In FY2017, the U.S. Fish & Wildlife Service continued to leverage the agency's assets and programs for the benefit of monarch and pollinator conservation. The Service strategy focused on four key areas: partnerships, habitat, science, and people. In FY 2017, the Service restored or enhanced over 330,000 acres of monarch and pollinator habitat, invested and contributed to monarch science, and engaged thousands of people through events, campaigns, and the media.

Listed below are highlights from Service Regions and Programs during FY17 in support of both monarch and pollinator conservation activities.

Region 1

- **Southern Oregon Monarch Advocates (SOMA)-** a significant partner sharing FWS messages by developing presentations for children and adults throughout Oregon. Topics covered include "Monarchs and Milkweeds", "Monarchs and Climate Change" and "How best to use native pollinator plants". Presentations in schools are tailored for K-12.

- **Southwest Oregon Pollinator Collaborative (SWOPC)** – Collaborative created in Southwest Oregon made up of federal, state, and local agencies, NGO's, and private entities for the support of monarchs and pollinators.

- **Advocates of Idaho Monarchs (AIM)** – Similar to SOMA and with the assistance of SOMA, the Advocates of Idaho Monarchs formed in 2017 and now represent many hours of citizen monarch advocacy in Idaho. AIM actively participates in the Western Monarch Tagging project.

- **National Fish and Wildlife Foundation (NFWF)** Monarch Implementation Grant – Lomakatsi Restoration, working in collaboration with SOMA, the U.S. Fish and Wildlife Service, the US Forest Service, the Bureau of Land Management, the Nature Conservancy, and a number private landowners, have reared nearly 45,000 plants to be planted across approximately 300 acres of publicly and privately owned lands in the Rogue Valley in Southern Oregon.

- Working through **Interagency Agreements**, the USFWS provided the USFS funding during FY17 to support two propagation nurseries in Oregon to create seed increase plots of two different native milkweed and to propagate additional beneficial native pollinator species for future outplanting.

- **Schoolyard Habitat Projects-** Oregon PFW program provided funding and technical assistance for several SYH projects.

- The Service helped to design and construct nine new **Monarch Way-Stations** including the first-ever supported by Oregon Department of Transportation.

- The USFWS Roseburg Field Office initiated **a new partnership** with the City of Roseburg's Parks and Recreation Division to develop Monarch Waystations and pollinator throughout the city.

- **Wildlife and Sport Fisheries Restoration (WSFR):**
    - Competitive State Wildlife Grant - Idaho Department of Fish and Game in conjunction with Washington Department of Fish and Wildlife: *Idaho Fish & Game recently completed its second year of a two-year statewide survey effort to map the distribution of monarchs and milkweeds.*

Region 2

- **State Collaboration**
    - The Service participated in the Oklahoma Monarch Summit, setting the stage to establish the **Oklahoma Monarch and Pollinator Collaborative (OMPC),** and the development of a state monarch conservation plan. The plan was drafted in September 2017, and Service staff continues working with the OMPC Steering Committee to finalize and implement monarch conservation activities throughout the state (OK).
    - The Service worked closely with Texan by Nature to host the **South-Central Monarch Symposium** on May 31-June 1, 2017. The event had presentations from over 45 speakers and working group discussions on topics ranging from data gaps to providing consistent messaging. Former First Lady Laura Bush provided the keynote, reiterating the call to action to conserve and enhance native prairie habitat for the benefit of monarchs and other pollinators. Symposium presentations can be viewed on the Texan by Nature website.
    - The Service is assisting in planning the **Texas Monarch Summit**, to be held on November 1-2, 2017, in Cedar Creek, Texas. Texas Parks and Wildlife Department previously created the Texas Monarch and Native Pollinator Conservation Plan. The goal of this 2017 summit is to develop quantitative, biologically-driven goals for monarch conservation throughout the state with potential to develop a new Texas Monarch Conservation Plan.
    - In partnership with Texas Parks & Wildlife Department, the Service coordinated the second annual Texas Pollinator BioBlitz. The bioblitz encourages the public to learn about pollinators and their habitat through observation and identification. The bioblitz provided an opportunity to enhance social media outreach about local events throughout the state and pollinators.

- **Tribal Collaboration**
    - The Service partnered with Monarch Watch and the Learning Center at the Euchee Butterfly Farm to create the **Tribal Alliance for Pollinators (TAP).** The TAP, initiated in Oklahoma, is a partnership collaboration working with federally recognized tribes to promote monarch and pollinator habitat projects and promote education and awareness.
    - The Service incorporated monarchs and pollinators into numerous **tribal workshops** throughout the year. FWS partnered with the Native American Fish and Wildlife Society to host a Tribal Monarch Butterfly Workshop in Albuquerque, NM. FWS hosted the Arizona Inter-Tribal Workshop on Monarchs and Pollinators. At the Native American Fish and Wildlife Society Southwest Region Conference, FWS participated in a Pollinator Panel hosted by the Mescalero Apache Tribe from Mescalero, NM. At this event, biologist Megan Goyette from Bosque del Apache National Wildlife Refuge gave a presentation on monarchs, and Valle de Oro National Wildlife Refuge Manager gave a presentation on pollinators.

- **National Monarch Monitoring Strategy**
    - ES and Refuges' Inventory and Monitoring Program partnered to host two SCA technicians stationed at Balcones Canyonlands National Wildlife to pilot monarch monitoring protocols, now in year two of development. They conducted monitoring of milkweed, nectar plants, and monarchs (eggs, larvae, adults) throughout Texas.
    - Technicians monitored habitat at Balcones Canyonlands National Wildlife Refuge, Hagerman National Wildlife Refuge, and Neches River National Wildlife Refuge.
    - Outcomes of their monitoring are in support of finalizing a standardized set of national monarch monitoring protocols to understand monarch survival, quality of habitat, and best management practices.
    - Region 2 hosted monitoring technicians from the Midwest (stationed at Washita National Wildlife Refuge) building off of previous work to revisit monitored sites to better understand fall migrating monarchs and their habitat.
    - During their one month stay in the Southwest Region, technicians conducted monitoring of sites on privately owned lands and at Washita National Wildlife Refuge, Hagerman National Wildlife Refuge, and Balcones Canyonlands National Wildlife Refuge.

- **Partners Program**
    - New Mexico Partners Program worked with high school youth and local organizations to plant and establish various native pollinator habitats. Youth planted over 200 native pollinator forbs, 10 shrubs, and 2 trees. Work was done at two community-supported outdoor classroom gardens, and a bosque site along the Rio Grande. Native bee habitat also included constructing a native bee hotel.
    - The Oklahoma Partners Program completed a large scale cooperative agreement with the **Oklahoma Conservation Commission** (OCC)**,** a cooperator for over 10 years**.** In addition to the dedicated monarch budget, the Partners Program used existing funds to conduct multiple monarch-related projects with the Chickasaw Nation, private landowners, and the Oklahoma Department of Wildlife Conservation.
        - OCC and FWS partnered to implement **the I-35 Corridor Monarch Project**. This lead to 27 completed projects totaling 815 acres. A total of $67,580 1121 funds and a total of $69,064.00 landowner cash/in-kind dollars were leveraged to complete the projects to date. The first year of the I-35 Corridor Monarch Project funding prioritized four counties adjacent to Oklahoma City.
        - Chickasaw Nation - Chickasaw Nation – The PFW program worked with the Chickasaw tribe to develop a Monarch Waystation, signage, and an outdoor classroom at their Cultural Center to provide habitat for monarchs and provide educational opportunities for the tribe members and the public that visits the center. This project planted several different species of milkweeds and other native forbs that provide nectar during the migration periods. A total of $7,000 PFW and $13,000.00 landowner's cash/in-kind dollars were used to complete the project. The Chickasaw Cultural Center has approximately 100,000 visitors annually and helps promote the PFW program and monarch habitat. The photo above shows Terry Dupree, Partners biologist, at one of the pollinator gardens near the Chickasaw Cultural Center.

        - The Oklahoma Partners Program worked with Oklahoma Department of Wildlife Conservation to conduct habitat improvement projects that benefit monarchs. Using traditional Partners Program funding, these projects have improved more than 2,147 acres of pollinator habitat throughout Oklahoma.
    - Austin, Texas:
        - The **NWF monarch heroes program** has signed up 15 schools in Austin (10) and San Antonio (5) ISDs to develop outdoor classrooms with an emphasis on monarch butterflies. Staff from these schools will attend two professional development classes to develop monarch/pollinator curriculum to teach at their respective monarch gardens/classrooms.
    - Arlington, Texas:
        - The Arlington PFW staff have a collaborative project between the **Fort Worth Zoo** and U.S. Fish and Wildlife Service. This project is working to save monarch butterflies by helping to restore native habitat. Currently, a 10-foot-by-10-foot test plot is being solarized, if the test plot is successful, more areas along the Trinity River and throughout the zoo will be restored.
    - Texas Gulf Coast
        - PFW and the Coastal Bend Bays and Estuaries Program used funds to contract brush management and partner with the Nature Conservancy to burn their Nueces Delta preserve. This resulted in enhancing 2,056 acres of pollinator habitat.

    - The Texas State Botanist continued **seed development projects** with the Lady Bird Johnson Wildflower Center and the Nueces County Soil and Water Conservation District. These projects have led to the collection of over 220,000 seeds of locally adapted ecotypes of milkweed and the distribution of more than 170,000 seeds to commercial and non-profit growers. This has provided valuable information on growing protocols and best practices for seedling propagation and distribution, which partners have used to train citizen scientists. In South Texas, the seed development projects have contributed to enhancement of 1,000 acres of grasslands with native pollinator plants.

- **National Wildlife Refuge System**
  Region 2's National Wildlife Refuge System (NWRS) has prioritized restoration and enhancement of pollinator habitat, conducted outreach to promote awareness of pollinators and encouraged engagement in citizen science programs, and participated in research and monitoring.
    - **Habitat:** Bosque del Apache National Wildlife Refuge (NWR) planted pollinator habitat and used prescribed fire to enhance more than 500 acres on Wichita Mountains Wildlife Refuge and 764 acres of monarch habitat on Balcones Canyonlands NWR. At Balcones Canyonlands NWR, the Refuge completed a 34 acre habitat restoration project that converted a field heavily dominated by exotic grasses into a field dominated by native grasses, forbs, and milkweed. The Refuge initiated a restoration project on a 15 acre field dominated by exotic species. Over 1,000 milkweed seedlings were planted on Balcones Canyonlands NWR. Throughout the Region, Refuge staff used their partnerships to create or enhance additional monarch habitat and demonstration gardens at Furr High School (Houston, TX), Clinton Park (Houston, TX), five public gardens throughout the City of Alamo, and Marcia Garza Elementary School (Alamo, TX).
    - **Outreach:** Refuge staff throughout the region worked to teach others how to propagate and plant milkweed species; the importance of pollinators; monarch tagging; and the monarch life cycle. Refuges hosted monarch-related events or incorporated monarchs and pollinators into existing events at Hagerman NWR, Northern New Mexico NWR Complex, and Bosque del Apache NWR.

- Monarch tagging events were hosted at the Northern New Mexico National Wildlife Refuge Complex and Bosque del Apache NWR.
- Refuge interns created a coloring page of Puddles the Blue Goose about monarch migration along with a migration maze handout to engage children. Hagerman NWR hosted Butterbike rider Sara Dykman in April, as she traveled north along her 10,000 mile journey with migrating monarchs.
- **Research:** Bosque del Apache NWR, refuge biologist established a mark-recapture study on local monarch populations. Hagerman NWR served as a research site for the Cross Timbers Pollinator Restoration project coordinated by the University of Texas - Austin. Trinity River NWR collected wild milkweed plant and soil samples and submitted them to Tyler Flockhart of the University of Guelph, Ontario, Canada, for his research regarding the natal origins of monarch butterflies using radioisotope data.

- **Science Applications**
  - Through two Wildlife Management Institute grants, the Science Applications Program provided funding to Oklahoma State University and the University of Texas - San Antonio to conduct monarch habitat monitoring in Oklahoma and Texas.
  - In partnership with the **Gulf Coast Prairies Landscape Conservation Cooperative**, the Austin Ecological Services Field Office hired three ecological technicians to conduct urban monarch monitoring in the Greater Austin Metropolitan Area. This information created a geospatial planning tool for the five county Austin metropolitan area to prioritize lands for monarch projects based on biological and sociological information.

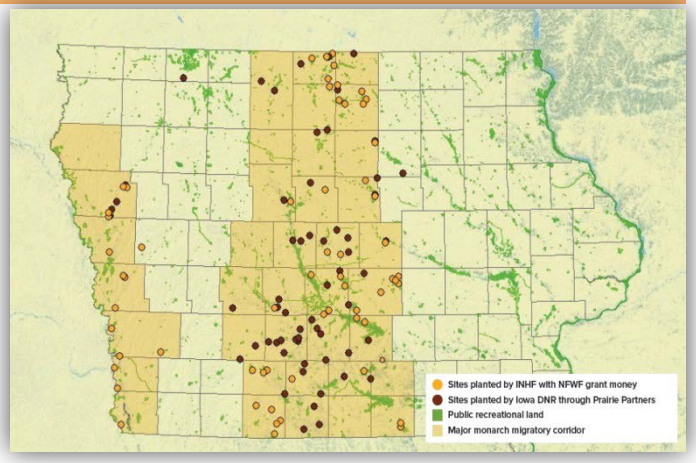
- **Phoenix, AZ, ESFO Office** initiated numerous projects with local participants in Flagstaff, Arizona:
  - Provided seeds from two milkweed species to the Northern Arizona University (NAU) greenhouse for propagation research. These plants were used in feeding trials with monarch butterflies and milkweed tussock moths. Afterwards, the plants were provided back to AESO to distribute to local restoration projects;
  - Collected seeds from three different milkweed species to provide the NAU greenhouse material for continued research;
  - Assisted in the planning and development of a pollinator garden as part of the Sinagua Middle School Outdoor Classroom and Gardens. AESO provided seeds and grow tubes for the Sinagua Middle School science class to grow milkweed plants to use in local restoration projects; and
  - Worked with Southwest Monarch Venture to tag numerous monarch butterflies, prior to migration, at the South Rim of the Grand Canyon National Park.

- **Clear Lake, TX, ESFO Office**
  - Clear Lake planned the **Houston Monarch Summit**, a collaboration across Houston and the conservation community, to develop a Monarch Summit including Katy Prairie Conservancy, Houston Wilderness, Houston Audubon, NFWF, and Monarch Gateway. The meeting addressed four priorities: habitat conservation, research/monitoring, education/outreach, and collaboration/partnerships. Meeting goals were to better approach public with messaging on pollinators, monarchs, prairies and to develop a plan for strategic habitat conservation.
  - Installed monarch signs at Dobie High School for a pollinator garden.
  - ESFO coordinated a milkweed collection and propagation workshop and plantings with local high schools and partners.

- **Fisheries**
    - Monarch habitat on fisheries lands has been implementing a no-mow policy for hatcheries during the spring and fall when monarchs are migrating throughout the southwest.
    - The San Marcos Aquatic Resources Center (SMARC), located along the "monarch highway", served as a test site to implement the "**No-Mow**" Policy during peak migration weeks. Several monarch caterpillars were observed.
    - SMARC Botanist raised three monarch caterpillars for outreach events in the spring of 2017, including "Earth Day ATX" at Huston-Tillotson University in Austin, TX reaching ~500 people and Science Day at Schlather Intermediate School in Cibolo, TX reaching ~300 students at the 5th and 6th grade level.
    - In FY 16 and FY 17, the weekly volunteer group at SMARC built a bird blind, benches, 0.8 mile trail system, and two kiosks with information about the blackland prairie habitat and the wildlife it attracts. These efforts were to make the prairie more accessible to the public, noting two key nectar plants for monarchs during their migration back to Mexico were observed in the prairie; frostweed (*Verbesina virginica*) and Roosevelt-weed (*Baccharis neglecta*).
    - With the success of the no-mow policy at SMARC in FY 2016 and FY 2017 during peak migration, SMARC intends to share their methods with all other Region 2 Fisheries Project Leaders in FY 2018.

Region 3

- **The Iowa Monarch Flyway**- now in its third year, has created habitat corridors which are built around north-south sections of the state to focus on strategic habitat conservation delivery across many partners (NGO, state, and federal). Several NWRs and the Iowa PFW program have been instrumental in the success of this initiative. This effort has been a two time recipient of the NFWF Monarch Butterfly Conservation Fund.



- With leadership from the PFW state coordinator in Missouri, **Missourians for Monarchs**, is a statewide collaborative moving into implementation of the state's monarch conservation plan which includes strategic conservation delivery and development of education and outreach products.

- In a partnership between PFW and the Refuge Division of Natural Resources, two crews piloted a monarch monitoring protocol looking at public and private lands near Necedah and Neal Smith NWRs.

- ES staff coordinated and help host the **Quad Cities Pollinator Conference** (IA).

- **Monarch State Summits** were held in Indiana, Michigan, and Wisconsin.

- The **Ohio Pollinator Habitat Initiative** hired a full-time coordinator, following the model set forth by Missourians for Monarchs.

- The Indiana PFW State Coordinator is a co-lead for implementing Pollinator Partnership's project **Monarch Wings Across the Eastern Broadleaf Forest** in Indiana. This has served to strengthen partnerships across the region as we work to increase monarch and other pollinator habitat. Hundreds of people from private landowners, local government, non-profits, etc have created a volunteer network to collect native wildflower seed and will later be involved in the planting of that seed. Primary duties have been coordinating with Pollinator Partnership to recruit volunteers, assist with training, organize volunteers into teams, and identify collection sites. Assisted with creating the volunteer training manual as well as leading one in person training session and organizing two other training sessions.

- The Missouri PFW State Coordinator collaborated with Big Muddy National Fish and Wildlife Refuge and also Great Rivers National Wildlife Refuge to inform and engage youth and their families about monarch conservation and monarch habitat needs. We were one of several state, federal and NGO participants who conducted kid events, caught and tagged monarchs, walked through monarch habitat areas, and made available the purchase of natives important to monarchs to plant at home. Approximately 500 attendees were at the event.

- Work continued in the **Driftless Area Monarch Initiative** with strategic collaborations across private lands for the implementation of grassland restorations.

- A continuing project with Hamilton County Parks in Indiana involved a 120 acre prescribed burn. The site is adjacent to a 41 acre prairie planting completed in early 2016 through the **Partners for Fish and Wildlife Program**, in partnership with the Hamilton County Parks and Recreation Department, IDNR, Hamilton County SWCD, Pheasants Forever, and Cardno Nursery. The Strawtown Koteewi Park is a popular 750-acre park owned by the Hamilton County Parks and Recreation Department with existing prairie and wetland habitats. This project enhanced existing grassland habitat for pollinators and migratory birds by improving species diversity of forbs and vegetative structure. Benefits to pollinators, such as the monarch butterfly, will be encouraged by improving the diversity and abundance of milkweed as well as flowering plants serving as nectar sources for the monarch.

Region 4

- In FY17 Region 4 reported 686 acres of restored habitat specifically for the Service's monarch initiative, providing nearly $167,362 in Service funds and leveraging approximately $109, 415 in partner contributions.

- The St. Sebastian River Preserve (FL)- was provided $49,000 from the Service's Coastal Program matched with $94,000 to manage 2,983 acres of pollinator habitat. The project used prescribed fire and roller chopping to recover native plant diversity and increase populations of declining fire-dependent species, some of which are important for pollinators, such as Curtis's milkweed (*Aslepias curtissii*), Giant orchid (*Pteroglossaspis ecristata*), Leafless beaked orchid (*Sacoila lanceolata*).

- **Alabama**- Service staff in coordination with Alabama Department of Conservation and Natural Resources restored approximately 150 acres of longleaf through planting and prescribed fire that will benefit numerous species including the monarch butterfly. An additional 2500 acres were restored via prescribed fire in partnership with the local chapter of The Nature Conservancy.

- The Lafayette Field Office completed five longleaf pine reforestation projects totally approximately 890 acres, improving habitat for **pollinators** within the regional, along with supporting other species including **RCW's and gopher tortoises**.

- In Arkansas approximately 42 acres of prairie, glades and grasslands were enrolled into the Upper Little Red River **Safe Harbor and Candidate Conservation Agreement** with the Service. The mixed shortleaf pine and sandstone glades scattered throughout is being restored to an open woodland/glade complex to support monarchs and other pollinators.

- Natchez, Mississippi- the Service partnered with Copiah-Lincoln Community College to create a pollinator garden for the local community. The garden served as a community-building project. Local schools and volunteers participated in its creation which has an education focus for the plight of pollinators within the region. Educational signage and observation areas were created.

- The Cookeville Field Office in Tennessee coordinated with Clinch Powell RC&D on approximately 20 acres of pollinator habitat across six private landowners, distributing 200 seed packets and supplies for a native plant/pollinator garden at Cane Creek Park. They also worked with Cumberland and Morgan counties SCD's planted six gardens at schools in Cumberland County (planted by the SCD and students) and distributed 1000 seed packets.

- South Carolina Department of Parks, Recreation, and Tourism initiated the restoration of native grassland habitat with species beneficial to **native pollinators at two state parks**, Hampton Plantation State Historic Site and Huntington Beach State Parks. The two 1-acre projects are both located near historic structures and compliment cultural landscapes with native slower species that support monarch butterflies and other pollinators.

- The Service collaborated with the South Carolina Department of Natural Resources to conduct the second year of **surveys for migrating and wintering monarch butterflies** in coastal areas of South Carolina between November and March. The surveys confirmed continued presence of monarchs after the normal migration season at several locations along the barrier islands. The effort was driven largely by volunteers through collaboration with the master Naturalist program.

- The Carolina Mountain Land Conservancy (CMLC), a nonprofit that permanently conserves, cares for and connects people to the natural wonders of western North Carolina, is working with schools and organizations to plant pollinator gardens in this local community. In Asheville, North Carolina CMLC partnered with the Service, AmeriCorps and another non-profit, Monarch Rescue to install two pollinator gardens at the Isaac Dickson Elementary School. These gardens were created both for pollinators and for the local community, and to help kids connect to the monarch in a meaningful way that will ultimately translate into care and concern for the environment. Nearly 170 students participated in the planting of the garden, raising caterpillars or tagging the butterflies before migration.

- In western North Carolina the Service provided funding to restore monarch habitat in the region. Volunteers and partners established local gardens of native milkweed and nectar plants, and worked to raise and release monarch butterflies. The last release was located in Bakersville, North Carolina, at the Rhododendron Festival, where those public could watch the release of the butterflies raised in the local communities within the area.

- Monarch Rescue partnered with the NC Arboretum to provide programming, educational supplies, and free milkweed seeds for this 2nd annual public event. The event was well-attended

with approx. 800-1000 visitors. Monarch rescue provided the two educational lectures, monarch educational brochures and bookmarks for all attendees, as well as free milkweed seeds for the first 200 guests.

- **Care Partners/Kids Path Children's Bereavement Program** developed a program that would help educate, support and help transition youth through their grief process as well as support monarch butterfly conservation efforts. The kids worked with Monarch Rescue to help raise, tag and release monarchs during weekly visits and created milkweed seed bombs to distribute around western North Carolina in an effort to help sustain the monarch population.

- International Paper and Anchor QEA Monarch Meadow worked with Monarch Rescue to construct a Monarch Meadow on International Paper's #5 site in Waynesville, North Carolina. International Paper has granted Monarch Rescue funds for the meadow construction and has expressed an interest in expanding the "Monarch Meadow" idea to other **landfill sites** throughout the southeast region.

- **St. Marks National Wildlife Refuge** raised 60,000 milkweed plants, at least a dozen different native species in three green houses. They are currently growing 500 butterfly milkweed to give away at the upcoming Monarch Festival on Oct 28, 2017. Friends of St. Marks has provided a stipend for three milkweed interns (students during each college semester) to coordinate and oversee the milkweed nursery and to direct the volunteer workdays.

    - Utilizing a small amount of Coastal Program funding ($7,000), a 20-member partnership was formed, led by Wildlife Mississippi, to grow 10,000 native pollinator plants that were then planted at 14 locations, including large patches in appropriate fire-maintained habitats and smaller patches in existing outreach and education butterfly gardens.

- Mississippi Field Office collaborated with a landowner in the Blackbelt Prairie to restore 119 acres of native warm season grasses and forbs. The project required substantial habitat alteration to set the succession back to prairie habitat. .

- Collaborating with many in-state partners, the Kentucky Field Office helped complete **Kentucky's Monarch Conservation Plan**, to coordinate and guide conservation efforts for the species.

- The **Kentucky Field Office** has developed a highly varied portfolio of monarch conservation projects, including habitat restoration and enhancement, education and outreach. Many of these projects are highly-leveraged and often occur on permanently protected lands. Most involve a diverse array of partners and landowner participation and all have been enthusiastically supported by our conservation partners and the public. Highlights from the Kentucky Field Office include:

    - Harrison County Monarch Project: 44.3 acres of monarch habitat enhancement and restoration on two tracts in Harrison County, Kentucky. Forb species were selected so that nectar plants for adult monarchs would be available throughout the growing season

and to ensure that milkweed was present for monarch reproduction. Monarch caterpillars and adults have already been documented using both tracts.

- Kentucky Waterways Alliance Louisville (KY) Monarch Project: used funds provided by the Service and Aveda EarthMonth to partner with the Louisville Nature Center to help install pollinator gardens at 35 local schools with 25 of these gardens also becoming certified monarch waystations, and three monarch habitat installations at public spaces, including a 2.8 acre area of state-owned land across from Medora School.

- Partnering with the Kentucky Waterways Alliance (KWA) and the City of Covington: pollinator plants were integrated into existing garden beds at city parks. With the addition of milkweed and nectar plants at these sites, more than half of the city's 112 garden beds could qualify for Monarch Watch's waystation certification requirements. These sites are already on a maintenance schedule and will maintained by full-time horticulture specialists. The city's Urban Forester and Parks and Recreation Manager will also work with the city's Public Information Officer to design educational content and signage that will be consistent for all waystations in the city.

- Pennsylvania Run Habitat Restoration Project involved the restoration and enhancement of glade habitat for monarchs, other pollinator species, and the Kentucky glade cress, a **federally threatened plant**. The Pennsylvania Run site is a privately owned conservation area managed in perpetuity by the Kentucky Natural Land Trust (KNLT) for its rare glade habitat and the Kentucky glade cress. In a partnership with KNLT and Bernheim Forest (another private conservation organization), the Service removed invasive species, and conducted a prescribed fire to restore these areas and enhance the forb component for monarch butterflies.

- The Kentucky Field Office funded the Kentucky State Nature Preserves Commission (KSNPC) to survey remnant grasslands and develop management recommendations for grasslands on Fort Knox to benefit plant diversity, monarchs, and other pollinators.

- Terrapin Barrens Habitat Restoration Project is a 160-acre barren in central Kentucky. A mechanical brush shredder was used to remove eastern red cedar to open up areas of fire-suppressed barrens in order to release native forbs and grasses, invasives were removed and prescribed fire implemented. Many monarch butterflies, rare scurf pea flower moths, and other pollinator species have been observed in this assemblage of unique barrens, indicating a positive response to these restoration efforts.

- Valhalla Golf Club, of Louisville, Kentucky, is one a America's premiere **PGA golf course** and host location for major professional golf tournaments, such as the Ryder Cup and PGA Championship. On areas adjacent to the golf course, Valhalla wanted to establish monarch butterfly and pollinator areas and artificial bat roosting structures to benefit listed and rare bats that could occur in the area. Valhalla Golf Club established four acres of native forbs specifically for monarch butterflies that contained a heavy component of native milkweeds and installed five artificial bat roosting structures. Monarchs have been documented using the established pollinator planting, which has led to additional opportunities for monarch conservation. Specifically, the Valhalla Golf Superintendent plans to work through the **Golf Managers**

Association of America and the Kentucky Chapter of that organization to promote monarch-friendly plantings on other golf courses.

- On lands protected by a Kentucky Heritage Land Conservation Fund easement, the Kentucky Field Office and Western Kentucky University Foundation restored 22 acres of native barren-grassland habitat with a special mixture of native forbs that bloom throughout the flowering season and a heavier than normal component of native milkweeds for the monarch butterfly.

- The **Green River Riparian Restoration Project is** a collaborative effort between the Service, and the Kentucky Chapter of The Nature Conservancy to establish over 105 acres of riparian forest habitat on four project sites. These projects will have early successional habitat for many years and were enhanced with native milkweeds in order to provide conservation benefits to monarch butterflies and other pollinators.

- **Private landowners** in Cadiz, Trigg County, KY converted their fescue fields into an officially registered monarch butterfly waystation by establishing a highly diverse mix of native forbs (wildflowers), including a heavy milkweed component. A combination of factors, including this officially designated Monarch Waystation, involvement of the Kentucky Field Office's Partner for Fish and Wildlife Program, and the opportunity to connect the site to an adjacent Conservation Reserve Program native grassland, led a cell tower company to relocate a tower further away from these conservation areas.

Andy Radomski/
USFWS photo

- The City of Benton in Marshall County established a Children's Art Center and the surrounding city landscape was enhanced by environmental demonstrations utilizing bioswales, native plantings for monarchs with signs identify the native flora that was funded by the Partners for Fish and Wildlife Program. The project also included partners demonstrating environmentally-friendly plantings, rain garden, bioswales, permeable pavement, and pavers. This project is in the southern exterior monarch butterfly conservation unit.

Region 5

- Philadelphia is the **300th city** to take the **Mayor's Monarch Pledge**.
- Nearly 300 K-5 students in West Virginia transformed the front lawn of their school into pollinator garden using native seeds and perennials. http://bit.ly/2sQ4AqO
- Wildflower seeds distributed to 35 field stations for habitat projects and outreach events.
- Installation and maintenance of a pollinator garden at Independence Hall National Historical Park is used weekly by staff at John Heinz NWR for programming.
- Chef Larry, Philadelphia local, demonstrates healthy cooking techniques using pollinator food items in Philadelphia, PA. http://bit.ly/2fJD3zr
- Chloe Doe, SCA intern, hosts an outreach event with Whole Foods in Hadley, Massachusetts. http://bit.ly/2pqOxhv
- Students, administrators, groundwork board members and staff, and USFWS staff celebrated the opening of Yonkers' first schoolyard pollinator garden, made possible by the support of NCTC and the USFWS http://bit.ly/2hVxfS8
- Interns have been monitoring wildflower habitat sites to evaluate the pollinator community during peak blooms and make recommendations for future restoration efforts. http://bit.ly/2eBpykR
- Sara Dykman bikes the monarch migration route and stops at Assabet River National Wildlife Refuge in Sudberry, Massachusetts to speak with students for her "Butterbike". http://bit.ly/2vwOAIJ
- **Team Rubicon** - USFWS partnered with Team Rubicon, a **non-profit military veterans and first responders organization**, to accomplish habitat management projects that benefit pollinators on National Wildlife Refuges.
    - Team Rubicon trained on Assabet River NWR and Mashpee NWR, where future native meadow restorations are planned.
- Mashpee Wampanoag **Preserving Our Homelands Summer Science Camp** - USFWS participated in the Mashpee Wampanoag Tribe's youth science camp. Strong partnerships between the Tribe, the Mashpee NWR, and the USFWS Partners Program enabled this collaboration. Service employees gave sessions on pollinator conservation and helped the youth create a pollinator garden.

Region 6

- Working collectively via a **NFWF Monarch Grant** the **KS PFW Program** partnered with Kansas landowners, the Kansas Grazing Lands Coalition and Dow AgroSciences to deliver effective strategies to control invasive species. Dow provided specific herbicides to target control of these species on private lands. Herbicide contributions and application supplies totaled over $100,000 towards PFW voluntary private landowner projects. The efforts have resulted in over **13,000-acres of native prairie habitat**, 230 acres of wetlands, and 80 riparian miles being restored/enhanced during 2017. One rancher's comment, *"Partners working together helped me accomplish long-term goals and support the future of healthy grasslands and sustainable, profitable ranching"*.

- A unique partnership has been developed in the heart of the Kansas Flint Hills to enhance and restore nectar resources and breeding habitat for Monarch butterflies. The **KS PFW Program** has teamed up with The Nature Conservancy, the National Park Service and Monarch Watch to restore and manage 1,246 acres for Monarch Butterflies on the Tallgrass Prairie National Preserve. The preserve itself is 10,864 acres of which 10,830 acres are owned by the Nature Conservancy and 34 acres are owned by the National Park Service but all are managed as a National Park open to the public. Conservation practices being applied through this project include native grass/forb planting, prescribed burning, grazing management and the installment of a 5 mile hiking trail with interpretive media describing the diversity, abundance, and importance of native pollinators and the Monarch butterfly.

- On a **36,000 acre privately owned ranch** in South Central **Kansas patch-burn grazing** is one of the best grazing regimes for livestock performance and wildlife habitat. In this system approximately ¼-1/3 of the acres are burned in any one year. Approximately 75% of cattle grazing is within areas burned the current year. The remaining unburned areas receive rest and regrowth, benefitting plant and soil health. This creates a shifting mosaic of prairie habitat types, in regards to structure and composition. A quote from the ranch reads……*"as long as I incorporate fire in my management of the prairie on this ranch, I'm not going to have any tree problem, I'm going to have more wildlife, and I'm going to produce more pounds of beef."*

  Patch-burn grazing provides spring and fall migration and breeding habitat for Monarch Butterfly in the Great Plains. Additionally, northern bobwhite, grasshopper sparrow and lesser prairie-chicken benefit from patch-burn grazing. The Kansas Partners for Fish and Wildlife Program has supported these innovative efforts through voluntary private landowner agreements, providing technical and financial assistance to carry out beneficial practices, such as firebreak establishment, prescribed grazing, invasive tree control and prescribed burning.

  In concert with Kansas PFW, this landowner has worked with the Oklahoma State University and Kansas State University to research and document the outcomes of these land management practices. Future generations of ranchers and wildlife will indeed benefit from the adoption of this historical management regime.

- The **South Dakota PFW** program signed Landowner Agreements with 28 private landowners to plant native grass and forb species. All totaled, nearly 1,600 acres of cropland was planted in FY17. Typical plantings consist of 7-8 grass species and 10-12 forb species including various milkweed species and forbs that flower in the three different seasonal bloom periods. Various funding partners included the private landowners, South Dakota Department of Game Fish and Parks, South Dakota Department of Agriculture, South Dakota Association of Conservation Districts, National Fish and Wildlife Foundation, and NAWCA.

- The South Dakota PFW program implemented **12,950 acres of multi-celled managed grazing systems** with 41 landowners. Landowner agreements were signed outlining livestock stocking rates and grazing dates which are beneficial to native grass and forb species, thus beneficial for pollinator species.

- The Brookings PFW office worked with the City of Brookings to establish three **pollinator plots**, totaling six acres, strategically placed in high public use parks. Over 30 species of forbs, including milkweeds, were planted in the pollinator plots. The City of Brookings conducted all the site preparation, the South Dakota PFW program provided funding for the seed and recommendations on seed varieties, and the Brookings Conservation District seeded the plots with a specialized no-till grass drill. The City of Brookings provided weed control after the seeding. The local Pheasants Forever chapter provided educational signage for the plots.

- Monarch and pollinator delivery actions for **Quivira NWR** (Stafford, KS) and the Great Plains Nature Center (Urban Education Center - Wichita, KS).
  - During the spring, Quivira NWR restored 80 acres from farm ground into native prairie. Seeding methods promote forb and pollinator abundance and diversity.
  - Quivira NWR and Friends of Quivira hosted Monarch Mania with 235 people in attendance for the half-day event. The event included educational activities, as well as netting and tagging Monarch butterflies.
  - 438 Monarchs were tagged on Quivira NWR during this year's migration south. Based on past **tag recoveries**, monarchs tagged at the refuge normally migrate to El Rosario, RBMM, Ocampo, Michoacan, Mexico, a migration distance of 1,275 miles.

- The Quivira NWR pollinator garden was expanded with help from volunteers and the Friends of Quivira NWR to plant nectar plants.
- Great Plains Nature Center hosted the refuge Prairie Pollinator Party. Activities included pollinators at the nature center, a presentation about monarch migration, monarch tagging and release, native plant hike, and crafts. Nearly 425 people were in attendance.

- **Marais des Cygnes NWR:**
  - Marais des Cygnes NWR staff participated at Daffodil Day, a public event hosted by the Spring Hill Recreation Commission. FWS provided a pollinator game and pollinator wheel of fortune and engaged children and adults in conversations about pollinators with emphasis on monarchs.
  - Sara Dykman and her Butterbike trek with the monarch migration (www.beyondabook.org): Marais des Cygnes NWR connected Sara with local schools in Pleasanton, LaCygne and Louisburg, Kansas and provided support during the presentations. The refuge worked with the schools to encourage small pollinator gardens and/or milkweed plots on school grounds and participated with one school as they planted.
  - Almost every year milkweed and native forbs are planted in restored prairie tracts, and partner with local volunteers. The Refuge hosted ag students from Pleasanton High School. They planted as their school-sponsored Day of Service. The Kansas City chapter of Zeta Phi Beta visited the Refuge on their national "Day At The Refuge" event. The refuge provided information and discussions regarding monarch conservation and participated in a planting.

- **North Dakota Partners for Fish and Wildlife Program** biologist, Dan Duchscherer, worked with two private landowners on adjacent properties in Rolette county to seed 278 acres of cropland to a diverse, 18-species mixture of native grasses and forbs, including common milkweed. The landowners couldn't be happier and the same could be said for the Monarch butterflies, pollinators, grassland birds, breeding waterfowl and other wildlife that now call this place home!

Western Monarch Highlights (Regions 1, 8, 2 and 6)

- **Western Monarch Science Team** - USFWS and the Xerces Society hosted the first western monarch science meeting in Pacific Grove, CA in December 2016. In addition to the meeting hosts, university professors, non-profit groups, California Department of Fish and Wildlife, and other monarch experts discussed current research and science priorities at the meeting. The group in attendance formed the Western Monarch Science Team, and we continue to add other interested parties to the team so that communication continues into the future.

- **Population Viability Assessment (PVA)** - In 2016, USFWS funded a western monarch PVA that was led by Washington State University. The PVA was published in the journal of Biological Conservation in September 2017. The results indicated that the western monarch California overwintering numbers were likely around 10 million in the 1980s, compared to approximately 300,000 that were estimated in last year's Western Monarch Thanksgiving Count.

- **Western Monarch and Milkweed Habitat Suitability Assessment** - This project was initiated and led by USFWS Region 1 and the Xerces Society, in partnership with Regions 8, 2, and 6. Regions 8 and 1 pooled their monarch initiative money to fund the project in 2016-2017. The project began in 2015, when little was known regarding the status of milkweed in the western U.S., with the goal of elucidating areas important for monarch breeding and migration. The purpose of the study was to create spatial models of known milkweed and breeding monarch records to assist in targeting habitat restoration and protection efforts for monarchs. The study was concluded in July 2017, with the final results forthcoming; however, the Xerces Society will continue to host a publicly available website where milkweed and monarch records can be accessed, and where citizen scientists or others may contribute new information to the database: Western Monarch and Milkweed Mapper.

- **Western Monarch Demography Project** - This project was initiated by Washington State University and the Xerces Society in 2017, via funding through the DoD Legacy program. Work is currently being conducted on military installations in CA, NV, OR, WA, and ID, and it may be expanded to other areas. The Coastal Program in R8 will be contributing funds for the second year of data collection along with DoD funding. Work is expected to help determine the seasonal timing and location of breeding by monarchs in the western U.S.via examination of site-based breeding phenology. The project will yield information regarding the number of generations that comprise the annual monarch migration.

- **Monarch SOS Iphone App** - Partners, in coordination with USFWS, developed an Iphone App where data can be captured in the field for a variety of research projects, including the Western Monarch and Milkweed Mapper, Western Monarch Thanksgiving Count, and others. This app streamlines data collection and information sharing by citizen scientists.

Region 8

- **Overwintering Site Management Plans/Restoration** - USFWS and partners are developing overwintering grove management plans for priority sites along the CA coast. Management plans were completed and habitat restoration actions were in initiated in 2016 for Ardenwood Farms in San Francisco Bay, and in 2017 for Lighthouse Field in Santa Cruz, CA. Partnerships were formed at two other important sites, Esalen and Pismo Beach, and the focus is now on using the Lighthouse Field management plan as a template to tailor plans for those overwintering groves. Additionally, FY17 USFWS Communication Funds will be used to host a Land Management Plan development workshop in Pismo Beach this fiscal year. State, Federal and private entities

that manage overwintering sites along the central coast will be invited to participate in creating land management plans for their respective areas.

- **Western Monarch Thanksgiving Count (WMTC)/New Year's Count (NYC)**- Citizen scientists and USFWS personnel participated in the 2016-2017 WMTC and NYC. Approximately 300,000 butterflies were detected at overwintering sites along the CA coast in 2016-2017, and at a few inland sites. The volunteer effort had increased from previous years, but the number of butterflies had declined at many sites along the coast. In a shift from prior years, Esalen, on the Big Sur section of the coast, hosted the most butterflies during the 2016-2017 season (~40,000).

- **Ventura FWO (California)** sponsored 21 monarch and pollinator habitat planting days, gave 26 monarch and pollinator presentations, hosted seven field trips, and participated in four monarch festivals, including the sponsorship of one. ES and Public Affairs staff also developed partnerships at priority overwintering sites, participated in the WMTC, and they continue to highlight stories to foster public involvement in their area. Additional partnerships included 21 schools, one Tribe, and ten community groups.

- **Reno FWO (Nevada)** has taken on a coordination role for monarch conservation in Nevada and the eastern Sierras of California. Staff worked with two schools and at the University of Nevada, Reno to install pollinator gardens and schoolyard habitats. They conducted outreach via community monarch/pollinator workshops, volunteer planting days, and they gave presentations at conferences and other events. Tagging efforts and OE testing were increased through the office's efforts, and remote overwintering sites in Death Valley National Park will be surveyed through the leadership of the Partners program and citizen scientists.

- **Refuges** in the San Francisco Bay Area conducted monthly surveys (spring-fall) at milkweed sites in the Butterfly garden at Alviso, and they also planted milkweed and nectar plants. They used the Monarch SOS App to report the data via the Western Monarch Milkweed Mapper.

- **Yreka FWO (California)** gave multiple presentations to schools (k-10th grade) to educate students about the importance of monarch and pollinator conservation. Staff also participated in workshops for citizen scientists to learn about what they can do to help monarchs, and they assisted in the installation of two monarch waystations.

- **Sacramento NWRC** restored ~11 acres of pollinator habitat, and volunteers and staff surveyed for milkweed and breeding monarchs. Data was shared via the Western Monarch and Milkweed Mapper. Staff and volunteers tested 13 monarchs for OE, in partnership with University of Georgia. Staff also conducted monarch outreach programs at the Refuge.

Natural Resource Program Center

- **National Monarch Monitoring Strategy**
    - Continued work with MJV and MCSP to refine design of Surveillance Monitoring to include citizen science participation
    - Added to Cooperative Agreement to facilitate development of guidance for organizations on setting up MCSP monitoring participation/coordination nodes in a National or Tri-national Network
    - Managed and summarized MCSP data gathered by FWS in 2016
    - Supported and coordinated two internal training sessions (R2 and R3)
    - Coordinated and funded MCSP monarch and plant monitoring at 60 sites in Regions 2 and 3 (near Balcones Canyonlands and Hagerman NWR in TX; Neal Smith NWR, and Lamoni IA, and Necedah NWR in WI).

- Coordinated and funded MCSP monarch and plant monitoring by revisiting ~ 18 sites sampled last fall and this spring in Region 2.
- Developed and coordinated online GIS-based database (USFWS AGOL) for archiving data

- **Socio-ecological Planning and Evaluation**
  - Completed baseline situation analysis resulting in a conceptual model depicting the socio-ecological context for monarch conservation, including threats (based on SSA) and contributing social, economic, cultural and political factors. The model represents a shared understanding of monarch conservation threats and needs and serves as the foundation for identifying strategic points of intervention for the Service and the development of related strategies, objectives, activities, and metrics for evaluation.

  - Developed preliminary "results chains" (i.e., visual representations of how each strategy is anticipated to achieve desired short-, intermediate-, and long-term outcomes).

  - Shared results chains with Engagement Team to inform the development of communications to the initial three target audiences – urban, ROWs, and agriculture.

  - Convened the first meeting of Service social scientists engaged in monarch conservation to begin formulating overarching social outcomes for the monarch conservation effort that could also transcend other Service efforts.

  - Developed a statement of work and secured a contract with Foundations of Success to facilitate the development of the socio-ecological evaluation plan for monarch conservation. The evaluation plan builds on the situation analysis and supports the adaptive management process of SHC.

HQ & National Conservation Training Center

- **Fish and Aquatic Conservation**, in collaboration with staff across the USFWS, developed a national Pollinator Conservation Strategy and Reference Guide for the U.S. Air Force Civil Engineer Center (AFCEC).
  - The Reference Guide provides the technical information needed to implement the strategy.
  - Training, based on the information in the Reference Guide, was delivered in March 2017 at the National Military Fish and Wildlife Association Conference. The training was well received and attended by over 100 personnel.
  - As part of this project Air Force funded three pollinator pilot projects (habitat restoration project at Arnold AFB; a pollinator garden at McConnell AFB; and a comparison of the effect burn techniques on pollinators at Cape Canaveral AFB) that are currently in a monitoring phase. Additional training and outreach are being funded through March 2018.

- **NCTC & the Monarch Joint Venture** continued their partnership to develop a webinar series on monarch biology, monitoring, and conservation. The Monarch Conservation Webinar Series is open to the public, offering a platform to address arising issues regarding monarch conservation, and often experts were brought in which captured the attention of hundreds of participants.

  - Developed and led by NCTC staff, Monarch was featured as one of the course topics offered to employees to better understand development and engagement of citizen science programs.

- Partnered with MJV to host monthly webinar series on monarch conservation.
- Conducted multiple citizen science monitoring and research programs.
- Conducted education programming on campus with employees, guests, and visitors.
- Provided outreach to the local community through presentations and interpretative programs.
- Gathered b-roll and images of monarchs, milkweed, and monarch conservation in action.
- Created monarch wayside habitats throughout campus.
- Supported a full time intern at MJV.
- Manages and administers the cooperative agreement between HQ and University of Minnesota- Monarch Joint Venture

- **Wildlife and Sport Fish Restoration-** the Maryland Department of Natural Resources partnered with the Service's Chesapeake Bay Ecological Services Field Office to establish new habitat for pollinators.
  - Fourteen sites within the migration corridor underwent an initial evaluation of land-use and habitat conditions.
  - Of 14 sites, eight were selected for enhancement or restoration. This included six State Parks and two Wildlife Management Areas. Approximately 10.7 acres received conservation actions to benefit pollinators across the eight sites. Activities included treatment for invasive plants, tilling, seeding, and planting thousands of plugs to promote growth of habitat essential for pollinator foraging and breeding.

Two Western States Study Monarchs to Improve Management Using **State Wildlife Grant (SWG) Funds**

- Idaho Department of Fish and Game, Washington Department of Fish and Wildlife, and the Xerces Society for Invertebrate Conservation is collaborating to collect information critical to assessing the status of monarch butterfly in Idaho and Washington. Funding for the project is provided by the State Wildlife Grant (SWG) Program, with additional state funds provided as match.
- In both states, biologists are conducting surveys for milkweed and monarchs in portions of the states where monarch breeding occurs, including hundreds of miles of road transects. Biologists are locating and collecting data on patches of milkweed covering several hundred acres. Both states' datasets are being provided to partners working on the Western Monarch and Milkweed Habitat Suitability Assessment Project.
- Information obtained through surveys by staff biologists and citizen scientists is critical for future management of this iconic butterfly species in the northwestern United States.