Suggested Means to Qualify and Quantify Wetland Water Rights

Montana Department of
Natural Resources and Conservation
Water Resources Division

Ethan Mace, Surface Water Hydrologist

http://dnrc.mt.gov/wrd/

DNRC Rule Effort

- Assessing options
- DNRC seeks on-going input
- DNRC will continue to develop a framework for wetland water rights

Current Process

- DNRC will process wetland applications as in the past
- Applicants must provide sufficient evidence to meet issuance criteria
- DNRC will continue to document application deficiencies
- DNRC will offer suggestions for qualification and quantification

Who needs a wetland water right?

- 85-2-302(1), MCA: An individual or entity is required to apply for and receive a water use permit any time they divert, impound, or withdraw water for a beneficial use.

ALL PROJECTS THAT UTILIZE ARTIFICIAL MEANS

OF WATER CONTROL NEED A WATER RIGHT

Wetland Water Rights Application Options

- 600 - New Appropriations
- 606 - Changes to Existing Appropriations
- 602 - Exceptions: Groundwater

Suggested Means to Qualify and Quantify Wetland Water Rights

Qualifications:

- Project description
- Diversion description
- Beneficial use
- Map/survey

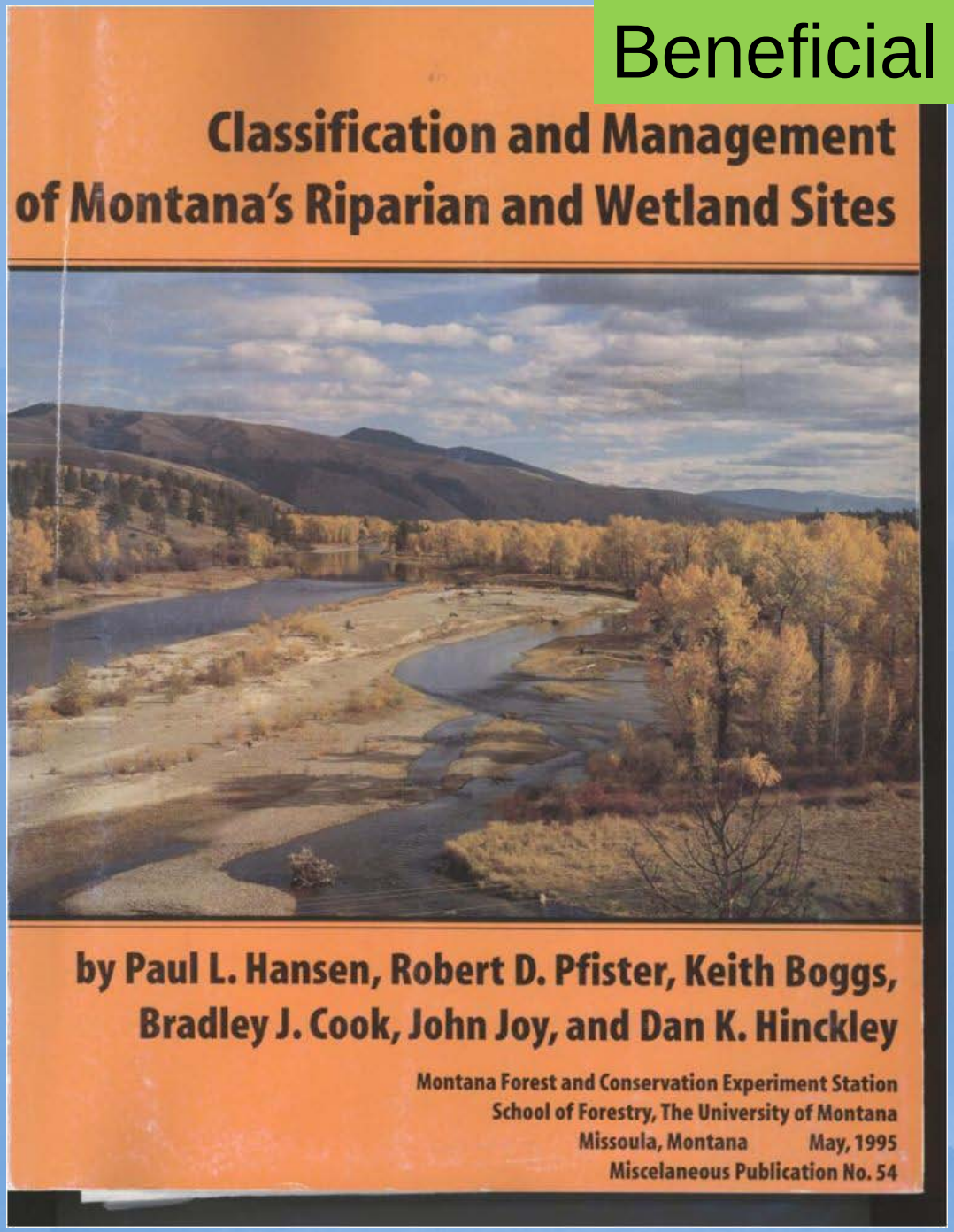
Quantifications:

- Consumptive volume
- Diverted volume
- Flow rate

Describe the Project

- General Overview
- Define Project as a Wetland Project
- Define the Wetland Type
- Habitat Classification(s)
  - Dominant Life-forms
  - Dominant Species Composition
- Map

Beneficial Use



Salix geyeriana/Calamagrostis canadensis Habitat Type (Geyer Willow/Bluejoint Reedgrass)

- Location and Associated Landforms
- Vegetation Description: average % canopy cover
  - Shrubs
  - Graminoids
  - Forbs
  - Trees
- Successional Information
- Soils
- Adjacent Communities
- Management Information

MANAGEMENT INFORMATION

Livestock

Forage production is high, and where extensive, this type may be an important source of summer forage…….

Wildlife

Abundant food, cover, and proximity to water provide habitat for numerous wildlife species such as mammals and Songbirds……..

Fisheries

…..effectively stabilizes soils and forms overhanging banks, enhancing fisheries quality. The importance of willows in streambank protection, cover, and thermal protection for fisheries can not be emphasized enough. The herbaceous understory aids in filtering out sediments during high flows thereby contributing to the overall building of the streambanks.

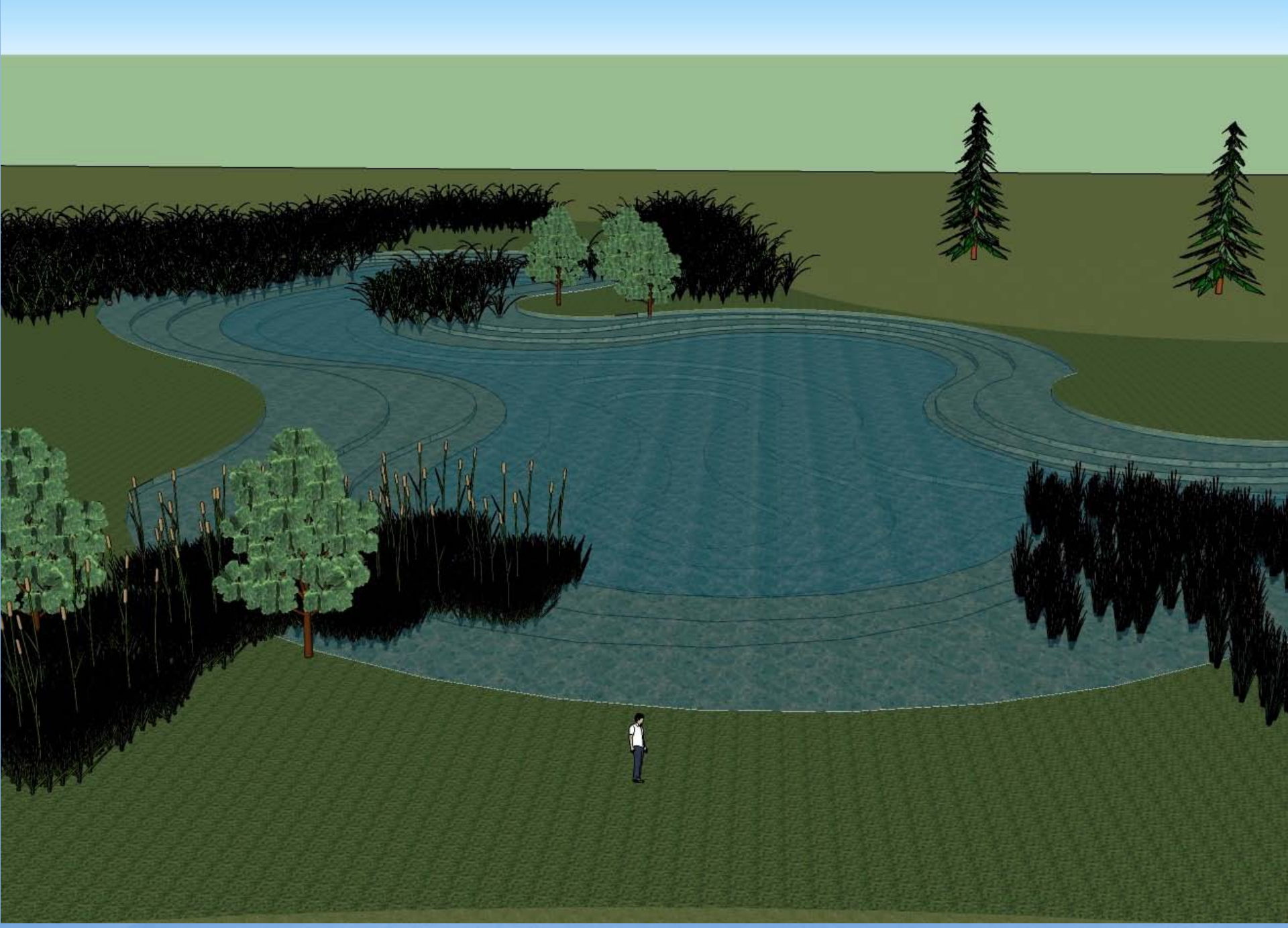
Recreational Uses and Considerations

Fishing opportunities are good in streams associated with this type. Moist soils and streambanks are subject to trampling damage. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool.

Stock and Agriculture

Fish and Wildlife

Fish and Wildlife



Wetland Character

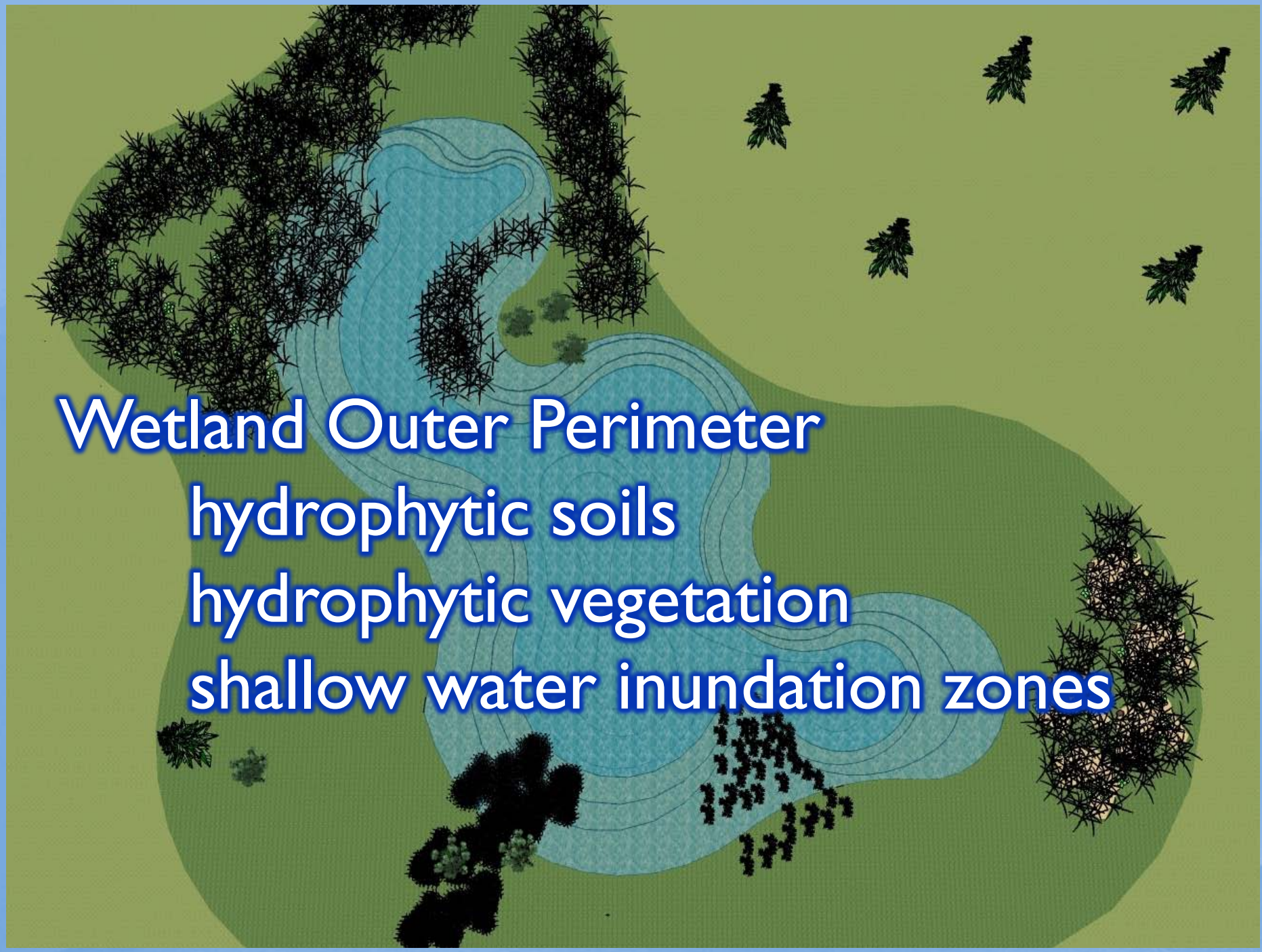
- Geyer Willow/Bluejoint Reedgrass
- Natural Wetland
- Single pool, year round on average
- Distinct and separate max and base fill volumes
- Overlapping vegetation and shallow water inundation zones

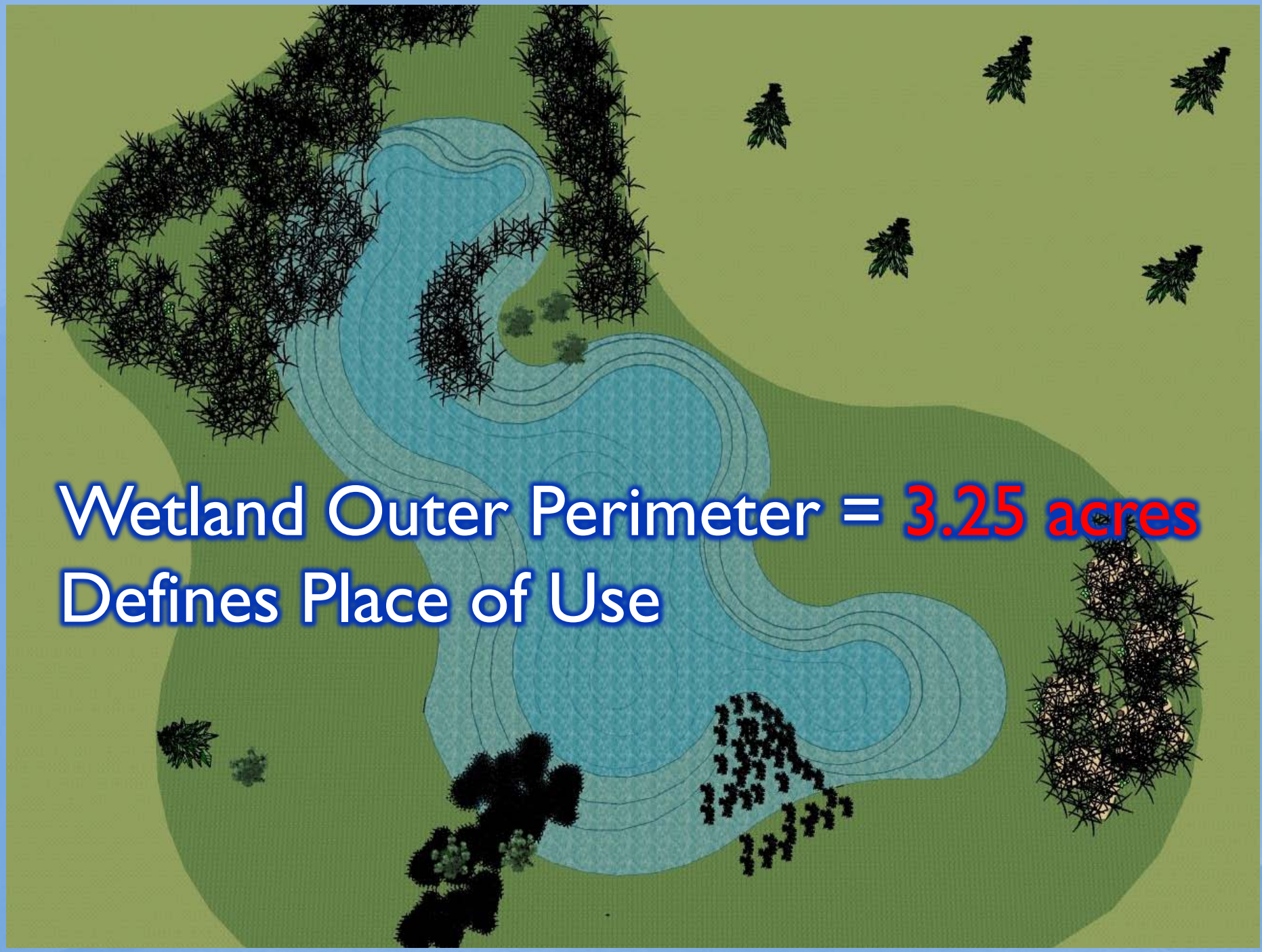
Wetland Water Right Parameters

- Overall Wetland Area
- Wetland Vegetation Area
- Shallow Water Max Volume
- Shallow Water Evap Area

Wetland Water Right Parameters

- **Overall Wetland Area**
- **Wetland Vegetation Area**
- **Shallow Water Max Volume**
- **Shallow Water Evap Area**


Wetland Outer Perimeter
hydrophytic soils
hydrophytic vegetation
shallow water inundation zones

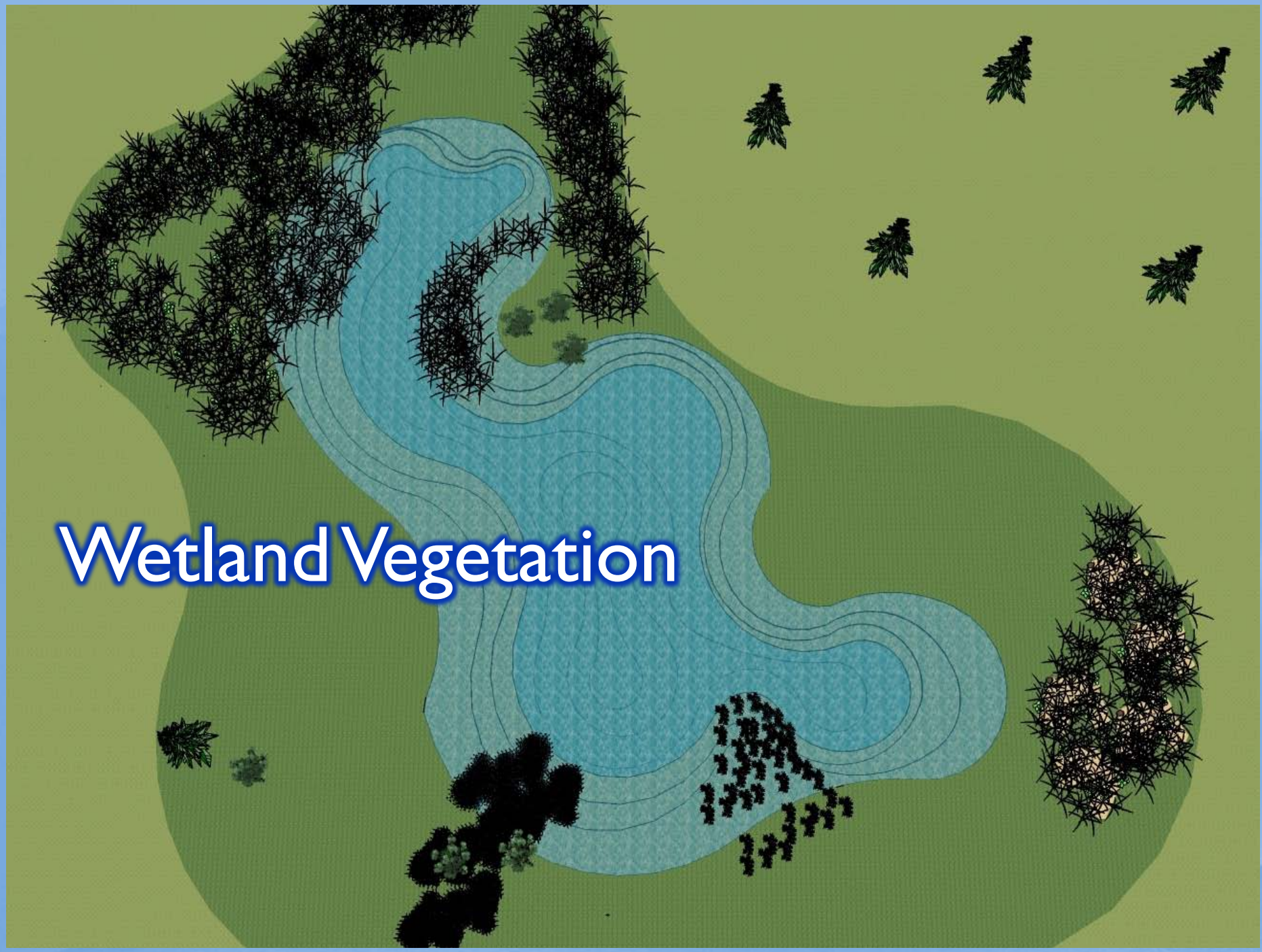

Wetland Outer Perimeter = 3.25 acres
Defines Place of Use

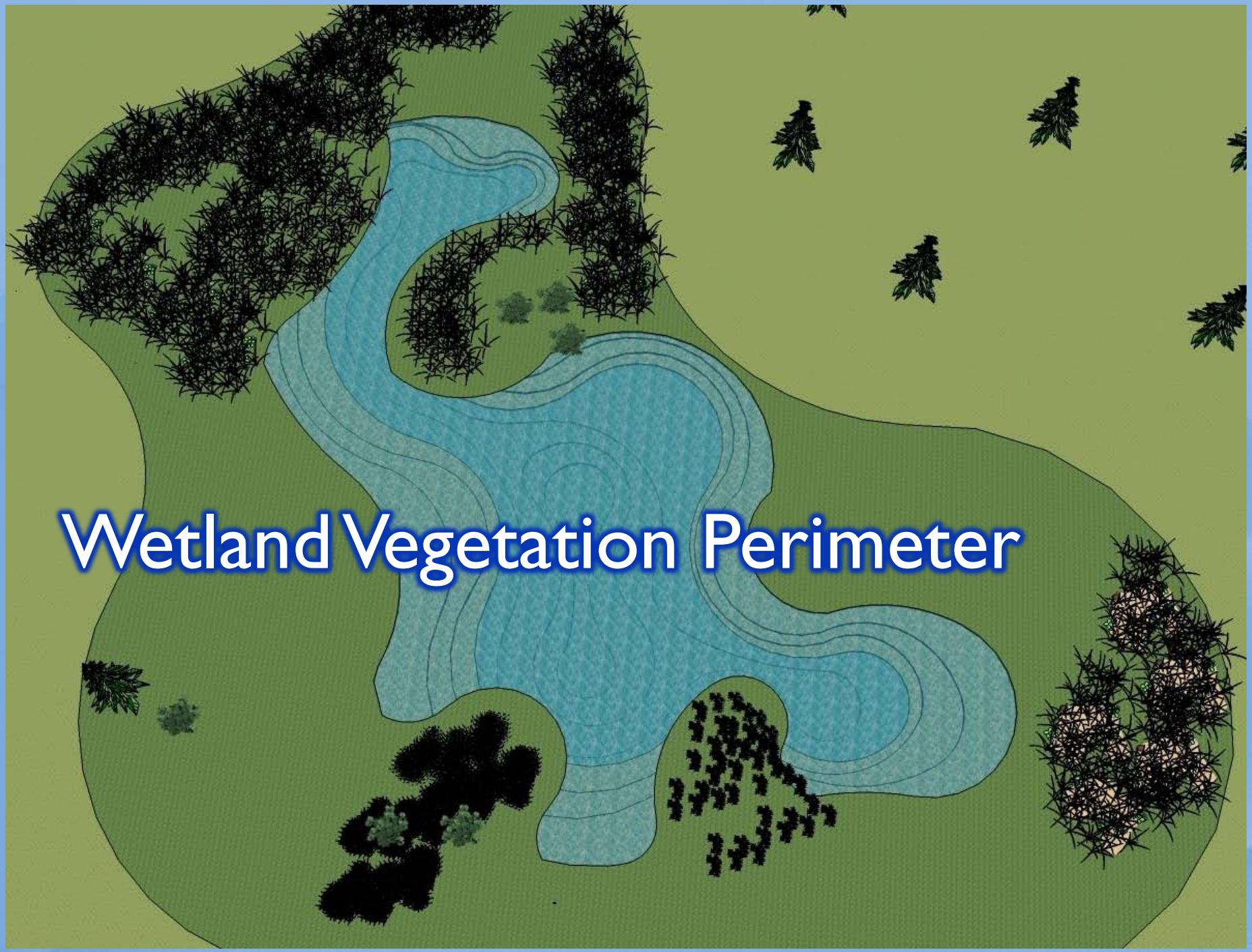
Wetland Consumptive Use Components

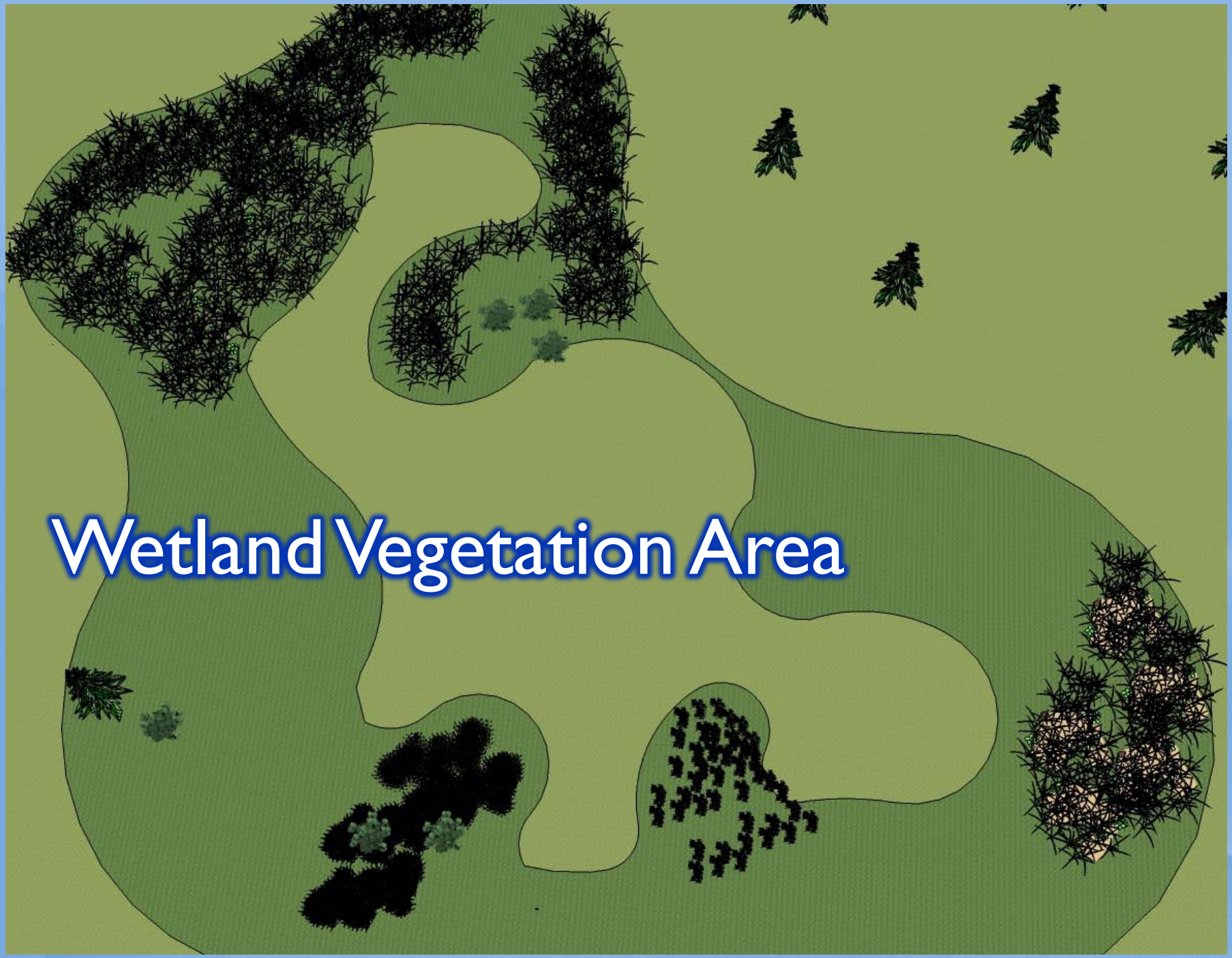
- **Wetland Vegetation Transpiration**
- **Open-Water Evaporation Losses**
- **Volumes of Shallow Water Inundation Zones at Max Fill**

Wetland Water Right Parameters

- Overall Wetland Area
- Wetland Vegetation Area
- Shallow Water Max Volume
- Shallow Water Evap Area


Wetland Vegetation


Wetland Vegetation Perimeter


Wetland Vegetation Area


Wetland Vegetation Area = 2.0 Acre

EVAPOTRANSPIRATION PARAMETERS FOR VARIABLY-SIZED WETLANDS

by

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Crown Center
Kansas city, Missouri
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Summary:

The areal extent of a wetland affects the rate of evapotranspiration (E_t) in arid regions due to advection of dry air and clothesline effects. Measurements of E_t from cattail wetlands indicate that E_t from 6 m wide stands is 1.6 times that of alfalfa reference E_t (E_{tr}) and that E_t from 200 m wide stands is 1.15 times E_{tr}.

www.kimberly.uidaho.edu/water/papers/wetlands/ET_variably_sized_wetlands_1994.pdf

Consumptive Use – ARM 36.12.1902

Table 1 – Montana County Weather Station IWR Data for Seasonal Alfalfa Evapotranspiration and Montana County Management Factor.

Column A	Column B	Column C	Column D	Column E	Column F
County	Weather Station	Elevation	IWR Flood Irrigation, Wheeline & Seasonal ET (inches)	IWR Center Pivot Irrigation Seasonal ET	Management Factor Percentage 1964-1973
Missoula	Lindbergh Lake	4320	13.65	16.48	69.5%
	Missoula	3420	17.52	20.50	
	Potomac	3620	13.18	15.60	
	Seeley Lake	4100	13.85	16.55	

Wetland Vegetation Area = 2 Acre

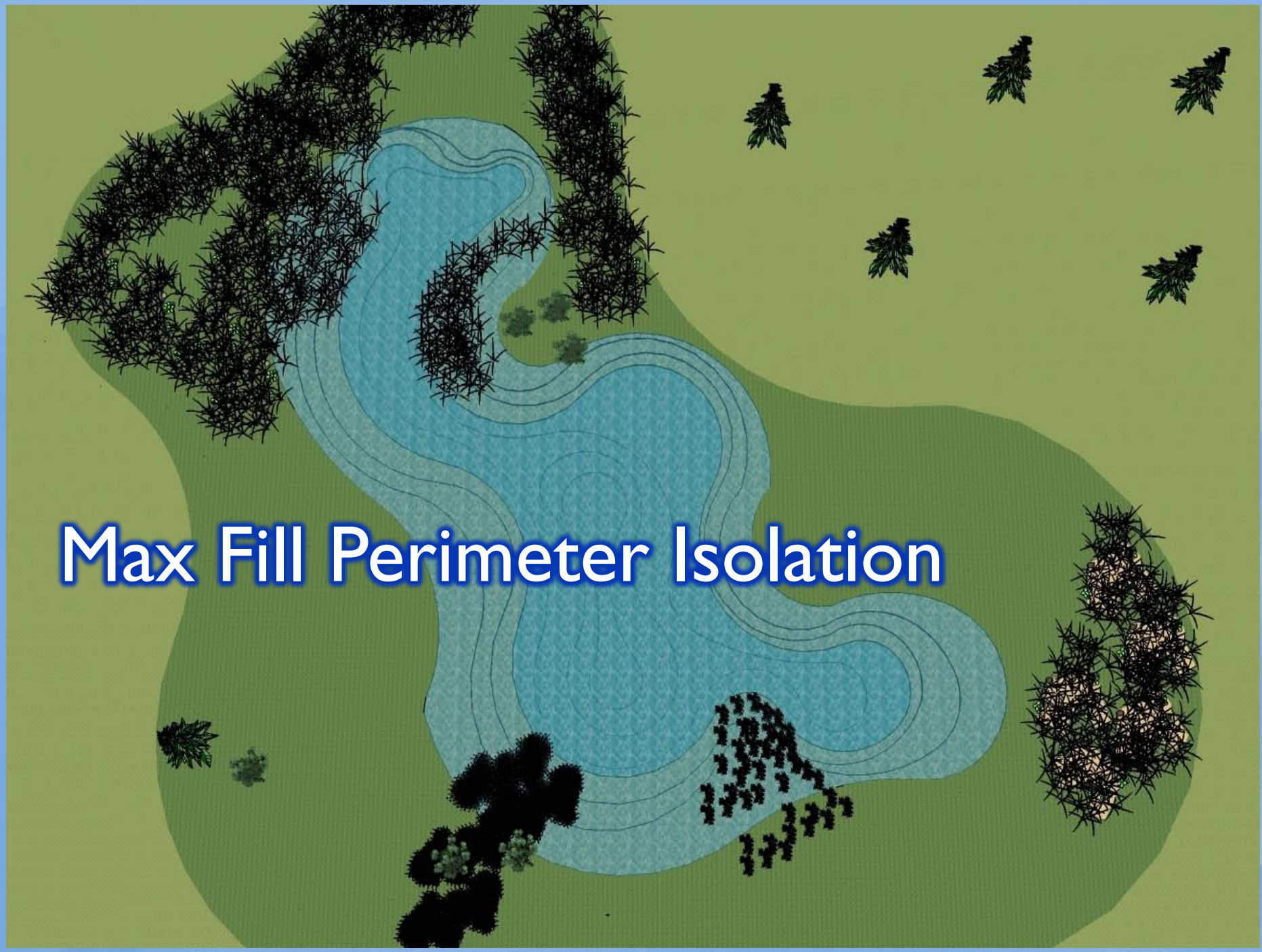
Alfalfa Transpiration = 1.18 AF/Acre

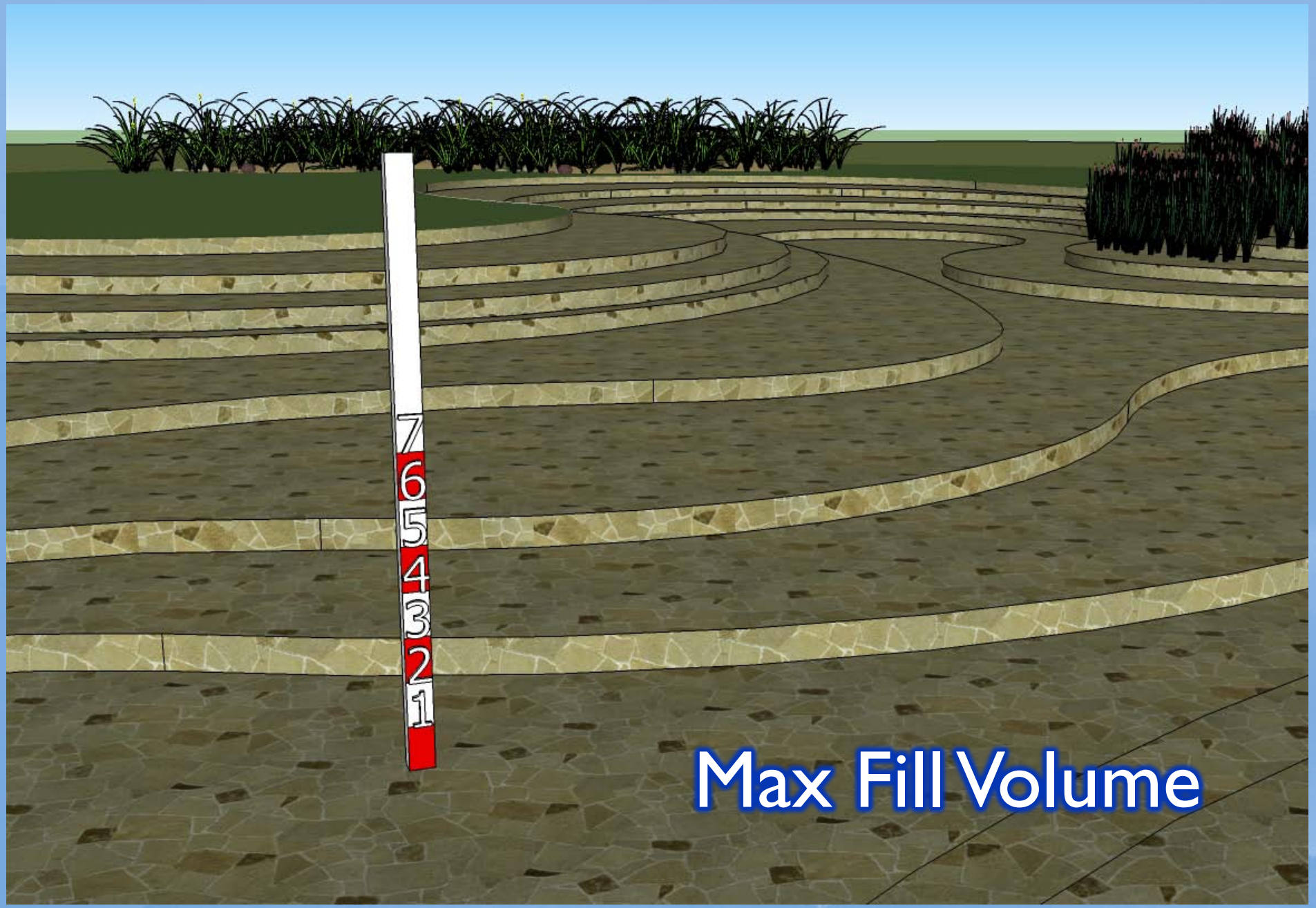
Wetland Vegetation Transpiration =
1.18 AF/Acre x 1.15 = 1.36 AF/Acre

Wetland Area x Wetland Transpiration
1.36 AF/Acre x 2 Acre = 2.72 AF

Wetland Water Right Parameters

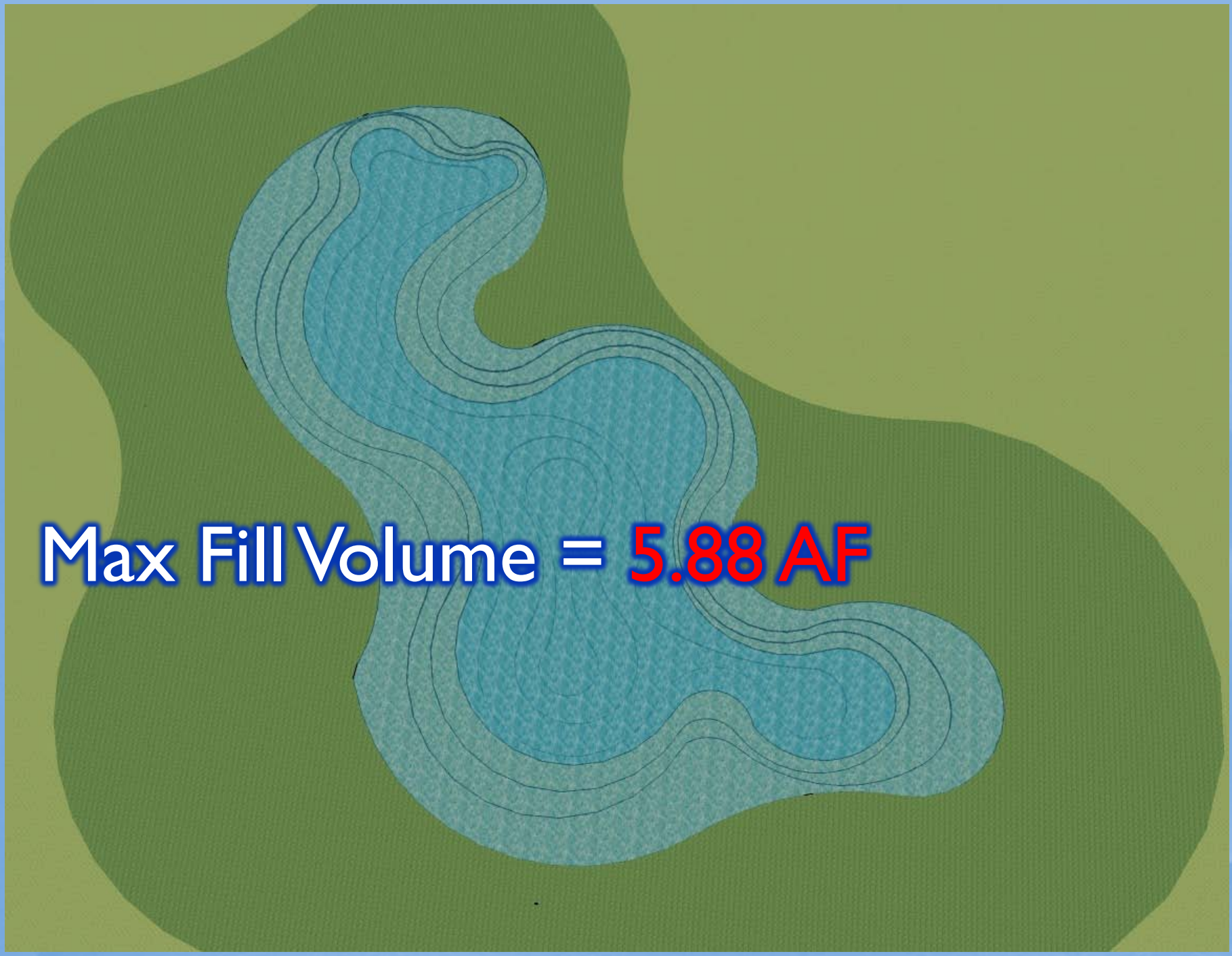
- Overall Wetland Area
- Wetland Vegetation Area
- Shallow Water Max Volume
- Shallow Water Evap Area


Max Fill Perimeter Isolation


7
6
5
4
3
2
1
Max Fill Volume

Max Depths x Acres = Volume

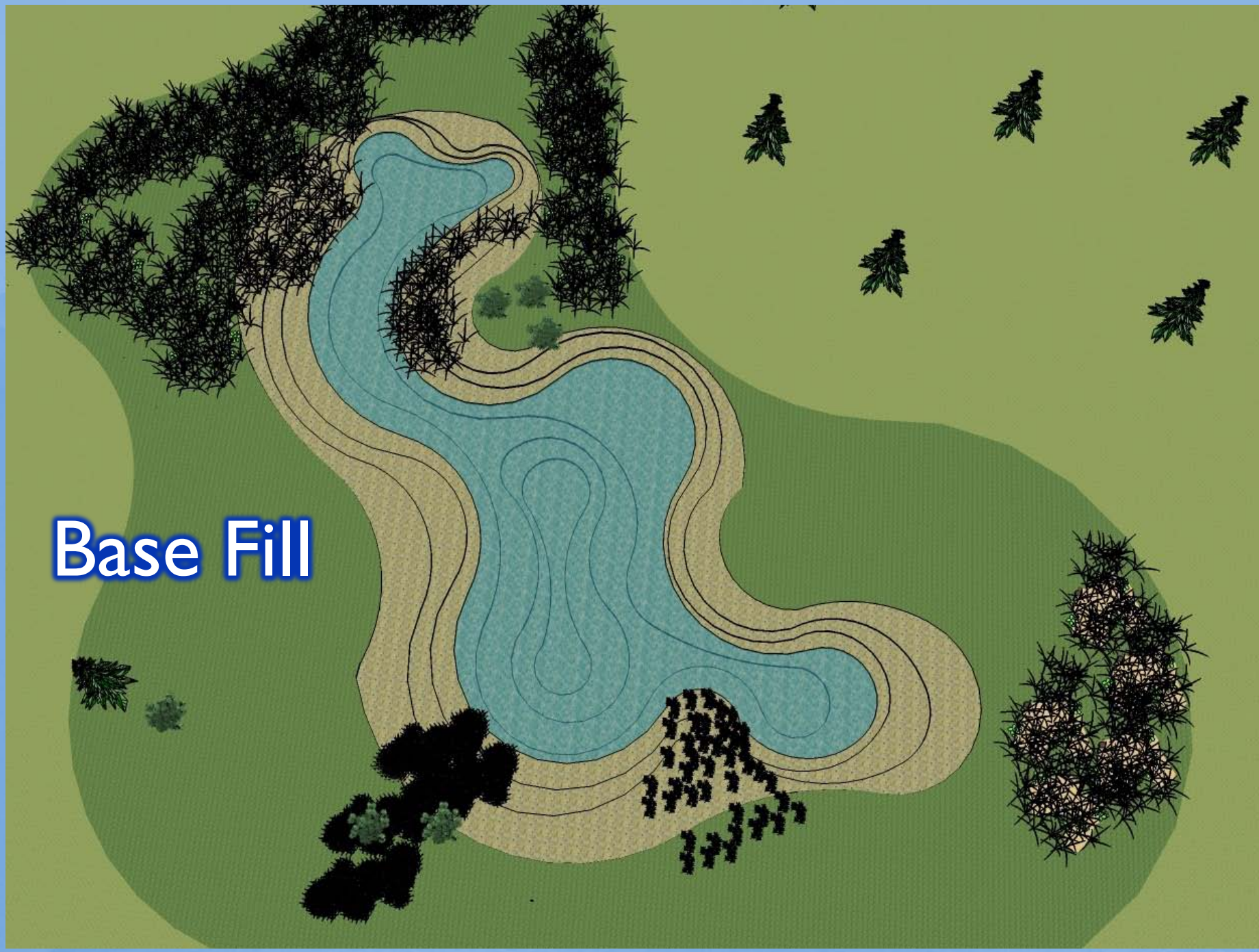
1 ft deep x 0.28 acres = 0.28 AF
2 ft deep x 0.18 acres = 0.36 AF
3 ft deep x 0.15 acres = 0.45 AF
4 ft deep x 0.22 acres = 0.88 AF
5 ft deep x 0.14 acres = 0.70 AF
6 ft deep x 0.50 acres = 3.00 AF
7 ft deep x 0.03 acres = 0.21 AF

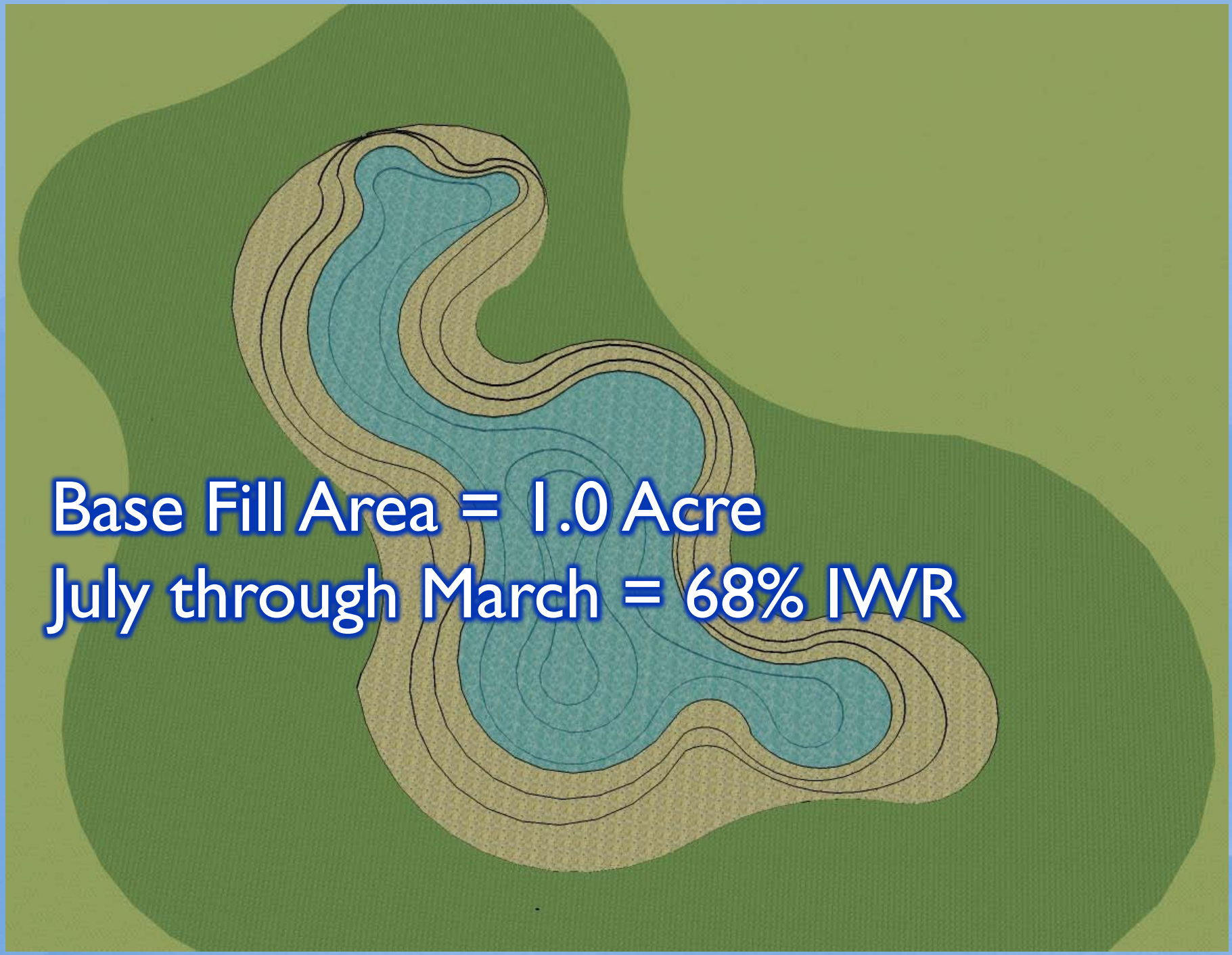

Max Fill Volume = 5.88 AF

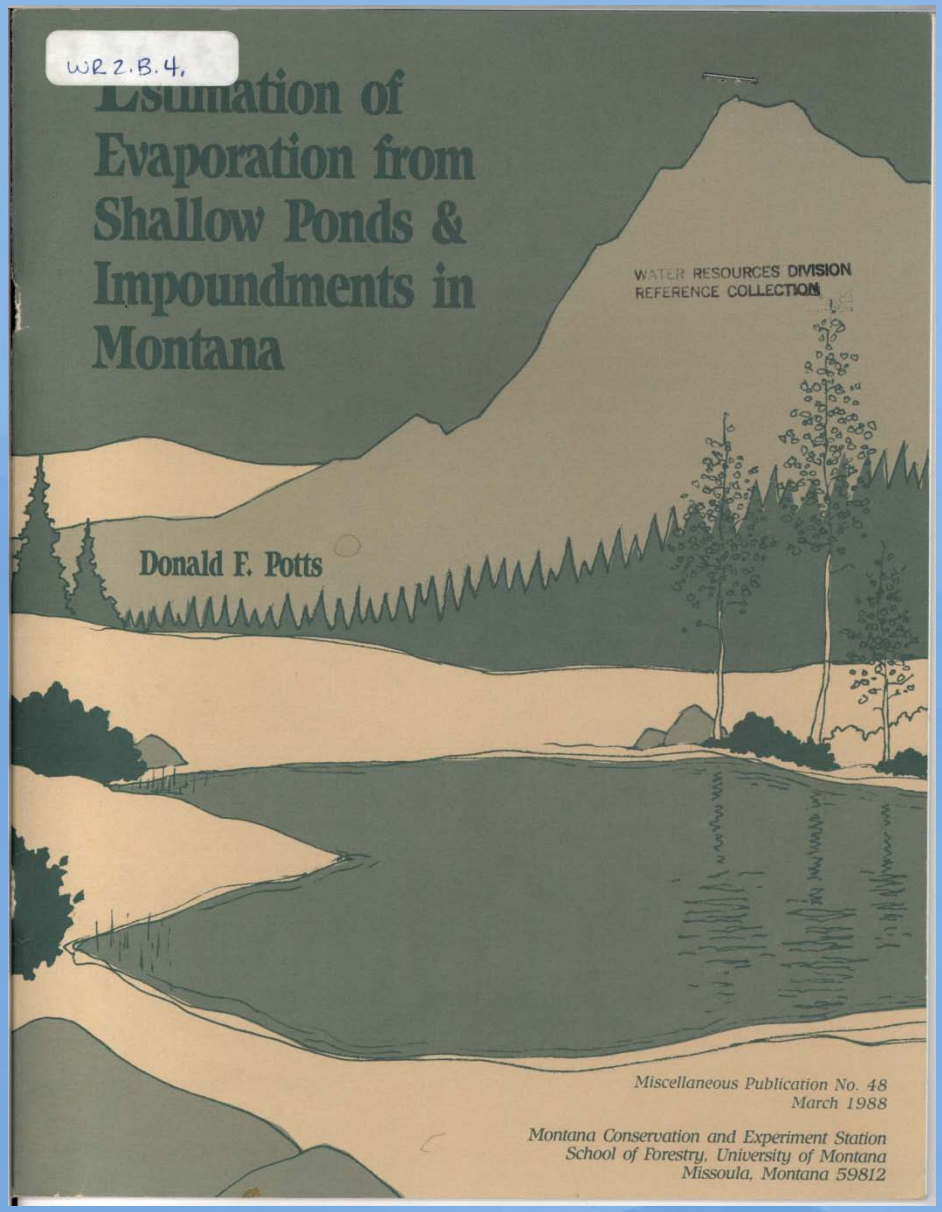
Wetland Water Right Parameters

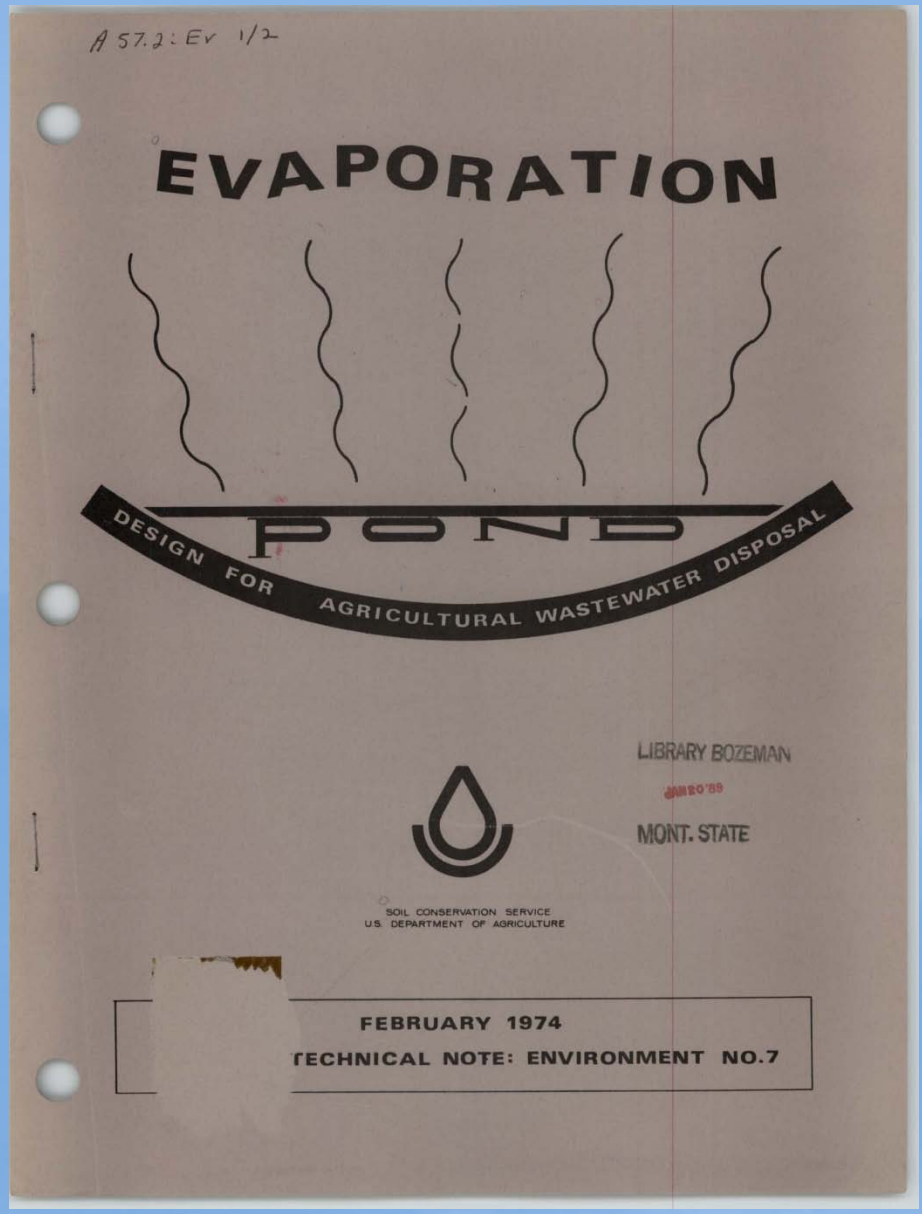
- Overall Wetland Area
- Wetland Vegetation Area
- Shallow Water Max Volume
- Shallow Water Evap Area


Max Fill Area = 1.5 Acre


Base Fill


Base Fill Area = 1.0 Acre
July through March = 68% IWR





Open-water Evaporation

Irrigation Water Requirement (IWR)

Irrigation Water Requirements Summary

Job: Demo IdahoTemperature Method
Location: Jerome Idaho
By: John
Weather Station: JEROME
Latitude: 4244 Longitude: 11431
Computation Method: Temperature (FAO BC)
Crop Curve: Grasses and forage legumes
Begin Growth: 4/24 End Growth: 10/12
Irrigation Type: Sprinklers- above canopy
Surface Soil: Silt Loam
Wetting (Development): 7 days (Mature): 14 days

Crop: Alfalfa Hay
County: Jerome, ID
Date: 05/07/98
Sta No: ID4670
Eleveation: 3740
Net irrigation application: 3 inches
Estimated carryover moisture used at season:
Start: 1.5 End: 1.5 inches
Water stress factor: 1
Number of cuttings: 3
1st Cut: 6/10 Last Cut: 9/25

Month	Total Monthly ET (3)	Dry Year 80% Chance (1)		Normal Year 50% Chance (1)		Average Daily ETc	Peak Daily ETPk
		Effective Precipitation	Net Irrigation Requirements	Effective Precipitation	Net Irrigation Requirements		
	(inches)	(inches)	(inches)(2)	(inches)	(inches)(2)	(inches)	(inches)
January							
February							
March							
April	0.43	0.08	0.00	0.11	0.00	0.07	
May	5.48	0.49	3.85	0.68	3.62	0.18	0.20
June	6.26	0.47	5.79	0.65	5.60	0.21	0.23
July	9.69	0.13	9.56	0.18	9.51	0.31	0.37
August	6.75	0.22	6.53	0.31	6.44	0.22	0.25
September	4.97	0.30	3.71	0.41	3.55	0.16	0.18
October	0.65	0.11	0.00	0.16	0.00	0.05	
November							
December							
TOTALS	**34.23**	**1.80**	**29.44**	**2.50**	**28.74**		

Max Fill Open-water Evaporation

Fill Area = 1.5 Acre
April through June = 32% IWR Values
Total Evap Rate = 37.24" or 3.10'
Avg Precip = 13.8" or 1.13'
Net Evap Rate = 3.1' – 1.13' = 1.97'
Net Evap = 1.97' x 1.5 Acre * 32% =
0.95AF

Base Fill Open-water Evaporation

Fill Area = 1.0 Acre
April through June = 68% IWR Values
Total Evap Rate = 37.24" or 3.10'
Avg Precip = 13.8" or 1.13'
Net Evap Rate = 3.1' – 1.13' = 1.97'
Net Evap = 1.97' x 1.0 Acre * 68% =
1.34 AF

Step 3 – Calculate Consumptive Use

- Vegetation Transpiration — 2.72 AF
- Max Fill Water Volume — 5.88 AF
- Open-water Evaporation
  - Max Fill — 0.95AF
  - Base Fill — 1.34 AF

Total Consumptive Use — 10.89 AF

Step 4 – Additional Components

- **Base Flow Rate on Volume distributed over time**
- **Be mindful of site-specific source limitations**
- **Include conveyance quantities or additional water requirements as necessary**