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Initial Recommendations for Bird and Pollinator Friendly Management Intervale Center and Farms

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Introduction and Site Background

This report is an initial habitat assessment and list of preliminary recommendations for the Intervale Center and any of the independently operated farms leasing and working land on the property in Burlington, Vermont. The purpose of this report is to describe current site conditions and offer ideas for management options to guide the development of future conservation plans where there is interest and practicality to implement.

Audubon Vermont and the Gund Institute at the University of Vermont have partnered for a [Bird and Bee Friendly Farming](#) Initiative to promote the creation and improvement of on-farm habitat for birds and pollinators and to document the ecological and economic benefits of those practices on demonstration farms. The initiative focuses on marginal habitat out of production (i.e., field edges, hedgerows, and fallow fields) as well as grasslands, forest patches, and riparian areas. In the agricultural landscape, these spaces provide essential foraging and breeding habitat for diverse bird and pollinator communities. The presence of structurally heterogeneous hedgerows that incorporate a mix of native tree, shrub, and perennial species can increase the abundance and diversity of pollinator and bird species that in turn provide important on-farm services, such as crop pollination and pest control. Wildlife structures, such as bird nesting boxes, bee houses, and standing dead trees, also increase the presence of insect predators that prey on pests in crop production systems. The Bird and Bee Friendly Farming initiative intends to offer recommendations that do not conflict with farm objectives, therefore, it is recognized that landowner goals may take priority over these recommendations. The Intervale Center and its farmers are likely already practicing many bird and bee friendly techniques, so this report hopes to identify and prioritize additional steps that could be taken. To date, we have met with farmers and land managers from the Intervale Center, Intervale Community Farm, and Sugar Snap Farm and plan to have conversations with other farms at the Intervale Center in the near future.

The Intervale lies in the Lower Great Lakes/St. Lawrence Plain Bird Conservation Region (BCR 13), which encompasses a narrow, low-lying plain stretching from the Champlain Valley west to Northeastern Ohio and surrounds the St. Lawrence River, and lakes Erie, Ontario, and Champlain (Figure 1).

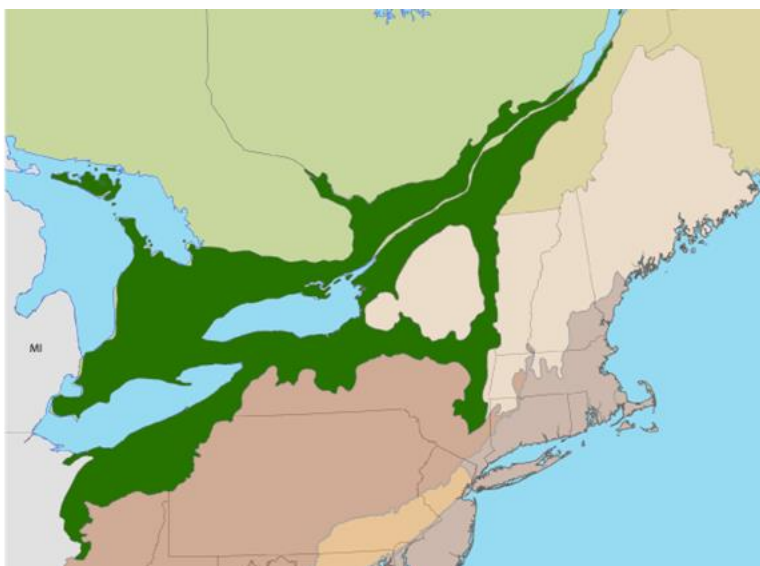


Figure 1. The Lower Great Lakes/St. Lawrence Plain (BCR 13) shown in green.

This BCR is comprised of extensive wetland ecosystems, accompanied by a mosaic of forests, agricultural fields and early successional habitat (abandoned fields reverting to shrubland or young forests). The Champlain Valley of Vermont and New York has been identified as a Focus Area within BCR 13 because its mixed habitat types and open water are home to a number of BCR13's [priority bird species](#).

The larger landscape surrounding the Intervale is primarily urban and residential development to the south and public lands to the north and west (City of Burlington-owned McKenzie Park, Winooski Valley Park District's Ethan Allen Homestead, and the state Intervale Wildlife Management Area), which may have similar conservation goals that [Burlington Wildways](#) is coordinating efforts for. The 360-acre Intervale Center property is uniquely situated on the floodplains of the Winooski River close to Lake Champlain, which leaves the area prone to frequent flooding, especially in the spring and during extreme weather events. A valuable combination of habitat heterogeneity, a native plant nursery owned and operated by the Intervale Center on-site, flowering crops from agricultural working lands, sandy soil ideal for ground nesting bees, and warmer and more stable temperatures in the Champlain Valley relative to the rest of the state of Vermont all contribute to the high abundance and diversity of pollinators and birds enjoyed on site.

The property is comprised of fallow and actively managed fields for agriculture, wetland zones, mature hedgerows, and a unique Silver Maple Ostrich Fern Clay Floodplain Forest along the riparian edge of the Winooski River. The habitat types at the Intervale support bird species characteristic of grasslands, early successional habitat types (shrublands and young forest), riparian areas, wetlands, and mixed forests. Priority bird species identified by Audubon Vermont that are particularly well suited to these habitat types include the Northern Harrier, American Kestrel, Osprey, Peregrine Falcon, Bald Eagle, Tree and Barn Swallows, and the Northern Flicker. The Intervale Center is a known hotspot for pollinator diversity and abundance, with a robust collection of data expanding over ten years and some of the best understanding of pollinator populations for the state of Vermont.

Audubon staff recently surveyed the property on 9 June, 2021, when avian breeding activity was high and as a result probability of detection was also high. Appendix A at the end of this report lists confirmed observations of bird species on site, including those detected during surveys by Audubon staff, sightings by Intervale Community Farm staff, or reported to [eBird](#) since 2000. Observations of three priority conservation species—the American Kestrel, American Woodcock, and Short-eared Owl—have not been reported at the Intervale to date, but may appear if habitat is managed for them. Bees have been surveyed at the Intervale since 2013 and are listed in Appendix B. Audubon staff visited again on 30 August, 2021 for a vegetation assessment.



General Considerations for All Habitat Enhancement

- Size: *The larger the area, the better.* Audubon and Gund recommend setting aside at least a 30-foot-wide area when planting field edges, ditches, hedgerows, or riparian areas. Avoid large gaps between habitats. Small bees travel no more than 10 meters from their nest to forage while others may travel 70 meters. In contrast, honey bees can fly up to 2 miles to forage.
- Bloom times: *Plant for all of Vermont's blooming seasons.* To ensure that pollinators and birds can stay in the area and reproduce, they will need food to support them throughout the entire growing season. For example, while most bumble bees are active throughout the whole growing season (April through frost), specialist bees might only be active for a 2-week period when their specific plants are in bloom then return underground or back to sumac and raspberry stems.
- Complexity: *The greater the complexity of structure the better.* Mixed height trees and shrubs interspersed with open areas of native grasses and forbs are ideal.
- Diversity: *Diversity is the key to survival.* Many of the pollinators that are most threatened have evolved specifically to feed on one type of native plant or a small group of plants. The greater number of plant species provided, the more diverse the pollinator population will be.



Invasive species removal





As with many properties within the Champlain Valley, especially those currently in agriculture or with past agricultural activity, invasive plant species present a unique challenge. Although invasive species control is always a management recommendation and will benefit multiple native species, the purpose of this report is to offer additional recommendations beyond that. Invasive species create suboptimal habitat for birds and bees, outcompete and replace native species they depend on, and provide less nutrition. Wild parsnip, reed canary grass, multiflora rose, goutweed, garlic mustard, common buckthorn, giant hogweed, purple loosestrife, Japanese honeysuckle, and other invaders are all present on the Intervale property. Logistics of eradication are extremely difficult due in part to the distribution of the plants on the property as well as the presence of seed sources on adjacent properties. The Intervale Center has coordinated an extensive, innovative, volunteer-driven invasive species management project and the commitment to this effort is commendable and the continuation of this work is vital. Going forward, Audubon Vermont and the Gund Institute may be able to identify particularly sensitive areas for birds and bees that should be prioritized for management and protection.

Native Superstar Plants

Some native plants are more powerful than others when it comes to supporting pollinators and birds. Encourage the growth of established native plants in the area and supplement with some superstar natives listed below.

FAVOR NATIVE TREES	FAVOR NATIVE SHRUBS	FAVOR NATIVE PERENNIALS	REMOVE INVASIVE PLANTS
Oak –Oaks stand out for their biodiversity potential. They serve as larval hosts for hundreds of species of insects, which in turn provide reliable forage for birds. Host to 462 species of caterpillars. Blooms April-May.	Shrub Willow - Willows are often the only food sources for early-emerging pollinators. A tremendous diversity of shrub willows are native to Vermont. Host to 371 species of caterpillars. Blooms March-May.	Joe Pye – An excellent, long-blooming nectar source in mid-summer. Host to 42 species of caterpillars. Blooms July-September.	Common buckthorn – This aggressive invasive shrub leafs out earlier in the spring than native species, re-sprouts when cut back, and the seeds remain viable in the soil for several years. The fruits have a laxative property which both spreads the plant and limits birds' ability to absorb nutrients.
Black Cherry - Cherries are second only to oaks for the number of species of insects that they support. Chery fruits also feed the birds. Host to 390 species of caterpillars. Blooms April-May.	Alder – Another essential, early-blooming shrub. Provides food and cover for goldfinches and grouse. Thrives in wet soils. Host to 222 species of caterpillars. Blooms in March.	Aster - Provides late-season pollen and nectar to foraging insects. Birds feast on the seeds through the fall and winter. Host to 99 species of caterpillars. Blooms August-September.	Japanese honeysuckle – Takes over and crowds out natives. Produces thousands of berries with several seeds each that can remain viable for 3-5 years. Birds will eat the sugary fruit, but it's not nutritious or fatty enough to sustain long flights during migration.
Birch – A favorite tree for birds to forage for insects on the bark. Birch seeds are an important food source for birds. Host to 354 species of caterpillars. Blooms April-May.	Dogwoods – Berries of different species of native Vermont dogwoods ripen throughout the summer, providing a steady supply of fruit for birds. Blooms April-May.	Goldenrod - Provides even later-season pollen and nectar to foraging insects. Birds feast on the seeds through the fall and winter. Not responsible for seasonal allergies. Host to 125 species of caterpillars. Blooms August-October.	Reed Canary Grass – This non-native grass can make a field unsuitable for nesting grassland birds, and because it can outcompete native grasses, it can make it difficult to establish new plants where the grass is present.
Red Maple – One of the first flowers to bloom in the spring. Red maples flower every year, providing a reliable food source for early pollinators. Host to 276 species of caterpillars. Blooms March-April.	Blueberries – Delicious for humans as well as birds. Host to 276 species of caterpillars. Blooms in May.	Sunflowers – While most are not native to Vermont, sunflowers are a great larval host and a favorite high-fat seed source for birds. Plants will self-seed from year to year, but are an annual. Host to 60 species of caterpillars. Blooms July-September.	Wild Parsnip – This invasive forb can take over grassland and edge habitat and outcompete native forbs and grasses. The plant is toxic to humans and livestock.

Note: Two native **sunflowers** growing at the Intervale with importance to consider.

Jerusalem artichoke (<i>Helianthus tuberosus</i>)	Woodland Sunflower (<i>Helianthus divaricatus</i>)
Also called sunroot, sunchoke, wild sunflower, topinambur, or earth apple, this species is abundant at the Intervale and growing wild. It's a great pollinator plant and cultivated as food for its tuber, which is used as a root vegetable. Perhaps there is interest in maintaining and cultivating this species?	Also called rough sunflower. Discovered recently at the Intervale, this supposedly rare species prefers sandy soils, is a favorite nectar plant for the federally endangered Karner blue butterfly. It may be worthwhile to determine how widespread it is and protect it.
 ©Laurence Mouton	 ©Paul Fenwick
 ©New Hampshire Fish and Game	 ©Peter Friedman

Shelter for Birds and Bees

- Snags – or standing dead trees— benefit multiple wildlife species. If safe, leave snags standing. Mason bees and leafcutter bees will use abandoned beetle holes to nest in. Carpenter bees will construct their own nests by burrowing into the dead wood. Woodpeckers excavate nesting cavities and a wide range of birds, including owls, chickadees, and Tree Swallows, will use old and abandoned cavities to nest.
- Woody Shrubs – Many native bees spend the winter inside the stems of plants and branches of shrubs such as raspberries, blackberries, and sumac. These shrub species tend to spread quickly and then back can actually benefit bees, which tend to prefer broken or cut stems since the softer interior is easier to burrow through. Birds can also use the broken stems for nest building in the spring. Many bird species prefer to nest and feed in the dense foliage of woody shrubs, especially birds that specialize in early successional habitat.
- “The messier, the better” – Birds and bees prefer “messy” habitats. Piles of scrap wood, logs, leaves, stone walls, rocks, and mounds of soil are all great places for solitary bees to nest and for bumblebee queens and other insect larvae to spend the winter. Birds use these sites to forage for food and utilize brush piles for shelter from predators and the cold.
- Bee Houses – [Nest blocks](#), or “bee houses,” are very easy to construct and are also widely available commercially. They can be as simple as holes drilled into a piece of scrap wood, or they can be specifically designed to house many different species at once. Be sure to place them near (within a few meters of) plenty of flowering plants, and if using multiple nest blocks, be sure to spread them out to avoid attracting predators. Nest blocks should be cleaned each year once the holes have been abandoned to reduce transmission of diseases or parasites.
- Bird Nest Boxes, Towers, and Perches – Like bee houses, bird nest boxes are easy to construct and are widely available commercially. Consider erecting nest boxes for birds like American Kestrel, Tree Swallow, and Eastern Bluebird - [swallow and bluebird boxes](#) can be placed along fence lines and [kestrel boxes](#) should be put in a prominent tree near the forest edge or in a field. Boxes should be cleaned every spring. You may also want to consider building a [Chimney Swift tower](#) or [T-bar platforms](#) to encourage raptors to perch.
- Bat Boxes and Towers— Bats also serve as pollinators, seed dispersers, and pest control by eating insects, namely mosquitos. Like many bird and bee species, bats are also declining, with several species in [Vermont](#) listed as endangered or threatened. Provide shelter by installing a bat [box](#) or [tower](#). Structures should be placed 10 to 20 feet high in open areas that receive at least 8 hours of direct sunlight. Houses mounted on buildings are preferred to moderate the internal temperature of the chambers and provide some weather protection. Try to avoid areas near artificial lights or mounting to tree trunks because those areas receive less sun, branches make it harder for bats to enter and exit, and predators have easier access. Clean out any wasp nests in the late winter before the bats return and repaint structures black as color chips or fades over time.



Left to right: Pileated woodpeckers in natural cavity nest, American Kestrel box, bee house, swift tower, Red-tail hawk on T-bar

Management Options

Management options are provided for each habitat unit, which for the purpose of this report, have been divided into four general categories: 1) fallow and open fields, 2) hedgerows, 3) riparian areas/floodplain forest, and 4) small (<2 acres) unused field edge patches (Figure 2.). At the Intervale, birds are most commonly observed along the road and tree lines, along the river, and in hedgerows between fields. Songbirds come early in the season and raptors appear later in the season. Bees are concentrated near the Intervale Center's conservation nursery early in the season where they have access to early-blooming plants, such as willows, and will disperse to other flowering plants and crops later in the season. With this in mind, general goals and habitat components to achieve include greater structural diversity within habitat units and greater spatial distribution of early-, mid-, and late-blooming native species to enhance habitat quality and offer food and shelter resources over the duration of the growing season evenly across the property.

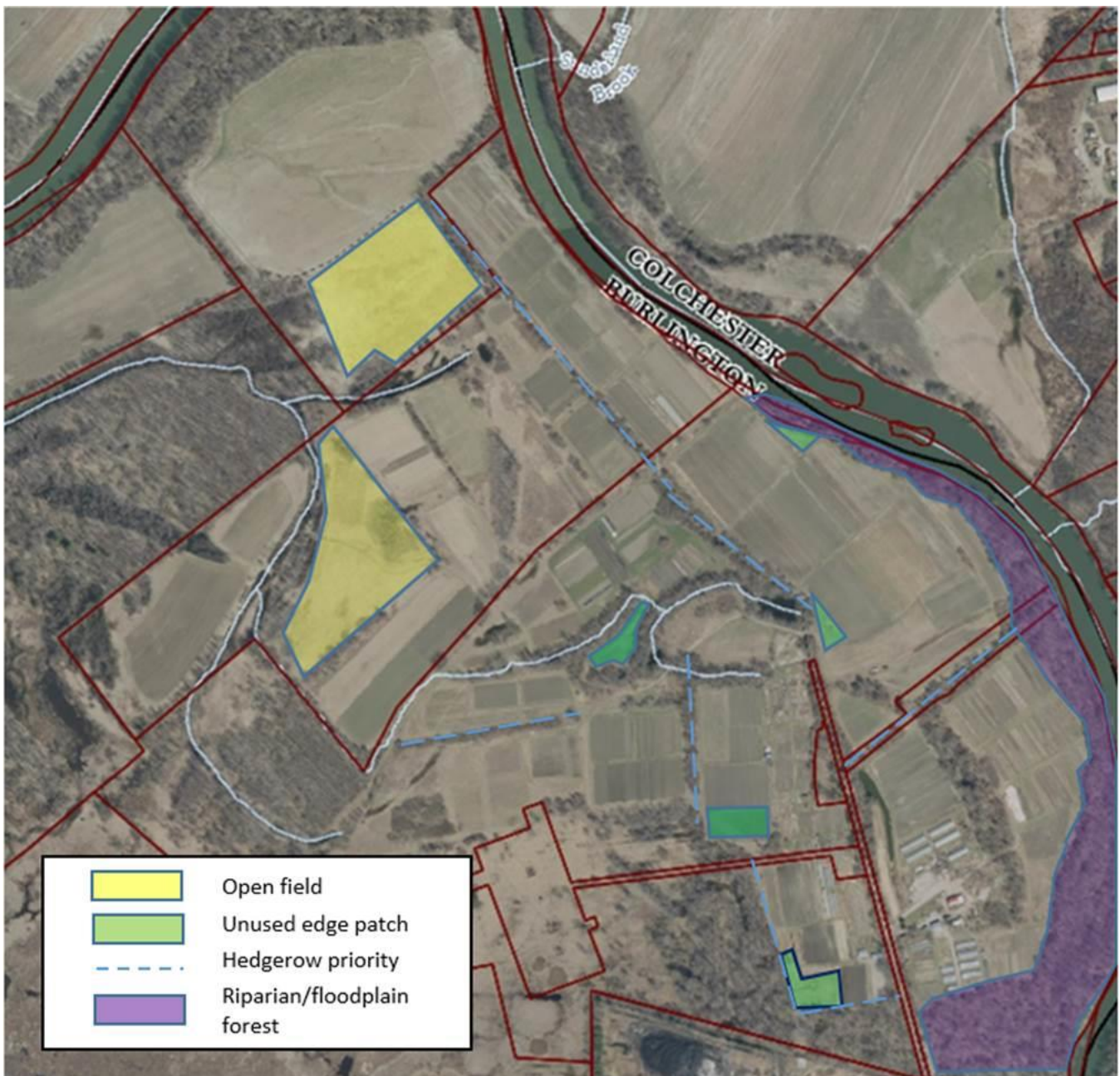


Figure 2. Map of Intervale Center parcel and 4 habitat units with potential identified areas for management.

Open/Fallow fields

Assessment of current habitat conditions:

Typically 5-6 acres are left fallow per year on the Intervale Community Farm and are planted with cover crops such as winter peas, red/sweet/alsike clover, white dutch, winter rye, oats, barely, or occasionally buckwheat. These fields (in yellow on the map) are invaded by reed canary, spotted knapweed, and others. The most practical enhancement of these fields while maintaining current uses likely would be to alter the mowing regime and cover crop composition to better support birds and pollinators while still fixing nitrogen and producing organic matter.

Management recommendations:

Option A— Adjust cover crop composition and mowing regime to support birds and pollinators

- *Add beneficial natives to the mix.* Add pollinator seeds at a 5% rate to a native dominant mix or plant ‘bridge patches’ of pollinator plants in fields to help them travel farther distances (see ‘[Cover Cropping for Native Pollinators](#)’). A before and after study could be conducted for each method to determine success if interested. An ideal pollinator mix includes native perennials that bloom throughout the duration of the growing season. A few sources for seed mixes: [American Meadows](#), [Minnesota Native Landscapes](#), and the [Xerces Society](#).
- *Consider tallgrass prairie mixes.* These are widely available and somewhat affordable in Midwest states. They typically include species that are native primarily to the Midwest and Great Lakes region, but some are also native to Vermont or naturalized to the northeast. [Prairie Nursery](#) and [Prairie Moon Nursery](#) are both good seed sources.
- *Delayed mowing for the birds and bees.* For open fields that are never used in production, perform a delayed cut every 1-2 years after the primary nesting season to maintain open field habitat. Optimally, mowing should be completed after August 1st to maximize plant diversity, but could be as early as July 15 and not later than August 15 to reduce invasive species dropping seed. This regime will allow the grasses and forbs to mature so as to attract the greatest diversity of insect food resources. Delayed mowing will allow obligate grassland-nesting birds to complete their breeding season.
- *Soften the edges.* If possible, maintain an uncut buffer of shrubby vegetation as the field transitions to the forested portions of the property. Transitioning from field to forest with a “soft” buffer of early successional shrub species can be a productive area for many bird species.

Option B – Allow portions of the area to grow into shrubland habitat and maintain on a rotational basis

- Plant clusters of flowering and fruit-producing native shrubs in islands of approximately 15 feet by 30 feet. The island could contain a single tree surrounded by ~10 shrubs of mixed species. Shrub willows, alders, dogwoods, and viburnums (especially high-bush cranberry, serviceberry, elderberry, and blueberry) are excellent choices for nectar, fruit, and hosting high numbers of caterpillars that are essential for feeding growing nestlings.
- Aim for a minimum of 10-30% shrub and young tree cover interspersed with a mosaic of grasses and forbs.
- When saplings reach a diameter of 2-3 inches and shrubs reach 10 feet or more, up to one third can be cut as infrequently as every 3-5 years. Leaving some areas undisturbed every year (i.e., brush hogging in thirds) will provide cover and food for species while disturbed areas regenerate.
- Mow around the patches at the end of the season or when ground is frozen if too wet in order to keep box elder from establishing stands. Target non-native shrubs such as common buckthorn and Japanese honeysuckle when brush hogging. Retain orchard fruit trees such as apples and pears where applicable.
- Retain any existing dying/dead woody tree species as cavity trees.

Option C – Target management for grassland birds

- Adjacent to the Intervale Center's northern property line is McKenzie Park, a parcel owned by the Burlington Parks, Recreation, and Waterfront Department, that Audubon VT has identified as having potential to support grassland birds. While the Intervale does not have control over this parcel, it might be possible to manage activities in conjunction with the Intervale if both parties were interested in coordinating.
- Harvest hay field after July 15th. If harvesting is needed prior to this date, the cut should be completed before June 1 and after a 65-day waiting period. Cutting areas to a height greater than 8 inches tall will also reduce machinery mortality of obligate ground-nesting grassland birds.
- Remove grass after each cutting to provide the best conditions for re-growth. Birds will settle in greener fields in the spring.

Additional options to consider:

- Build and install a [Chimney Swift tower](#) to provide a roosting structure for this declining species similar to the tower installed at [Oakledge Park](#) in Burlington.
- Erect and maintain nest boxes to provide possible nesting habitat for cavity nesting species such as Eastern Bluebirds and Tree Swallows and American Kestrels. Boxes should be cleaned every spring.
- Where applicable, maintain old fence posts to provide perches for singing male grassland birds.
- Install T-bar perches to encourage use by raptor birds such as Osprey, Red-tailed hawks, American Kestrels, and owls.
- Build and install bat boxes or towers.
- Manage the invasion of wild parsnip and other invasive plants where necessary.

Hedgerows

Assessment of current conditions:

Most hedgerows between fields and along forest edges are dominated by mature trees at a single canopy height with few mid-age trees or shrubs. Box elder, cottonwood, silver maple, hackberry, and green ash are common native trees; black willow and staghorn sumac are occasional natives; and riverbank grape and Virginia creeper native vines blanket many trees.



Management recommendations:

- Soften the hard field edge by not mowing as closely to the tree line and creating a 10–20-foot transition zone, allowing mid-height shrubs and trees to grow in.
- Create vertical and horizontal structural diversity within the hedgerow by cutting a few large trees at varying ~15-50 foot intervals and by “punching in” to the uniform straight edge with a brush hog or grinder.
- Selectively remove invasive woody plant species while retaining goldenrod, milkweed, and jewelweed understory.
- Leave snags where safe and install bluebird/tree swallow boxes and bee boxes along fence lines.

Riparian Areas/Floodplain Forest

Assessment of current conditions:



The Intervale resides on a floodplain that contains wetlands, small ephemeral streams within the productive landscape, a small pond along the road, and a riverine forest along the Winooski shoreline. This mix of habitat types is ideal for a suite of bird and pollinator species dependent on water-associated resources and benefits numerous other wildlife species. Hackberry, silver maple, and cottonwood are the main large tree species, wood nettle, ostrich fern, and invasive goutweed occupy the shaded forest floor, with little mid-story vegetation and Japanese knotweed is prevalent along the sandy riverbank. It is

imperative this riparian area remain as wide and intact as possible to function as a buffer between river and field to curb the effects of flooding and to intercept surface-runoff. Effective long-term streambank integrity can provide habitat, build biodiversity, store carbon, retain nutrients, and support clean water. Due to the presence of public recreational trails, frequent flooding, and the proximity of agricultural field edges, it is not practical to expand this area with plantings for example, so the best recommendation is to maintain what is already there.

Management recommendations:

- Leave snags where safe and maintain as large a riparian buffer as possible.
- Continue the control of invasive species such as Japanese knotweed and goutweed.
- Potentially coordinate and align goals with the Vermont State Fish and Wildlife Department on wetland and floodplain forest restoration methods planned at the 322-acre Intervale Wildlife Management Area on the other side of the Winooski River. In some experimental plots, they have planted or will plant stands of disease-tolerant American elm and may be disk between trees to encourage natural seed recruitment and growth.
- Consider erecting nesting platforms for Ospreys or nesting boxes in wooded areas near ponds for Wood Ducks.

Small (< 2 acres) unused edge patches

Assessment of current conditions:

There are several small and irregular-shaped areas scattered throughout the Intervale property adjacent to fields that are not currently being used (potential areas identified in green in Figure 2 and some outlined in red on the image below). This is likely because they are too shady and wet to be reliably productive for agricultural products in addition to their size and shape limitations. Wildlife and pollinator habitat may be the best use of these areas. Most are mowed annually late in the season to keep aggressive box elder from establishing large stands too quickly. Currently, a few great native herbaceous plants like goldenrod, jewelweed, Joe Pye weed, sensitive fern, and milkweed occupy these areas, but less desirable species such as common burdock are also present. Importantly, beneficial shrubs such as willows, dogwoods, alders, and viburnums are absent and could enhance the areas if established.



Management Recommendations:

Option A: Plant pollinator insectaries

Insectaries are areas set aside for the purpose of attracting and supporting pollinators and other beneficial insects. While insectaries can be periodically mowed and maintained, plants must be allowed to reach reproductive maturity to be most effective, as this will provide the necessary food and habitat structure for the target species of insects. Results from experiments conducted by Sustainable Agriculture Research and Education (SARE) suggest that crop fields adjacent to insectaries tend to have a relatively high population of predatory insects and relatively small pest populations.

- While there are no minimum size recommendations for insectaries, their effectiveness increases with the amount of area provided. Aim for at least 10m X 10m plots, ideally larger, and plant at least 3 species for each early-, mid-, and late-bloom season.
- Rather than relying on one or two very large insectaries, it is considered more effective to incorporate smaller patches – or “islands” – both adjacent to and within cultivated areas to ensure that smaller, less mobile insects can access the intended crops.

Disclaimer: Newly established insectaries have the potential to harbor pests in the short term. However, after allowing several seasons for beneficial insects and predator populations to become established, studies have shown a long-term decline in pest populations.

Option B: Shrub/tree clustered islands and mow in between

- Plant clusters of flowering and fruit-producing native shrubs in islands of approximately 15 feet by 30 feet. The island could contain a single tree surrounded by ~10 shrubs of mixed species. Shrub willows, alders, dogwoods, and viburnums (especially high-bush cranberry, serviceberry, elderberry, and blueberry) are excellent choices for nectar, fruit, and hosting high numbers of caterpillars that are essential for feeding growing nestlings.
- To keep box elder from establishing, mow around the patches at the end of the season or when the ground is frozen if the area is too wet.

Other general recommendations and ideas for these areas:

- Keep blueberry bushes, even if not productive for berries, since there are excellent host plants for a large number of caterpillar species vital for birds rearing young broods.

- Selectively remove invasive species such as purple loosestrife and common burdock (though this species has been naturalized in Vermont).
- Mowing—in general, wait until very late in season to brush hog plants after they bloom. Some plants still have nectar even if a flower is not showing and leaving stems intact provides overwintering habitat for many bee species. Keep brush piles after mowing or chopping as this provides structure for some birds from predators and weather.
- Consider installing signage or a viewing bench to demonstrate methods and importance in highly visible areas to the public such as the wet area near the Intervale Community Farm parking lot.
- Consider installing additional butterfly gardens, bird baths, or fruit trees.
- Tommy Thompson's Burlington Community Gardens: work with Burlington Parks, Recreation, and Waterfront Department to ask gardeners to avoid using double layered plastic grid netting (an American Robin was found trapped between fencing layers on 9 June). Provide flyers about bird and bee friendly flowers to plant in plot if interested and offer a complementary packet of sunflower seeds.

Potential Cost-sharing Opportunities:

Audubon Vermont offers guidance on whether or not you are eligible for funding to support habitat management on your land and can guide you through the application process. Federal assistance programs can provide significant funding to support invasive species control and riparian and hedgerow plantings. The Natural Resources Conservation Service (NRCS) has developed habitat incentive programs that assist landowners in managing their land for wildlife. Your property may be eligible for cost-share support through the [Environmental Quality Incentive Program](#) (EQIP) or other programs such as the [Conservation Stewardship Program](#) (CSP). US Fish and Wildlife Service's [Partners Program](#) may also be a possible option for funding source. If the Intervale Center or any of its farms were interested in pursuing recommendations that involve planting native trees or shrubs, the most practical source would be the Intervale Center's own non-profit Conservation Nursery if stock is available.

Summary and Next Steps:

The Intervale provides exceptional foraging, breeding, and refuge habitat for many pollinator and bird species, included some of those identified as species of greatest conservation need in Vermont. Many of the current management techniques implemented by the Intervale Center and its farmers are already supporting these species. However, adjustments to current practices and future management work can enhance and increase the potential for this habitat to support these species long-term and have a positive impact on populations in Vermont. Biologists at the Gund Institute and Audubon Vermont recommend prioritizing areas for management according to need, ease of access, and potential benefit vs. cost. Upon initial assessment, increasing native vegetation and structural diversity in hedgerows and small unused areas appear to have the greatest potential for success. Audubon Vermont staff plan to meet again with Intervale and farm staff to discuss interest and ability in any or all of the above recommendations after this initial list is reviewed. Further, technical assistance can be provided on the ground during any management activities and spring bird surveys can be conducted for further habitat evaluation. There is potential to use different spaces that are managed for bird and bee conservation as demonstration sites to display the work done as a source of public education and to transfer ideas of methods to other farms. It may also be worthwhile to monitor the impacts of some of these practices if implemented. Audubon is happy to organize bird walks for members of the public and/or provide workshops for farmers on the material in this report in the future if that is of interest and feasible for all parties.

Appendices

A—Bird Species Observed at the Intervale 2000-2021.

Species common name	Habitat	Date last seen	Present 6/9/21
Alder Flycatcher	Hedgerow, shrubland, riparian	2021	X
American Black Duck*	Riparian, wetland	2020	
American Crow	Multiple	2021	
American Goldfinch	Forest, hedgerow	2021	X
American Pipit	Field	2017	
American Redstart	Forest, hedgerow	2021	X
American Robin	Multiple	2021	X
American Tree Sparrow	Hedgerow, shrubland, field	2021	
American Wigeon	Riparian, wetland	2020	
Bald Eagle*	Riparian	2020	
Baltimore Oriole*	Open field, hedgerow	2021	X
Bank Swallow*	Open field, hedgerow	2020	
Barn Swallow*	Open field, hedgerow	2021	
Barred Owl	Open field, forest	2019	
Bay-breasted Warbler	Forest, hedgerow	2020	
Belted Kingfisher	Riparian	2021	
Black Vulture	Hedgerow, field, forest, riparian	2021	
Black-and-white Warbler	Forest, hedgerow	2021	
Black-billed Cuckoo*	Hedgerow, forest	2013	
Black-capped Chickadee	Hedgerow, forest	2021	
Black-crowned Night-Heron*	Riparian, wetland	2021	
Blackpoll Warbler	Forest, hedgerow	2021	
Black-throated Blue Warbler*	Forest	2021	
Black-throated Green Warbler	Forest	2021	
Blue Jay	Multiple	2021	X
Blue-gray Gnatcatcher	Open field, hedgerow	2021	
Blue-headed Vireo	Hedgerow, forest	2021	
Blue-winged Warbler*	Shrubland, hedgerow	2012	
Bobolink*	Open field, hedgerow	2009	
Bohemian Waxwing	Hedgerow	2019	
Broad-winged Hawk	Open field, forest	2021	
Brown Creeper	Forest	2021	
Brown Thrasher*	Hedgerow	2021	
Brown-headed Cowbird	Open field, hedgerow	2021	
Bufflehead	Riparian, wetland	2019	
Canada Goose	Riparian, wetland	2021	X
Carolina Wren	Open field, hedgerow	2021	
Caspian Tern	Riparian	2021	
Cedar Waxwing	Hedgerow	2021	X
Chestnut-sided Warbler*	Forest, hedgerow	2021	X
Chimney Swift*	Open field, hedgerow	2021	
Chipping Sparrow	Hedgerow, shrubland, field	2021	
Cliff Swallow*	Open field, hedgerow	2017	
Common Goldeneye*	Riparian, wetland	2019	
Common Grackle	Open field, hedgerow	2021	
Common Merganser	Riparian, wetland	2021	
Common Raven	Multiple	2021	
Common Redpoll	Forest, hedgerow	2020	
Common Yellowthroat	Forest, shrubland, hedgerow	2021	X
Cooper's Hawk	Open field, forest	2021	

Dark-eyed Junco	Multiple, nest in forest, winter in field	2021	
Double-crested Cormorant	Riparian	2021	
Downy Woodpecker	Hedgerow, forest	2021	
Eastern Bluebird*	Open field, hedgerow	2021	
Eastern Kingbird	Hedgerow, forest, riparian	2021	
Eastern Meadowlark*	Open field, hedgerow	2017	
Eastern Phoebe	Hedgerow, forest, riparian	2021	
Eastern Screech-Owl	Open field, forest	2021	
Eastern Towhee*	Hedgerow, shrubland, field	2012	
Eastern Wood-Pewee	Hedgerow, forest, riparian	2021	
European Starling	multiple	2021	X
Evening Grosbeak	Forest	2014	
Field Sparrow*	Hedgerow, shrubland, field	2019	
Fish Crow	Multiple	2021	
Fox Sparrow	Hedgerow, shrubland, field	2020	
Gadwall	Riparian, wetland	2014	
Glaucous Gull	Riparian, field	2011	
Golden-crowned Kinglet	Hedgerow, forest	2021	
Gray Catbird	Hedgerow	2021	X
Great Black-backed Gull	Riparian, field	2021	
Great Blue Heron*	Riparian, wetland	2021	X
Great Crested Flycatcher	Hedgerow, forest, riparian	2021	
Great Egret	Riparian, wetland	2021	
Green Heron	Riparian, wetland	2021	
Green-winged Teal	Riparian, wetland	2019	
Hairy Woodpecker	Forest	2021	
Hermit Thrush	Forest	2021	
Herring Gull	Riparian, field	2021	
Hooded Merganser	Riparian, wetland	2021	
Horned Lark	Open field, hedgerow	2013	
House Finch	Forest, hedgerow	2021	
House Sparrow	Multiple	2021	
House Wren	Open field, hedgerow	2021	X
Iceland Gull	Riparian, field	2011	
Indigo Bunting	Forest, hedgerow	2021	X
Killdeer	Field, hedgerow	2021	
Least Flycatcher	Hedgerow, forest, riparian	2021	
Lesser Black-backed Gull	Riparian, field	2010	
Lincoln's Sparrow	Hedgerow, shrubland, field	2021	
Magnolia Warbler	Forest	2021	
Mallard	Riparian, wetland	2021	
Merlin	Open field, forest	2021	
Mourning Dove	multiple	2021	X
Nashville Warbler	Forest	2021	
Northern Cardinal	Forest, hedgerow	2021	X
Northern Flicker*	Hedgerow, forest	2021	X
Northern Goshawk	Open field, forest	2012	
Northern Harrier*	Open field	2016	
Northern Mockingbird	Hedgerow	2019	
Northern Pintail	Riparian, wetland	2019	
Northern Rough-winged Swallow*	Open field, hedgerow	2021	
Northern Shrike	Hedgerow, forest	2018	
Northern Waterthrush	Riparian, forest edge	2014	
Nuthatches	Hedgerow, forest	2021	
Osprey*	Riparian	2021	
Ovenbird	Forest	2018	

Palm Warbler	Forest, hedgerow	2021	
Peregrine Falcon*	Open field, forest	2021	X
Pileated Woodpecker	Hedgerow, forest	2021	
Pine Grosbeak	Forest	2018	
Pine Siskin	Forest, hedgerow	2014	
Purple Finch	Forest, hedgerow	2018	
Purple Martin*	Open field, hedgerow	2000	
Red-bellied Woodpecker	Hedgerow, forest	2021	X
Red-breasted Nuthatch	Hedgerow, forest	2021	
Red-eyed Vireo	Hedgerow, forest	2021	
Red-tailed Hawk	Open field, forest	2021	
Red-winged Blackbird	Open field, hedgerow	2021	X
Ring-billed Gull	Riparian, field	2021	X
Ring-necked Duck	Riparian, wetland	2019	
Ring-necked Pheasant	Hedgerow, forest	2017	
Rock Pigeon	multiple	2021	X
Rose-breasted Grosbeak*	Forest edge, shrub	2021	
Rough-legged Hawk	Open field, forest	2021	
Ruby-crowned Kinglet	Hedgerow, forest	2021	
Ruby-throated Hummingbird	Hedgerow	2021	
Ruffed Grouse*	Hedgerow, forest	2005	
Rusty Blackbird	Open field, hedgerow	2020	
Sandhill Crane	Riparian, wetland	2018	
Savannah Sparrow	Hedgerow, field	2019	
Scarlet Tanager*	Forest	2021	
Sharp-shinned Hawk	Open field, forest	2018	
Snow Bunting	Open field	2017	
Snow Goose	Riparian, wetland	2020	
Solitary Sandpiper	Hedgerow, riparian	2018	
Song Sparrow	Hedgerow, shrubland, field	2021	X
Spotted Sandpiper	Hedgerow, riparian	2021	
Swainson's Thrush	Forest	2021	
Swamp Sparrow	Hedgerow, wetland	2021	
Tennessee Warbler	Forest	2021	
Tree Swallow*	Open field, hedgerow	2020	
Tufted Titmouse	Hedgerow, forest	2021	
Turkey Vulture	Hedgerow, field, forest, riparian	2021	X
Veery*	Forest	2021	
Vesper Sparrow*	Hedgerow, field	2015	
Warbling Vireo	Hedgerow, riparian	2021	X
White-breasted Nuthatch	Hedgerow, forest	2021	X
White-crowned Sparrow	Hedgerow, shrubland, field	2021	
White-eyed Vireo	Hedgerow, forest	2014	
White-throated Sparrow	Hedgerow, shrubland, field	2021	
Wild Turkey	Hedgerow, forest	2015	
Willow Flycatcher*	Hedgerow, shrubland, riparian	2021	
Wilson's Snipe	Field, hedgerow	2014	
Winter Wren	Open field, hedgerow, forest	2020	
Wood Duck*	Riparian, wetland	2021	
Wood Thrush*	Forest	2018	
Yellow Warbler	Forest, hedgerow	2021	X
Yellow-bellied Sapsucker	Hedgerow, forest	2021	
Yellow-billed Cuckoo	Hedgerow, forest	2021	
Yellow-rumped Warbler	Forest, hedgerow	2021	
Yellow-throated Vireo	Hedgerow, forest	2021	

* = Priority species of conservation concern identified by Audubon or BCR13.

B-List of Confirmed Bee Species at the Intervale Center 2013-2020

Species	Common Name	Habitat	Notes
<i>Agapostemon sericeus</i>	Silky Striped-Sweat Bee	Floodplains, forest edges	Common, generalist pollinator
<i>Agapostemon virescens</i>	Bicolored Striped-sweat Bee	Fields, forest edges	Very common, generalist pollinator
<i>Andrena canadensis</i>	Canada Miner Bee	Sandy soil specialist	Early season pollinator
<i>Andrena cressonii</i>	Dotted Miner Bee	Ground-nesting	Early season pollinator
<i>Andrena erigeniae</i>	Spring Beauty Miner Bee	Ground-nesting; forests and forest edges	Specialist on Claytonia
<i>Andrena erythrogaster</i>	Red-Bellied Miner Bee	Ground-nesting	
<i>Andrena wilkella</i>	European Legume Miner Bee	Ground-nesting	Non-native specialist on clovers and vetch
<i>Anthophora terminalis</i>	Orange-Tipped Wood-digger	Unknown	
<i>Apis mellifera</i>	European Honey Bee	Domesticated	Non-native, domesticated
<i>Augochlorella aurata</i>	Golden Green-Sweat Bee	Ground-nesting Flat, sandy, sites	Very common, generalist pollinator
<i>Bombus bimaculatus</i>	Two-Spotted Bumble Bee	Nests in tussocks, woodpiles and hollow logs	Very common, generalist pollinator
<i>Bombus impatiens</i>	Common Eastern Bumble Bee	Wide variety of habitats Nests in ground	Very common, generalist pollinator
<i>Bombus ternarius</i>	Tricolored Bumble Bee	Ground-nesting	Pollinator of blueberries and raspberries
<i>Bombus vagans</i>	Half-Black Bumble Bee	Forests and forest edges	Very common, generalist pollinator Will forage in shady areas
<i>Calliopsis andreniformis</i>	Eastern Miner Bee	Ground-nesting	
<i>Ceratina calcarata</i>	Spurred Carpenter Bee	Forest edges Nests in sumac and raspberry stems	Common, efficient crop pollinator
<i>Ceratina dupla</i>	Doubled Carpenter Bee	Forest edges Nests in sumac and raspberry stems	Efficient crop pollinator, often nests in sumac or raspberry stems
<i>Ceratina mikmaqi</i>	Mikmaq Little Carpenter Bee	Forest edges Nests in sumac and raspberry stems	
<i>Colletes inaequalis</i>	Unequal Cellophane Bee	Nests in sandy soils and floodplains	Common, early season pollinator of red maple, willow, and apple
<i>Epeolus scutellaris</i>	Notch-Backed Cellophane-Cuckoo Bee	Forest edges and meadows	Uncommon An indicator of healthy Colletes population
<i>Halictus confusus</i>	Confusing Furrow Bee	Sandy areas and floodplains	Common
<i>Halictus ligatus</i>	Ligated Furrow Bee	Hardpacked bare soil, roads, trails etc	Very common, generalist, efficient crop pollinator
<i>Halictus rubicundus</i>	Orange-Legged Furrow Bee	South-facing, sandy slopes Stone walls	Very common, generalist, efficient crop pollinator
<i>Hoplitis pilosifrons</i>	Hairy-faced Summer Mason Bee	Unknown	Unknown
<i>Hoplitis producta</i>	Produced Small-Mason	Unknown	Unknown
<i>Hylaeus modestus</i>	Yellow-Faced Bee, Modest Masked Bee	Unknown	
<i>Lasioglossum birkmanni</i>	Birkmann's Sweat Bee	Unknown	Uncommon
<i>Lasioglossum bruneri</i>	Bruner's Sweat Bee	Unknown	Uncommon
<i>Lasioglossum coriaceum</i>	Leathery Sweat Bee	Unknown	
<i>Lasioglossum cressonii</i>	Cresson's Sweat Bee	Unknown	Important pollinator of apples
<i>Lasioglossum leucocomum</i>	Lasioglossum leucocomum	Unknown	
<i>Lasioglossum leucozonium</i>	White-Banded Sweat Bee	Nests in flat ground, sandy, bare soil	Widespread, believed to be introduced to North America
<i>Lasioglossum macoupinense</i>	Macoupin County Sweat Bee	Unknown	
<i>Lasioglossum pectorale</i>	Rugose-Chested Sweat Bee	Unknown	
<i>Lasioglossum pilosum</i>	Hairy Metallic-Sweat Bee	Unknown	Important pollinator of fruits, most often associated with apples
<i>Lasioglossum tegulare</i>	Epaulette Metallic-Sweat Bee	Unknown	
<i>Lasioglossum vierecki</i>	Viereck's Sweat Bee	Sandy soil specialist	
<i>Lasioglossum zonulum</i>	Bull-Headed Furrow Bee	Unknown	
<i>Megachile relativa</i>	Golden-Tailed Leafcutter	Woodland edges Nests in wood	Generalist pollinator
<i>Megachile rotundata</i>	Alfalfa Leafcutter Bee	Nest in old lumber, cracked wood, and snags	Generalist, important crop pollinator
<i>Melissodes bimaculata</i>	Two-Spotted Long-Horned Bee	Unknown	Only found in Champlain Valley

<i>Melissodes desponsus</i>	Thistle Long-Horned Bee	Unknown	Specializes on thistles
<i>Nomada articulata</i>	Articulated Nomad	Forest edge	Parasitizes the nest of mining bees
<i>Nomada sp.</i>	Nomad Bee	Forest edge	Parasitizes the nest of mining bees
<i>Peponapis pruinosa</i>	Squash Bee	Loose, sandy soil	Specializes on squash Important pollinator of cucurbits
<i>Perdita octomaculata</i>	Eight-Spotted Miner Bee	Sandy soil where goldenrod is abundant	
<i>Triepeolus remigatus</i>	Squash Longhorn-Cuckoo	Sandy soil specialist	Rare Indicator of healthy squash bee population

C—Resource List

- [SARE information on cover cropping for pollinators and beneficial insects](#)
- [Audubon’s Native Plants for Birds Database](#)
- [Audubon’s Plants for Birds Program](#)
- [SARE information on insectaries](#)
- [Xerces Society for Invertebrate Conservation](#)

Books, articles, and talks from Doug Tallamy, entomologist at the University of Delaware

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Tallamy, D. W. “Doug Tallamy at the North American Lake Management Society NALMS International Symposium in Burlington, VT.” Uploaded by Vermont Agency of Natural Resources, 20 November 2019, <https://www.youtube.com/watch?v=lrRJm-yLsQ8>.

Tallamy, D.W. (2020). *Nature’s Best Hope: A New Approach to Conservation That Starts in Your Yard*. Timber Press. 256 pages.