A Citizen's approach to Ecological Management of Invasive Plants: Your yard and Your community

Francis L. Maltby - Presented at:

Columbia Shuswap Invasive Species Society Meeting

Revelstoke, B.C. June 20, 2013

Introduction

What I am and what I am not.

- **not a biologist**
- **not a botanist – you'll find weeds!!**
- **am a school bus driver = $**
- **am an ecologist = ♥♥♥**

Me at work


Me at play
11/07/2010

Physical Ecologist

- I am a **“habitat”** guy.
- Interest in the *physical condition which create and sustain habitats* for various organisms; both plants and animals.
- Interested in how organisms are affected by *changes (good or bad) in the physical conditions* of their habitats.

Habitat Assessments

A Preliminary Evaluation of Painted Turtle (Chrysemys picta) Habitat and Ecological Factors at Burnaby Lake

and

Potential Impacts on Painted Turtles and Proposed Mitigation Strategies for the Burnaby Lake Rejuvenation Program

Burnaby Lake Nature Park
Burnaby, British Columbia, Canada

Prepared for:

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June 2002

Case Study

Waterfowl/Recreation Interactions:

Developing a Recreation Use and

Habitat Conservation Strategy

at Revelstoke, British Columbia

Downie Marsh
Habitat Assessment

29/06/05 - FINAL

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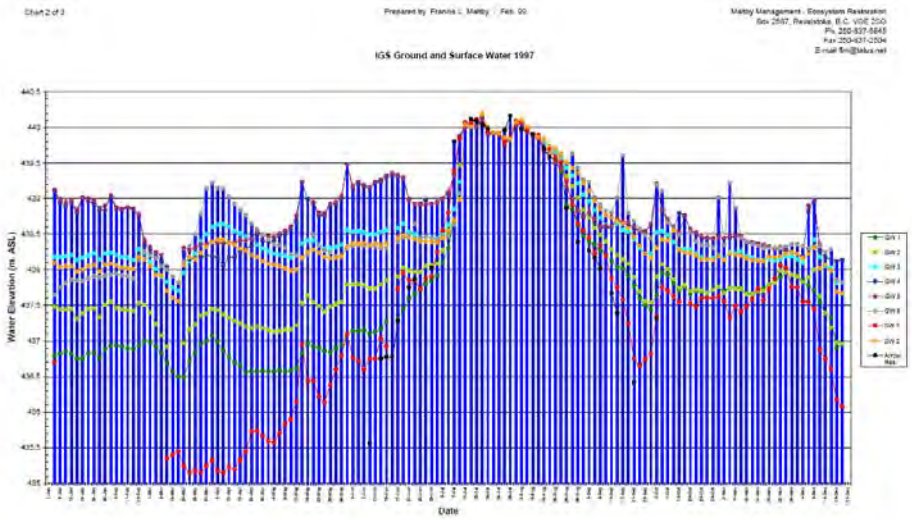
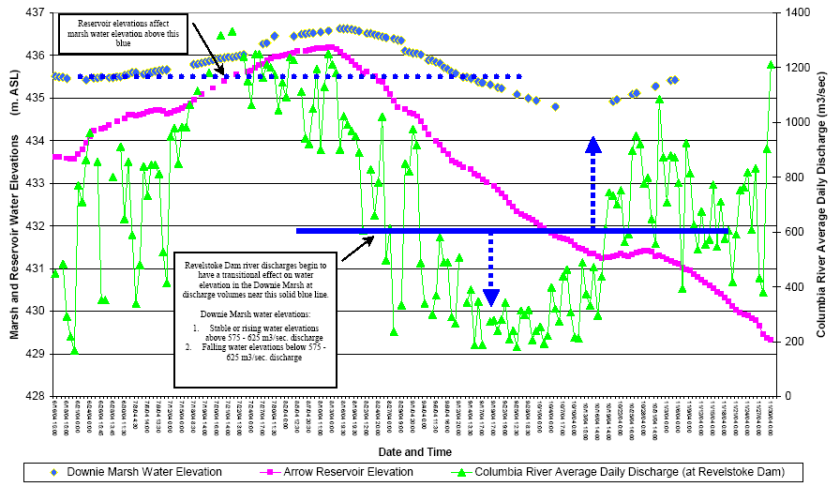




University of Victoria
Restoration of Natural Systems

Continuing Studies Program
Field Study I - ER 312A

Final Assignment

Course Instructor: Colin Laroque

Ground Water Elevations (all measures in meters)

CT 1 - 437.9 m. ASL and CT 2 - 438.15 m. ASL

Date	CT 1 Meters A.S.L.	Change CT 1	Depth below surface (437.9 m.)	CT 2 Meters A.S.L	Change CT 2	Depth below Surface (438.15 m.)
24/04*				437.31		.84
26/04				437.35	+ .04	.80
28/04				437.30	- .05	.85
30/04*				437.36	+ .06	.79
02/05*				437.42	+ .06	.73
05/05				437.54	+ .12	.61
07/05				437.60	+ .06	.55
09/05				437.65	+ .05	.50
11/05* P				437.68	+ .03	.47
13/05*				437.71	+ .03	.44
15/05*				437.73	+ .02	.42
19/05*				437.59	- .14	.56
21/05*				437.57	- .02	.58
23/05*	436.86[1]		1.04	437.60	+ .03	.55
25/05*	437.04	? + .18?[2]	0.85	437.65	+ .05	.50
28/05*	437.15	+ .11	0.75	437.77	+ .12	.38
30/05*	437.08	- .07	0.82	437.70	- .07	.45
03/06*	437.09	+ .01	0.81	437.71	+ .01	.44
05/06*	437.02	-. 07	0.88	437.65	- .06	.50
07/06*	436.99	- .03	0.91	437.61	- .04	.54
08/06* P	436.98	- .01	0.92	437.61	+ .00	.54
09/06*	436.99	+ .01	0.91	437.60	- .01	.55
11/06*	437.01	+ .02	0.89	437.62	+ .02	.53

Figure 5.2

* - Are CT Site Measurement Days

P - Are Photo days with Erica

[1] Piezometer installed at CT 1 today. This reading is probably incorrect due to disturbance of ground water during installation.

[2] This figure is likely incorrect due to the suspect reading from 23/06, F.N. 1 above.

General Principles of Ecological Management

1st prevent.

- Use practices which promote and sustain natural barriers or controls to infestations.

2nd effective control and restoration

- Rapid response[1] and continued follow-up[2]
- Use measures which support and sustain natural controls.
- Do not use practices which favour invasives.

[1] can be very labour intensive

[2] usually much easier than initial response

Factors which promote both common weeds and Invasives

- Many invasives and common “weeds” *follow linear corridors* created by *human disturbances*. Roads and pathways create habitats then our activities spread the seeds.
- *Soil and site disturbances* - topsoil loss, removal or erosion, removal of healthy native or domestic vegetation.
- *Poor nutrient and or moisture* status.
- *Vegetation Management Practices* - overgrazing, frequent mowing, scalping, inappropriate herbicide use.
- *Poor project planning* - control, preparation and restoration measures not considered in advance.
- *Failure to respond rapidly* - control seed production and vegetative spread.
- *Lack of public awareness* and knowledge.
- *Climate change*.

Poor soil and or moisture conditions favour hardy “pioneer” species.

Many common weeds and invasives are “pioneer” species which thrive in areas disturbed by humans.

What I think I learned from a common “weed”.

Oh, did I mention my bunny loves them and I can use them in salad?


May 2, 2013

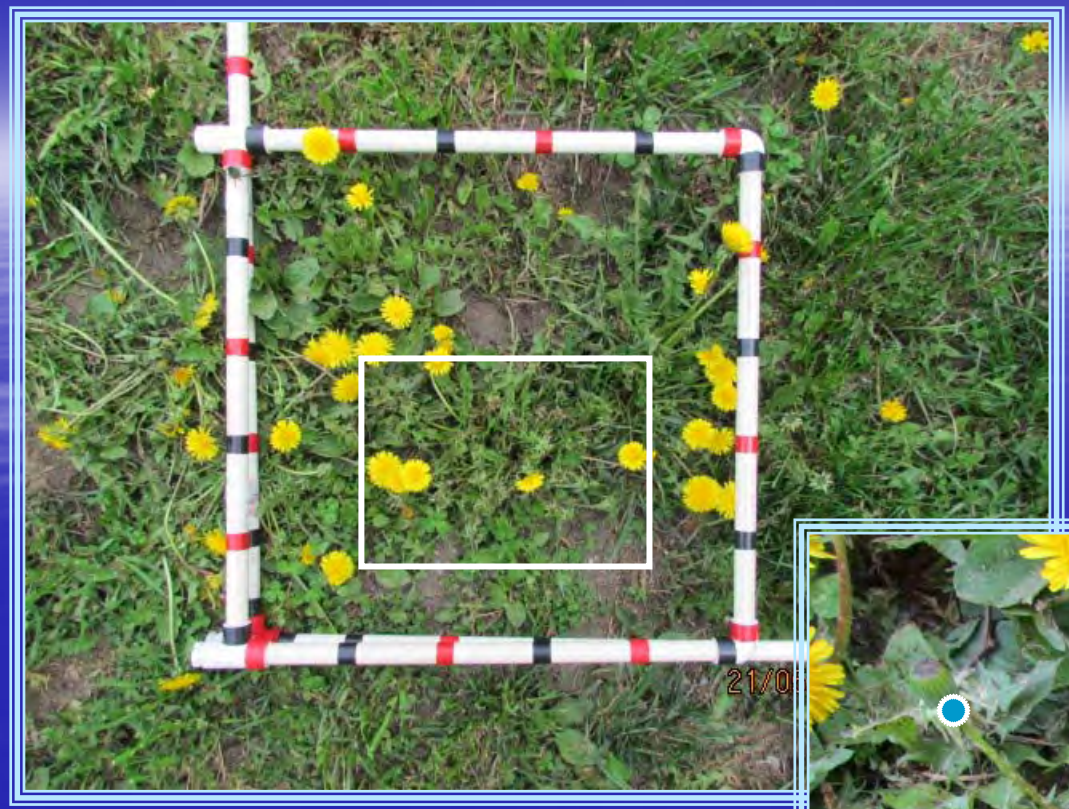

May 2, 2013


What's going
May 9, 2013


on here?
May 9, 2013

Possible responses to stress

- Produce more flowers?
- Attempt to complete reproductive cycle more quickly?
- Produce multiple reproductive cycles?
- If heavily grazed or mowed, change in growth form to compensate? I'll get smaller?



Under stress some plants respond by increasing reproductive effort.

27 flower heads on a plant on a good site & under regular mowing.

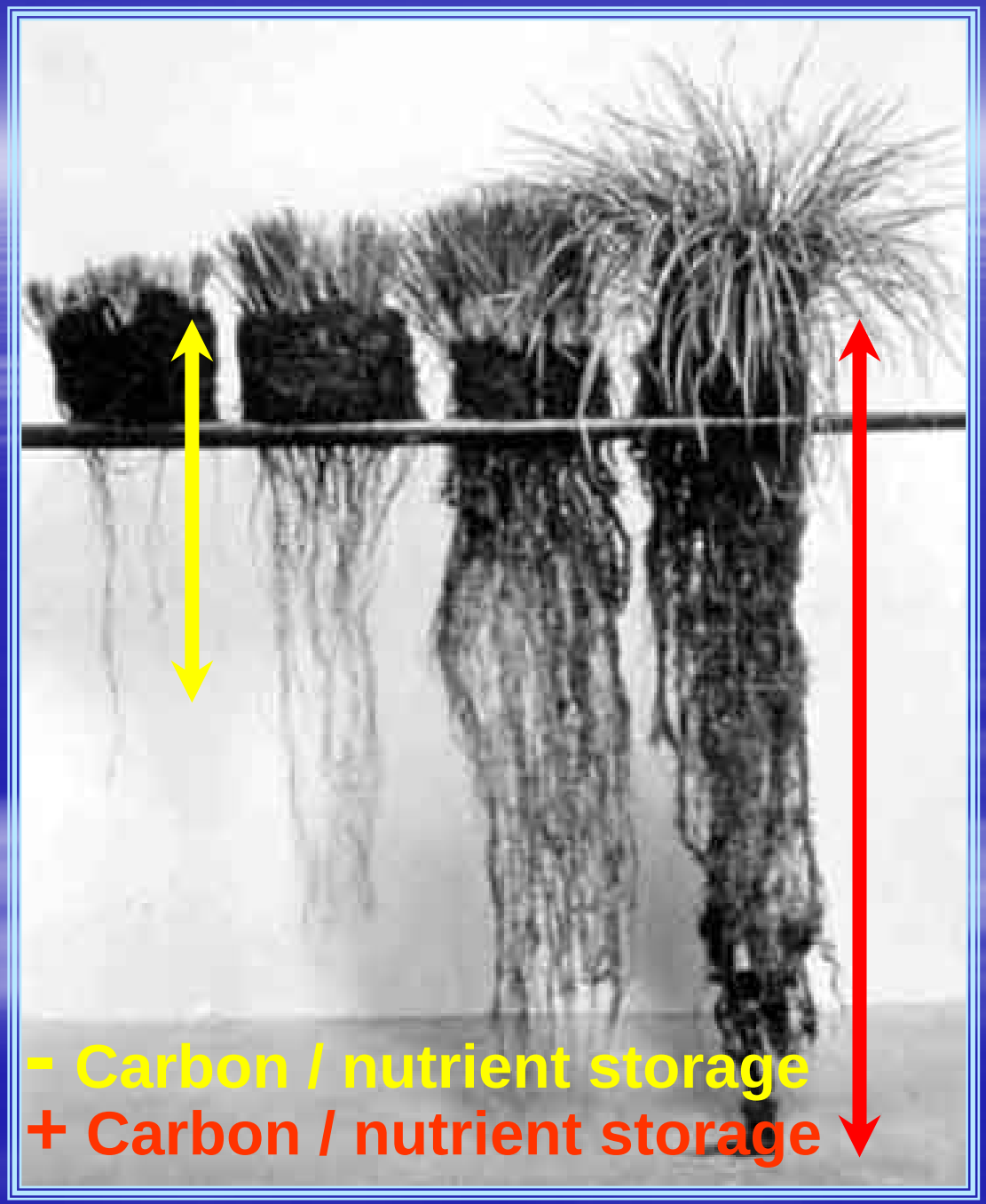
Average of 7 – 9 f.h. on my “happy” plants.

Working against natural defenses

- Many common yard and grounds maintenance practices handicap natural defenses which can resist some invasive infestations.
- Even modest changes in these practices can support these economic and effective natural defenses.
- This simply means working with the vegetation we would prefer rather than creating ecological conditions which favour the vegetation we wish to prevent.

Heavy Grazing or Mowing?

- ***Stresses desirable plant*** species, both grasses and broadleaf.
- ***Reduces densities*** of desirable species opening “habitat” for weeds and invasives.
- ***Favours certain weeds and invasives*** which are better adapted to heavy grazing or mowing.
- **Only increased water use, fertilizer and occasional herbicide applications** can maintain desired grass / lawn species ability to resist invasion by weeds and invasives.



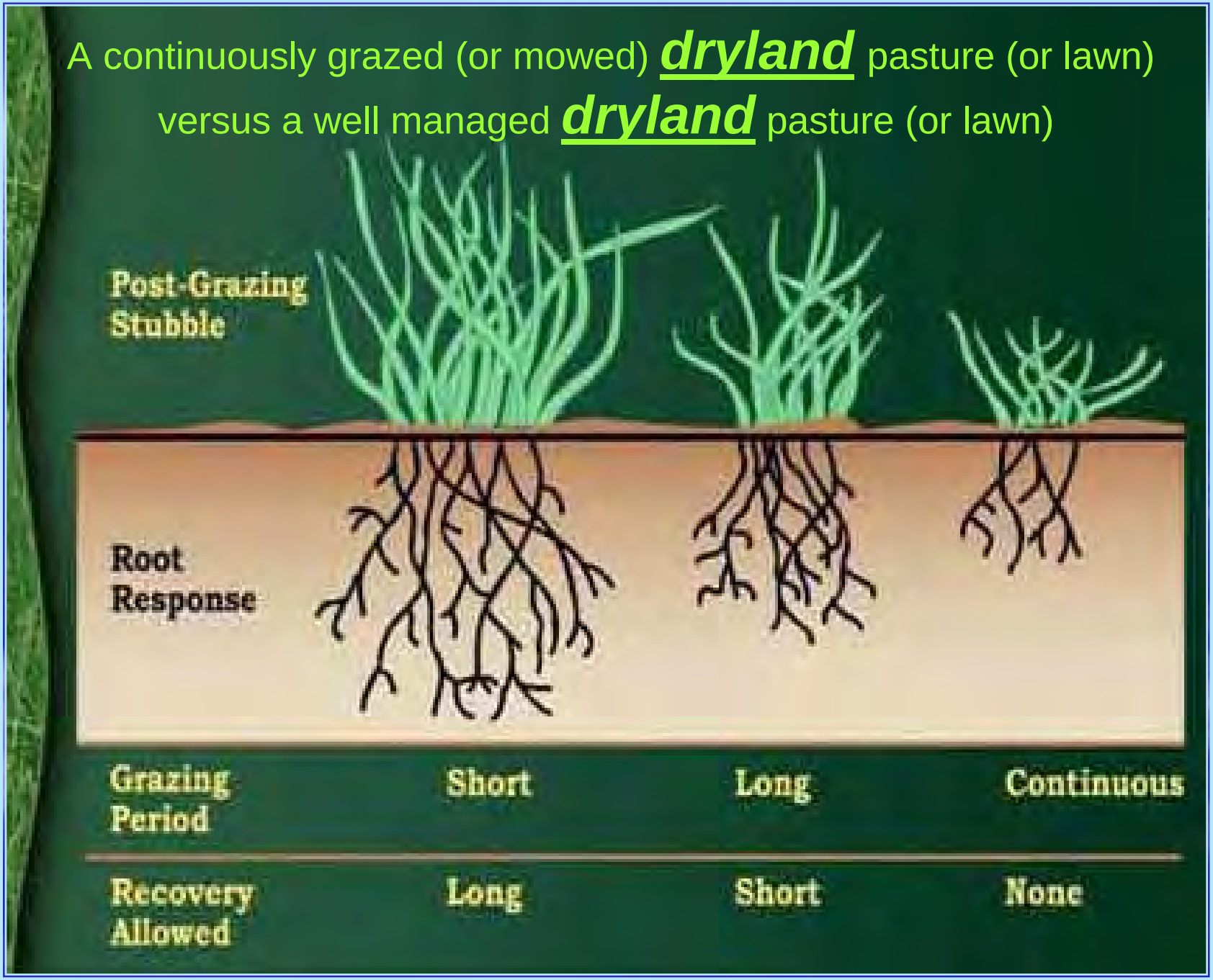
Increased grazing and mowing reduce root growth.

"When roots are longer, soil is better and plants are stronger."

Canadian Agricultural Research Branch: Root growth of bunchgrass kept clipped at different heights.

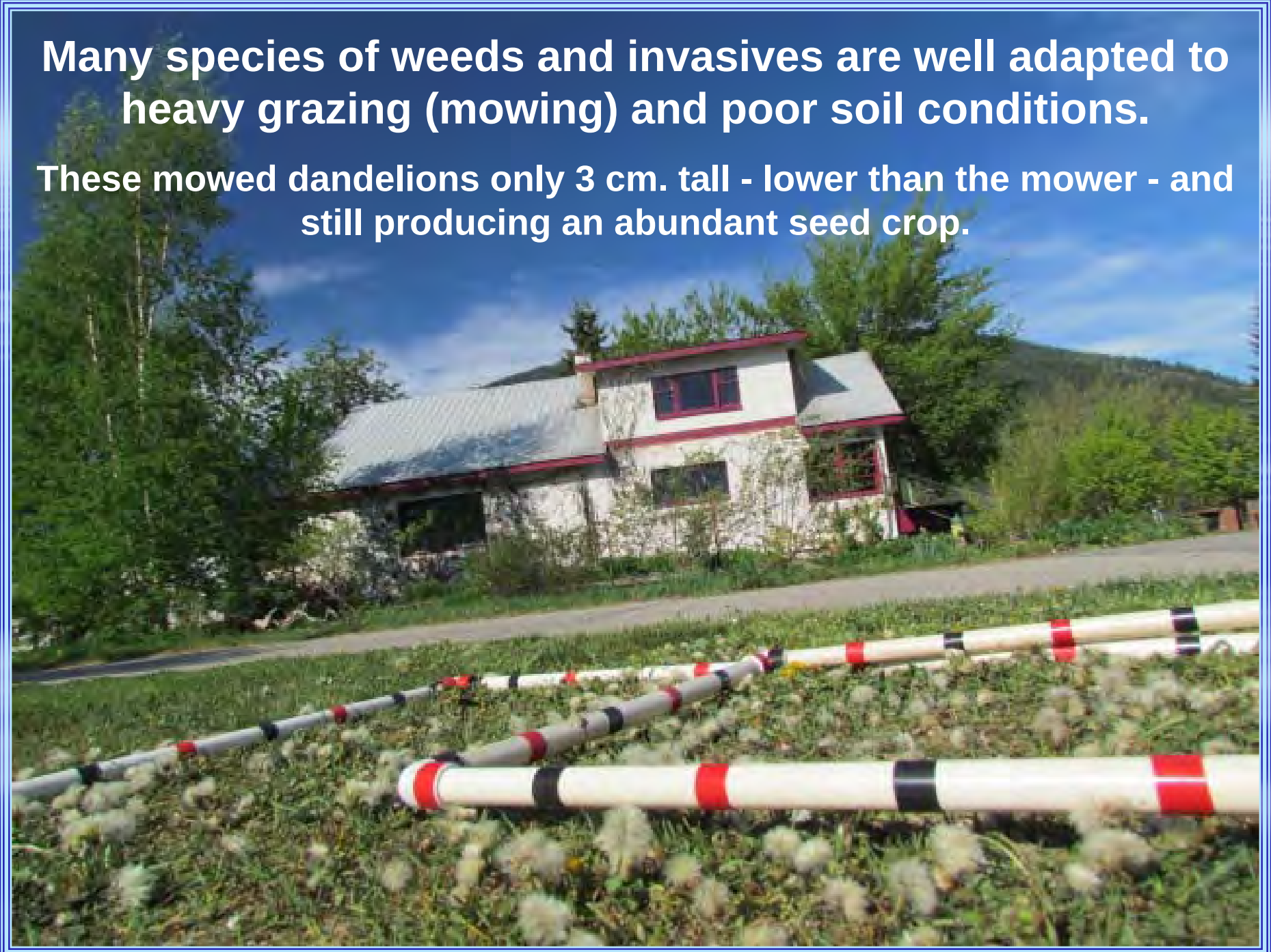
A continuously grazed (or mowed) ***dryland*** pasture (or lawn)

versus a well managed ***dryland*** pasture (or lawn)



Many species of weeds and invasives are well adapted to heavy grazing (mowing) and poor soil conditions.

These mowed dandelions only 3 cm. tall - lower than the mower - and still producing an abundant seed crop.



What seemed to work – Happy Plants?

Less than 2% seed escapement for entire management area. Heavy initial work followed by small increments of follow-up work.

Letting the plant grow through the flower bud and flowering stages seemed to reduce the number of replacement flowers and slowed the re-flowering cycle.

Final Assignment 312B

Natural Systems Restoration Program

University of Victoria

Inventory and Ecological Control

Of

Centaurea maculosa (Spotted Knapweed)

In the

Illecillawaet Greenbelt

Nature Park at Revelstoke, B.C.

August 1998

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Knapweed Sites Summer 1998.
ER 312B Final Assignment

IGS Nature Park
Map and Inventory Knapweed

This inventory and ecological control project had four key objectives:

1. ***Map and describe the distribution*** **of Spotted Knapweed within and immediately adjacent the Illecillewaet Greenbelt Nature Park.**
2. **Determine the *mechanisms and patterns* of distribution.**
3. ***Evaluate edaphic (soil) and biotic*** **characteristics of Knapweed invasion sites.**
4. **Determine *role of native vegetation* in moderating or controlling invasion rates or densities.**

Most interesting findings

- **The native plant Dryas drummondii - Yellow Mountain Aven was resisting knapweed invasion.**
- Knapweed Density ***without Avens*** (5 plots)
  110, 42, 72, 15 & 41 / plants per sq. m. Average Density – ***56 / sq. m.***
- Knapweed Density ***with Avens*** (5 plots)
  11, 0 , 1, 0 & 0 / plants per sq. m. Average Density – ***2.4 / sq. m.***
- In this region / climate, and *without further disturbances*, native plants will eventually outcompete and replace knapweed on many sites.
- Restoration can be greatly accelerated using ecologically based methods.

Recommendations / Treatments

- 1st Do not import a “founding” seed source.
- Try to prevent seed export.
- Control seed production, pull plants if possible.
- Try to avoid further disturbances in infested areas.
- Introduce desired plants and or seeds ASAP.
- Fertilize and irrigate if required (short term only during establishment stage).

Things I learned down by the marsh

- **Common control methods can be the worst possible treatments.**
- **Fixing errors is very hard work.**
- **Casual experimentation can produce interesting results.**
- **Understanding your target species weaknesses is important.**
- **Working with natural systems is a good strategy.**

Spotted Knapweed
Research and Control Experiment
On the Revelstoke Rivers Trail

At the Downie Marsh, Revelstoke, B.C.
2010 (Year 1 of 3)

(Above photo shows second growth of Knapweed florets on a narrow strip beside Rivers Trail that was mowed by the City of Revelstoke approximately mid to late June 2010. This strip was re-mowed prior to seed set)

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Methods and Treatments

- Mow / mulch portion of area
- Hand pull portion of area
- Have a Control area
- 9 - Peavine Plots
- 5 - Native and agronomic grasses and forbs Plots
- 2 - Grass clippings mulch Plots.
- Nootka Rose mulch and fertilize.

Landscape cloth, wood mulch and fertilizer – Nootka Rose support and stimulus.

Bare ground – vegetation plots

Grass mulch – seed-bank kill plots

Most interesting findings

- Knapweed density on this site increased due to herbicide application. It Killed the competition.
- Pull or mulch plants when major energy has been committed to flower development but before viable seed are set and you have no disposal problems.
- Plant density / sq. m. – counted plants
- Bio-control affect – counted bugs.
- Seed production / sq. m. counted seeds.

- 10 cm. layer of fresh ***"green grass mulch" destroys the knapweed seed-bank*** on and in the soil!!

- Simply applying certain agronomic grasses and legume seeds to a site produced a reduced knapweed density within two years.
- Fertilizer application greatly enhance the density and plant vigor of newly seeded grasses. Include N fixing plants on poor sites.

July 1, 2010 – 95% K.W.

June 18, 2013 – < 20% K.W.

Citizen's Science

- Citizen's science should be relaxed, educational and enjoyable.
  - In my ***EcoYard*** I try to be relaxed.

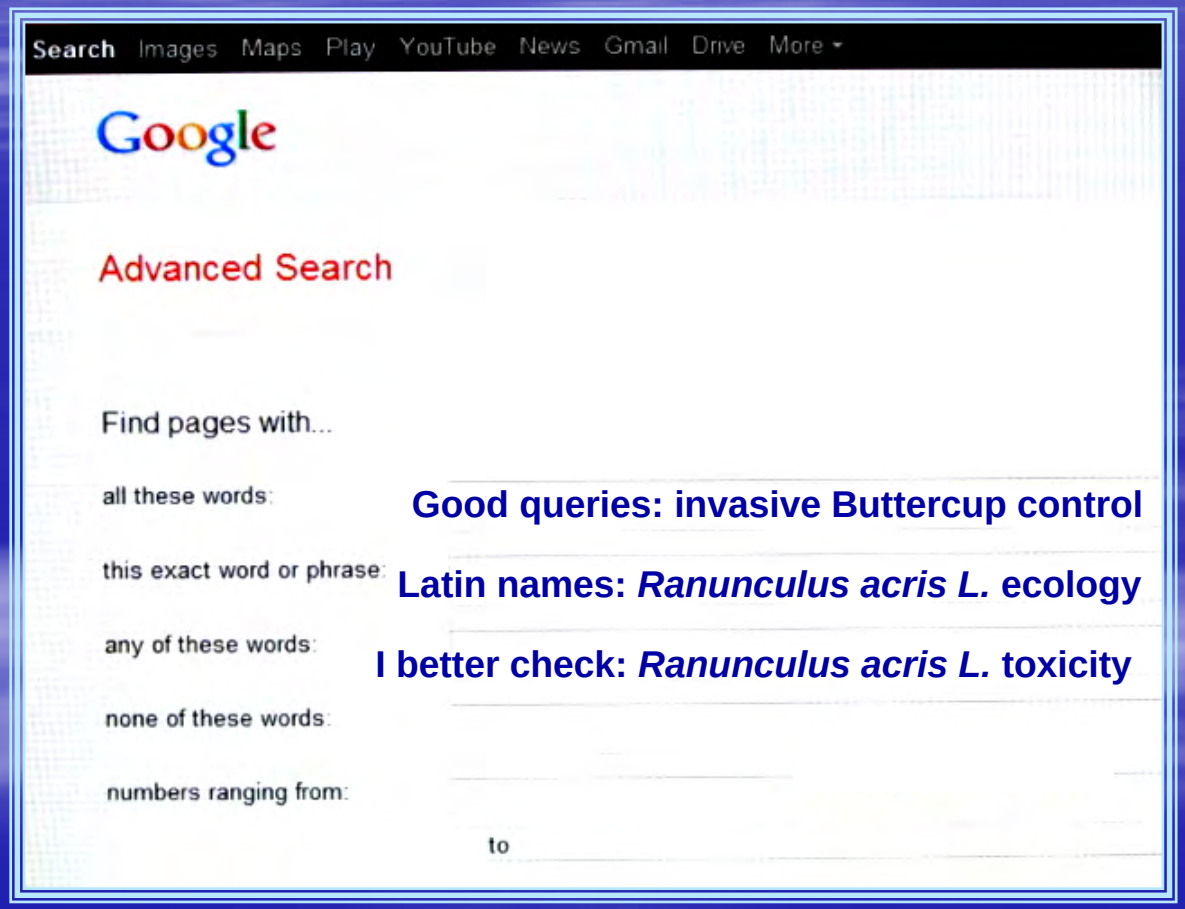
June 23, 2010

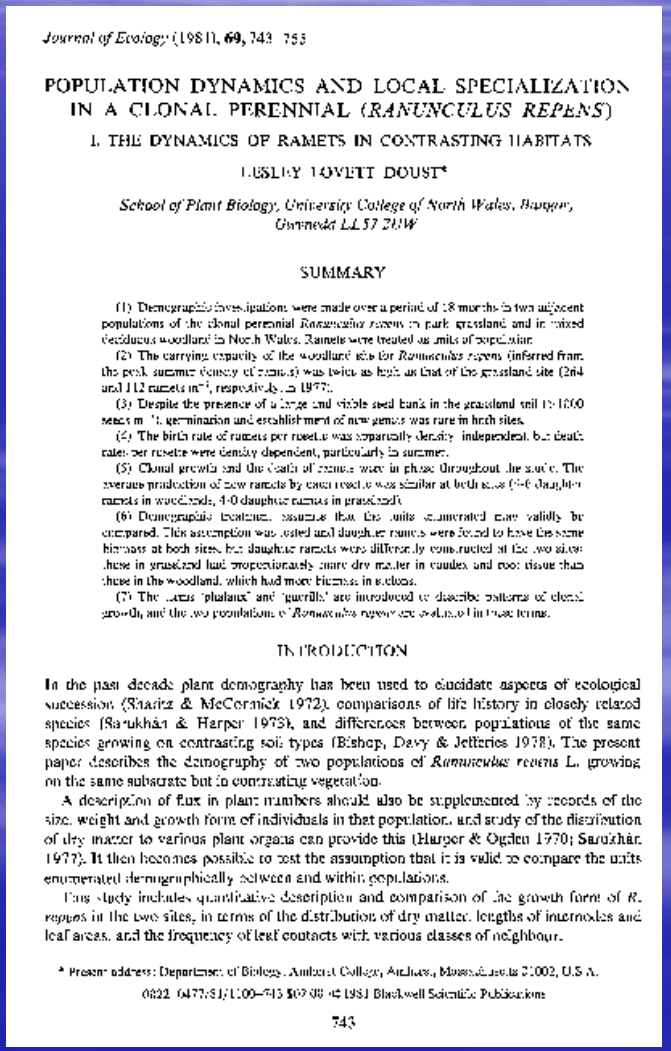
June 11, 2013

What's up Buttercup?

My mistake, failure to respond rapidly. = Much more work!

Good research can be found online





Journal of Ecology (1981), **69**, 743–755

POPULATION DYNAMICS AND LOCAL SPECIALIZATION IN A CLONAL PERENNIAL (*RANUNCULUS REPENS*)

I. THE DYNAMICS OF RAMETS IN CONTRASTING HABITATS

LESLEY HOWETT DOUST*

School of Plant Biology, University College of North Wales, Bangor, Gwynedd LL57 2UW

SUMMARY

(1) Demographic investigations were made over a period of 18 months in two adjacent populations of the clonal perennial *Ranunculus repens* in park grassland and in mixed deciduous woodland in North Wales. Ramets were treated as units of population.

(2) The carrying capacity of the woodland site for *Ranunculus repens* (inferred from the peak summer density of ramets) was twice as high as that of the grassland site (264 and 112 ramets m^{-2}, respectively, in 1977).

(3) Despite the presence of a large and viable seed bank in the grassland soil (> 1000 seeds m^{-2}), germination and establishment of new genets was rare in both sites.

(4) The birth rate of ramets per rosette was apparently density independent, but death rates per rosette were density dependent, particularly in summer.

(5) Clonal growth and the death of ramets were in phase throughout the study. The average production of new ramets by each rosette was similar at both sites (3·6 daughter ramets in woodlands, 4·0 daughter ramets in grassland).

(6) Demographic treatment assumes that the units enumerated may validly be compared. This assumption was tested and daughter ramets were found to have the same biomass at both sites, but daughter ramets were differently constructed at the two sites: those in grassland had proportionately more dry matter in roots and root tissue than those in the woodland, which had more biomass in shoots.

(7) The terms 'phalanx' and 'guerilla' are introduced to describe patterns of clonal growth, and the two populations of *Ranunculus repens* are evaluated in these terms.

INTRODUCTION

In the past decade plant demography has been used to elucidate aspects of ecological succession (Sharitz & McCormick 1972), comparisons of life history in closely related species (Sarukhán & Harper 1973), and differences between populations of the same species growing on contrasting soil types (Bishop, Davy & Jefferies 1978). The present paper describes the demography of two populations of *Ranunculus repens* L. growing on the same substrate but in contrasting vegetation.

A description of flux in plant numbers should also be supplemented by records of the size, weight and growth form of individuals in that population, and study of the distribution of dry matter to various plant organs can provide this (Harper & Ogden 1970; Sarukhán 1977). It then becomes possible to test the assumption that it is valid to compare the units enumerated demographically between and within populations.

This study includes quantitative description and comparison of the growth form of *R. repens* in the two sites, in terms of the distribution of dry matter, lengths of internodes and leaf areas, and the frequency of leaf contacts with various classes of neighbour.

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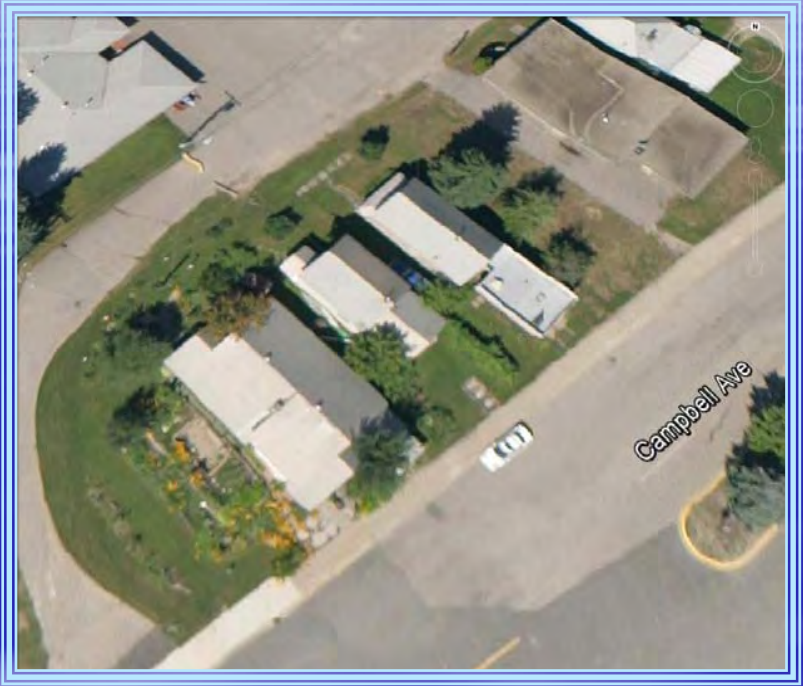
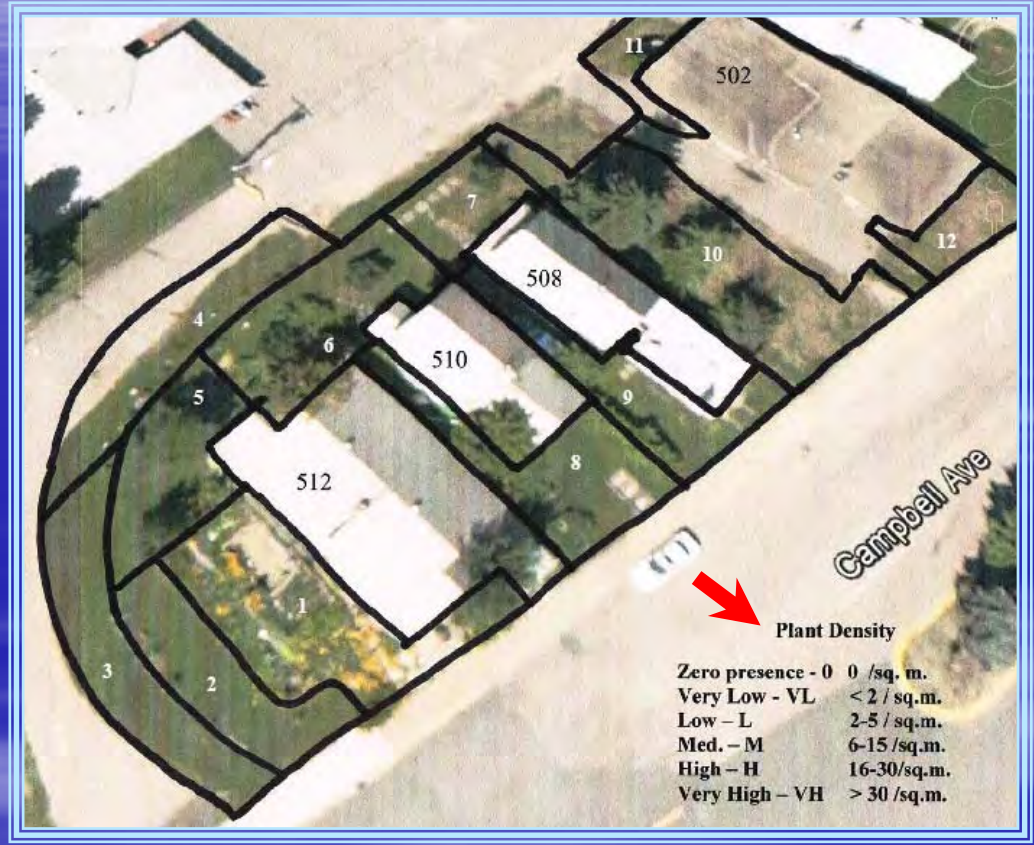
0022-0477/81/1100-0743 $02.00 © 1981 Blackwell Scientific Publications

Google Earth Images



Start with basic image

- create a simple map, locations & density
- develop management techniques
- photo document with measurement device
- record starting conditions (plant densities)
- document changes over time (annual)



Map your yard or management area

Management Units: record plant density / management practice

Measure, Record & Document

Data: date, work time, location, method, species

Date d/m/y	Time elapsed Start / finish or minutes / hours	Location / Polygon See site map	Method Mow - M Mulch - ML Cover - CV Pull - PL Pick – PK (seed heads - sh, plant stem - st)	Species / Notes Dandelions – d, Hawkweed – h, Buttercup – bc, Burdock – bd, unknown sp. – uk, other sp. - or (data can include % approximate by species)

Buttercup Density at start – 10/06/13

Polygons:

1. L
2. L - M
3. L - VL
4. M - H
5. L - M
6. L
7. H - VH
8. VL - L
9. M - VH
10. VL
11. O
12. VL

Plant Density

Zero presence - 0	**0 /sq. m.**
Very Low - VL	**< 2 / sq.m.**
Low – L	**2-5 / sq.m.**
Med. – M	**6-15 /sq.m.**
High – H	**16-30/sq.m.**
Very High – VH	**> 30 /sq.m.**

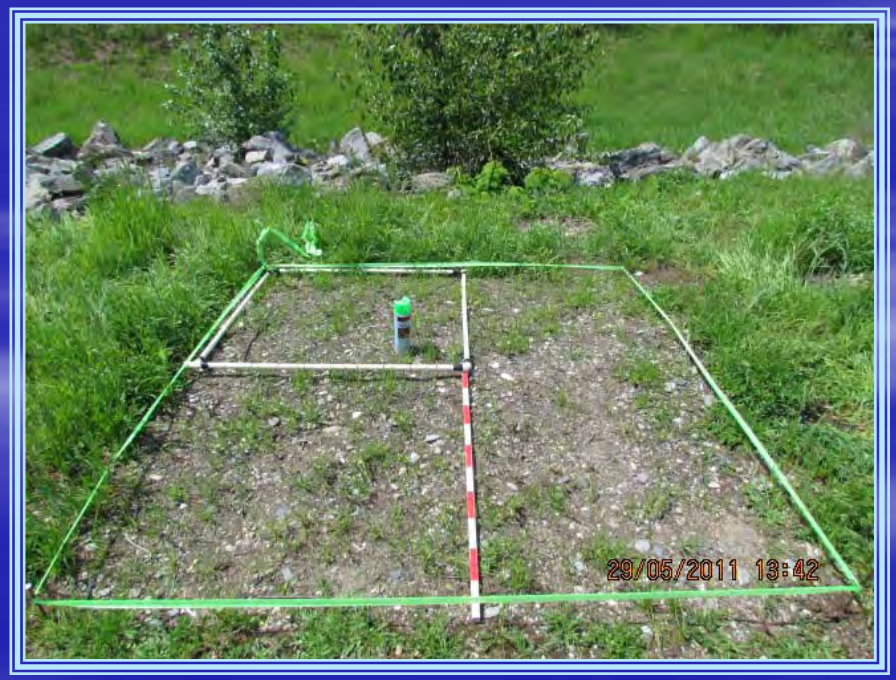
Treatments:

Pull roots – PL
Pick plant tops or seed heads – PK (pt, sh)
Mower – M
Cover/mulch plants to smother and re-seed - CM
Cultivate and re-seed - CL

Treatments Applied - 2013

1. Pulled and mowed plants to reduce seed production.
2. Encourage vigorous competition from healthy grasses and forbs (in pulled areas).
3. Mulch with grass clippings. Kill and reseed area.
4. Cover with plastic. Kill and reseed.
5. Cover with landscape cloth. Kill and reseed.
6. Possible cultivate and reseed.

“Fun” science?
“Citizen” Practitioner?
“Spiritual” connection?
All good. *You decide!*



EcoYards =

Sanctuary & Core Values

Community Diversity

Thank you!