

## Appendix D: Best Management Practices for the Monarch Butterfly: Greater Appalachian Mountain Region



### ***Incorporate these best practices into your monarch butterfly habitat conservation plan:***

#### **Use Approved Decision Support Tools**

Use the monarch butterfly wildlife habitat evaluation guide (Monarch WHEG) as a decision-support tool to inform the planning process, and to implement a monarch butterfly habitat plan.

- **Why?** The WHEG is the decision-support tool used by NRCS planners and their clients to identify habitat deficiencies, and then to identify alternatives available for monarch butterfly habitat improvement.

#### **Use Time-of-Year Restrictions**

Implementing and managing the plan consistent with an applicable time-of-year restriction ensures best outcomes. Journey North animation maps (<https://journeynorth.org/monarchs>) are excellent predictors of when monarch butterflies will be in the area.

Lands Identified as Good or Excellent Monarch Habitat: The use of habitat rated as *good* or *excellent* is expected to be high. Thus, the risk of mortality associated with disturbance is high in these areas. Minimize monarch mortality associated with normal farm and ranch management activities by minimizing disturbance during the period of the year when the habitat is in use by monarchs.

- **Why?** Curbing activities during peak breeding and migration periods is paramount to achieving best outcomes. Adhering to all applicable best practices in *good* or *excellent* habitat during a time-of-year restriction period helps avoid and minimize larval and adult mortality. Research suggests that some land management activities (mowing or burning) within the time-of-year restriction period can be beneficial to monarchs if conducted strategically to assure that all habitat is not being impacted. For example, a midsummer burn or mowing on a portion of the habitat, will result in younger milkweed plants with higher digestibility. These plants are sought after for egg laying by late season gravid females.

Lands Identified as Poor or Fair Monarch Habitat: Adherence to time-of-year restrictions should not preclude activities being implemented to increase habitat quality on areas rated as *poor* or *fair*.

- **Why?** Activities related to plan implementation or management in habitat with a WHEG rating of *poor* or *fair* will have long-term beneficial effects that will more than replace any short-term monarch mortality resulting from the habitat improvement activities.

#### **Look Before Acting**

To the extent practicable, monitor the habitat for the presence of eggs and larvae before undertaking management activities. The Monarch Larva Monitoring Project provides an excellent monitoring protocol and online training (<https://monarchlab.org/mlmp>). It is especially important to conduct monitoring before undertaking activities within the time-of-year restriction period.

- **Why?** It is not difficult to perform a rapid assessment to detect the presence of monarch eggs and larvae. Foregoing activities (plan implementation or management) until eggs and larvae are absent or in low abundance can greatly minimize mortality and thereby balance short-term adverse with long-term beneficial effects. Monitoring for such adaptive management is an option under NRCS Conservation Practice Standard (645): Upland Wildlife Habitat Management.

### Coordinate Activities with Neighbors

To the extent practicable, use an adaptive, landscape approach by coordinating plan implementation and management activities with neighbors.

- **Why?** Coordinating activities with neighbors may allow for a more effective approach to habitat development and management by staggering disturbances (e.g. mowing or burning) which will better assure successful monarch production in the immediate area.

### Burning

When possible, implement prescribed burning on no more than 1/3 of the habitat, unless suitable monarch habitat exists nearby, or the WHEG rating is *poor* or *fair*.

- **Why?** Prescribed burning is a common management technique used to set back ecological succession and increase the abundance of milkweed and nectaring forbs. Restricting burning to a fraction of the habitat retains suitable habitat, promotes ecological heterogeneity, and promotes abundant breeding and nectaring resources.

When possible, allow fires to burn in a patchy, finger-like pattern within units.

- **Why?** Unburned patches of suitable habitat promote ecological heterogeneity and long-term benefits important to the monarch's life cycle.

### Grazing

Monarch habitat should be fenced from grazed areas. Short-term grazing can be used to target grasses, which can benefit forbs. Monitor the area and move cattle when they begin to forage extensively on the forbs.

- **Why?** Many excellent monarch nectaring forbs are of higher digestibility than are grasses. In these situations, livestock will target these high-quality forbs. Conversely, milkweed is avoided by livestock, and grazing stands of milkweed will have little impact on reproductive habitat. Through a prescribed grazing plan, with monarch butterflies as a consideration, higher quality habitat may be achieved.

### Herbicide Applications

Herbicides are often an essential tool when establishing new monarch habitat. Additionally, herbicides can be a viable management tool following planting and to manage established monarch habitat.

- **Why?** Broadcast application of herbicides is often the most cost-effective and efficient way to prepare existing stands to high quality, species-rich monarch habitat. Depending on the existing cover, aggressive treatment may be necessary. After establishment, individual plant treatment (IPT) can be used to control noxious and invasive species. If grass becomes too dense, the use of grass specific herbicides (graminicides) can be used to release the forb component.

### Mowing and Haying

Do not mow any area more than once every 4-5 years. Mow or hay no more than 1/3 of the habitat per year, and when possible leave patches. The use of individual plant treatment (IPT) to control invasion of woody plants may be required between mowing intervals.

- **Why?** Mowing and haying are common management techniques used to set back ecological succession and control invasion of woody plants. Mowing too often (more than once every 4-5

years) will favor the grass component in the habitat and will reduce monarch nectar plants (forbs). Limiting this activity to no more than 1/3 of the monarch habitat in the area, promotes ecological heterogeneity, and promotes abundant breeding and nectaring resources each year.

Mow at 12-16 inches, but not less than 8 inches. When practical defer mowing until after fall migration.

- **Why?** Mowing benefits monarch habitat because it somewhat replicates disturbance and stimulates new plant growth. Increasing mowing height retains more standing biomass and reduces temporal loss of milkweed and nectar resources. If the objective is to control woody species, mowing lower than an 8-inch height should be considered.

### **Tillage**

Shallow-till no more than 1/2 of the habitat per year, if possible. Leave patches of untilled habitat for the entire year.

- **Why?** Use of a tillage tool such as a disk to break the sod and stir the soil surface to a shallow depth is a common management technique used to set back ecological succession. Tilling a limited portion of the site retains some suitable habitat, promotes ecological heterogeneity, and promotes abundant breeding and nectaring resources. Mowing, burning, grazing or haying may be needed prior to tillage if equipment is not heavy enough to penetrate existing sod. For habitat with the primary purpose of providing reproductive habitat (milkweed), late-season tillage is an excellent tool to increase the density of common milkweed (*Asclepias syriaca*) the following year.

### **Useful Resources:**

#### [Journey North Interactive Maps](#)

- Real-time peak migration tracking.

#### [Integrated Monarch Monitoring Program](#)

- Monitoring protocol, [online-training](#) and datasheets