



# Ecological Buffers (Eco-buffers)

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February 12, 2011

# Eco-buffer:

A new shelterbelt design that incorporates a variety of native trees and shrubs in a narrow, dense configuration that captures the site quickly, reducing the need for long-term weed control.



# Eco-buffers: An Agroforestry Design Concept

- A linear row of trees and shrubs planted in a natural arrangement composed of a variety of trees and shrubs native to region.
- The goal is to create a concentrated group of plants that will establish quickly providing diverse buffers that model natural hedgerows.

# Eco-buffers: An Agroforestry Design Concept

- *Eco-buffers* can be located anywhere a traditional shelterbelt would be planted.
- For optimal environmental impact *Eco-buffers* should be connected to a natural area such as a riparian zone or wooded area.



Image © 2009 DigitalGlobe

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Imagery Date: Sep 17, 2004

50°57'03.07" N 102°52'34.78" W elev. 1841 ft

Eye alt 2817 ft

# Eco-buffers: Benefits

- Superior habitat for wildlife (including pollinators)
- Soil, crop, water and livestock protection, as well as snow trapping.
- Biodiversity (structurally more complex)
- In addition to their ecological function, *Eco-buffers* can be a valuable source of wood and non-forest products (i.e. fruit, mushrooms etc.)
- Reduced maintenance

# Design Considerations

- Plants native to the region
- Variety of species, thorny plants, suckering plants, fast and slow growing plants, fruiting plants
- Range of tree and shrub heights to give the buffer a layered appearance
- Main species will constitute 30% of buffer
- Include a minimum of 4 to 5 shrub species

# Species Selection

## Species options for prairie ecoregions:

### – **Grassland**

- Silver buffaloberry, Woods rose, Choke cherry, Green ash, Hawthorn, Snowberry, Wolf willow, Potentilla

### – **Aspen Parkland**

- Woods rose, Choke cherry, Green ash, Manitoba maple, Balsam poplar, Trembling aspen, Plains cottonwood, Pin cherry, Hawthorn, Snowberry, Dogwood, Bur oak\*, Potentilla, Hackberry\*, Saskatoon, Beaked hazel

### – **Boreal Transition**

- Woods rose, Choke cherry, White spruce, Balsam poplar, Trembling aspen, Pin cherry, Hawthorn, Snowberry, Dogwood, Highbush cranberry

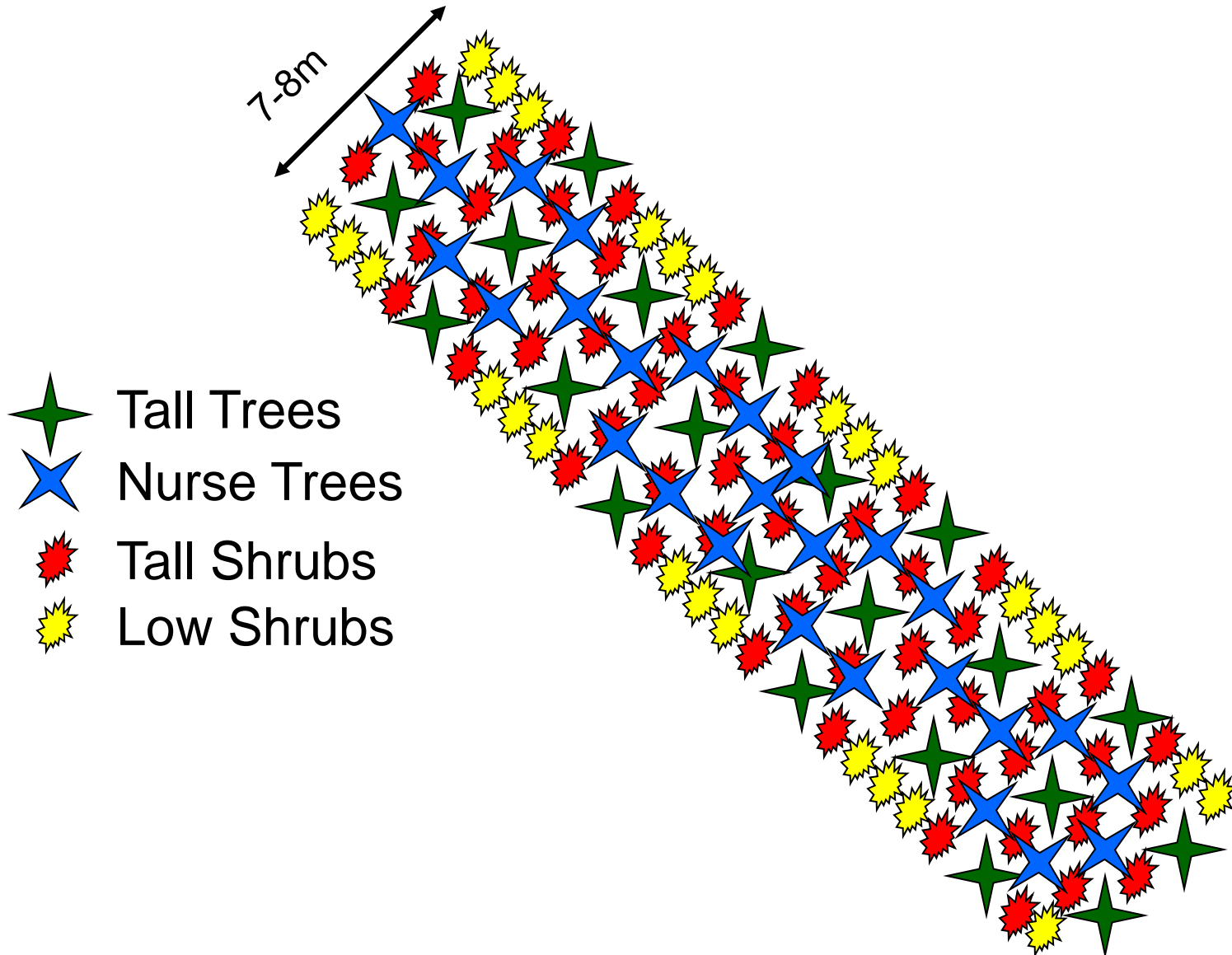
\* Manitoba only



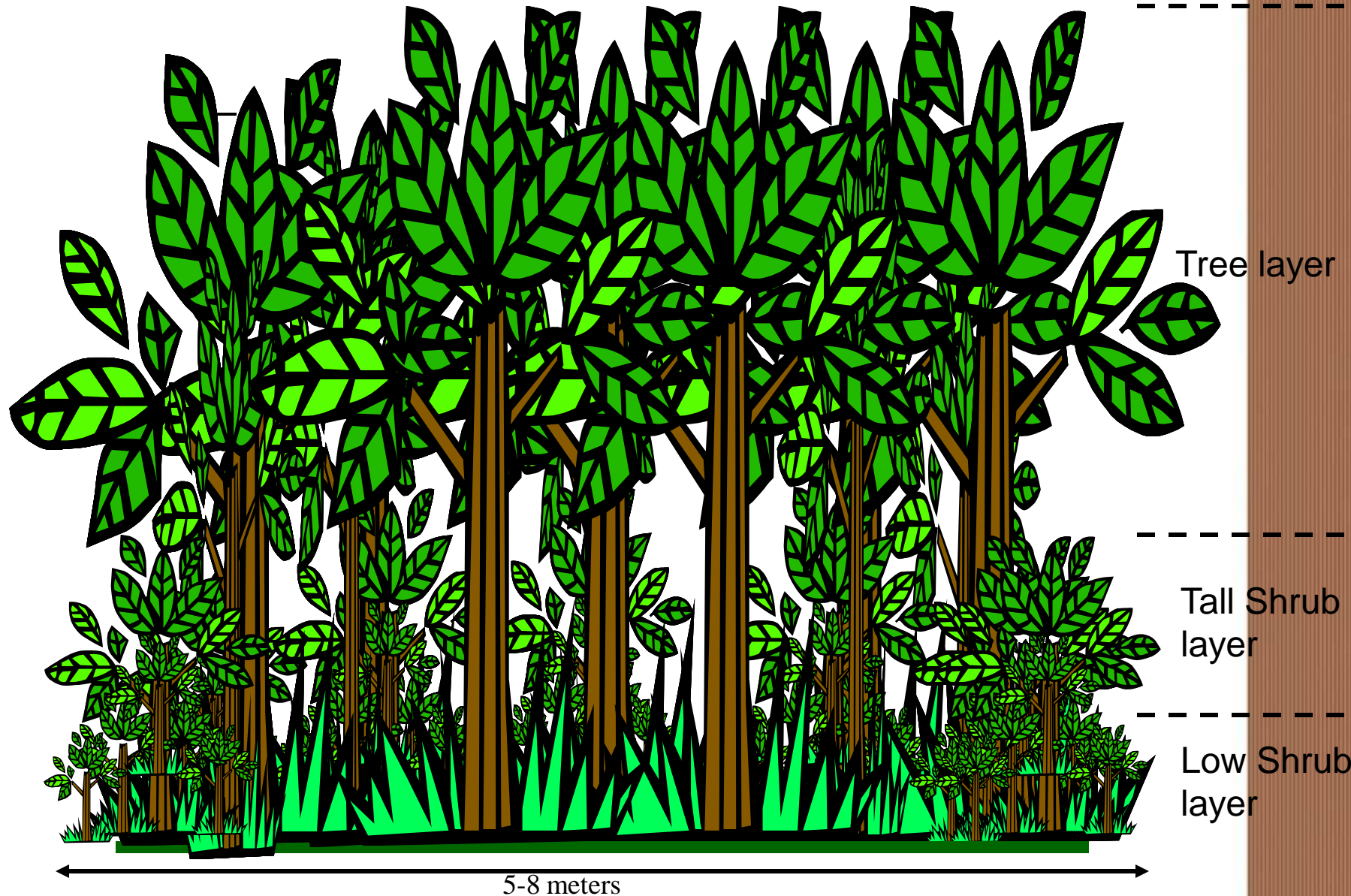
# Classification of Trees & Shrubs for Ecobuffers

- **Tall Tree**
  - >15 meters
  - Long-lived climax species
  - 10% of plants
  - Green ash, white spruce, Manitoba maple, Bur oak, Hackberry, Basswood
- **Nurse Tree (fast growing)**
  - 20% of plants
  - Short-lived, fast growing pioneer species
  - Pin cherry, Balsam poplar, Trembling aspen, Plains Cottonwood, Peach-leaf willow, Speckled alder, Showy mountain ash
- **Tall Shrubs**
  - 40% of plants
  - Form future understory
  - Choke cherry, Buffaloberry, Dogwood, Hawthorn, Highbush cranberry, Canada plum, American plum, Red elder, Basket willow, Pussy willow, Heartleaf willow, Bebb willow, Nannyberry, Hazelnut
- **Low Shrubs**
  - 30% of plants
  - Snowberry, Woods rose, Prickly rose, Wolf willow, Potentilla,

# Ecobuffer Design (5-row)



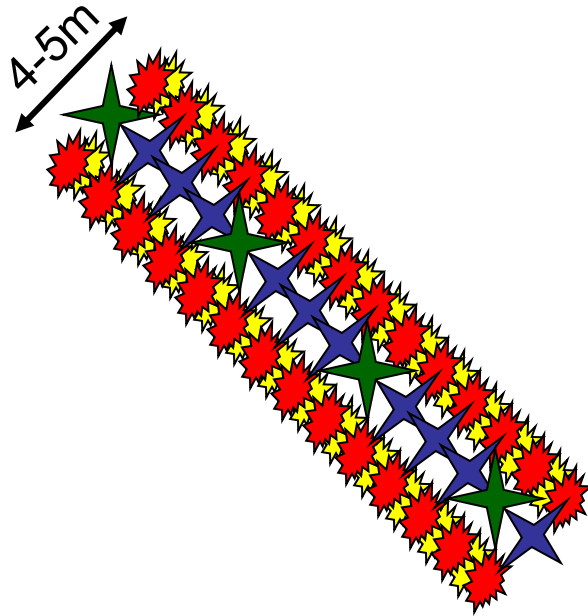
# Eco-Buffer (5-row)



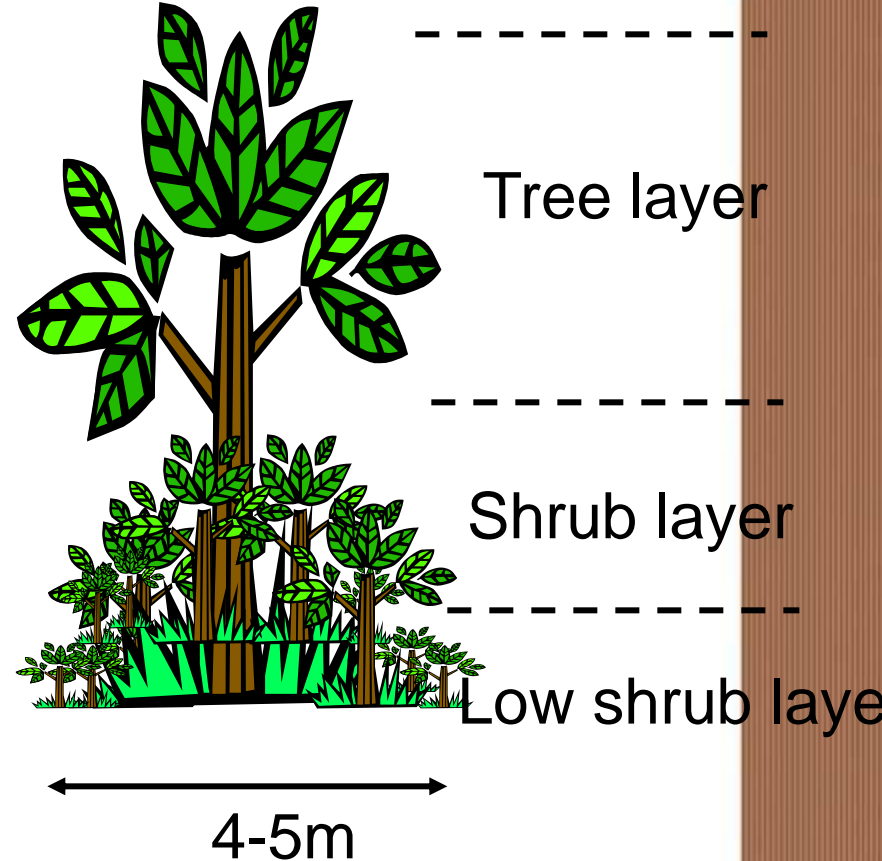
# Narrow Eco-buffer Design (3-row)

- This design is narrower than the 5-row concept and therefore suited for locations with limited space
- Provides similar function as the 5-row design, however may not be as resilient

# Narrow Eco-buffer Design



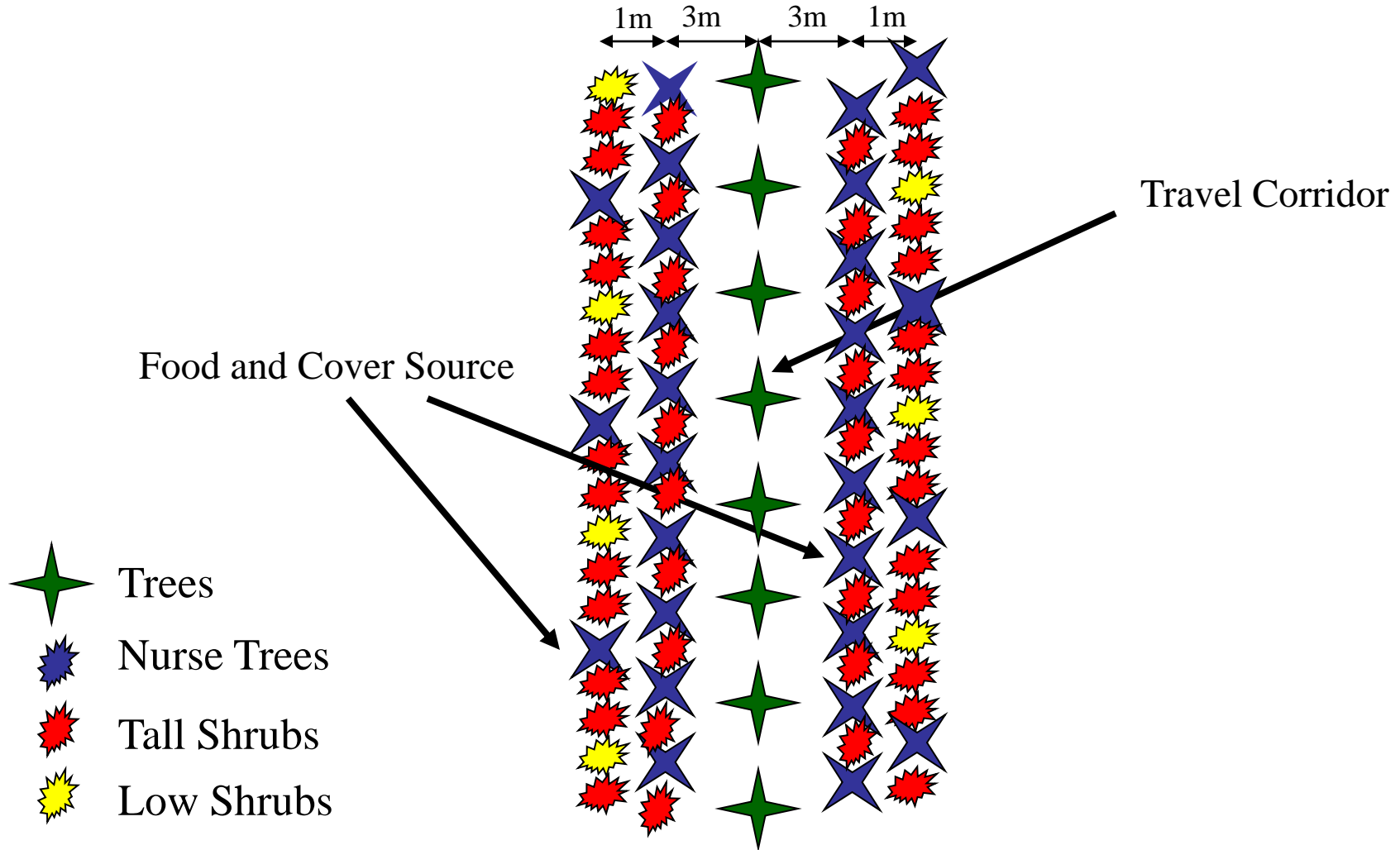
-  Trees
-  Nurse Trees
-  Tall Shrubs
-  Low Shrubs



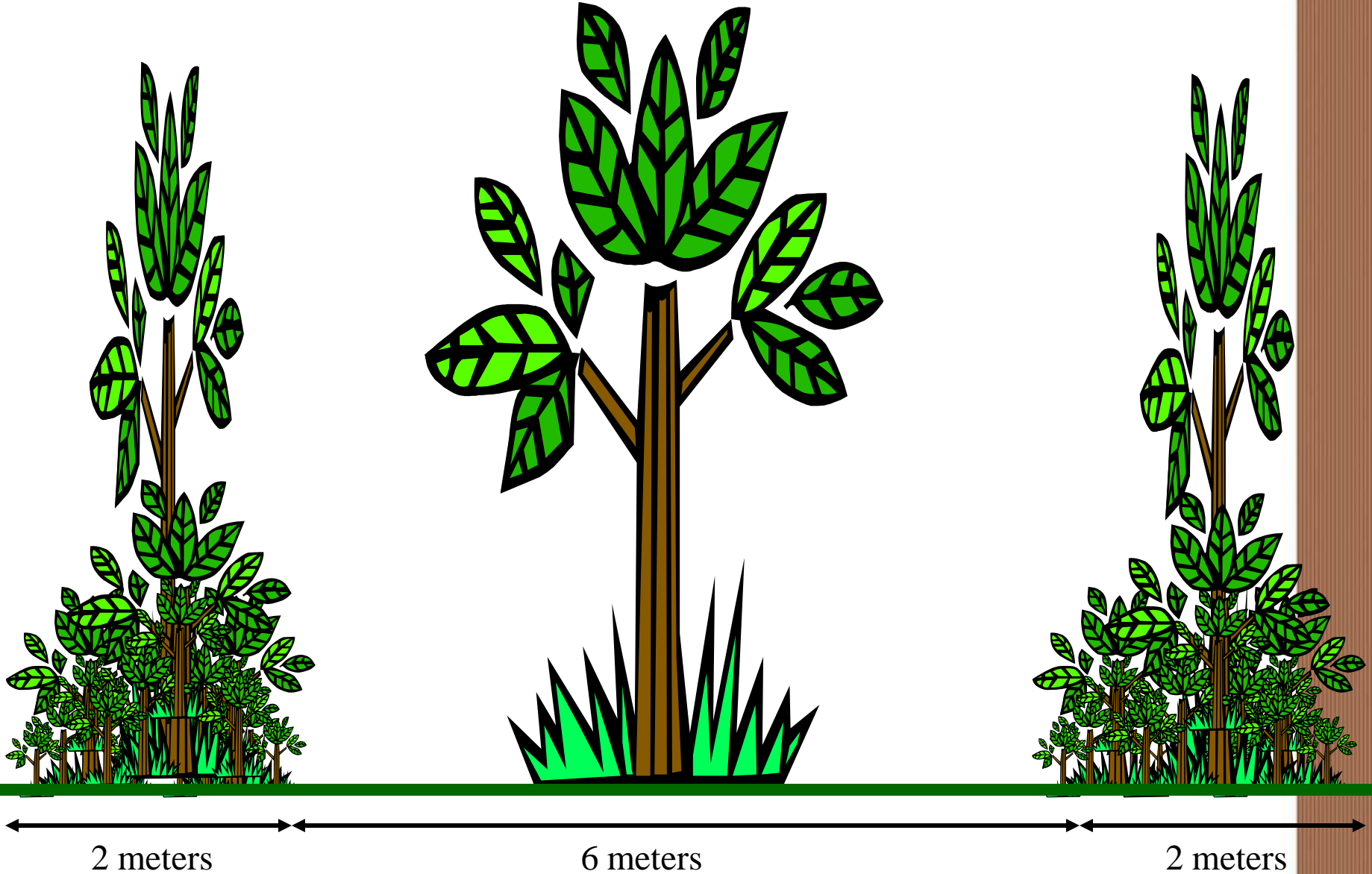
# Wildlife Corridor – Eco-buffer

- Provides buffering function as well as connectivity within the landscape
- Creates corridors for the movement of wildlife through the landscape
- Source of food and cover

# Wildlife Eco-buffer



# Wildlife Eco-buffer





# Eco-Buffer History

- Establishment of a site at Francis, SK
  - follow-up to a forest belt concept
  - multiple row
  - increased biodiversity and enhancement
  - quicker establishment and self sustaining
  - wanted to see how the tree species interacted
  - led to a more refined study to determine how to structure an Eco-buffer

# Eco-buffer Research Site

- Indian Head, SK
  - focused and refined the species
  - What kind of shelterbelt will result?
  - comparison with a traditional shelterbelt





# Research Findings

## Woody plants counts (per 100 m)

- Eco-Buffer
  - 500 trees initial planting time
  - 5000 trees 5 years later
- Traditional
  - 350 trees at planting time
  - 350 trees 5 years later

\* Highest degree of suckering:

- 1) pincherry/chokecherry
- 2) Rose

BUT, not at the expense of the other species

# Research Findings (continued)

## Tree Growth

- Eco-Buffer
  - Green Ash – 200 cm
- Traditional
  - Green Ash – 185 cm

# Research Findings (Continued)

## Weed Growth

- Eco-Buffer
  - Almost no weeds
- Traditional
  - Lots of grass and grassy weeds

# Research Findings (Continued)



Traditional Shelterbelt



Eco-buffer Design

# Research Findings (continued)

## **CONCLUSIONS:**

- **Tremendous capture of the site (increasing trees by 10 fold)**
- **Not compromising tree growth (no affect from close spacing and interactions)**
- **Placement of shrubs not as critical EVERY 6<sup>th</sup> plant should be a TREE**



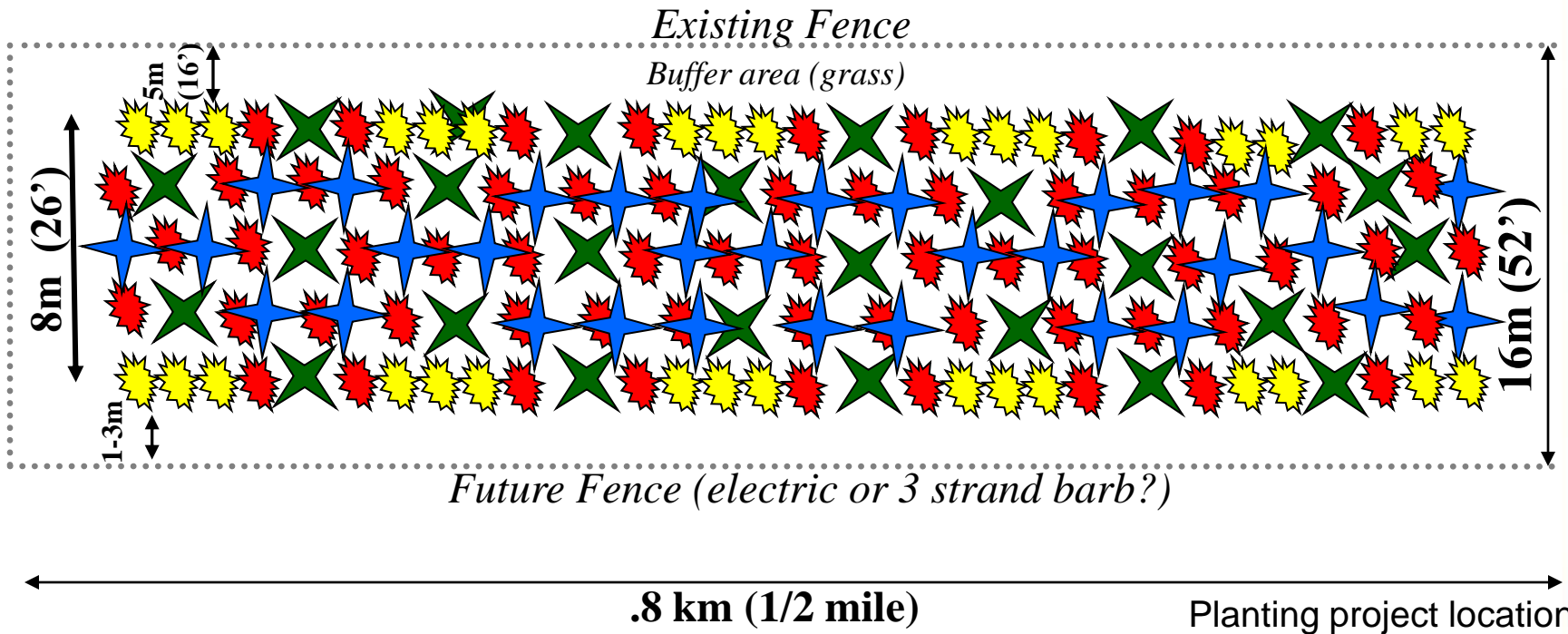
# Demonstration Phase

- Two demonstration sites planted this spring 2009, three demos spring 2010
- three different designs
- three eco-regions

# Demonstration Site



# Eco-Buffer Design– WBDC Wintering site (08/09)

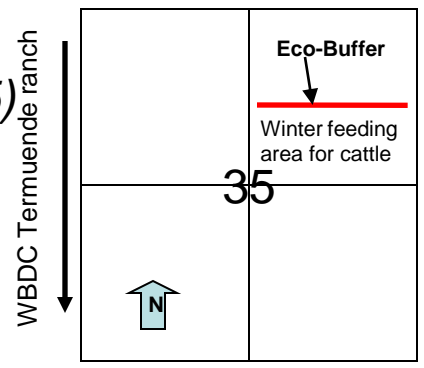


- Road
- Fence
- Tall Trees
- Nurse Trees
- Shrubs
- Bushes

Winter feeding area for cattle  
located between fields 10 & 10A (NE 35)



Planting project location



**Figure 1: WBDC Eco-Buffer Design**





## Eckart Ecobuffer 2010

Planted May 12, 2010

*Yellow line indicates GPS outline row of trees planting*





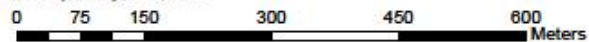
# Lewis Ecobuffer 2010

## Planted May, 2010

Yellow line Indicates GPS of outside row of 3 rows



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# Steps To Eco-Buffer Establishment

- Planning
- Site Preparation
- Pre-planting Preparation
- Planting Operation
- Maintenance

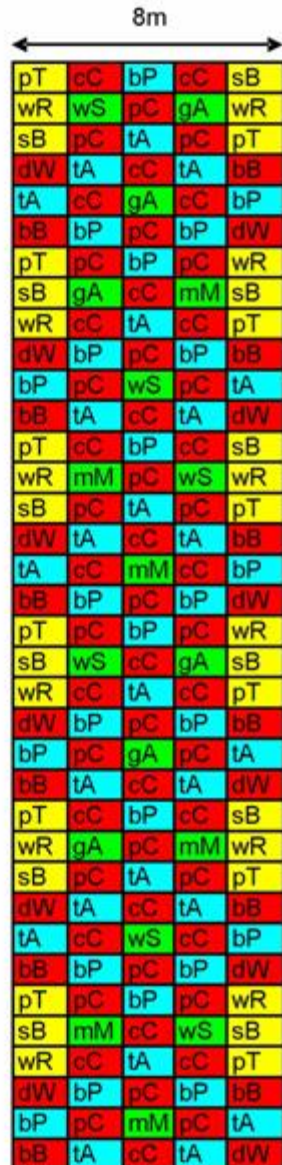


# Planning

- Draft a Plan – keep in mind your ecoregion

# Eco-Buffer - Parkland 5 row design

Western Beef Development Centre - Termuende ranch, Lanigan, SK  
 .5 miles (.8 km) long



**In-row Spacing:** 1.0 meters  
**Between row spacing:** 2.0 meters

**Small shrubs/bushes**

- pT - Potentilla
- sB - Snowberry
- wR - Wood's rose

**Tall Shrubs**

- cC- Choke cherry      inner rows only
- pC - Pin cherry      inner rows only
- dW - Dogwood      outside row only
- bB -Buffaloberry      outside row only

**Nurse Trees** (every 6th in outside rows)

- bP - Balsam poplar
- tA - Trembling aspen

**Trees** (every 6th in middle 3 rows)

- gA - Green ash
- mM - Manitoba maple
- wS - White spruce

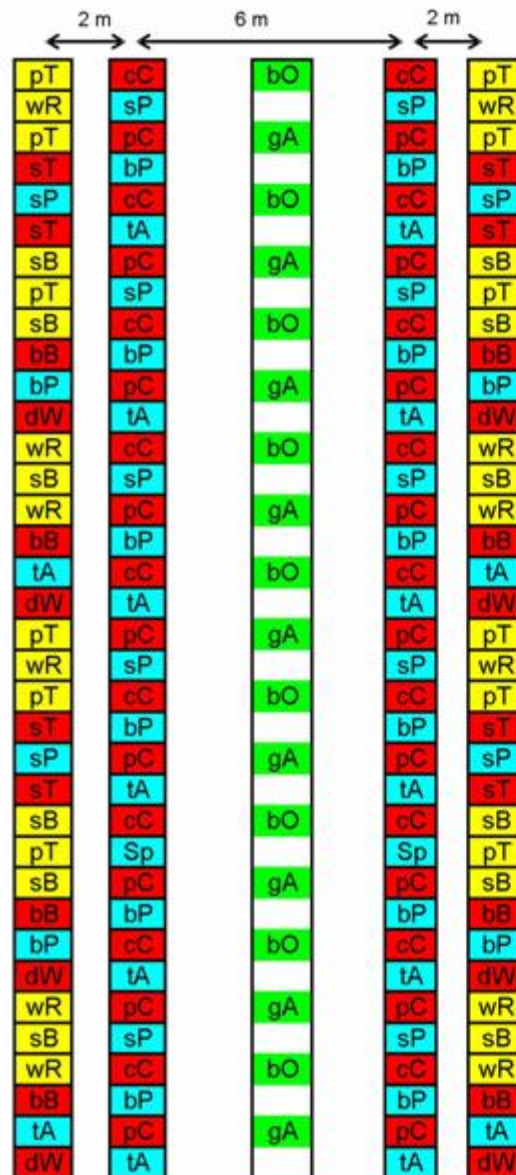
Note: in outside rows, every 6th is a nurse tree

Figure 2: Species listing for Eco-Buffer Parkland 5-row design.

# Ecological buffer design -Wildlife Corridor (543 m)

Riche Demonstration Site, Bethune, SK

## Wildlife Corridor



### Spacing

Between-row: As shown

In-row: Trees 3.0m, all others 1.0m

### Small Shrubs/ Bushes

wR Wood's rose

pT Potentilla

sB Snowberry

### Tall Shrubs

pC Pin cherry inner row only

cC Choke cherry inner row only

dW Dogwood outside row only

sT Saskatoon outside row only

bB Buffaloberry outside row only

### Nurse Trees

tA Trembling aspen

sP Scots pine bP Balsam poplar

### Trees (spaced 3m apart)

gA Green Ash bO Bur oak

In outside rows, every 6th is a Nurse tree & 2 m between outside rows

Figure 2: Species listing for Eco-Buffer - Wildlife Corridor design.

# Planning (continued)

- Check site for suitability and problem areas
- Order Stock

# Walk the site



# Site Preparation

- Herbicide application
- Cultivation/tillage
- Remove larger stones
- **SHOULD** initiate the fall prior to planting!

# Pre-Planting Preparation

- Staking



# Pre-planting Preparation (continued)

- Sort stock





# Planting Operation

- Mechanical Planting



# Planting Operation (continued)



# Maintenance

- Water well, as required



# Maintenance (continued)

- Weed control
- Replacements?