Jug Bay Wetlands Sanctuary
Meadow Habitat Management Plan

Last time updated: January, 2016

BACKGROUND

Currently, Jug Bay Wetlands Sanctuary has a total of five areas characterized as meadow habitat. These comprehend about 30.9 acres of land (Figure 1). These meadows are:

1. Sanctuary meadow (2 acres)
2. River Farm meadow (9.7 acres)
3. Plummer Lane meadow (4 acres)
4. Back Plummer meadow (4 acres)
5. Front Plummer meadow (11.2 acres)

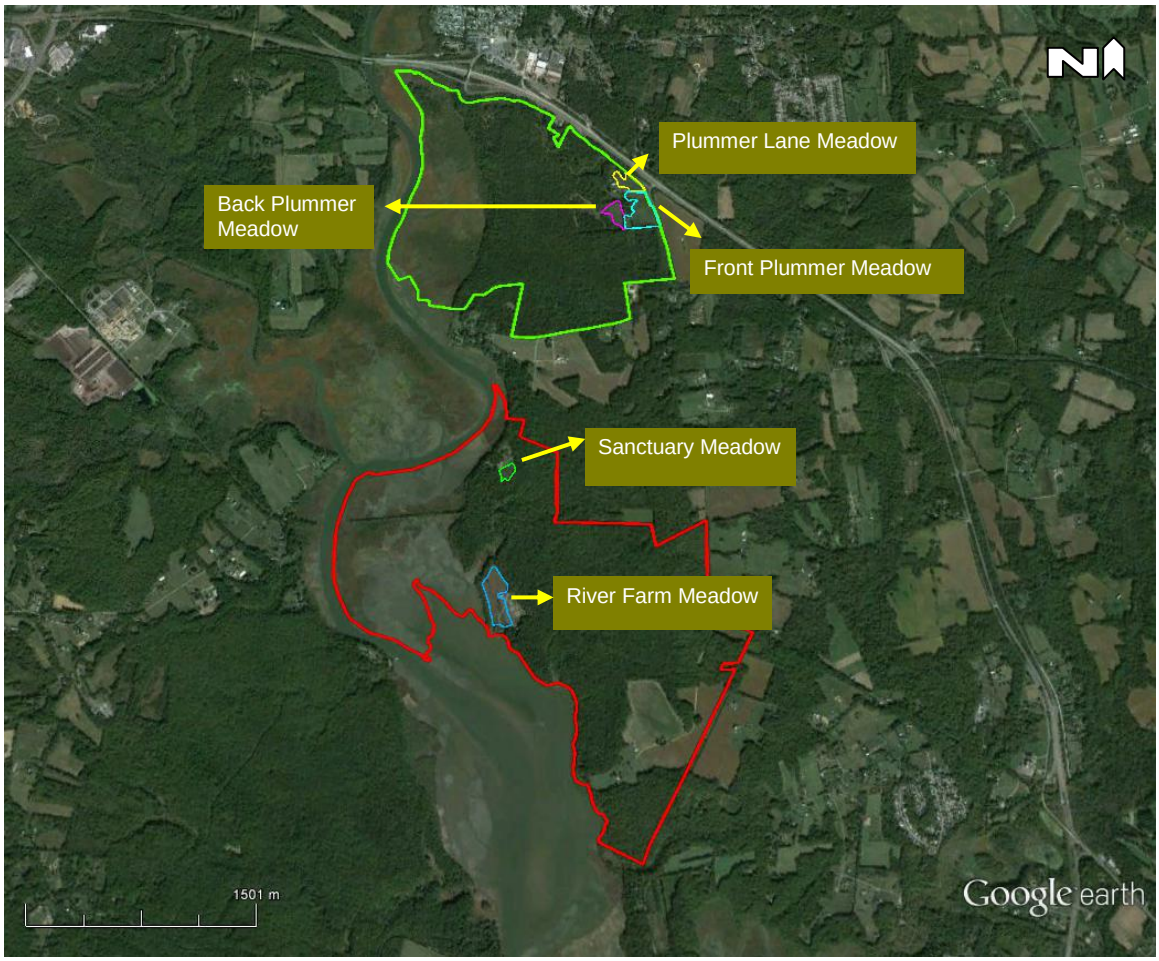

Figure 1. Location of existing meadows at Jug Bay Wetlands Sanctuary.

Meadows are a unique habitat and are very important for pollinator and bird species. Some ecological benefits these habitats provide include:

- Habitat and food sources for beneficial plant pollinators, e.g. butterflies, bees, other insects, etc.
- Food source for bird species and sometimes nesting habitat (e.g., Blue Grosbeaks and Indigo Buntings).
- Habitat protection and food source for other wildlife.
- Protection against soil erosion.

The main management issue affecting Sanctuary's meadows is the establishment and spread of woody plants (invasive and non-invasive), which threatens meadow plant diversity while promoting a transition to forested habitat. For many years, mowing has been used as the primary management practice to maintain our meadow habitat. This plan will embrace a broader approach, where other practices in addition to mowing may be considered for implementation for the management of this important habitat, including manual removals, herbicide application, grazing with goats, and burning.

As a result, the main goal of this management plan is *"to outline the best management practices that can be implemented to enhance and maintain the health and plant diversity of the Sanctuary's meadow habitat".*

MEADOW HABITAT MANAGEMENT GUIDELINES

Regular Maintenance of Meadow Habitat

Mowing is the preferred practice used for the regular maintenance of meadow habitat; however, herbicide application, grazing, burning, or any other technique may be considered to maintain the correct mixture of desired plant species or to reduce unwanted (invasive) species.

Following there is a list of considerations regarding the implementation of mowing for the regular maintenance of meadow habitat:

1. Full mowing (mowing of an entire meadow) is conducted once each year during early spring, between early-mid February and mid-March. Limited mowing is cost effective and provides significant ecological benefits:

    a. Maximizes the number of months that the meadow provides valuable wildlife habitat.
    b. Seeds and berries persist as long as possible on erect, dried plant stalks, thus providing maximum food for birds and other wildlife.
    c. Mowing is scheduled to avoid bird and turtle nesting seasons and to avoid the season when turtle hatchlings emerge from underground nests (mid-March through early November).
    d. Reduces disturbance of birds during nesting season (May to August).
    e. Limited mowing reduces the accidental mortality to wildlife that occurs when mower blades strike turtles, snakes, birds and small mammals.

2. Instead of full mowing, partial mowing may be implemented in a given year and in a given meadow as determined necessary. Partial mowing consists in mowing one-third to one-half of a meadow during early-mid February and mid-March and then the other half during mid-July. This mowing schedule guarantees some plant coverage for wildlife at all times. However, if the presence of invasive and woody plants is prominent in the meadow, partial mowing may not be the best practice regarding their control.

3. When mowing, use a cutting height of at least 8" - 12" if possible; this is a good height to leave some cover for wildlife.

4. Maintain regular mowing of trails around the meadow and sometimes across the meadow to permit easy access to visitors, as well as to facilitate research and education activities.

5. If appropriate, a transitional zone from grasses to shrubs may be developed and managed to provide migration paths for wildlife from forest to meadow habitats.

6. As possible, meadows will be surveyed/monitored to obtain information regarding plant species composition, including the presence and abundance of invasive species.

Controlling the Spread of Woody Plants and Invasive Species on Meadows

As mentioned above, the main threat to Sanctuary's meadows is the establishment and spread of woody plants (invasive and non-invasive). Different management practices are identified below to address this issue. These practices may often be implemented together, particularly in severely impacted areas.

Mowing

- An additional mowing and/or spot mowing will be considered as one management option to control the growth and expansion of woody plants and invasive species in affected areas. As possible and as needed, goat grazing and/or herbicide applications may also be implemented in conjunction with mowing, particularly in severely impacted areas.

- The need to conduct spot mowing and/or an additional full mowing will be determined in a case by case basis for each of the meadows. Staff-lead surveys and visits of meadow habitats will provide the information needed to inform the practice to be used.

- Depending on the severity or invasion level (moderate or severe), two different options for implementing spot and/or additional mowing will be considered (the level of invasion will be determined based on staff knowledge and experience):

    - Moderate invasion: In addition to the spring mowing, conduct targeted/partial spot mowing in affected areas. Spot mowing will be done once a year during the summer (mid July). However, if needed, a second spot mowing can be done between mid-November and December. In addition of using regular mowing equipment, weed-whacking could also

be employed to help control the moderate invasion of woody/invasive plants within a meadow.

- Severe invasion: Conduct two full mowings during the year, one during the spring (regular mowing) and an additional one during the summer (mid July). Repeat this for at least two years or until a noticeable control of invasives is achieved. The second mowing in July will still provide sufficient time to establish winter cover.

Management of Trees and Saplings Within and Around Meadows

All Sanctuary meadows are fully or partially surrounded by forest. In addition, some of them have within the meadow itself either small areas of trees, tree lines, or isolated trees that divide meadow area, compete for water and nutrients, and/or facilitate the spread of woody seedlings and invasive species.

To address this issue trees and tree saplings found within a meadow would be considered for removal, and to limit re-sprouting, the stumps will be manually painted with a herbicide (as feasible), following AA County recommendations and regulations. For better results, tree/sapling removals and herbicide painting application would occur during the fall/winter. Manual removal of small woody seedlings and saplings and invasive species can take place all year round to help with this effort.

Herbicide Applications

This plan follows a conservative approach for the use of herbicides, thus, targeted applications are preferred to minimize impact to other meadow plants. Herbicide applications will be implemented in combination with mowing and/or goat grazing.

After a field visit, following are some recommendations provided by a county herbicide applicator expert, regarding the application of herbicides to control the spread of woody plants and invasive species:

1. The stump of any tree/sapling cut should be chemically treated with a triclopyr-based herbicide or Glyphosate to kill the roots and limit re-sprouting. To be effective, this application needs to occur soon after the tree/sapling has been cut. Otherwise, wait until late spring or summer of the following year and spray re-sprouts with a different formulation of same active ingredient to ensure death to the entire woody plant system.

2. As needed, in late spring or early summer after full leaf-out, begin walking through the meadow with a backpack sprayer selectively spraying only nuisance tree whips with a selective herbicide that would begin the control of woody material with minimal impact on grasses and other herbaceous plants. Several "passes" through the meadow may be needed during the growing season to ensure hitting everything.

Any herbicide application will be done by properly trained and certified Sanctuary staff, and following AA County regulations. Appropriate signage before and following applications will be displayed as required.

Grazing Using Goats

Another management technique that is being considered to control the growth and spread of woody plants in Sanctuary meadows is the use of goats. This option is being explored as a collaborative effort with the FOJB. More information on its potential implementation will be provided once details are better defined.

Burning

Burning is another option used for the management of meadow habitat and invasive control. For Jug Bay, this is not a priority option at the moment mainly due to the logistical effort this management technique requires. However, if we consider implementing burning, all the necessary information and technical support will be researched and requested as needed.

Enhancing Meadow Habitat

Disking

Disking can be used as a technique to enhance meadow habitat by disturbing the ground and promoting the growth of flowering plants. Disking would be more effective if done deeper and followed by the removal of thatch. After disking, seeding of the area may also be helpful to increase plant diversity.

Before implementing in large areas, disking would be done first as an experimental approach. Strips of about 8 feet wide will be used as tests; results will be monitored and recorded to determine success. If possible, the equipment needed for disking would be borrowed from a local farmer.

Seeding / Plantings

If seeding is applied in any of the meadows, only NATIVE, east coast, warm season grasses and NATIVE, east coast, meadow plants will be used. We will avoid the use of SHA roadside mixes as they tend to be mixed with non-natives.

We will also consider the following: for many plant species native to eastern North America, the availability of many nutrients essential to plant growth is limited in soil with a pH less than 4.5 or greater than 7.5. Ideal pH is 5.5-7.0. When pH is outside this range, we will choose species tolerant of the site's pH (the pH can be raised with lime or lowered with sulfur).

Soil samples from our different meadows would be collected and sent to a laboratory for pH analyses to determine their viability for meadow plant growth. This is important to inform any seeding or planting efforts.

Monitoring Meadow Habitat

Monitoring the plants and wildlife found and/or using the meadows is an important part of

meadow management as it helps to better inform the implementation and evaluation of success of different management practices. As a start point, some baseline information on meadow plant diversity exists from past bioblitz and from the plant collection found in the Sanctuary herbarium.

In 2016, a rapid assessment of the meadows would be conducted to (1) estimate the dominance level by invasive species and woody plants; (2) determine dominant native meadow plants; and (3) identify the presence of any potentially rare or endangered species. In the longterm we would like to develop an easy to use picture guide of the Sanctuary meadow plants that would be available to the public.

In addition to the monitoring of plant species, in 2014 an effort was initiated to monitor the bird population using the different meadows. This effort was not fully implemented, but we are hoping to do so in 2016 with the support of volunteers. Data collected from this effort is available on eBird (http://ebird.org/content/ebird/).

Some information on the different species of herps that have been observed in these habitats would be drawn from visitor's wildlife sightings log data and hopefully complemented with some monitoring coordinated by volunteers.

Finally, we would like to complement these monitoring efforts with the monitoring of pollinator species visiting the meadows. An initial effort was done by STEM students during the summer of 2015, but we hope to implement a longer term effort with the support of volunteers.

RESOURCES (More to be added…)

Chesapeake Wildlife Heritage. http://www.cheswildlife.org/category/meadow-articles/

How to grow a meadow. Wildflower Farm. http://www.wildflowerfarm.com/index.php?route=product/category&path=84

Meadows in Southeastern Pennsylvania. https://natlands.org/wp-content/uploads/downloads/2013/01/Meadows2009-07Page.pdf

Monitoring Meadow Vegetation Response to Restoration in the Sierra Nevada. http://www.americanrivers.org/assets/pdfs/meadow-restoraton/vegetation-protocol.pdf?1bd6dd

Native Warm Season Grasses. http://nativegrasses.utk.edu/publications/PB-1752.pdf

Native Warm Season Grasses. Wildlife Considerations When Haying or Grazing Native Warm-Season Grasses. http://nativegrasses.utk.edu/publications/SP731-H.pdf

Pollinators in Natural Areas. A Primer on Habitat Management. http://monarchjointventure.org/images/uploads/documents/pollinators_in_natural_areas_xerces_society.pdf

Supporting the Health of Honey Bees and Other Pollinators. https://www.whitehouse.gov/sites/default/files/docs/supporting_the_health_of_honey_be

es_and_other_pollinators.pdf

Vegetation Management. http://www.montgomeryparks.org/PPSD/Natural_Resources_Stewardship/veg_management.shtm

Wratten S.D., et. al. 2012. Pollinator Habitat Enhancement: Benefits to other ecosystem services. Agriculture Ecosystems and Environment, 159: 112-122.

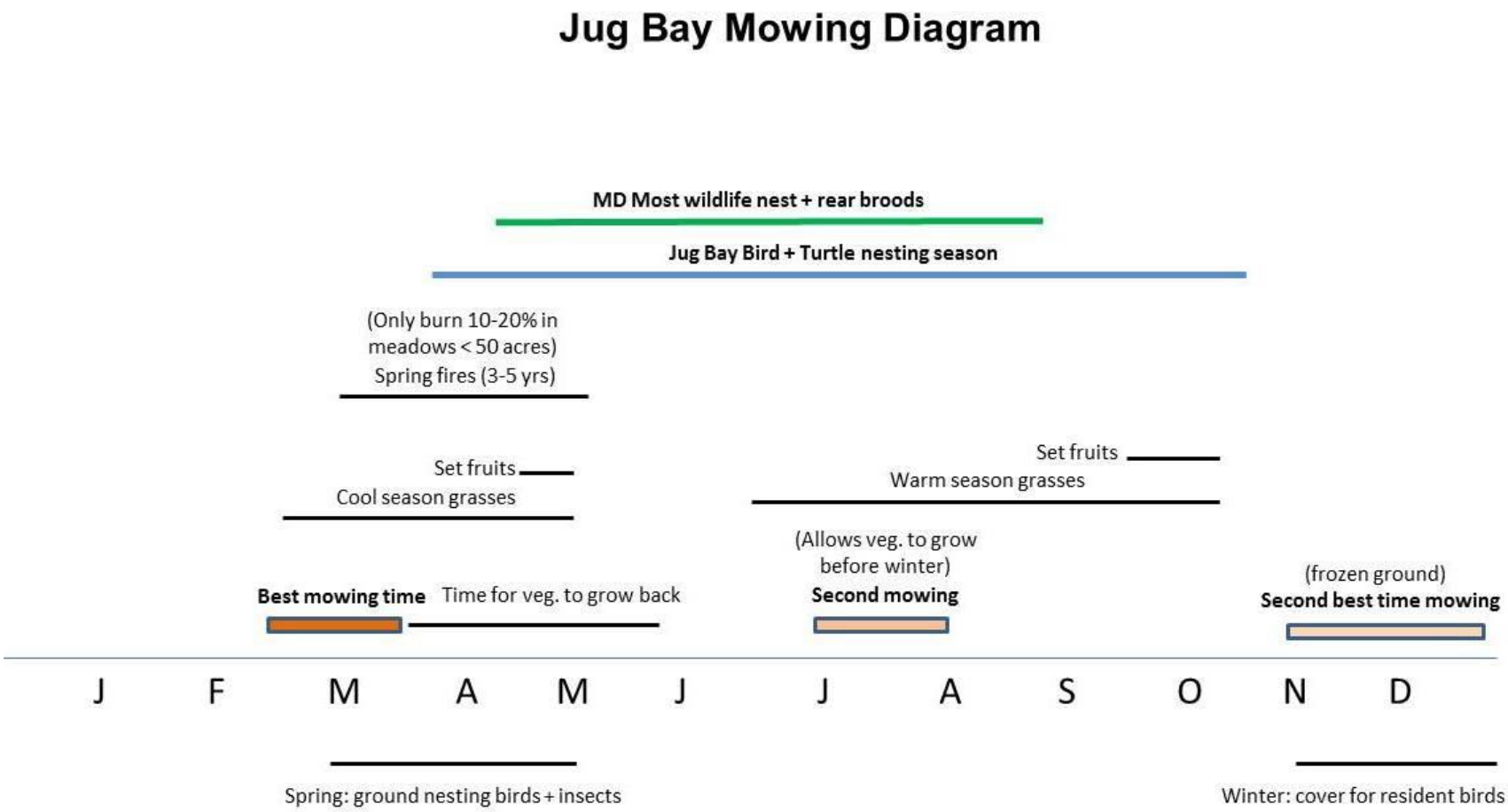

Figure 2. Diagram showing the best proposed times to conduct mowing during the year.