Planting Plan:
To Plant or Not To Plant

What to Plant
When to Plant
How to Plant

Refer to Planting Plans in Notebook
• Herbaceous Planting Plan
• Woody Planting Plan

Included Items
• Location & Acres
• Species & Amounts
• Site Prep & Plant Dates
• Special Instructions
Revegetation Strategies

• **Natural Regeneration** – Allowing the site to revegetate naturally by propagules in the soil, stockpiled and spread soil, and/or dispersal from surrounding landscapes.

• **Revegetation by Planting** – Planting seed, plants, cuttings, and/or other propagules on site.

• **Augmented Revegetation** – Allowing the site to revegetate naturally with additional materials planted over all, or part of the site; usually for specific purposes.

Begin at the Beginning!

**Site Inventory**

• Walk the entire site and inventory
  • Species list – identify to species
  • Hydrology zones and what species are in each
  • Collect soil for soil test
  • Note invasive species and locations
  • Note contaminants – tires, batteries, trash sites, pesticide mixing areas, dead zones

• Other
  • Identify cropping history or other land use
  • Time left fallow
  • Herbicide and other pesticide use that may interfere with planting success
Seed Dispersal

- Related to distance from natural wetlands
- Woody species – within 200 feet of seed wall
- Herbaceous – within ½ mile of restoration site
- Targeted community within dispersal distance

Forested Wetland Type Key

1. Hydrology and soils marginally altered Go to 2
1. Hydrology and soils significantly altered Go to A
   2. Propagules already on site Go to 3
   2. Propagules not on site Go to 5
3. Desirable species on site Go to 4
3. Desirable species not on site Go to 5
   4. Cover of plants adequate Go to B
   4. Cover of plants inadequate Go to 5
5. Site adjacent to seed wall Go to 6
5. Site not adjacent to seed wall Go to A
   6. Contains desirable species Go to C
   6. Does not contain desirable species Go to A

A = Natural regeneration not recommended
B = Natural regeneration possible for the entire site
C = Natural regeneration ≤ 200 feet from seed wall
**Emergent Marsh Wetland Type Key**

1. Desirable species on site Go to 2  
   1. Desirable species not on site Go to 3  
   
   2. Diversity and cover adequate Go to A  
   2. Diversity and cover inadequate Go to 3  
   
   3. Site near an existing wetland Go to 4  
   3. Site not near an existing wetland Go to 5  
   
   4. Contains desirable species Go to C  
   4. Does not contain desirable species Go to 5  
   
   5. Wetland effectively drained < 20 years Go to 6  
   5. Wetland effectively drained > 20 years Go to B  
   
   6. Seed bank contains desirable species Go to A  
   6. Seed bank does not contain desirable species Go to B  

A = Natural regeneration possible for the site  
B = Natural regeneration not recommended  
C = Natural regeneration if ≤ 1/2 mile of emergent wetlands

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**Natural Regeneration Exercise 1**

Is natural regeneration a viable alternative?  
Why or why not?
Natural Regeneration Exercise 2

Is natural regeneration a viable alternative?

Why or why not?

Natural Regeneration Exercise 3

Is natural regeneration a viable alternative?

Why or why not?
Selecting Species for Planting

Considerations
- #1 Intended use & #1 Hydrology zones
- Soils
- Historical habitat records, Species on-site
- Reference wetlands/Intended purpose
- Species availability / Biotypes
- Financial
  - Material costs
  - Planting costs
  - Short & Long term maintenance

SEEDING – Using Seed to Establish Herbaceous Vegetation

Information On A Seed Tag
1) Variety and kind (Species and Common name)
2) Lot number
3) Origin
4) Net weight
5) Percent pure seed
6) Percent germination (and date of test)
7) Percent inert matter
8) Percent other crop seed
9) Percent weed seeds
10) Name of restricted noxious seed
11) **Prohibited noxious seeds are not allowed.**
12) Name and address of company responsible for analysis (seller)
Example Seed Label

30.24% (species 1)
19.57% (species 2)
17.79% (species 3)
14.69% (species 4)
14.32% (species 5)
0.05% (other crop)
3.31% (inert/dirt)
+ 0.03% (weed)
100.00% (total)

Calculating PLS (Pure Live Seed)

- Commercial seed
  - PLS (Pure Live Seed)
  - PLS = (% pure seed x germination) ÷ 100

- Seed analysis report example
  - 95% pure seed
  - 89% germination
  - (95 x 89) ÷ 100 = 84% PLS
  - 84% of seed lot contains viable seeds
Designing a Seed Mix: Determine what species and planting density

- Seeding rate
  - Square foot basis / 10 plants total
  - PLS per pound

- Seedling establishment rate
  - Variable among species
  - General rule – 20% PLS

- Forb-to-Grass ratio
  - 80-90% grass = mostly grass
  - 50-60% forbs = diversity

Planting Herbaceous Material

Material Types:
- Donor Wetlands
- Mulching & Inoculating
- Sod-mats
- Wild Hay
- Plugs & Sprigs
- Rhizomes, Corms,
Donor Wetlands

- Sometimes wetlands will be destroyed
- Existing wetlands or areas with wetland plants
- Source of wetland propagules?

Mulching and Inoculating

- Remove 8-10 inches of topsoil
- Collect by hydrologic zone
- Spread no more than 6 in thick
- Place in same hydrologic zone
- Late fall/early spring (dormant)
Sodmats

- Cut from donor wetlands
- Piece back together
- Place – same hydrologic zone

Wild Hay

- Mature vegetative material from natural wetlands
- Most seeds ripe late summer to fall
- Sedges require mid-summer collection
- Spread in same hydrologic zone
Plugs and Sprigs

- Hydrology: tops must be above standing water
- Chop or cut into smaller pieces for planting
- Plugs: cut tops down to about 10 to 12 inches
- Use shovel / coring device to dig planting holes

Rhizomes Corms and Tubers

- Cut rhizomes into pieces with at least one node; plant just below soil surface and tamp in
- Broadcast small tubers and rake into the soil; plant large tubers in hole twice the size of tuber
Plant Spacing

- Plant on 1.5 to 2.0 foot centers (1 per 4 sq. foot)
- Stock shortage: 15 to 20 ft. alternating patches
- Plants will spread out naturally

Woody Plant Establishment

- Material Types
  - Bare rooted seedlings
  - Potted material
  - B & B (balled and burlap)
  - Cuttings
  - Seed/Acorns
  - Miscellaneous
    - Spacing
    - Tree Protection
Bare Root Seedlings

- Minimum Attributes
  - 18 inches in length
  - 3/8 inch collar
- Larger seedlings better
  - less predation
  - less competition loss
  - from grasses / weeds
- Roots
  - large fibrous
  - root = shoot

Storing Seedlings

- Cold storage 34 – 40°F
- Cold storage not possible
  - cool, shaded place
  - protect from freezing
- Seedling care
  - tape packaging holes
  - keep roots moist
  - stack bundles loosely
- On-Site: Stored more than 2 weeks
  - heel-in seedlings
  - shaded, protected area
**Planting**

- Do not do like this picture! – exposing roots
- Carry out small amounts at a time – desiccation problems
- Dig hole first, then pull plant from bag

**Containerized and B&B**

- Can jump start a system
- Longer planting window; don’t plant in frozen soil
- Higher survival rate; use in harsh environments
- Deformed roots
  - roots circle around
  - gently pull and feather
  - severe: cut vertical slits

Cutting pattern for root bound plant
Planting Considerations

- Planting hole: 1-2 feet wider than root system
- Roughen sides: roots less likely to spiral
- Carefully place plant in the hole
- Fill hole 1/3 full; tamp; saturate soil with water
- Finish backfilling with soil and than water

Hardwood Cuttings

- Collect – dormant season
- Current season’s wood
  - best potential for roots
  - 3/8 – 3 in diam, > 4 buds
  - cut at an angle
- Cold storage 34 – 40°F
- Store DRY in a cooler, basement or root cellar
- Do not cover in damp or wet materials – water roots
**Treatment Before Planting**

- Soak cutting in cold water to swell root primordia
- Min 24 hrs, 7 – 14 days best
- Roots will emerge after 17 days (longer for some species)

**Planting Cuttings**

- Use probe to make hole
  - steel rod – good probe
  - avoids damaging the buds
  - at least ¾ length of cutting
- Insert cutting into hole
  - 75% below the surface
  - 1 or more buds above
  - muddy in (water/mud slurry)
- Use longer cuttings if conditions are unfavorable
**Acorns**

- 1/3 cheaper than seedlings
- Native oaks close to planting site
  - match source to planting site
  - collect from number of trees
- Survey crop potential in spring
- Collect as soon as seeds fall
  - first 5 – 10% unviable
- Check for maturity
  - pericarp (dark - mottled yellow)
  - easily separate from the cup

**Tree Planting Spacing & Density**

- Most common is bare rooted seedlings
- 10’ x 10’ spacing is preferred = 435 seedlings/ac.
- 12’ x 12’ spacing optional = 302 seedlings/ac.
- Other spacing options to consider based on material and site layout.*
  *Always plan for weed control access.
- Avoid straight rows if possible; curvilinear rows best.
Seedling Protection

- Herbivore damage is a major concern
- Tree shelters
  - provide protection
  - lower mortality
- Tree shelter concerns
  - expense and labor
  - requires maintenance
- Other alternatives
  - fencing
  - chemical repellents

Questions?