Impact of Oil Spill Removal on a Freshwater Wetland

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Fifth Biennial Freshwater Spills Symposium 2004

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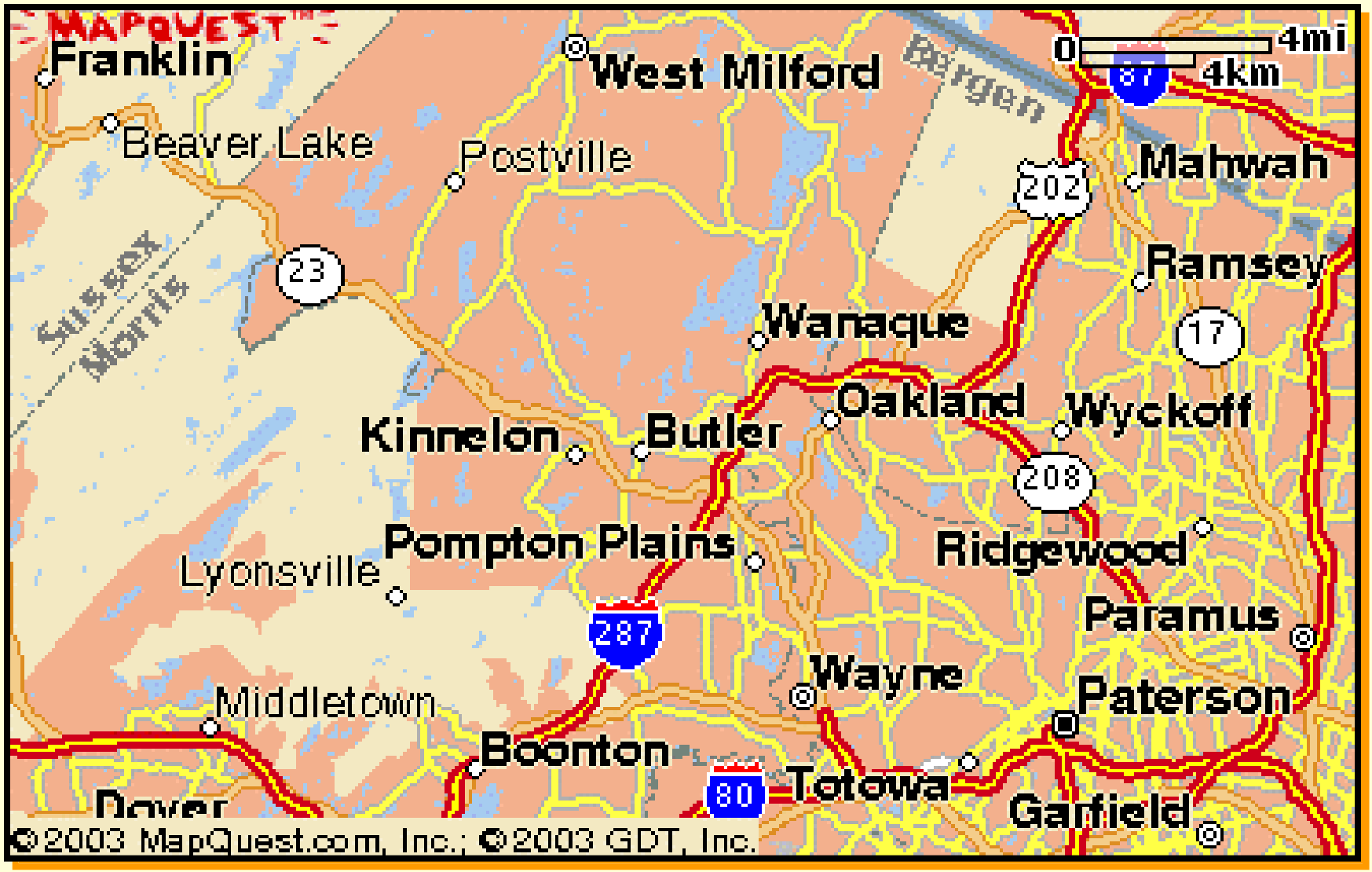

Impact of Oil Spill Removal on a Freshwater Wetland

The wilderness core of the NJ Highlands, and its largest unprotected forest tract, holds enormous biological value and is home to hundreds of bear, native trout, bobcat and rare interior forest bird species.

Much of the watershed has been held by the City of Newark since the early 20th century to safeguard its water supply.

Highlands forests supply and protect clean drinking water for over 15 million people, including over half of New Jersey's population, and protect major water supply watersheds for New York City.

USGS

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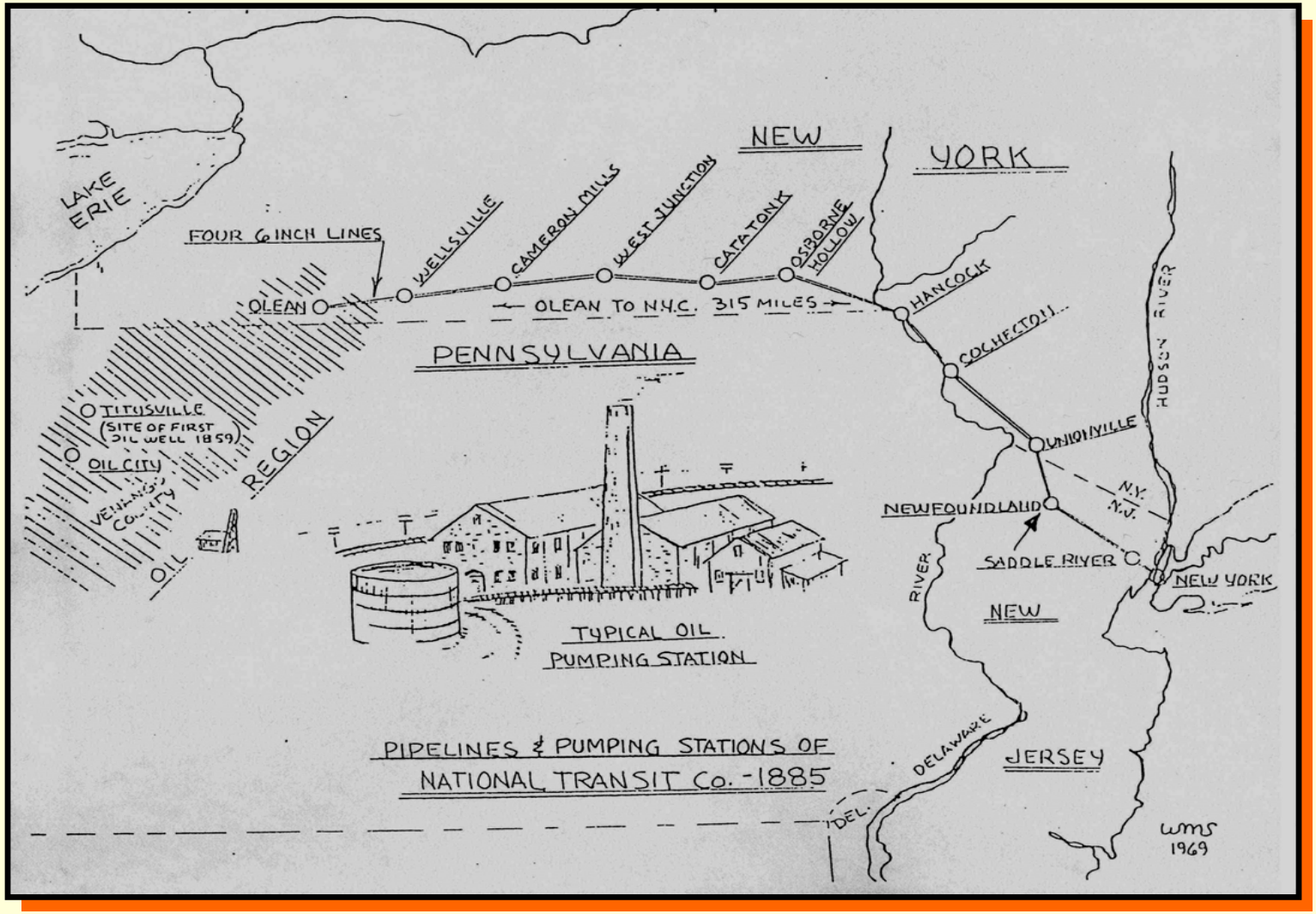

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Relict Pumping Station at Unionville, New York similar to Newfoundland Pumping Station

+ Eleven stations, 28 miles apart, over a 315 mile distance with 4 six inch diameter pipelines

+ Maximum capacity of 50K barrels a day (2.1 million gallons).

+ Operation period: 1881-1920.

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February 1996 Initial Response

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Interceptor Trench installed before soil removal

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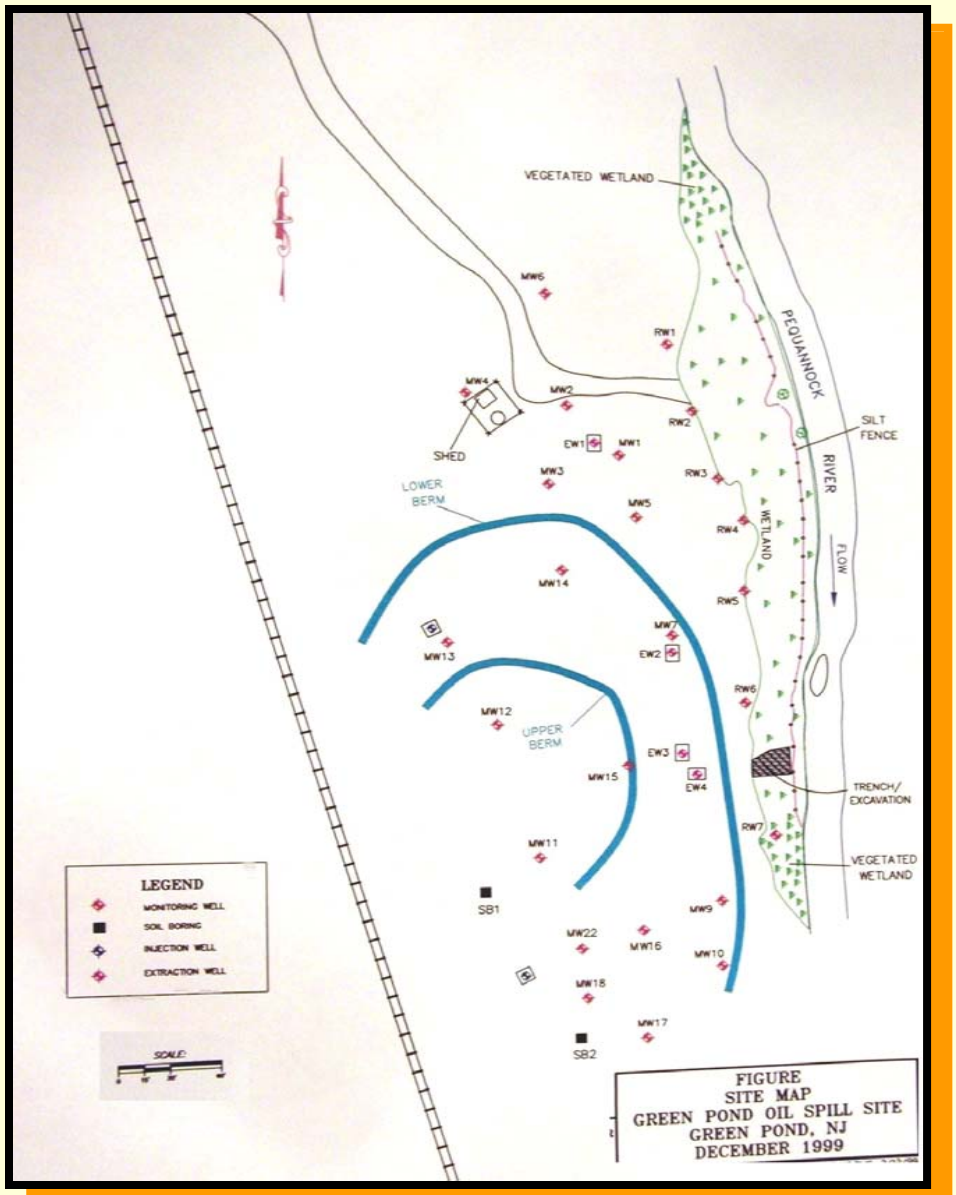

Impact of Oil Spill Removal on a Freshwater Wetland

28 July 1998 Before Oil Contaminated Soil Removal.

Impact of Oil Spill Removal on a Freshwater Wetland

July 1998

Impact of Oil Spill Removal on a Freshwater Wetland

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Autumn 1998

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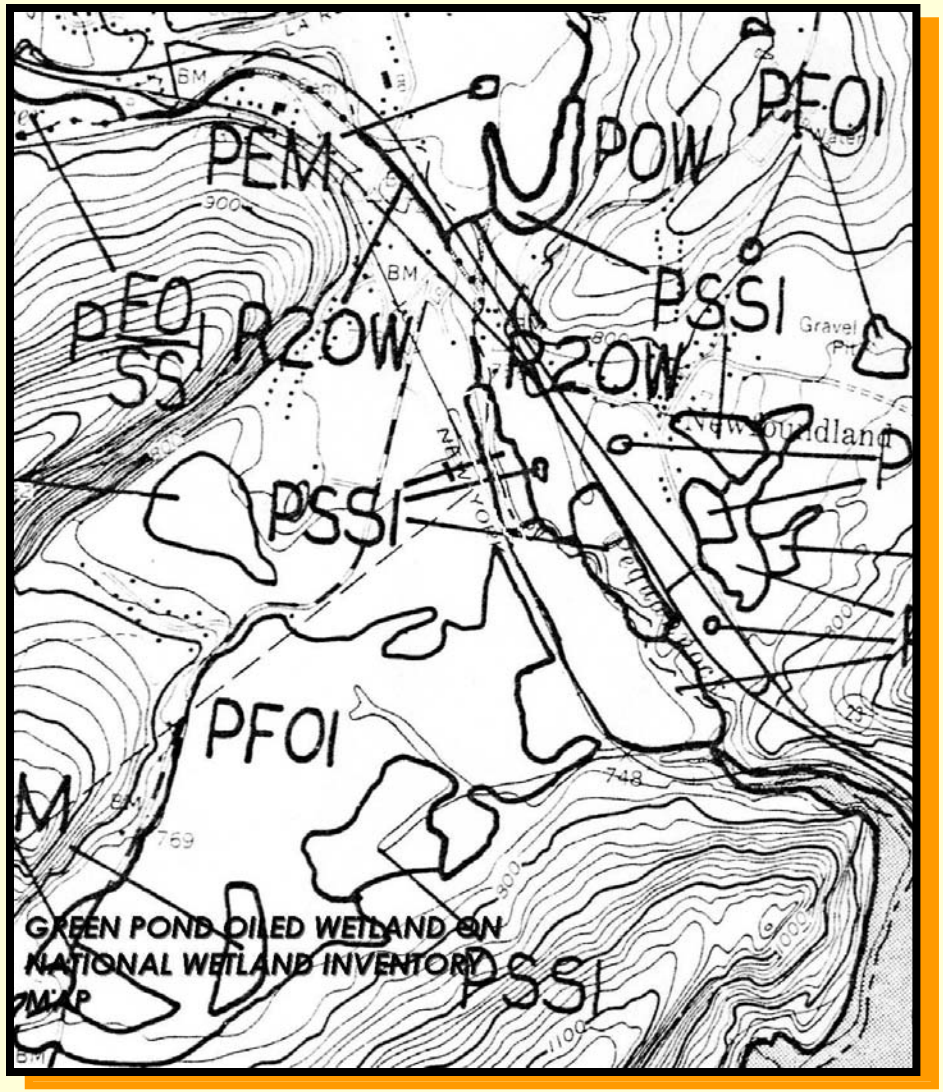
PSS1 = Palustrine Scrub Shrub Broad leaved Deciduous e.g. Red Maple swamp



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April 1999 Earth Day at Green Pond Oil Spill Site

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Species	Number Live		Differential
	1999	*2002*	
V. dentatum	21	12	-9
Aronia	55	21	-34
Alnus	59	52	-7
Cornus sericea	15	46	+31
Cornus amomum	69	93	+24
Sambucus	26	18	-8
Ilex	18	21	-3
Salix discolor	52	37	-15
Salix nigra	19	17	-2
Total	334	311	Net -23

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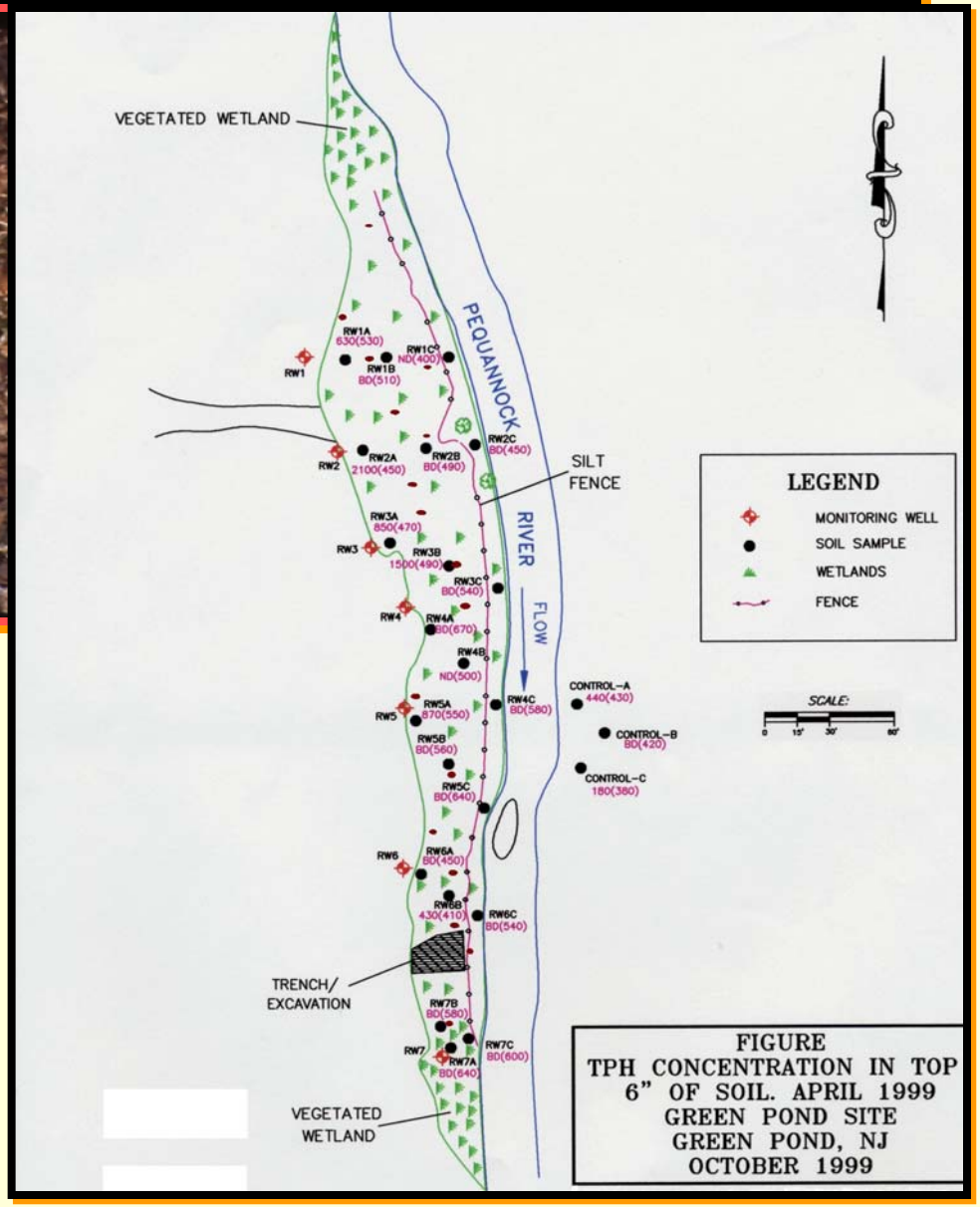

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TABLE 1. Total Petroleum Hydrocarbon (TPH) levels in Wetland Soils at Green Pond Oil Spill Site

in mg/Kg (dry weight)

Location	Apr-99		Location	May-00		Location	Jun-01		Jun-02		May-03	
	Conc	MDL		Conc.	MDL		Conc.	MDL	Conc.	MDL	Conc.	MDL
RW1-A	630	530				Near Rock	220	44	370	41	150	60
RW1-C	ND	400				Close to RW1-C	110	40	100	42	97	46
						Near "Spooge“	120	39			*2100*	*630*
						Near "Spooge"	*1800*	*520*	*7700*	*510*	*8600*	*540*
RW2-B	83J	490				*Close to RW2-B*	*2100*	*520*	*1900*	*490*	*270*	*55*
			Between RW2&3	2300	510	Between RW2&3	560	220	1300	520	730	490
			Close to Above	1300	550	Close to Above	1500	510	1700	480	460	280
RW3-B	1500	490	Close to RW3-B	4400	630	Close to RW3-B	110	49	1400	500	210	61
RW5-A	870	550	Close to RW5-A	960	550	Close to RW5-A	200	62	1900	540	410	85
RW6-C	210J	540	Close to RW6-C	1300	550	Close to RW6-C	230	40	580	210	200	52
RW7-B	300J	580				Close to RW7-B	300	66	470	59	220	61

Across River –A	440	430
Across River –B	260J	420
Acoss River –C	180J	380

J = estimated value below the detection limit
MDL = Method Detection Limit

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Wetland Plant Species Indicator Categories*

OBL = Obligate Wetland

Occur almost always (>99% Probability) under natural conditions in wetlands.

FACW = Facultative Wetland

Usually occur in wetlands (67–99% Probability), but occasionally found in non-wetlands.

FAC = Facultative

Equally likely to occur in wetlands or non-wetlands (34-66% Probability).

FACU = Facultative Upland

Usually occurs in non-wetland (67-99% Probability). But occasionally found in wetlands (1-33% Probability).

*National list of Plant Species that occur in Wetlands: Northeast Region (Region 1)

USF&W Biological Report 88(26.1) MAY 1988

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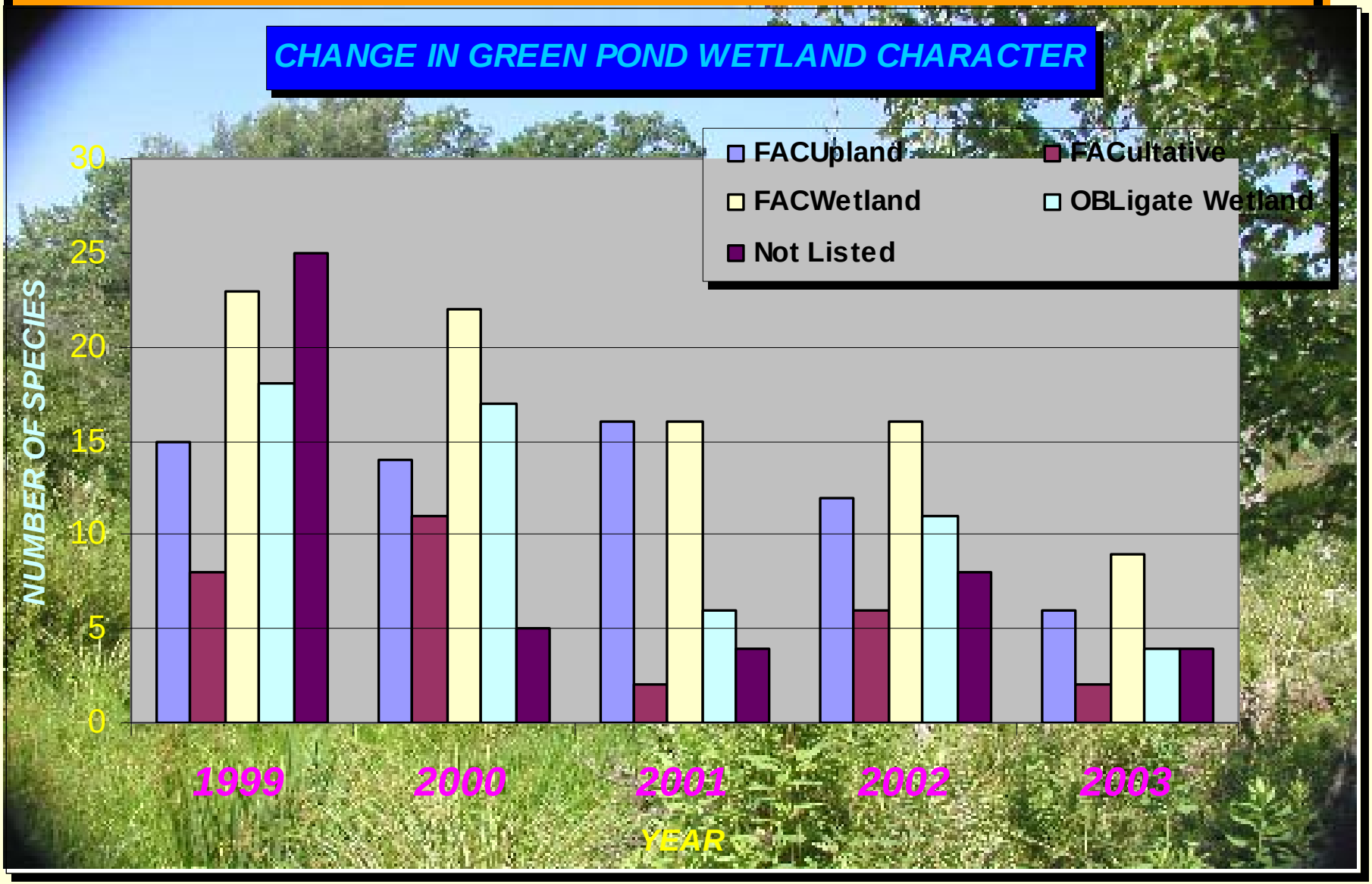

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- Explanation of Habitat Symbols
  - **P=perennial (comes back every year)**
  - **I=introduced (not native, would include invasives)**
  - **N=native (indiginous to Northeast US)**
  - **G=grass(like those found along roads and lawns)**
  - **Gl=grasslike(rushes, sedges)**
  - **F=forb(flowering non-woody like goldenrods,etc)**
  - **B=biennial(two year growing cycle)**
  - **S=shrub(woody plants usually < 20 ft in height)**
  - **A=annual(one growing season, that's it)**
  - **E=emergent** (grows out of water e.g. cattails)

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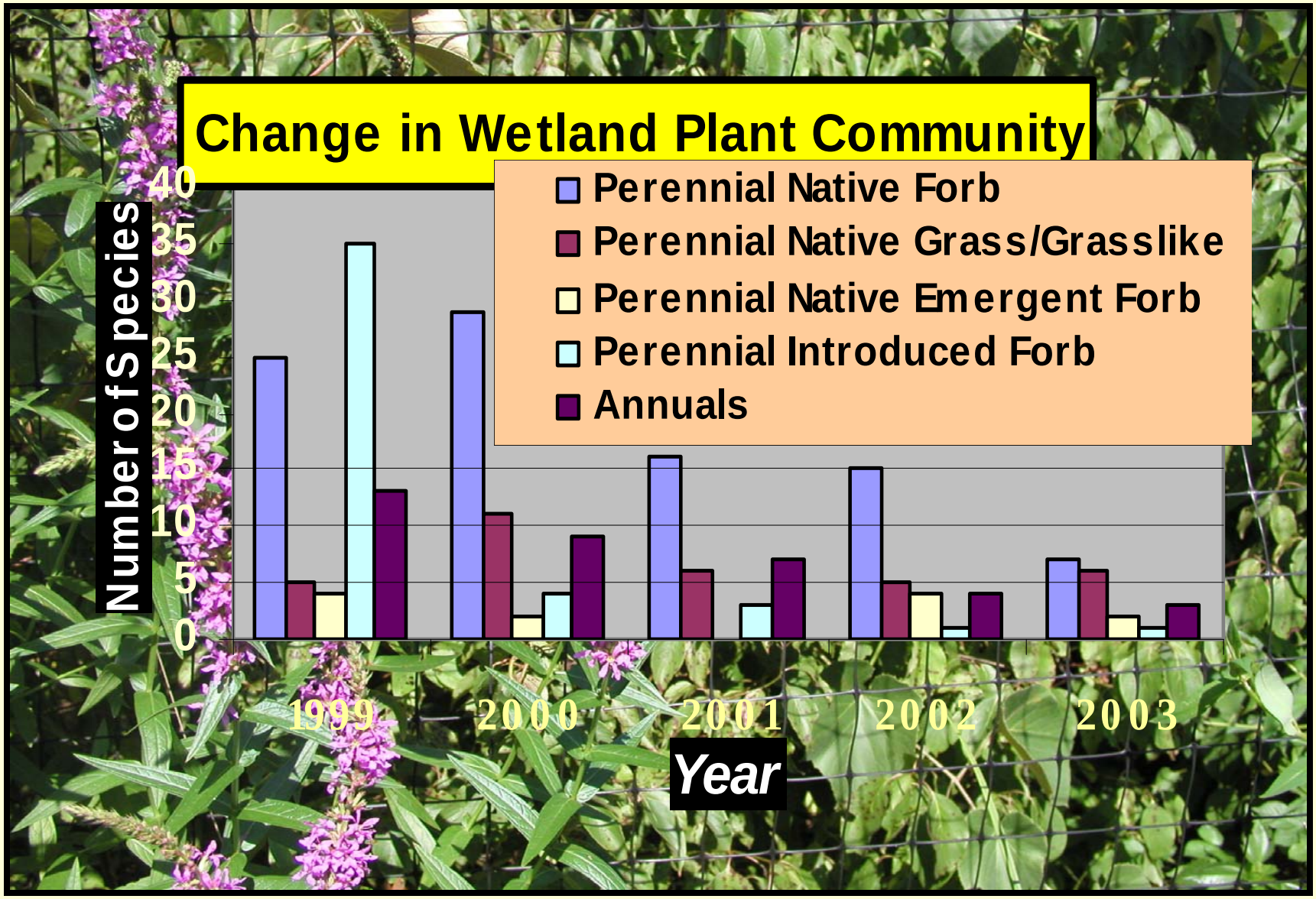

Impact of Oil Spill Removal on a Freshwater Wetland

28 July 1998 Before Oil Contaminated Soil Removal.
Notice Invasive Purple Loosestrife in left center of picture

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Invasive Species Management for Purple Loosestrife 2000

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Invasive Species Management for Purple Loosestrife 2001, 2002 & 2003

Biological Control with Galerucella beetles

Freshwater Wetland

Invasive Species Management for Purple Loosestrife 2001, 2002 & 2003 Galerucella spp. (calmariensis and pusilla)

Life Stages: Eggs laid in May, June , August and hatch in ten days. Larvae feed on young buds, leaves and stems up to 14 days. Pupation occurs in soil lasting about seven days.

Adults over winter and emerge in May and June. First generation adults emerge in July and August and relocate to new areas (hopefully).

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Invasive Species Management for Purple Loosestrife 2002 & 2003 also included :

- End of season whole Plant extrication
- Seed head clipping in Spring.
- Clipping Flowering structures in late summer before seed maturation

A single Loosestrife seed head with tiny seeds in lower left hand corner. One plant can produce 2 million or more seeds.

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Herbivory Issues Winter 2002 - Shrubs

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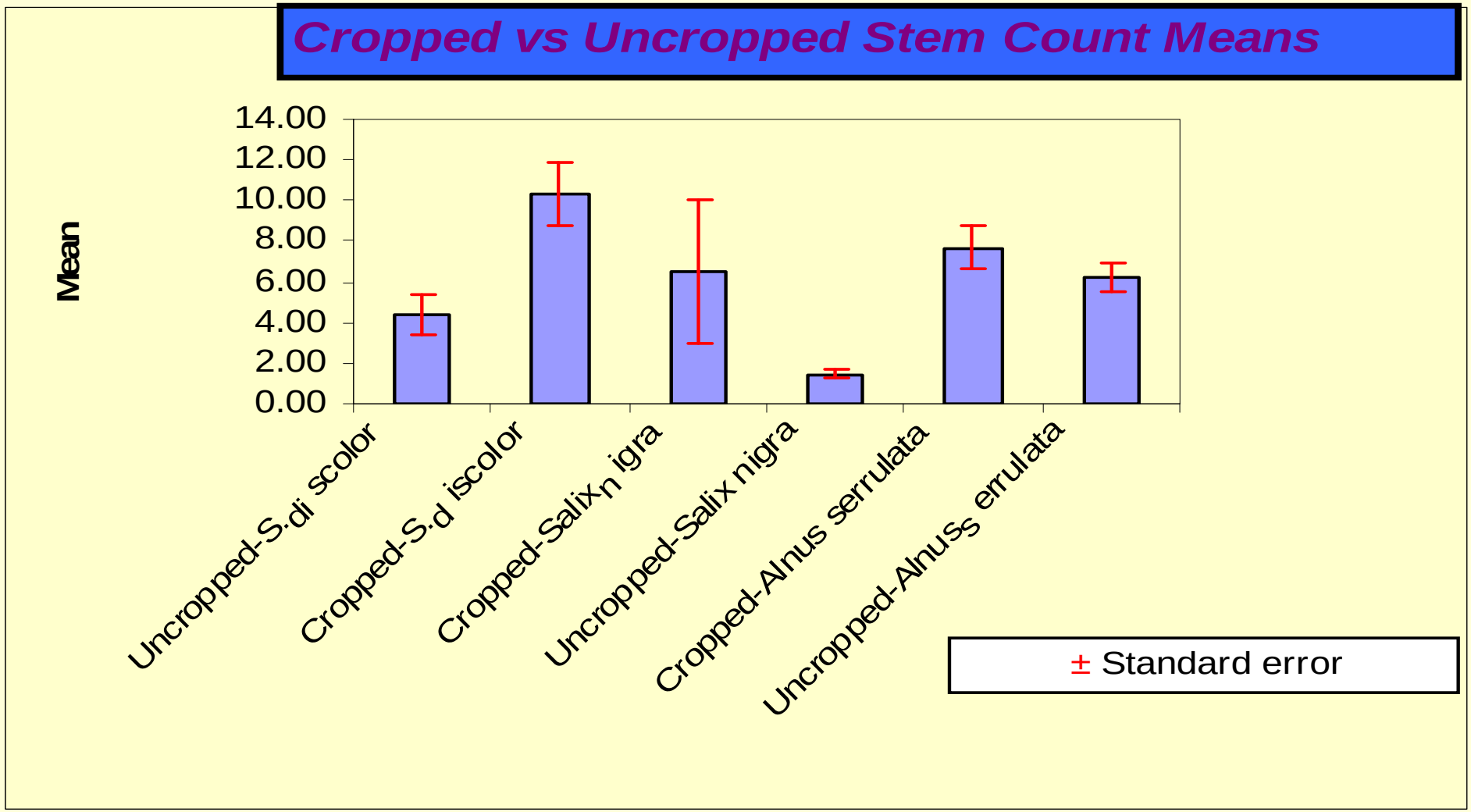
Cropped vs Uncropped Stem Count Means



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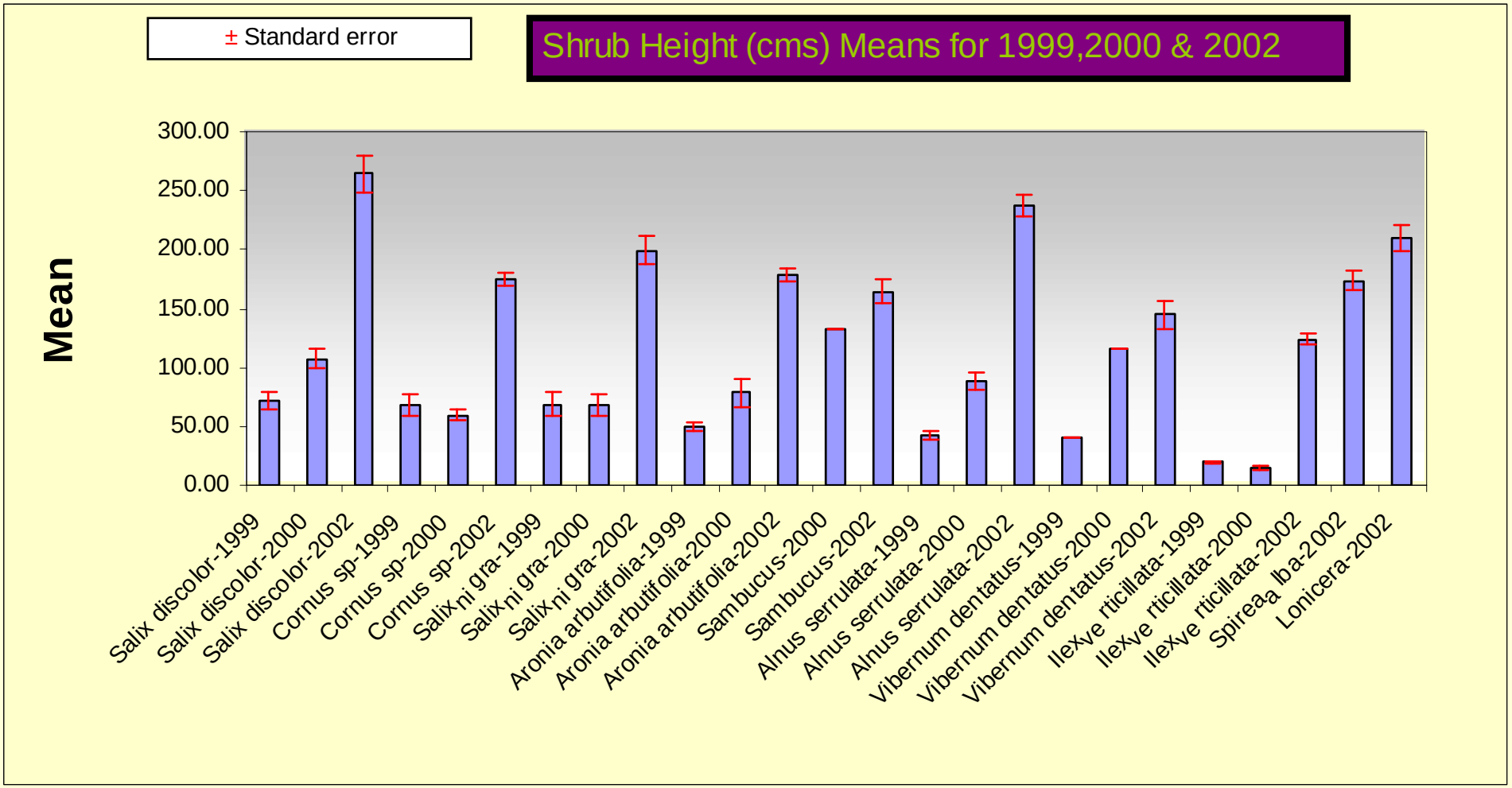

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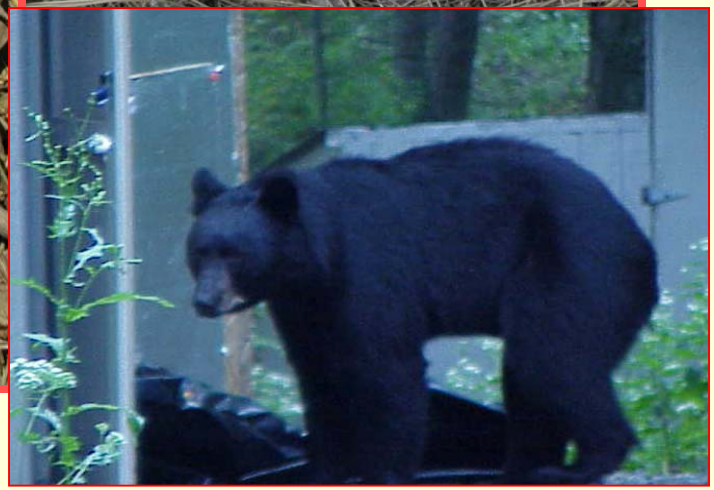
Herbivory Issues Winter 2002



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- What have we learned so far..
  - The herbaceous plant community in a wet meadow stripped of surface soil (4-6inches) will recover providing root systems remain intact.
  - Low level soil TPH levels do not adversely affect potted shrub survival.
  - Occasional oil “spooges” do not affect the plant community as a whole.
  - Although the number of plant species has decreased the plant community has maintained its wet meadow characteristics with sedges, rushes and forbs.
  - Invasive species management is a “must do” activity in a revegetation/restoration project.

  - ***WATCH OUT FOR THE BEAVERS AND BEARS, OH MY!***

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