Proactive Management of Imperiled Species to Avoid Federal Listing:

Monarch Butterfly (*Danaus plexippus*)Habitat Enhancement on Mined Lands

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Life History Strategy & Population Status

- larvae are specialist herbivores
  - feed only on milkweed plants
  - toxins in milkweed = predator defense

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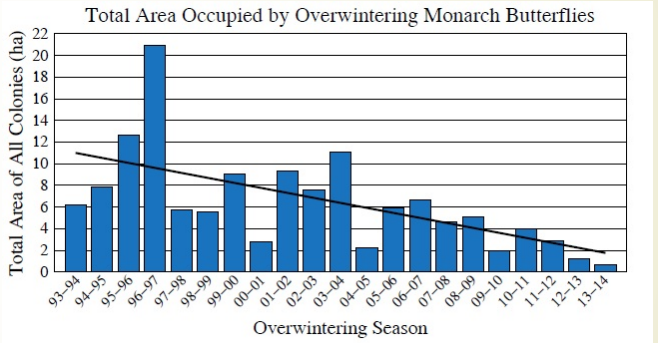
- 80% population decline over past 20 years
- Reduced habitat quality and quantity
  - loss of native milkweed for larvae
  - loss of pollinator habitat for adults



http://csas.ei.columbia.edu/2014/01/31/quest-of-a-broken-wing-butterfly/

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Federal Listing Status

- Petition for listing in 2014 under ESA
- USFWS determined listing may be warranted
- Conducting formal status review
- Listing decision expected June 2019
- **Potential mine permitting and operations ramifications**

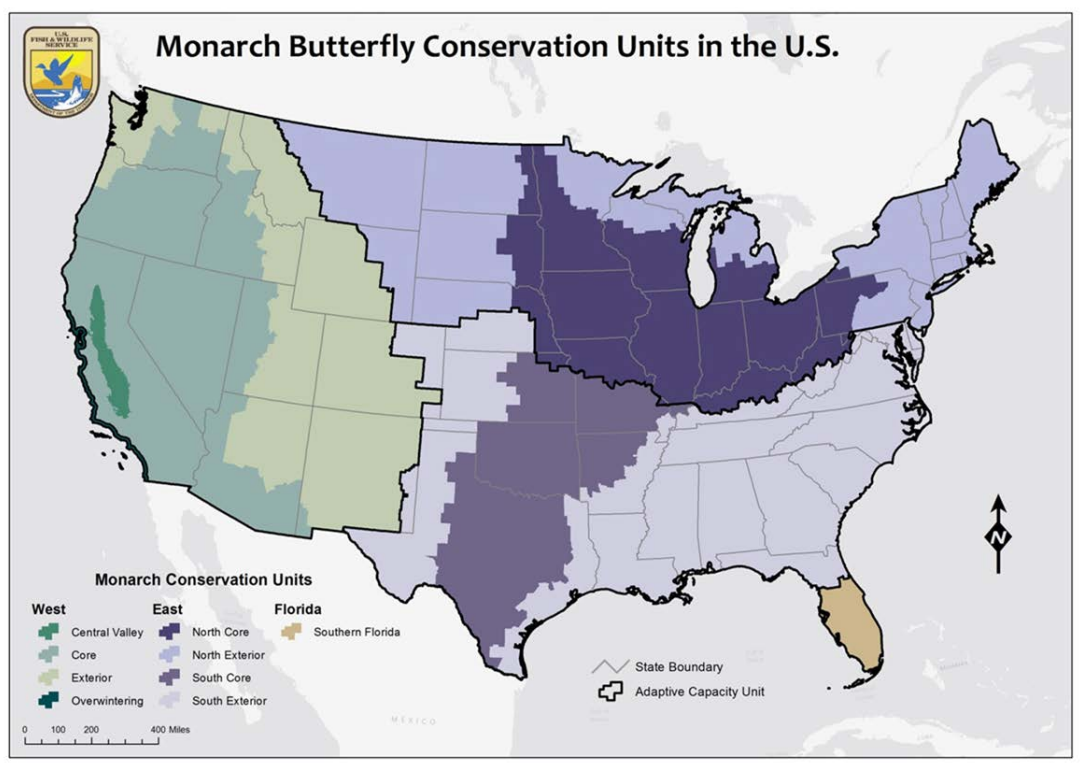
PROACTIVE species management

- **Mid-America Monarch Conservation Strategy** (2018-2038)

  http://www.mafwa.org/?page_id=2347

- Goal → prevent listing by highlighting current efforts and describing voluntary and incentive based future efforts
  - habitat to support 15 acres in Mexico
  - establish additional 1.3 billion native milkweeds (north core)

- Midwest Association of Fish and Wildlife Agencies
  - eastern population state natural resources agencies
  - non-profit organizations and universities
  - utilities, railroads, **energy infrastructure (pg. 95 Part 3.5.1 "Mined Lands")**



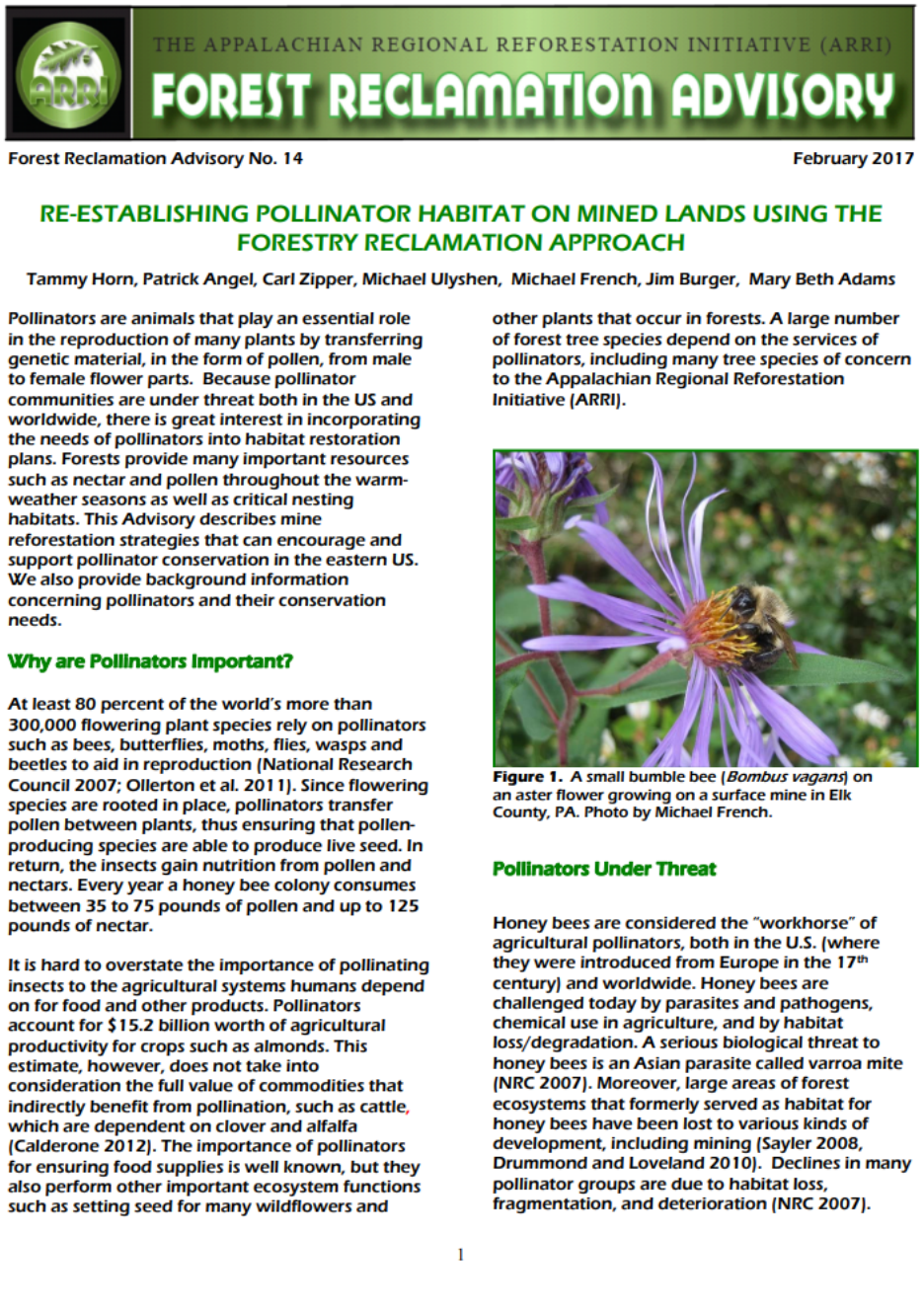
OSMRE Current Initiatives

- **Forestry Reclamation Approach**
  - encouraged by OSMRE
  - adopted by West Virginia

https://arri.osmre.gov/FRA/Advisories/FRA-14-ReestablishingPollinatorHabitat-Feb2017.pdf

Title IV Current Initiatives

- **AML NFWF grants**
  - Iowa – seeded over 150 acres educational field days
  - Missouri – planting native grasses and forbs on 100 acres in 2018



THE APPALACHIAN REGIONAL REFORESTATION INITIATIVE (ARRI)

FOREST RECLAMATION ADVISORY

Forest Reclamation Advisory No. 14 — February 2017

RE-ESTABLISHING POLLINATOR HABITAT ON MINED LANDS USING THE FORESTRY RECLAMATION APPROACH

Tammy Horn, Patrick Angel, Carl Zipper, Michael Ulyshen, Michael French, Jim Burger, Mary Beth Adams

Pollinators are animals that play an essential role in the reproduction of many plants by transferring genetic material, in the form of pollen, from male to female flower parts. Because pollinator communities are under threat both in the US and worldwide, there is great interest in incorporating the needs of pollinators into habitat restoration plans. Forests provide many important resources such as nectar and pollen throughout the warm-weather seasons as well as critical nesting habitats. This Advisory describes mine reforestation strategies that can encourage and support pollinator conservation in the eastern US. We also provide background information concerning pollinators and their conservation needs.

Why are Pollinators Important?

At least 80 percent of the world's more than 300,000 flowering plant species rely on pollinators such as bees, butterflies, moths, flies, wasps and beetles to aid in reproduction (National Research Council 2007; Ollerton et al. 2011). Since flowering species are rooted in place, pollinators transfer pollen between plants, thus ensuring that pollen-producing species are able to produce live seed. In return, the insects gain nutrition from pollen and nectars. Every year a honey bee colony consumes between 35 to 75 pounds of pollen and up to 125 pounds of nectar.

It is hard to overstate the importance of pollinating insects to the agricultural systems humans depend on for food and other products. Pollinators account for $15.2 billion worth of agricultural productivity for crops such as almonds. This estimate, however, does not take into consideration the full value of commodities that indirectly benefit from pollination, such as cattle, which are dependent on clover and alfalfa (Calderone 2012). The importance of pollinators for ensuring food supplies is well known, but they also perform other important ecosystem functions such as setting seed for many wildflowers and other plants that occur in forests. A large number of forest tree species depend on the services of pollinators, including many tree species of concern to the Appalachian Regional Reforestation Initiative (ARRI).

Figure 1. A small bumble bee (*Bombus vagans*) on an aster flower growing on a surface mine in Elk County, PA. Photo by Michael French.

Pollinators Under Threat

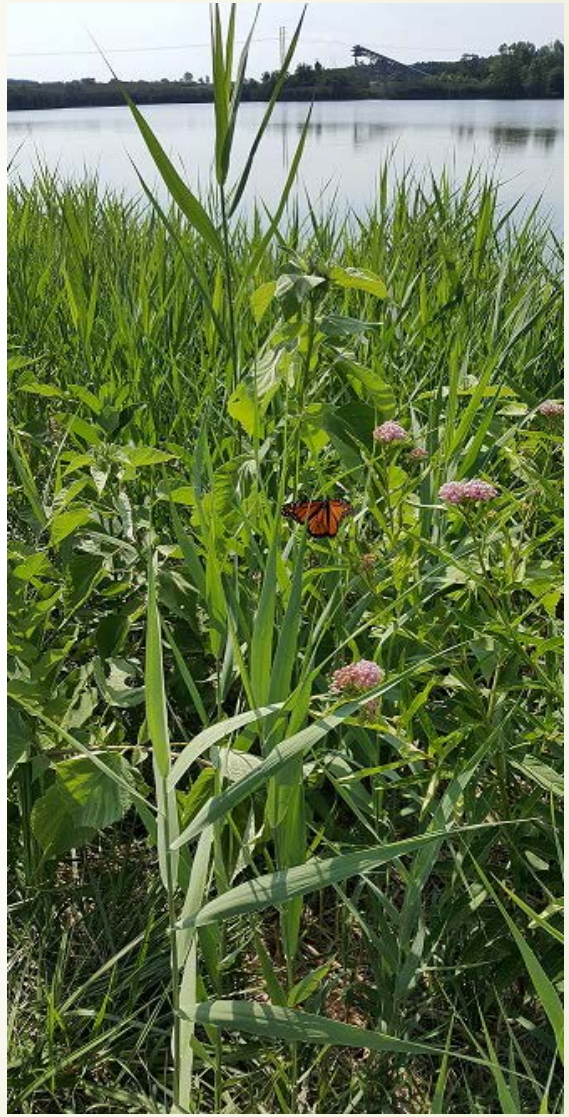
Honey bees are considered the "workhorse" of agricultural pollinators, both in the U.S. (where they were introduced from Europe in the 17th century) and worldwide. Honey bees are challenged today by parasites and pathogens, chemical use in agriculture, and by habitat loss/degradation. A serious biological threat to honey bees is an Asian parasite called varroa mite (NRC 2007). Moreover, large areas of forest ecosystems that formerly served as habitat for honey bees have been lost to various kinds of development, including mining (Sayler 2008, Drummond and Loveland 2010). Declines in many pollinator groups are due to habitat loss, fragmentation, and deterioration (NRC 2007).

Jordan Grove Mine

Title V Current Initiatives

- encourage and support voluntary adoption of native milkweed spp. and pollinator friendly forbs in revegetation seed mixes

- educate operators and consultants about the significance of monarch federal listing and proactive management
  - Ohio partnered with USFWS to present habitat enhancement info at a coal industry meeting
  - utilizing ag field conservation buffers for monarch habitat



Photos courtesy of Larry Reuss, Prairie State Generating Company

Strategies for Improvement of Current Efforts

- BMPs that consider mined lands issues and regulations
- access to cost effective pollinator friendly seed mixes
- erosion control considerations
- increased level of educational outreach
- training opportunities for state RAs via OSMRE
- exploring use of federal grants as incentives for habitat enhancement
- non-profits, universities etc. offering technical assistance to interested operators and consultants

Old Ed Mine

Photo courtesy of Kristi Dodson

Potential Scale of Mined Lands Efforts

- 1,234,624 acres are bonded across TX, WV, OH, OK, PA, KS, KY, MO, AR, IL, IN
- State RA responses:
  - 504,000 acres (IL, AR, IN, KY, OK, WV, MO, TX) *does not reflect PMLU terminology differences, does not reflect PA
  - total acreage is likely higher
- State AML responses:
  - 18,900 acres in AML programs across IN, IA, MO unreclaimed w/ potential
  - OH reclaims apprx. 1,500 acres per year

Vermillion Grove Mine

Photos courtesy of Kristi Dodson

Questions?

Photo Sources:

1.https://www.usatoday.com/story/tech/sciencefair/2017/02/15/monarch-butterfly-mexico-storms/97945470/

2.http://www.nj.com/entertainment/index.ssf/2017/10/monarch_butterfly_migration_season_cape_may.html

3.https://www.dnr.illinois.gov/conservation/NaturalHeritage/Pages/MonarchButterflySummit.aspx

4. https://www.treehugger.com/animals/indescribable-beauty-monarch-butterflies-filling-sky-video.html

5. http://www.factsandopinions.com/dispatches/science/to-protect-monarch-butterfly-a-plan-to-save-the-sacred-firs/

6. https://www.learner.org/jnorth/tm/monarch/sl/pop/index.html

7.http://www.friendsofthewildflowergarden.org/pages/plants/commonmilkweed.html

8. https://www.pinterest.com/pin/398498267002355799/