525 available)	Trust for Public Lands, Damuth Foundation, Travis Audubon, Univ. of Texas-LBJ Wildflower Center, Friends of Balcones and private donors
	Sonoran JV, DMB	40	AGFD, Sonoran Institute, Univ. of Arizona, Gary Nabhan
Total Acres FY 15		4000 - 5285	

2. Best Management Practices

1. Provide support for pollinator-focused prairie restoration on public and private land. Lady Bird Johnson Wildflower Center, Austin, TX. Funding Requested: \$50,000. Work with Xerces Society and other partners to develop best management practices for prairie restoration that supports pollinator health. Make seed and restoration protocols available to public and private landowners by establishing a small grant program for prairie restoration. Monitor and evaluate pollinator health on restoration projects. Contact: Dr. Damon E. Waitt, Senior Botanist, Lady Bird Johnson Wildflower Center, 4801 La Crosse Ave. Austin, TX 78739.

3. Native Seed Strategies

1. Facilitate commercial production of bulk quantities of native milkweeds to support Monarch health. Lady Bird Johnson Wildflower Center, Austin, TX. Funding Requested: \$50,000. Utilize the Wildflower Center's seed bank and statewide network of volunteer cooperators to collect locally adapted ecotypes of milkweed (*Asclepias* spp.) within the Texas/Oklahoma Monarch migration corridor. Utilize the Wildflower Center's growing operation to study germination and growth requirements of native milkweed ecotypes. Provide local growers with milkweed ecotypes and research results to facilitate commercial production of regionally appropriate milkweed species. Contact: Dr. Damon E. Waitt, Senior Botanist, Lady Bird Johnson Wildflower Center, 4801 La Crosse Ave. Austin, TX 78739.
2. Texas ES, Texas PFW – Seed source development of milkweed species for use in Texas. Natural Resources Conservation Service and Texas A&M University. Funding Requested: \$35,000. We will initiate greenhouse plant production in fall 2014 of existing seed collections of native milkweed species from South Texas (South Texas Natives Project) and from Central/West Texas (Texas Native Seeds Project), in order to provide plants for initial evaluation studies. We will also obtain additional milkweed collections in South, Central, and West Texas as part of ongoing seed collection efforts. Evaluation studies will be used to identify local ecotypes of widespread native milkweeds that would be suitable for large-scale, regional, commercial seed production in respective regions. After completion of 6 month to 1 year evaluations, we will install seed increase plots of appropriate selections, harvest and process the resulting seed, and distribute this seed to commercial seed producers for planting in commercial scale fields. We will also provide technical guidance in order to ensure successful production at the commercial level. Potential evaluation sites for ecotype selection include Kingsville, TX (STN Farm and Kika de la Garza Plant Materials Center); Rio Farms in the Lower Rio Grande Valley; Texas AgriLife Research Station Stephenville; the Knox City Texas Plant Materials Center, a private ranch research facility near Alpine, TX; and a private ranch research facility near Midland/Odessa, TX. Requested funds (\$33,000) will support the development of selected native ecotype seed of milkweed species for use in Texas. Commercial seed could be made available in 1-3 years under this methodology. Proposed species for focus would be *Asclepias asperula*, *Asclepias viridis*, and *Asclepias oenotheroides*. Contacts: John Reilley, Plant Materials Center Manager, E. "Kika" de la Garza PMC, 3409 North FM 1355, Kingsville, Texas 78363. Forrest S. Smith, Dan L Duncan Endowed Director, South Texas Natives & Texas Native Seeds Projects, Caesar Kleberg Wildlife Research Institute.
3. Enhance production and commercialization of other native pollinator plants. Seed source development of milkweed species for use in Texas. Natural Resources Conservation Service and Texas A&M University. Funding Requested: \$36,000. Previous work completed by the South Texas Natives Program (Texas A&M Kingsville) and the Kika de la Garza Plant Materials Center has resulted in initial selection of several pollinator-friendly native forb and legume species for future seed release, commercialization, and availability to consumers for use in restoration plantings. The requested funds (\$40,000) will support increased seed production of 5 important native pollinator plant species and will make these plants available for large-scale seed production and use by consumers

and agencies. Beginning in fall 2014, we will grow plants for establishment of larger seed increase fields, then harvest and distribute this seed to cooperating commercial seed producers within the same year. Species of focus include frostweed (*Verbesina microptera*), Liatris (*Liatris* spp.), Indian blanket (*Gaillardia pulchella*), tropical neptunia (*Neptunia pubescens*), and Tropical sage (*Salvia coccinea*). A suggested mechanism of funding would be to award the grant to the local Soil and Water Conservation District, which could then cover seed production expenses of the South Texas Natives Program and the E. Kika de la Garza Plant Materials Center. Contacts: John Reilley, Plant Materials Center Manager, E. "Kika" de la Garza PMC, 3409 North FM 1355, Kingsville, Texas 78363. Forrest S. Smith, Dan L Duncan Endowed Director, South Texas Natives & Texas Native Seeds Projects, Caesar Kleberg Wildlife Research Institute.

4. Partners for Fish and Wildlife program, ES - TPWD, NRCS, Xerces Society; Botanical Research Institute of Texas, Native Plant Society of Texas, other partners. Each Field Office would bulk purchase locally adapted pollinator plant seeds, including milkweeds, and distribute to ongoing programs and projects. Direct benefits to monarchs through the dispersal of pollinator plants seeds for use in habitat restoration/enhancement efforts of up to 500 acres in 2015. Cost: \$50,000.
5. Texas PFW, Arlington ES, Austin ES, Coastal ESFOs – seed increase Project to enhance propagation of local milkweeds. The many partners would include Master Naturalists Program (administered by TPWD, and Texas Agrilife Cooperative Extension), Universities, local nature centers, Native Plant Society of Texas, etc. In addition to the work proposed by the Austin ESFO above, the TX PFW program (and ES as a whole) will also engage with local partners (Texas Master Naturalist Program, Texas Native Plants Society, SFA University Native Plant Center, etc.) interested in propagating native milkweeds and other pollinator plants for "Monarch Waystations"/home garden plantings/Outdoor Classrooms, and other "outreach opportunities." \$50,000 is needed to implement this project, which will impact 20-100 acres of monarch habitat.
6. Oklahoma PFW, Tulsa ES – USDA Plant Materials Center, private landowners. PFW funds/staff time will be used to assist with the development of a milkweed seed/plant increase program. Direct benefits to monarchs through the eventual increase in the number of milkweed and other beneficial plants available for use in habitat restoration/enhancement efforts. Cost: \$25,000.
7. New Mexico PFW, New Mexico ES – USDA Plant Materials Center, other stakeholders. Seed increase project to continue existing Agreement with USDA-New Mexico State University, Los Lunas Plant Material Center (PMC) to grow a series of native pollinator plants, including growing out milkweed and other plant species specifically used by the monarch. Direct benefits to monarchs through the eventual increase in the number of milkweed and other beneficial plants available for use in habitat restoration/enhancement efforts. Cost: \$20,000.
8. Flagstaff ESFO – partnering with Arboretum at Flagstaff, in northern Arizona - To collect wild provenance Arizona *Asclepias* spp., propagate, and establish seed. The goal is to establish 300 individuals of *Asclepias* spp. (*A. speciosa*, *A. tuberosa*, and *A. asperula* as priority) in seed production beds, for the purpose of seed distribution to USFWS and other interested parties for restoration or enhancement of monarch butterfly habitat. Project would research and find wild sources of *Asclepias*, check on phenology during the growing season, collect herbarium specimens, collect seed, and initiate seed

germination at the Arboretum greenhouse in 2015. In 2016, seed germination and propagation maintenance would continue, with plants established outside in seed production beds. In 2017, this project would continue seed propagation, if needed, maintenance of seed production beds would be ongoing, and first harvest of seed would occur. Project would cost \$15,813, with \$2000 in kind match from the Arboretum at Flagstaff.

9. Texas PFW, Arlington ES – Stephen F. Austin State University, Nacogdoches, TX – Native Plant Center, private landowners. Seed increase project using Texas PFW funds/staff time to increase the amount of milkweed seeds/plants available for habitat restoration projects in east Texas. The work will be done in conjunction with a University; many youth will be involved. Projects occur on private lands; 200 acres will be enhanced/restored. Cost: \$20,000.

4. Inventory and Monitoring

1. Present webinar and conduct workshops to Region 2 NWRs, NFHs, and FOs focusing on in-house training, outlining steps necessary to inventory and monitor for monarchs and monarch habitat in USFWS lands throughout the region. This could be a collective effort spearheaded by the Southwest Region Monarch Conservation Team. Travel expenses could be needed to bring in members of the Team to conduct the workshops/presentations. Possible cost: \$15,000-30,000 for USFWS team member travel.

5. Research

1. Arizona ES, NWR, PFW – AZGDF, UofA, Sonoran Institute, and Borderlands Restoration L3c, a hybrid non-profit/for profit propagation nursery and restoration consultant. This project would investigate methods for restoration and enhancement practices (10 acres will be experimentally restored, and 10 acres will be experimentally enhanced). We wish to do "split plot comparisons" of costs and survival rates of milkweed and wildflower forb enhancement vs native seed mix hydroseeding with 60% native perennial grasses, 30-35% native wildflowers and 5-10% milkweeds. Estimated Costs: \$200/ acre seed mix, plus hydroseeding equipment rental and mulch, plus labor = \$500 an acre or \$5000 for 10 acres. An additional \$7.50 retail for 6 inch pot milkweed or forb transplant x 50 milkweeds and 50 nectar-rich forbs/acre=\$750 an acre, plus labor and drip irrigation lines=\$1000/acre or \$10,000 for ten acres. \$5000 for project management, documentation, and plant survival monitoring; \$2500 for entomologist and interns to do monarch and bee monitoring; \$2500 indirect costs for accounting, vehicle use, etc. Total cost: \$25,000 for both restoration and enhancement.
2. Region 2 USFWS- all divisions – Participate in research with R1 and R8 to investigate information, map, and strategically target best areas in R2 for habitat use and restoration for the Western monarch population (Joe Engler, Lead R1). Approximately \$20,000 would be needed in R2 for this effort.

6. Education and Outreach/In-reach

1. Balcones NWR – SCA Coordinator. With additional funding, we are interested in providing salary for a coordinator to organize partners and collaborators to work with schools, other agencies (TPWD, NRCS), NGOs (Native Plant Society's, Master Naturalists/Gardeners Austin Butterfly Forum), distribute milkweed seeds and nectar plant mixes for Outdoor classrooms, Waystations, Pollinator Gardens and work with Citizen Scientists on monitoring for eggs, larva, and migrating adults; habitat assessment of milkweeds and habitat to avoid duplication and focus efforts strategically on high priority areas for habitat and outreach. 1 Year for \$35,000.
2. Inks Dam NFH- By following the guidance given by the Strategic Plan the facility would secure funding for one FTE (Environmental Education Specialist) to improve or technical capabilities to fully meet our mission. This position has been in the Org Chart since 2009 but never funded or staffed. This position could accomplish development of partnerships, volunteer organization, Friends Groups, Conservation entities, State and local governments, and outreach to youth, adults, NGOs, etc. to benefit not only monarch butterflies but all pollinators. Number of acres for pollinators/monarchs increases with a dedicated staff member to draw other landowners, state partners, NGOs, and non-profit landowners together to make this a larger project in a critical flyway area. \$49,000/yr.
3. Arizona ES, NWRs, NFHs – University of Arizona, Borderlands Restoration. Training of NWR staff, interns, and volunteers on milkweed seed collection, propagation, and monarch monitoring by University of Arizona. Through the UofA School of Natural Resources and its Global Initiative Continuing Education certificate courses, we propose to train 8 USFWS conservation professionals in leading citizen science initiatives in monarch monitoring and milkweed propagation. Eight professionals will be recruited and selected from Arizona and New Mexico refuges and hatcheries for a three week hands-on intensive course at the University of Arizona Outreach College in Nogales and the nearby Borderlands Restoration and Native Seeds/SEARCH nursery in Patagonia, Arizona. This represents a necessary first step to initiate monarch larval monitoring and monarch adult tagging with local citizen scientists. Effective management actions anticipated from this project include: 1) Construction and milkweed production in nurseries in wildlife refuges and hatcheries near the border, 2) Milkweed seeding and transplanting to disturbed areas and abandoned farmlands within and adjacent to refuges, thereby enhancing or restoring migratory corridor habitat, 3) Training in milkweed establishment techniques under arid conditions, which can then be multiplied and implemented in and around protected areas on both sides of the border, 4) Ongoing information exchange among refuge managers and interpreters, the National Phenology Network based in Tucson, researchers and citizen science leaders supported by access to English and Spanish language education and technical materials, 5) Promotion of citizen science participation in milkweed and monarch monitoring among US and Mexican tourists visiting Mexico's protected areas, and 6) Identification and better management of existing milkweed populations, restored populations and monarch breeding sites along the migratory corridors in Mexico where little or no information is currently available. Cost would be \$15,000 total to University of Arizona, including \$8000 for research assistant for Dr. Gary Nabhan to help co-pile, develop or translate training materials, \$6000 for 3 week workshop costs in terms of vehicle rental, tools, training materials,

milkweed practitioners manuals, etc., not including travel to site, food, and lodging for USFWS professionals.

4. Las Vegas NWR – Schools, Friends group. Creation of a schoolyard habitat. Project would provide a pollinator garden at Memorial Middle School as an 8th grade project to supplement current Mission Fly Away Program. Memorial Middle School has a greenhouse and coordination to grow three species of milkweed (propagation has begun with New Mexico Highlands University). Will engage up to 160 students in project. Cost: \$2,500.
5. Las Vegas NWR – New Mexico Highlands University. Project would provide a pollinator garden with native species for New Mexico Highlands University. A greenhouse at NMHU has been secured to grow seedlings of milkweed to be planted in the university pollinator garden and at Las Vegas NWR. The Conservation Club and two professors are currently on board with the project. Engaging 130 youth in creating habitat at the university and providing milkweed on a large scale to Las Vegas NWR to be planted by 8th grade students on 1.5 acres. Cost: \$3,000.

7. Other Plans Not Addressed in the Above Sections – N/A