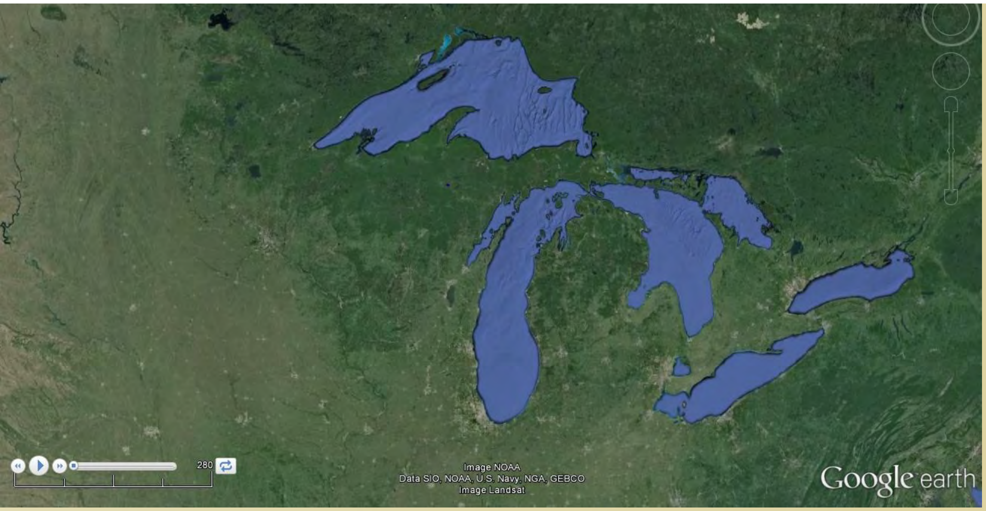
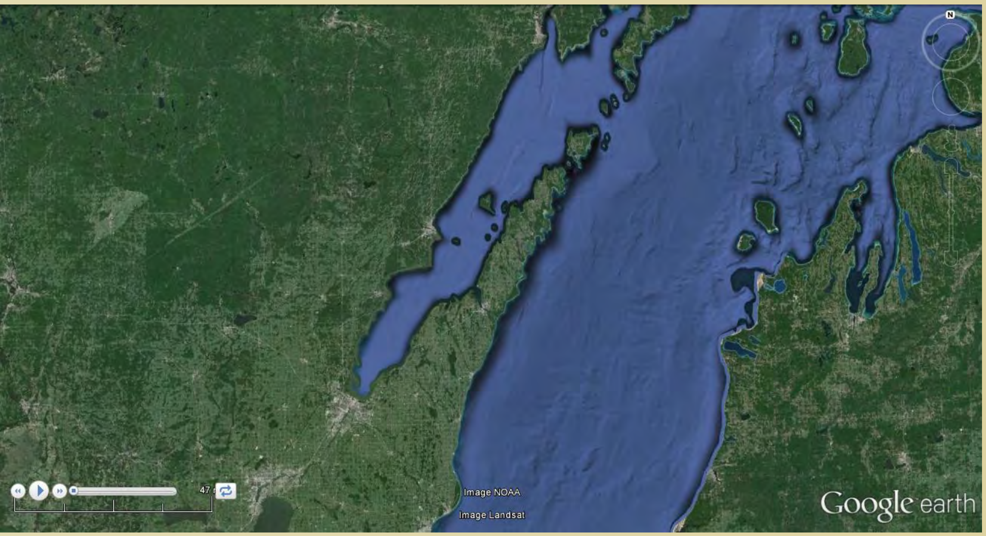
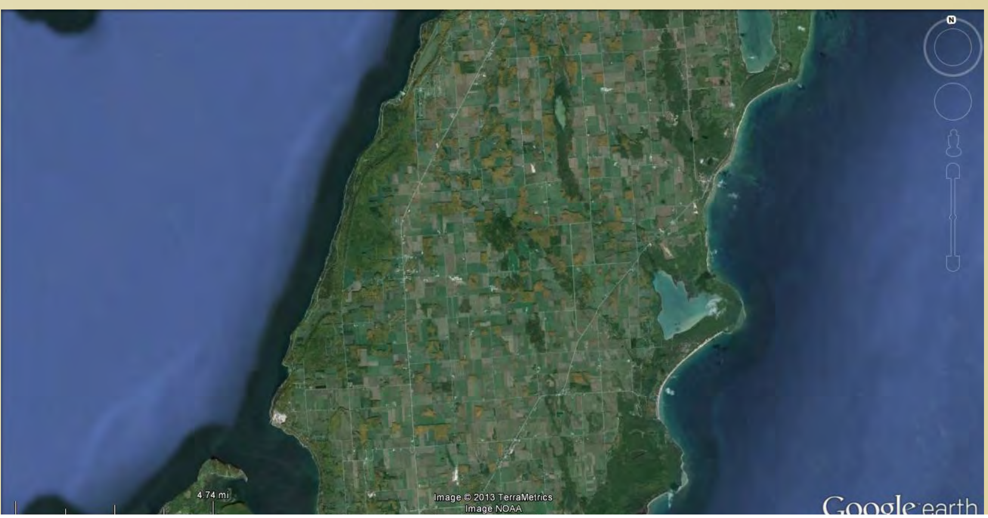
Wisconsin Wetlands Association's 20th Anniversary Wetland Science Conference

Achieving balance and success in a wetland complex infested with ~~one~~ two million stems of *Phalaris arundinacea*

Dan Collins
Landscapes of Place







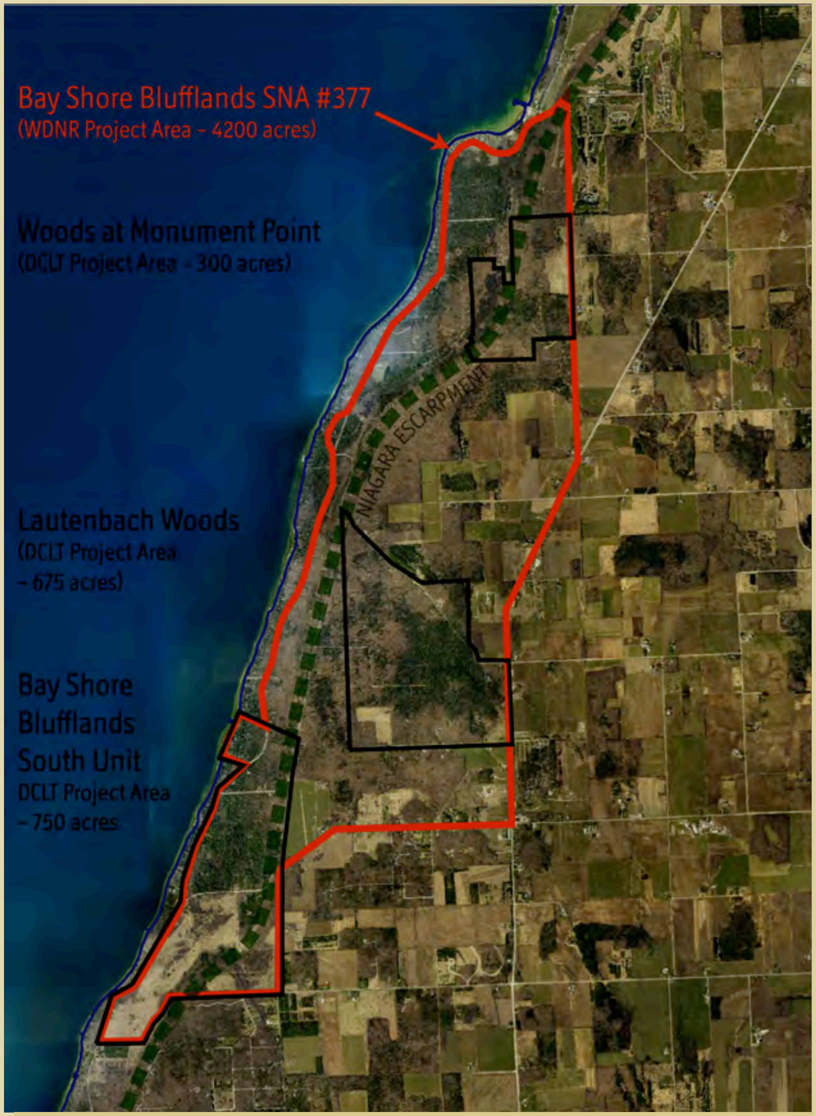
Geographic Context:

Great Lakes Region

Door Peninsula of Wisconsin

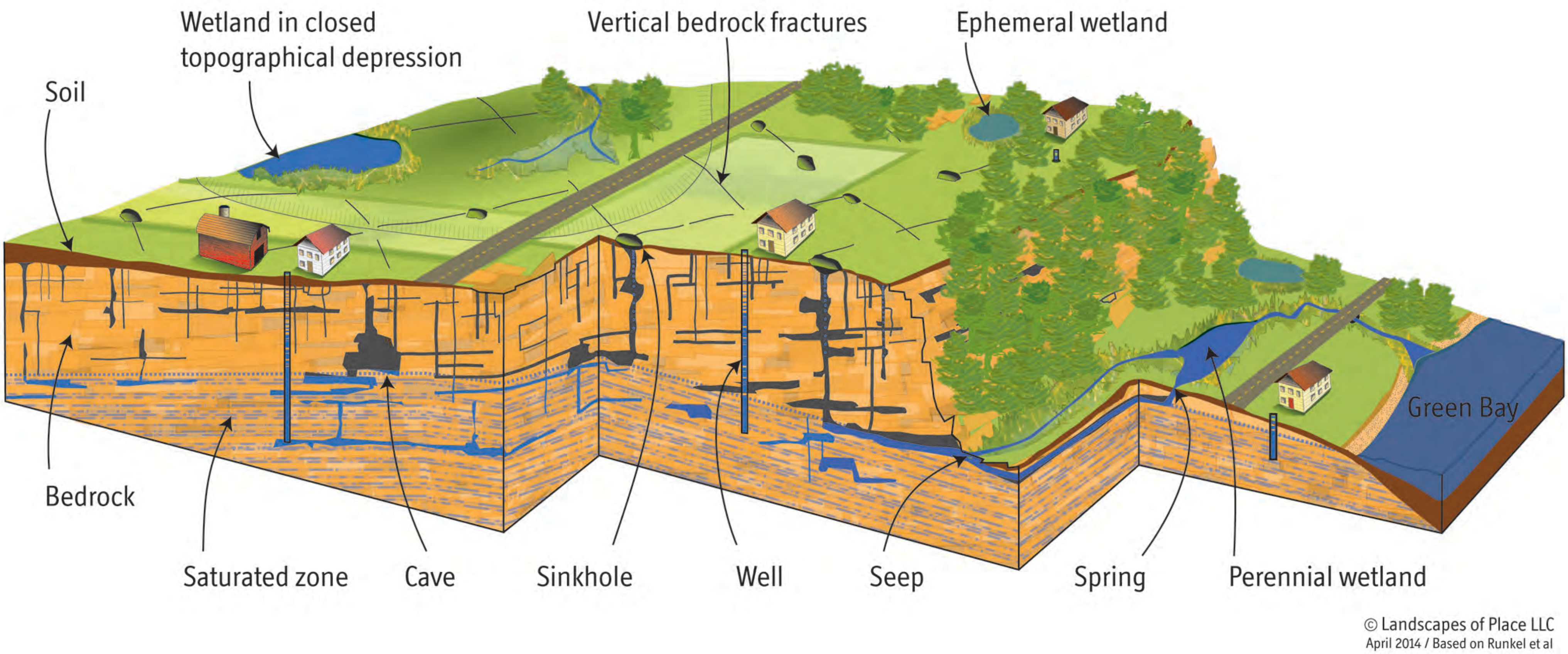
Bay Shore Blufflands SNA #377
(WDNR Project Area ~ 4200 acres)
Woods at Monument Point
(DCLT Project Area ~ 300 acres)
NIAGARA ESCARPMENT
Lautenbach Woods
(DCLT Project Area
~ 675 acres)
Bay Shore
Blufflands
South Unit
DCLT Project Area
~ 750 acres

Geographic Context



- Located within the Bay Shore Blufflands SNA 1700-ha (4200 acres)
- 7 miles of the Niagara Escarpment
- Door County Land Trust - project areas, 300-ha

Bay Shore Blufflands SNA



Geology: Karst, Silurian dolomite

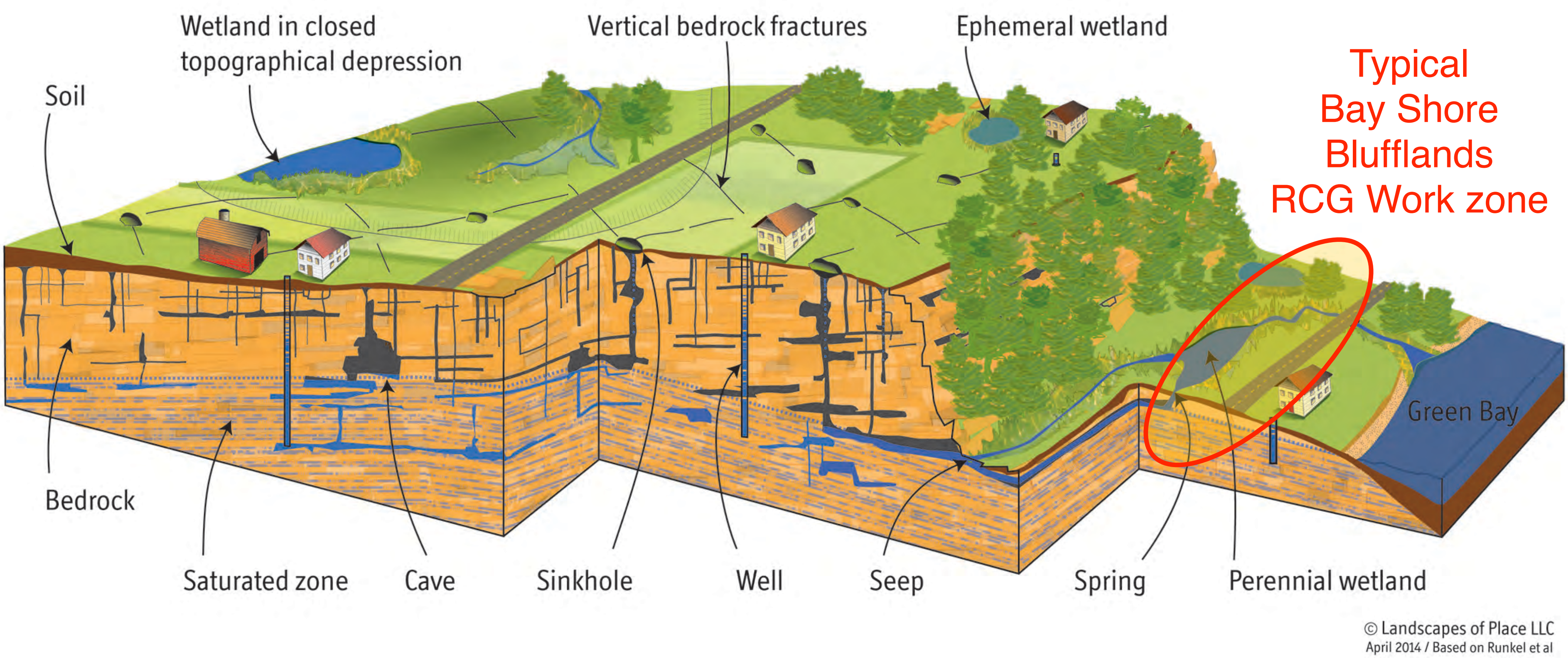
Hydrology: Ephemeral and permanent; seeps, ponds, floodplains, steams

Nutrient: Total N range: 7.7 – 15.8 mg/L, Total P range: 0.02 – 0.16 mg/L

Communities: Alder thicket, sedge meadow, hardwood swamp, floodplain forest

Forbs: N=290, mean C = 5.5, <OBL> = 58 species

Bay Shore Blufflands SNA



Geology: Karst, Silurian dolomite

Hydrology: Ephemeral and permanent; seeps, ponds, floodplains, steams

Nutrient: Total N range: 7.7 – 15.8 mg/L, Total P range: 0.02 – 0.16 mg/L

Communities: Alder thicket, sedge meadow, hardwood swamp, floodplain forest

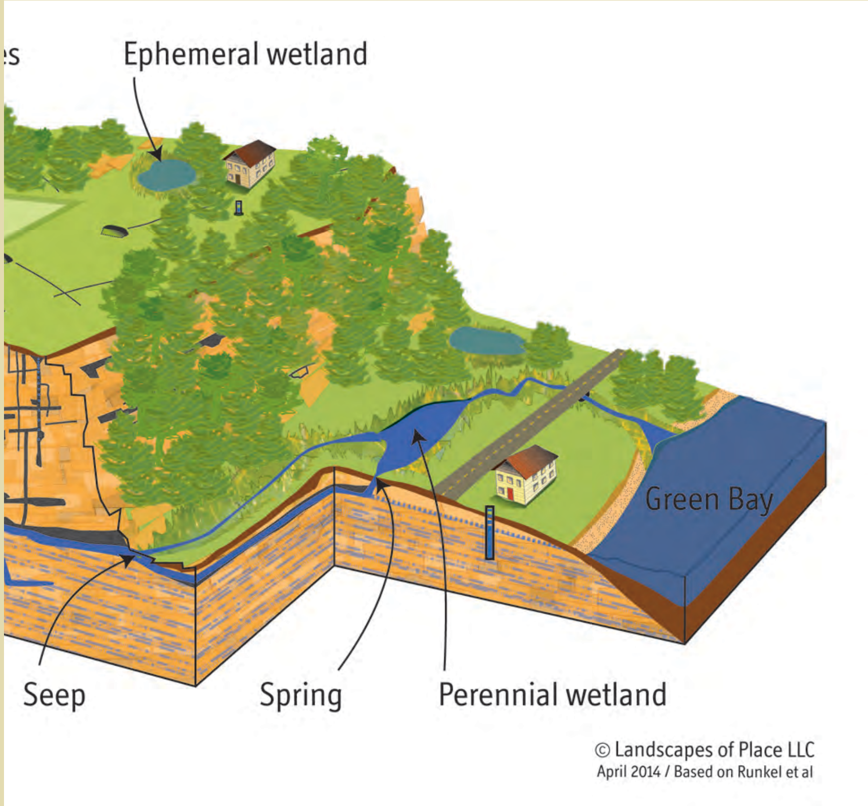
Forbs: N=290, mean C = 5.5, <OBL> = 58 species

Bayshore Blufflands SNA Approach

Goal:

Restore ecological function of the underlying wetland systems.

Note: This might not require the eradication of *P. arundinacea*.



Model

- Invasive species may persist because they possess traits that make them more resistant to enemies (e.g. Daehler & Strong, 1997; Leger & Forister, 2005).
- An alternate possibility is that invasive plants tolerate herbivory more than native species (Schierenbeck et al., 1994; Rogers & Siemann, 2003, 2004; Stastny et al., 2005).
- The working model is to behave as both a disruptive and a predatory species to disadvantage *P. arundinacea* monocultures

Bayshore Blufflands SNA Approach

Goal:

Restore ecological function of the underlying wetland systems.

Note: This might not require the eradication of *P. arundinacea*.

Model

- Invasive species may persist because they possess traits that make them more resistant to enemies (e.g. Daehler & Strong, 1997; Leger & Forister, 2005).
- An alternate possibility is that invasive plants tolerate herbivory more than native species (Schierenbeck et al., 1994; Rogers & Siemann, 2003, 2004; Stastny et al., 2005).
- The working model is to behave as both a disruptive and a predatory species to disadvantage *P. arundinacea* monocultures

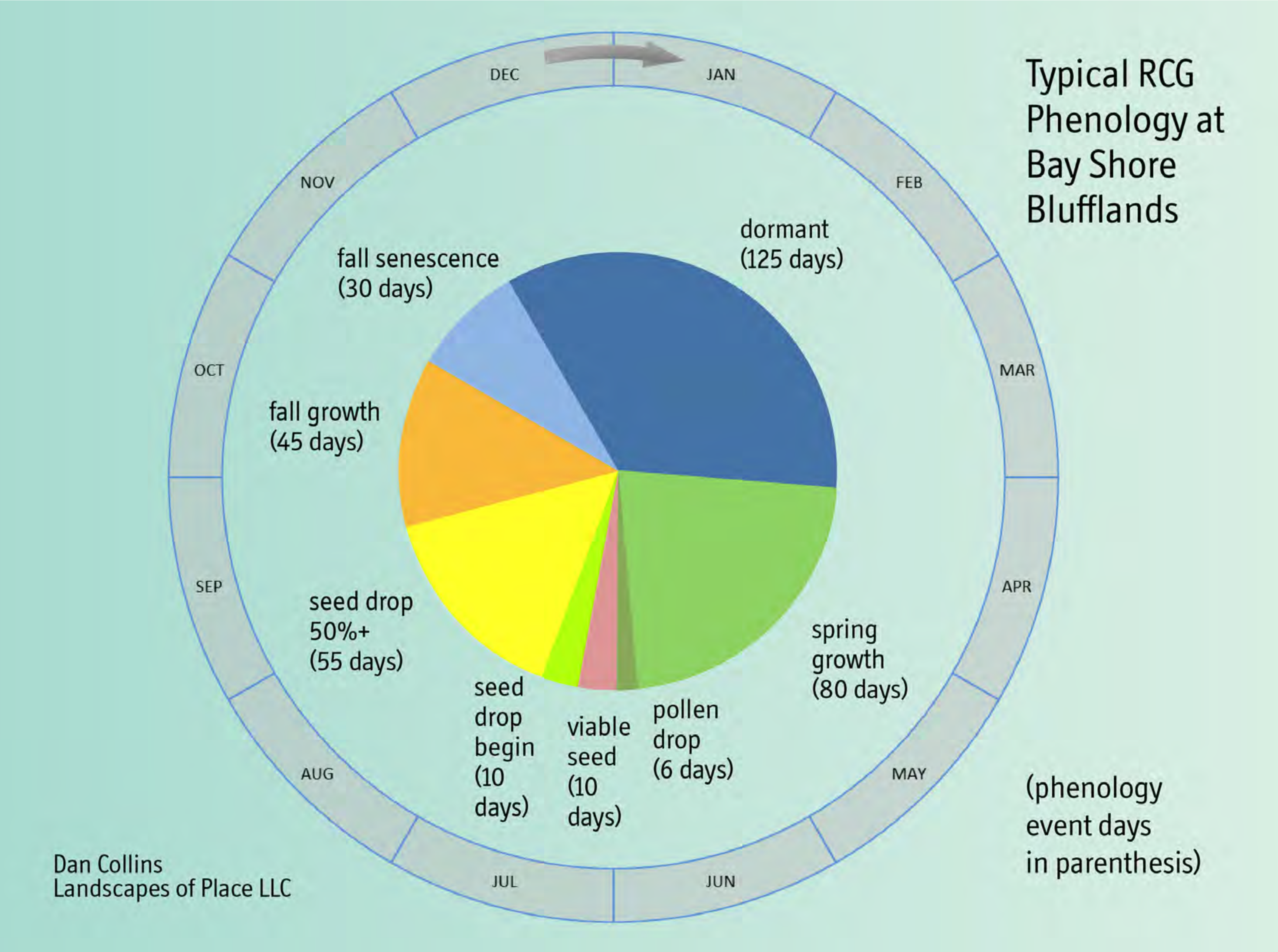
Bayshore Blufflands SNA Approach

Methods

- Deep quantification of stand and process parameters
  - Document hydrology and nutrient delivery (Wetzel 1996)
  - Quantify underlying native system (n, number of genii)
  - Precisely quantify local phenology of *P. arundinacea*
  - Quantify scope (we used zones with # of flowering stems)
- Integrated techniques selected & timed for local phenology
- Minimized disturbance - to retain native forbs competition
- Continuous implementation - ongoing management





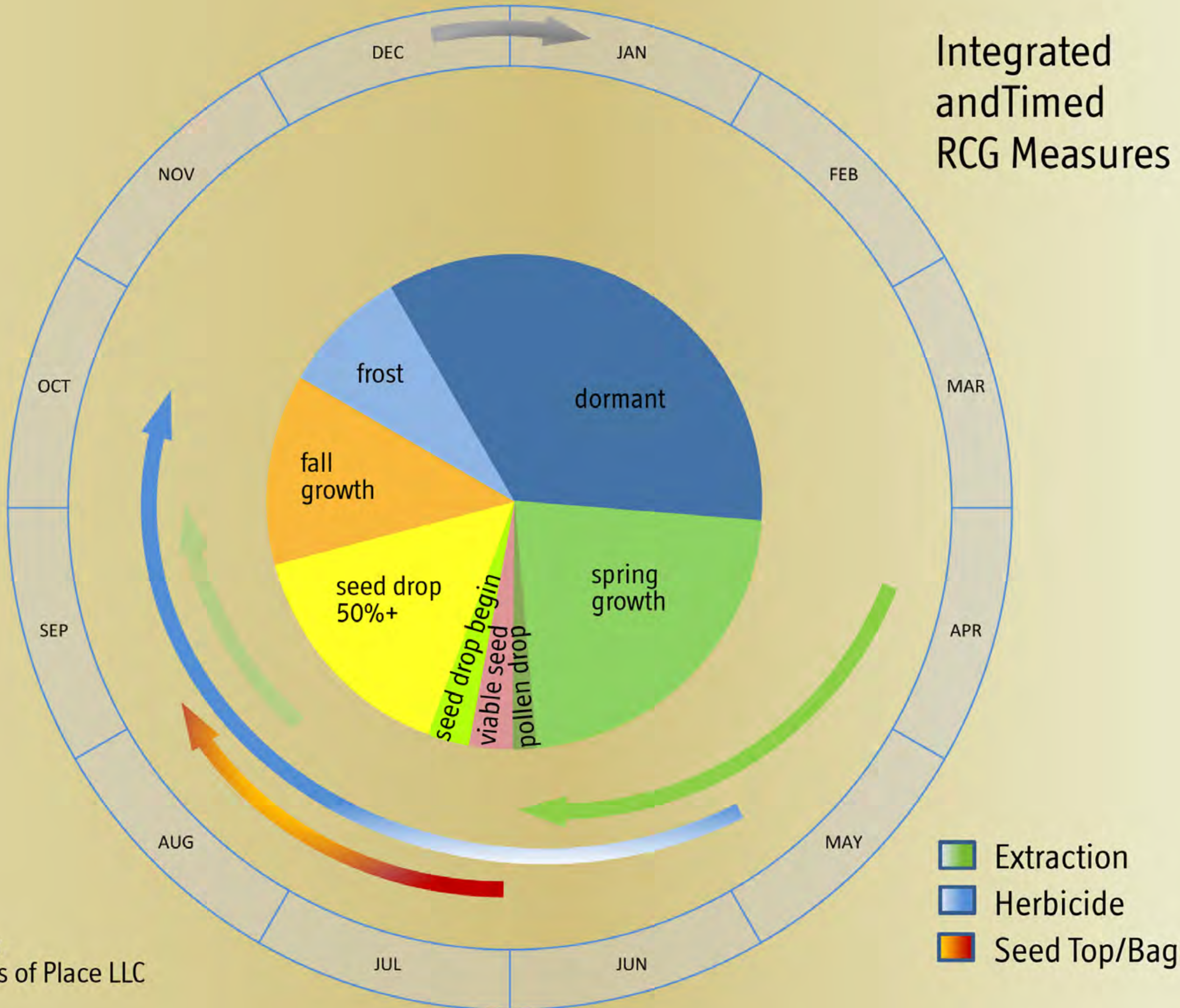


Typical RCG Phenology at Bay Shore Blufflands
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
dormant (125 days)
spring growth (80 days)
pollen drop (6 days)
viable seed (10 days)
seed drop begin (10 days)
seed drop 50%+ (55 days)
fall growth (45 days)
fall senescence (30 days)
(phenology event days in parenthesis)
Dan Collins
Landscapes of Place LLC

Quantitative assessments of infestation

Infestation Assessment	stems/m2	ha of this type	Stems
High	50	2	1,000,000
Medium	25	2.5	625,000
Low	10	3	300,000
totals		7.5	1,925,000

Integrated andTimed RCG Measures



Dan Collins
Landscapes of Place LLC


250,000 seeds per bag
bag, 1-
3 hours
labor
per bag

Seed topping:

Before

After about
2 hours work

Quantitative assessments of implementation

Infestation Assessment	stems/m2	ha of this type	Stems
High	50	2	1,000,000
Medium	25	2.5	625,000
Low	10	3	300,000
totals		7.5	1,925,000
Method	Extraction	Topping	Herbicide
Stems / hour	500	1000	900
Hours	3,850	1,925	2,139
Weeks	96	48	53

Extraction by pulling

Before

After about
6 hours work

(viable stems are placed
in trees after pulling
to dry and wither)

July 2012

Before

August 2014

After

(native seed source rebounding)

Before

After

Before topping (top left)

After topping (bottom left)

Later in fall, native plant rebound (bottom right)

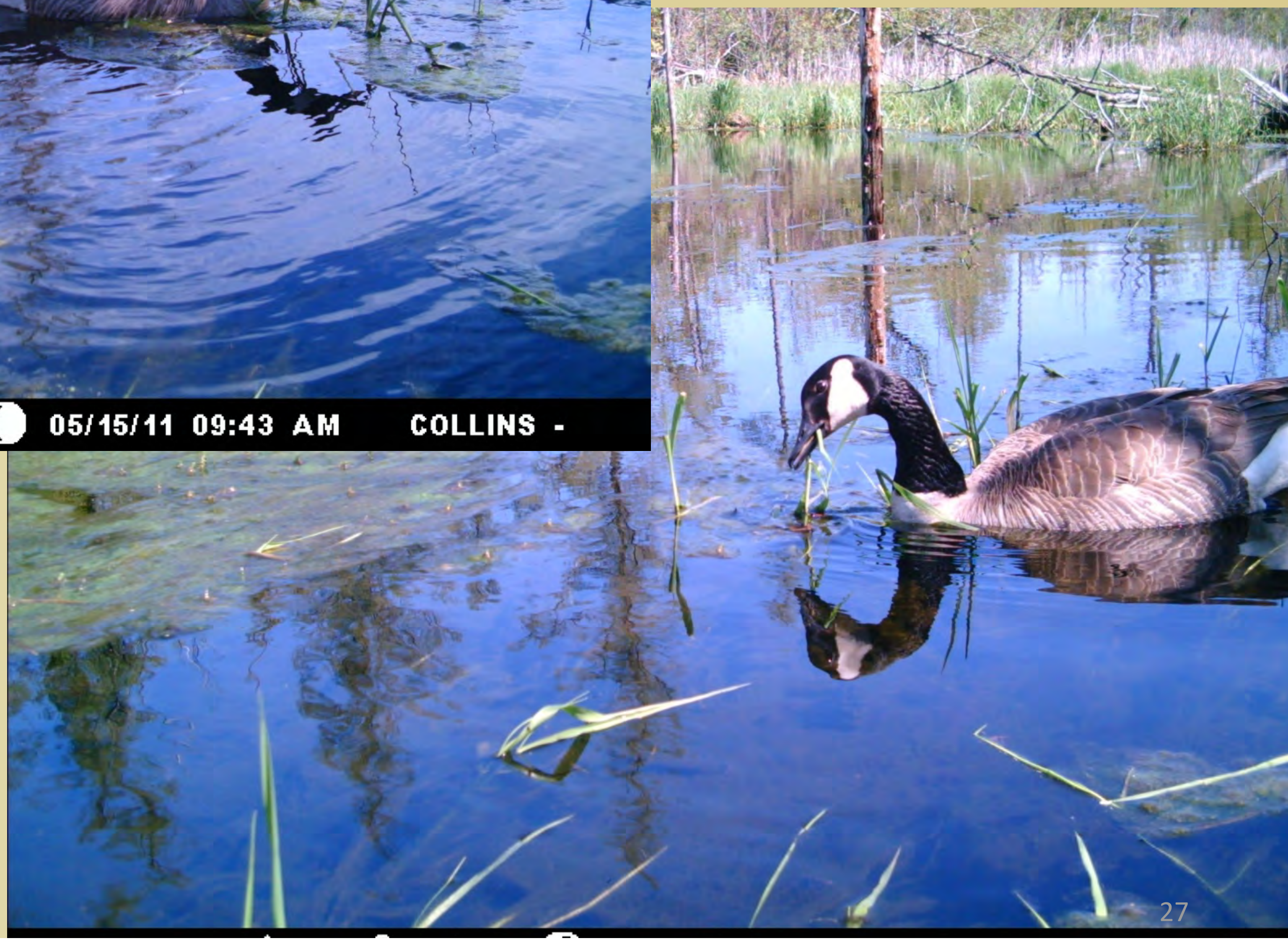
Before

After

One Million *P. arundinacea*
Seeds, gone in a day

12 hours work
4 – 42 gallon bags
of only RCG seed

You know you have turned the corner when your friends show up to help



One million stems treated, one million to go

References

Daehler, C.C. & Strong, D.R. (1997). Reduced herbivore resistance in introduced smooth cordgrass (*Spartina alterniflora*) after a century of herbivore-free growth. Oecologia, 110: 99–108.

Elton, C.S. (1958). The ecology of invasions by animals and plants. London: Methuen & Co. Ltd.

Herr-Turoff, A. and Zedler, J.B. (2007). Does morphological plasticity of the *Phalaris arundinacea* canopy increase invasiveness? Plant Ecol (2007) 193: 265. https://doi.org/10.1007/s11258-007-9264-2.

Klopatek and Stearns (1978)

Leger, E.A. & Forister, M.L. (2005). Increased resistance to generalist herbivores in invasive populations of the California poppy (Eschscholzia californica). Diversity and Distributions , 11 , 311– 317.

Maurer, Deborah A. and Joy B. Zedler (2002). Differential invasion of a wetland grass explained by tests of nutrients and light availability on establishment and clonal growth

Richardson, David M. and Petr Pysek (2008). Fifty years of invasion ecology: the legacy of Charles Elton. Diversity and Distributions, 14: 161–168.

Wetzel (1996)

Wisconsin Reed Canary Grass Management Working Group. 2009. Reed Canary Grass (*Phalaris arundinacea*) Management Guide: Recommendations for Landowners and Restoration Professionals

Landscapes of Place

www.landscapesofplace.com