

Old Field Habitat Creation and Management



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Table of Contents

Acknowledgements.....	2
Introduction.....	3
Grasslands and Climate change.....	6
Where can you create old field habitat?	6
How to create old field habitat.....	7
Reed canary grass.....	9
Litter layer.....	9
How to manage old field habitat.....	11
Raptor perches and barn owl pole boxes.....	14
References.....	17
Appendix A. Cascade Box group outdoor pole box design	19
Wrap-around deck for outdoor nest box.....	20

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Introduction

Grassland ecosystems have significantly declined on a global scale, and in North America up to 99% of grasslands have been altered by humans in some way (Lunt 2003). Consequently, grassland birds worldwide are experiencing significant populations declines and range contractions due to loss of habitat (Donald et al. 2006, Green et al. 2005). In BC's Lower Mainland, natural grasslands, as per pre-European contact, are virtually non-existent as these areas were the first sites to become converted to farmland (North and Teversham 1984). In respect to wildlife, the loss of natural grasslands has been partially offset by pasture and hay fields. However, grassland associated agriculture has also significantly declined over the last 50 years and been replaced by more intensive agriculture such as berry and greenhouse production (Metro Vancouver 2012). These intensive agricultural practices provide little to no suitable habitat for wildlife. In our region, the changes in agricultural practices in conjunction with direct habitat loss due to urbanization has meant some bird species such as burrowing owls, meadow larks and short-eared owls no longer breed in our region, while other grassland birds have experienced significant population declines.

Creating old field or grassland set-asides (hereafter referred to as old field) to mimic the succession of natural grasslands is a way to offset loss of habitat for grassland birds and other wildlife. Old field habitat is a mix of grasses, often native species, that is not mown for at least a year allowing the grass to grow tall and go to seed. In the fall, this tall grass falls over itself creating a litter layer of dead grass that is key habitat for small mammals, such as field voles. Old field habitat also provides important habitat for ground nesting birds and insects. The practice of creating old field habitat has been widely deployed in the UK and the EU (Buller et al. 2000). Locally, an old field habitat program is run by the [Delta Farmland and Wildlife Trust](#) (DFWT) on agricultural fields that are not in production (Fig 1). The fields can stay in the program for up to four years. The incentive for the farmers is monetary compensation per acre for having the field in the program and keeping the field as old field also improves the soil structure and organic matter of the field. The City of Richmond has

also created permanent old field habitat in [Terra Nova Park](#) in an effort to attract raptors and other wildlife to the park (Fig 2).



Figure 1. Old field habitat in West Delta created by the Delta Farmland and Wildlife Trust set-aside program. Photo credit: DFWT.

Terra Nova Habitat Management Strategy

Old-field Restoration Project

What's an old-field?

This term typically refers to farm fields that are no longer in crop production and have reverted to grass fields.

In Terra Nova these fields and woodlots provide habitat for resident birds of prey including Barn Owls, Great-horned Owls, Northern Harriers and Red-tailed Hawks. Small rodents (mainly voles) which are the primary food source for both resident and over wintering birds of prey make their foraging tunnels in old-fields.

Without active management these old-fields would be lost to invasive vegetation, and over time, revert to shrubs and trees.

Reed Canary Grass, a very tall, thickly growing invasive grass has taken over large portions of Terra Nova Park, shading out the shorter grasses, destroying vole habitat and severely reducing the wildlife value of these fields. This restoration project will improve the habitat for raptors living in Terra Nova by ensuring an abundant supply of voles as a reliable food source.

The City of Richmond is currently implementing Phase 1 of its Old-field Restoration Project at Terra Nova Park by ploughing and re-seeding selected fields to reduce the amount of Reed Canary Grass. To minimise the impact on wildlife the work will be carried out on a rotation which ensures that there are sufficient grass areas for the raptors to find food while the ploughed fields are establishing.

This Old-field restoration strategy has been successfully implemented in several Metro Vancouver Regional Parks in conjunction with the Delta Farmland and Wildlife Trust.

For more information, please contact the Richmond Parks Division at 604-244-1208



Figure 2. Old field habitat restoration information signage at Terra Nova Park in Richmond.

Grasslands and Climate change

Grasslands have recently been recognized as more reliable carbon sinks than forest ecosystems in the current 21st century climate regime which trends are showing increased temperatures, drought and fires (Dass et al. 2018). Grasslands store most of their carbon underground in the root system and soil, versus trees where most of the carbon is sequestered above ground. Carbon fixed underground tends to stay in the roots and soil during a fire event and grasslands seem to be more resilient to drought stress which has led to tree die offs in North America. Furthermore, plant species richness has shown to increase grasslands capacity to sequester carbon (Hungate et al. 2017). Creating old field habitat with diverse plant species richness is therefore an effective way to offset carbon emissions. Moreover, reducing mowing intensity to once every two-three years as prescribed to maintain old field habitat will also further reduce emission output.

Where can you create old field habitat?

Old field habitat can be created using farm fields or other open arable land. Alternatively, old field habitat can be created in 2-6-meter-wide strips, typically as margins around other types of land uses in locations where there is not enough land to dedicate solely to old field habitat (Fig 3). Strips of old field around perimeters of parks, sports fields or greenways is a great way to enhance habitat for wildlife in more urban settings where the land base is limited. In such instances, outreach to local residents about the value of old field habitat and its importance as habitat for wildlife is recommended. Long rough grass can be considered to be unkept and look messy and it is important to educate and change the perception of this so that the old field habitat is treated with care and respect.



Figure 3. Old field habitat can be created in 2-6-meter strips around farm fields, or other land uses where land base is limited. Photo credit: DFWT.

How to create old field habitat

Before you create old field habitat, complete an evaluation of pre-existing conditions such as vegetation, mulch, nutrient deficiencies (soil test for nutrients and soil composition), site hydrology, and weeds. Reed canary grass can be suppressed using Roundup® or another suitable herbicide in the fall prior to planting. If the vegetation is over 65 cm tall the field should be mowed prior to herbicide application. Burning is also an effective method to remove weeds prior to creating old field habitat and releases nutrients back to the soil.

Plowing and tilling is a non-chemical option for controlling weeds. Deep plowing and/or multiple disking's can be used to remove each new crop of emerging weeds up to the time of planting. This is followed by leveling the area, prior to seeding. You can also harrow after seeding to get better germination. A drawback of ploughing and tilling is that the soil disturbance results in the germination of weed seeds that have laid dormant in the soil. A combination of herbicides and tilling is probably the most effective means of controlling weeds, where burning is not an option. This involves tilling the soil, allowing weed seeds to germinate over a period of 7 to 14 days, applying Roundup® to the newly germinated weeds, and planting your grass mix a few days later.

Seedbeds must be firm for successful seeding. This helps to conserve moisture and ensures good seed to-soil contact, which is critical for adequate germination. Recently tilled soil should be compacted with a roller packer or soil finisher prior to planting. A seedbed is properly prepared when a human footprint penetrates no more than 1/4-inch-deep (~ 0.6 cm). If the soil is not properly compacted, seeds will be planted too deep and adequate germination will not occur. Soil packing is not necessary in stubble fields because the ground is already compacted.

Re-seed with DF&WT grassland set-aside mix which contains the following fine and course grasses to maximize habitat diversity for a wide range of species:

- Orchard Grass (25%)
- Tall Fescue (28%)
- Timothy (15%)
- Chewing Fescue (15%)
- Creeping Red Fescue (15%)
- Double Cut Red Clover (2%)

The DF&WT seed mixture should be planted at 35-40 lbs/acre. You can also reduce the DF&WT seed mixture to 30 lbs/acre and add a nurse crop (i.e. annual crop used to assist in the establishment of a perennial crop) of barley or oats that is planted at the same time at 100-120 lbs/acre (Total with DF&WT seed mixture and cover crop is 130-150 lbs/acre). The nurse crop helps outcompete weeds while the grass mix gets established, but the grain from the nurse crop needs to be harvested otherwise it will outcompete the DF&WT seed mixture. Alternatively, if you are not able to harvest the nurse crop you can add ryegrass to the DF&WT seed mixture instead to aid in controlling weeds and to enhance wildlife habitat value. This blended seed mixture would consist of 30 lbs/acre of DF&WT seed and 10 lbs/acre of ryegrass seed (i.e. 40 lbs/acre total). A more salt tolerant mix containing Fult's Alkali Grass is also available. If you want to attract more beneficial pollinators, consider adding some native phacelia seeds to the grass mixture. The DF&WT grassland set-aside mix can be purchased at [Terra Link in Delta](#) (50-pound bag/162\$), one bag seeds 1.4-1.8 acres.

The ideal time to seed is early spring when there is still enough moisture in the soil for germination as well as hopefully some spring rains to help with establishment. If planted too late in the spring or early summer the seeds tend to not germinate until the fall due to lack of moisture (i.e. not enough rain). Fields planted later in the spring also tend to become overgrown with weeds. Fall seeding should be done early September. Keep in mind, fields planted in the fall tend to get grazed quite significantly by waterfowl.

If the grass becomes low or stunted it is recommended to add manure or fertilizer. A soil test would help determine whether other treatments are needed, such as lime application. Nitrogen should not be applied during the establishment year as it will stimulate weed growth.

Reed canary grass

Reed canary grass is a pervasive and challenging invasive in the Lower Mainland. This grass species was planted in our region around the late nineteenth century due its potential as forage grass for livestock. It is tolerant to freezing and is one of the first grasses to emerge in the spring, giving it a competitive advantage over other plants. When left unchecked reed canary grass can completely dominate an area and will create an impenetrable monocultural carpet. Reed canary grass does particularly well in wet poorly drained sites, with high nitrogen levels such as ditches, along the edges of waterbodies and low-lying wet areas in fields. Depending on the location, the above prescription might not work as effectively on field sites that are dominated by reed canary grass, and continued management would be necessary. Given this, well drained sites are likely to be more successful when creating old field habitat.

Litter layer

The following spring, after the old field habitat becomes established, you will start to notice the litter layer when you part the fresh grass on top. The litter layer is the dead grass from previous years which forms a thick matt at the base which the new grass grows through. A good litter layer is about 70 mm deep and you can approximate its depth using the length of your index finger (Fig 4).



Figure 4. The litter layer provides voles with a safe cover and areas to nest in. Photo credit: British Barn Owl Trust.

A litter layer provides field voles with the cover they need for their tunnels and nests. From November to March you should be able to spot small holes (~ 1.5 inches/ 4 cm in diameter) in the grass which the voles emerge to graze. The litter-layer also provides cover for shrews and mice and together, these three families of species make up 92 % of what barn owls eat in the Lower Mainland (Hindmarch et al. 2014). Whereas crops and hay fields are only good for barn owls at certain times of the year, old field habitat provides barn owls and other raptors with food year-round. With a good 7 mm litter layer, old field habitat can contain up to 400 field voles per hectare! (A hectare is 100 m x 100 m).



Figure 5. Field voles comprise > 75 % of the diet of barn owls in our region. Barn owl hunting at Boundary Bay. Photo credit: Sean McCann.

How to manage old field habitat

Grassland in our region that is never cut or grazed will gradually become over-grown by reed canary grass, blackberry, shrubs and eventually trees, so some form of management is essential in the long term. The aim is to have a year-round grass height of 20-30 cm, as such habitat supports the highest number of voles, while periodically controlling for shrub invasion without destroying the litter-layer. Encouraging growth by cutting also helps to ensure there are ample, fresh, tasty stems for the voles to eat and the longer sward acts as refugia for the voles.

Grazing: Low density cattle grazing is often the best form of management but be careful not to over-graze and lose the litter layer altogether!

Mowing: Do not mow or graze the grass the first year after seeding. Every 2nd or 3rd year, grass can be grazed lightly or topped in the fall (set cutting blades to 13 cm or higher). If you have a large field, you can compartmentalize the mowing and cut a third of it over a 3-year cycle. Refuge areas (i.e. unmown old field habitat) creating high densities of voles combined with mown areas (i.e. easy access for predators) will maximize prey availability as well as prey abundance.

Strip Mowing: Rotational mowing, where sections or strips (2-6 meters wide) of old field are cut in alternate years will also ensure old field habitat is available for small mammals and the mown areas are easier for predators to hunt (Fig 6). In mid-August (after Aug 15 bird nesting window), cut alternate strips across the field to a height of about 13 cm. Next year, alternate and cut the other strips in the same way and so on, so each strip is cut every two years. Small sites can be ‘topped’ using a brush cutter, strimmer or scythe, but do be careful not to cut into the litter-layer.



Figure 6. Strip mowing is an excellent way to maximize small mammal abundance and prey availability for predators. Photo Credit: British Barn Owl Trust.

Mowing should not occur during the bird breeding window which is between March 15th to August 15th to minimize impacts on breeding birds.

Herbicides: Herbicides can be used to control weeds in grass habitat. Each herbicide control suppresses a wide range of weeds. You can also selective spray patches of weeds.

Table 1. Old field management options. For all options, do not mow or graze the grass the first year after seeding.

Management Regime	Mowing/Topping Height	Mowing Regime
The entire field	13 cm	Every 2 nd or 3 rd year, grass can be grazed lightly or topped in the fall.
1/3 rotational field management	13 cm	Cut a third of the field on a 3-year rotational cycle.
Strip mowing	13 cm	Strips (2-6 meters wide) of old field are cut in alternate years.

Raptor perches and barn owl pole boxes

In order to encourage raptors to hunt in old field habitat, perches can be placed in the field. They consist of a post and a horizontal piece of wood (~40-50 cm) that is placed on top of the post providing the raptors with an area to perch (the perch is T shaped, Fig 7). The perches provide raptors with a stationary hunting location, as a “sit and wait hunting approach” is often utilized by red-tailed hawks, and larger owls such as great horned and barred owls. Minimum perch height is 1.5 meters and they can be placed anywhere in the field. Old remnant posts from farm fencing, individual trees and/or shrubbery are also good perches for raptors and may already exist in the field (Fig 8).



Figure 7. Raptor perches can be made from an old post or a 2 by 4-inch piece of wood minimum 1.5 meters above ground and a horizontal bar (~40-50 cm). Photo credit: Michael Macor.



Figure 8. Old fence posts are excellent perches for raptors when hunting old field habitat.

Barn owl pole boxes can be installed in or around the perimeters of old fields (Fig 9). This is an effective way to compensate for the loss of nest sites when older derelict barns or wildlife trees that are deemed unsafe are taken down. Typically, wildlife trees with large natural cavities that are suitable for barn owl nesting are often deemed unsafe for the public due to the likelihood of them falling down during severe weather events. Primarily, two barn owl pole box designs have been utilized in our region, [the British Barn Owl Trust Pole Box Design](#) and the Cascade Box Design (See appendix A). The barn owl pole boxes should be installed a minimum of 4 meters above ground using a 6 by 6-inch treated post. A metal sheet is wrapped around the post at about 1.5 meters to prevent raccoons climbing the post. Avoid placing the entrance hole in the direction of prevailing winds. Also please note entrance hole on barn owl boxes should be no larger than 9.5 by 11.5 cm (3.75 by 4.5 inches) to avoid predation by larger owls such as great horned and barred owls. For the same reason, a predator guard in the nest box is highly recommended as this will reduce the likelihood of predation from other raptors and corvids. The predator guard consists of a 2-inch wide vertical piece of wood ~ 10-12 inches long to the right of the nest box entrance blocking the view into the nest box.



Figure 9. The two different barn owl pole box designs used in our region. The pole box to the left shows the British Barn Owl Trust pole design and the pole box to the right is the Cascade pole box design. The boxes are installed a minimum of 4 meters above ground on a 6 by 6-inch treated post.

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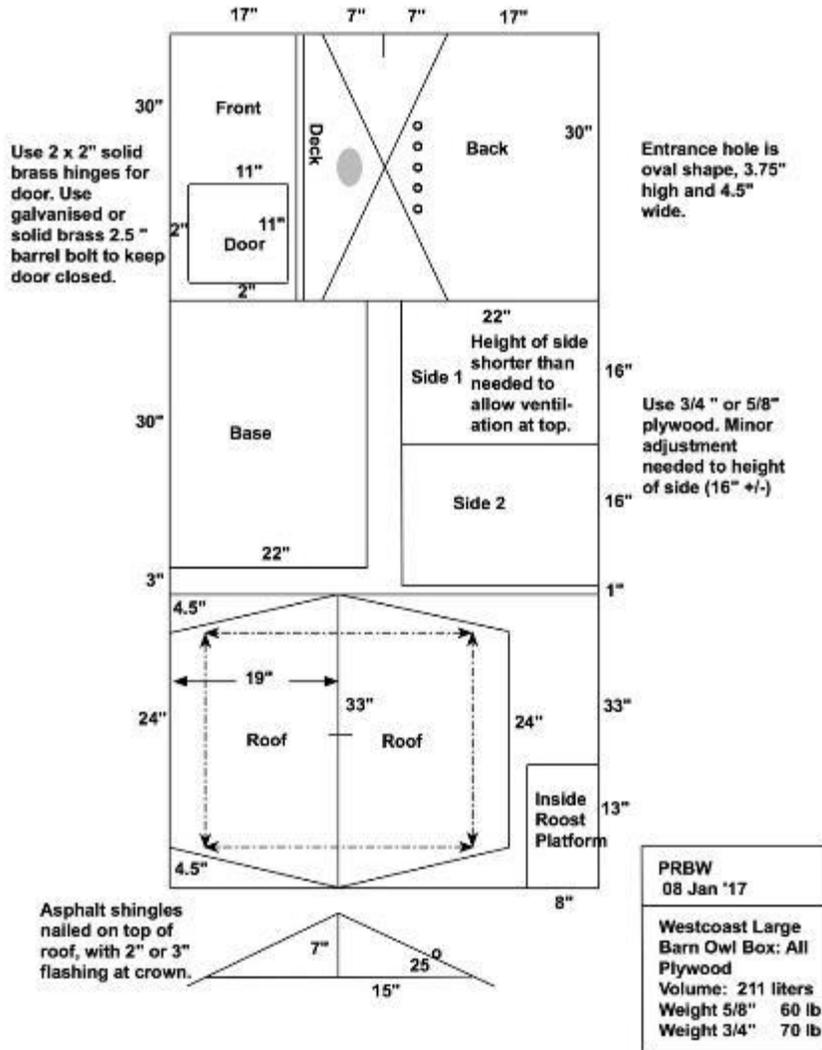
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Appendix A. Cascade Box group outdoor pole box design

The box should be made from rot resistant or tanalith e-treated sheet material manufactured using a waterproof adhesive. If not available, make sure to paint the nest box with a waterproof stain/paint. The group also makes the boxes at material cost only, if interested contact Peter Ward: prbward@gmail.com



Wrap-around deck for outdoor nest box.

All barn owl nest boxes need to have a deck below the entrance hole for the safety of the young owlets when they start to emerge from the nest box. This also reduces the risk of them falling to the ground before they can fly.

