Conservation

Weevil for Canada Thistle control

Kennedy Creek Riparian Health Assessment

Weed control in shelterbelt with chickens

CARA Shelterbelt

Browning of evergreens

Riparian Health Assessment of Kennedy Creek

Background

Riparian health is critical to water quality, quantity, stream stability and habitat for fish and wildlife. A Riparian Zone is the interface between the upland area and the aquatic zone. Riparian communities usually include or border water in the form of a river, wet meadows, creeks or springs. The Riparian community includes a vast and productive diversity of plants and fungi which are sought out by livestock and wildlife. The structure, function and management of these areas are not well understood compared to other types of land area. Many agricultural and industrial practises can and have drastically altered these zones. A healthy Riparian Zone, in terms of plant species, plant vigor and bank stabilization, will have enhanced filtering ability and thus less risk of water contamination from outside sources.

The constant need for consumable water for ourselves, our pets, our livestock and the fish and wildlife that surround us, requires us to focus on what is needed to keep that water clean and flowing. There are many benefits to a healthy riparian zone such as sediment filtering, stream bank building, water storage, aquifer re-charging, fish and wildlife habitat and dissipating stream energy, evaluating the health of water systems requires a hands-on assessment. Lacey Ryan, CARA's Environmental Conservation Agronomist, got knee deep into the wet meadows and plant life surrounding Kennedy Creek located in the MD of Acadia. Various environmentally aware producers allowed her to investigate the plant life, stream susceptibility and general quality of the Riparian zone of their part of the Creek.

Objective:

To determine the general state of riparian health along sections of the Kennedy Creek in the MD of Acadia.
To provide producers with information about their riparian zones.

Description and Observations:

Some of parameters looked at when investigating Kennedy Creek riparian health:

1) **Potential and existence of woody species on site** – Not all riparian zones can support trees and/or shrub; however on those sites where woody species belong, they play an important role in the system. Their root systems are very good bank stabilizers and their spread provides protection to soil, wildlife and livestock. Plains Cottonwood, choke cherry, silverberry and sandbar willow are some of the woody species that could survive at various points along the creek.
2) **Invasive Plant species** – Invasive plants are alien species whose introduction does or is likely to cause economic or environmental harm. Presence of these species in riparian zones reduces the overall health of the site. Invasive plant species found in the Kennedy Creek riparian zones include perennial sow-thistle, scentless chamomile and Canada thistle.
3) **Total vegetative cover** – Vegetative cover helps stabilize banks, control nutrient cycling, reduce water velocity, trap sediments, reduce erosion and provide habitat for fish and wildlife. Each site on the Kennedy creek varied with its vegetation cover depending on the disturbance it has had. Over grazing decreases vegetative cover as do some cropping and industrial practices.
4) **Disturbance-increaser undesirable herbaceous plant species existence** – A large cover of disturbance-increaser undesirable herbaceous species, native or exotic, indicates misplacement from the potential natural community and reduction in riparian health. They generally are less productive, have shallow roots and poorly perform in most riparian functions. Undesirable species found in the Kennedy Creek riparian zone were dandelions, foxtail barley, brome grass, Kentucky blue grass and sweet clover.
5) **Woody shrub utilization** – Evidence was found that both wildlife and livestock have had an impact on the woody species in the riparian zone of Kennedy Creek
6) **Stream bank stability** – Stream banks can be altered by human activity which impair the structural integrity of the bank. Stream banks which have been altered due to livestock and wildlife hoof shear and concentrated trampling, vehicle or ATV tracks are more susceptible to cracking and/or slumping. Stream bank stability is also hindered when there is an increase in undesirable species and when the number of natural trees has declined. Root mass along the Kennedy Creek was dependent on whether or not livestock had access to the Creek or at which point they crossed it.
7) **Human-caused bare ground –** Bare ground is soil that is not covered by plants, litter, downed wood or rocks larger than 6 cm in size. Bare ground caused by livestock grazing, human activity such as recreation, roads or industrial activities indicate a deterioration of riparian health. Human-caused bare ground was found on the Kennedy Creek riparian zone.
8) **Trend of the riparian zone, if its improving, degrading or static –** Trend here, refers to general apparent health of the zone. This changes from year to year, by weather, human activity and plant species present. Currently the Kennedy Creek shows degrading aspects in some areas and improving aspects in others, based

on location and activity. Going back to the same area every 3-5 years will give a better indication of the Trend.

The Kennedy Creek encompasses several plant community types. The MD of Acadia as well as the Special Areas fall within the Natural Grassland region of Alberta, and the sub region of dry mixed grass land characterized by Brown Chernozemic soil. On our investigation of the Kennedy Creek riparian areas that is just what we found: lots of various mix grass and shrub species. The project also investigates various human impacts on Riparian zones, such as impeding or bordering crop land, grazing of livestock grazing, industrial activity and damming or other alteration of the stream.

Human activity

Livestock access

Cropland disturbance

Plant Community Dynamics

Succession is the process of change in which biotic communities replace each other and the alteration of the physical environment over a period of time. This was observed in the plant communities of the Kennedy Creek. Most areas are in a secondary succession stage which occurs when the primary plant community, which has provided an appropriate environment, has been disturbed (for example by a fire, flood, human alteration or livestock activity). The primary plant species have been removed, allowing secondary plant species to grow.

Secondary succession can move toward or away from the climax community, or mature phase, of the natural community. For example, Manitoba maple seedlings under an overstory of cottonwoods would represent progressive succession towards the natural Manitoba maple/choke cherry habitat type. Regressive succession would be a failure to have Manitoba maple seedlings establishment, or a dormancy stage in the seedlings, due to overgrazing. Regressive succession is seen quite frequently when unmanaged grazing of riparian zones is allowed as it can drastically affect the growth of preferred species. Increasers (plant species which increase with disturbance) and invasive plant species (undesirable species or weeds) become abundant in areas where preferred specie seedlings are in a dormant phase.

Examples of some plant community types found in the riparian zones surrounding the Kennedy Creek:

1) Creeping Spiked Rush in its secondary phase with abundance of increaser and invasive species.
2) Silverberry/Creeping Spiked Rush with high amounts of buck brush (snowberry) and rose in its secondary phase.
3) Spiked Rush in its primary phase with increased invasive species
4) Sandbar Willow/Plains Cottonwood (highly adaptive to disturbance)
5) Plains cottonwood/Buck Brush – which originates from a disturbed plains cottonwood/red-osier dogwood habitat type in its secondary phase (regression succession example).
6) Choke Cherry Community type

Understanding which stage a riparian zone is in will help identify steps which can be taken to improve the health of the zone and thus ultimately increase water quality.

Contact CARA if you are interested in knowing the health score of your riparian area and what you can do to improve its quality.

Bio-Control of Canada Thistle with the Stem Mining Weevil

Background

Canada thistle (*Cirsium arvense*) is a competitive noxious weed that is widespread across Alberta and much of North America. This perennial herb can grow up to 4 feet tall, has prickly leaves and urn-shaped purple flowers. It causes intensive crop losses from its extensive, horizontal creeping root system. Canada thistle is attracted to sites that have had disturbance and moisture, either by overgrazing, tillage and/or earthmoving. It is listed under the Alberta Weed Control Act as noxious. Canada thistle has a high tolerance to many different environmental conditions and is highly competitive with other vegetation. It is prevalent in many locations such as riparian areas that do not allow for chemical or mechanical control methods. Biological control agents, such as the stem-mining weevil are of interest in controlling Canada thistle in sensitive areas.

There are 4 beetles that are considered as potential biocontrol agents for Canada thistle including the Stem-mining weevil, scientifically known as *Hadropontus litura* (formerly *Ceutorhynchus litura*. *H.litera* has one generation per year with 3 distinct stages of life: larva, pupa and adult. The adult lifespan is approximately 10 months as they overwinter in the soil and leaf litter, emerging in the spring to feed on rosette leaf foliage and stem tissue. Eggs are laid in May and June in the mid vein of the leaf and hatch 9 days later. The larva tunnel down the stem into the root collar consuming plant tissue and when several larva are present the stem turns black from tunneling and dies several days later. Early summer, once fully fed, the larva will emerge from the thistle shoot. This is the where the main damage happens to the thistle because it opens up holes to where secondary invaders, such as nematodes, parasite and fungi enter and further damage the stems. They then enter the soil, and the papal stage begins, in which they transform into adults. A few weeks later (late June and July) these new adults emerge from the soil and feed on the thistle foliage until heavy frost occurs in fall.

Reported success of the weevils varies depending on geographic location. Research in the Eastern States, California and British Columbia have indicated that *h.litura* provides poor to moderate control when used alone; however, integrating additional tactics may enhance its efficacy. Research carried out in the mid-western states (i.e. Idaho and Montana) and Alberta indicate higher incidences of impact on Canada thistle populations. This could be open to a number of different interpretations but conjecture on the part of some researchers is that stronger winter conditions could be a factor in the geographic locations where Canada thistle are being negatively impacted by the stem mining weevil. Other biological factors, such as rust, might also be more readily apparent in these regions and so add to Canada thistle decline when the stem mining weevil is introduced.

The stem-mining weevils are imported from Montana in dishes of 105 individuals at $125 (US). The weevils do procreate every year and while some documentation indicates that they will migrate, as long as they have a food source they remain rather sedentary and populations expand within a thistle stand. As they reproduce and feed

on Canada thistle, an absence of this habitat will eliminate their existence. Adults can fly very well and are active on warm summer days, however they are content to stay among the thistle patch.

Weevils are not ‘a be all and end all’ for the eradication of Canada thistle but may have a place in controlling the weed in sensitive areas of the environment. CARA is working with other ARECA member groups to evaluate establishment, survival and impact of the *h.litera* at several locations in Alberta.

Hadroplontus litura

DESCRIPTION: Weevil - 2 to 3 mm mottled-grey color with white cross marking on back



BACKGROUND	LIFE CYCLE					
Habitat	**Adult Emergence**	**Egg Laying**	**Larva Development**	**F1**	**Adult Life Span**	**Over Winters**
Dense stands 5 to 10 plants/m^2 surrounded by bare soil	Coincides with rosette stage	May to June eggs laid in mid vein of leaf (generally in clusters of 2-5, up to 120 eggs are laid)	Eggs hatch between 5-9 days, they then mine down the stem to root collar	Late June to early July	10 months	Adult in leaf litter

ATTACK		COLLECTION		NOTES
Stage	**Damage**	**Life Stage**	**Method**	
Larvae	Stem and root miner	Adults on warm sunny August days	Sweep net, aspirator	Adults can withstand some spring flooding
Adult	Minor rosette and leaf damage			

Objective:
To evaluate establishment, survival and affect of the Stem mining weevil on Canada thistle.
To decrease and control Canada thistle populations in sensitive areas such as riparian zones, organic farms and native pasture.
To reduce the use of chemicals to control weeds in sensitive areas.

Project Description:
CARA along with other ARECA member groups introduced the Stem-Mining Weevil as a bio-control agent to help control Canada thistle populations at various points in Alberta.

The *h.litera were* imported from Montana and introduced to two sites in September of 2012, one in the MD of Acadia and the second in Special Area 4. Weather conditions and thistle stand qualities were recorded. Winter started early in the Special areas and the MD of Acadia and there is concern that this may impact the survivability of the weevils. Survival will be assessed in the spring of 2013 by live insect counts and observations of weevil damage on the Canada thistle plants. A count and damage assessment will also be made in the fall of 2013 to monitor the impact on the Canada stands. Observations will continue for a 5 year period to monitor overall control of Canada thistle population. Follow our newsletters for updates on this project.

Chickens and Shelterbelts

Background

Shelterbelts are used on almost 90% of homesteads to reduce wind, reduce erosion and for aesthetic purposes. Most of the time weeds will appear in shelterbelts due to the disturbance of the ground when planning the trees. These weeds can flourish and can be difficult to control because the trees are sensitive to herbicide applications and rototilling between them can just provide a good seedbed for more weeds. There are many animals which find weeds desirable and chickens are one of these. Many weeds such as Canada thistle have high protein, but are unpalatable for many animals. Chickens, on the other hand, seem to have a higher tolerance for many weed species, similar to goats.

Objectives:

To determine if chickens are successful at weeding shelterbelts
To determine the long term effects of chickens weeding shelterbelts, including weed reduction, grass quality, health of chickens and trees within the shelterbelt.

Cooperator: Gould Ranching Ltd, Consort

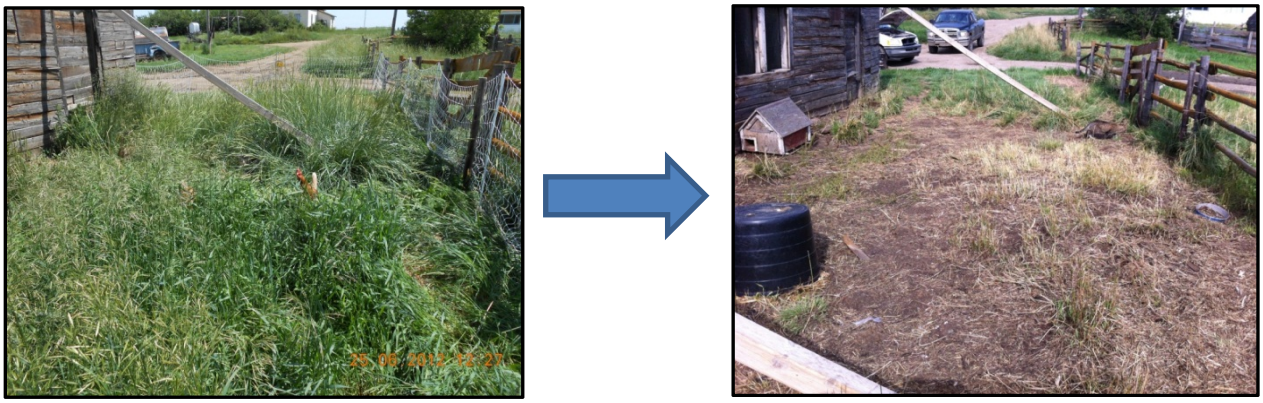
Project Description:

CARA along with cooperator Gould Ranching Ltd introduced a new environmental project in the spring of 2012 to demonstrate a biological method of weed control within shelterbelts. 64 chickens were confined in an established shelterbelt consisting of two rows of spruce and one row of caraganas, in order to monitor their impact on weed and grass control.

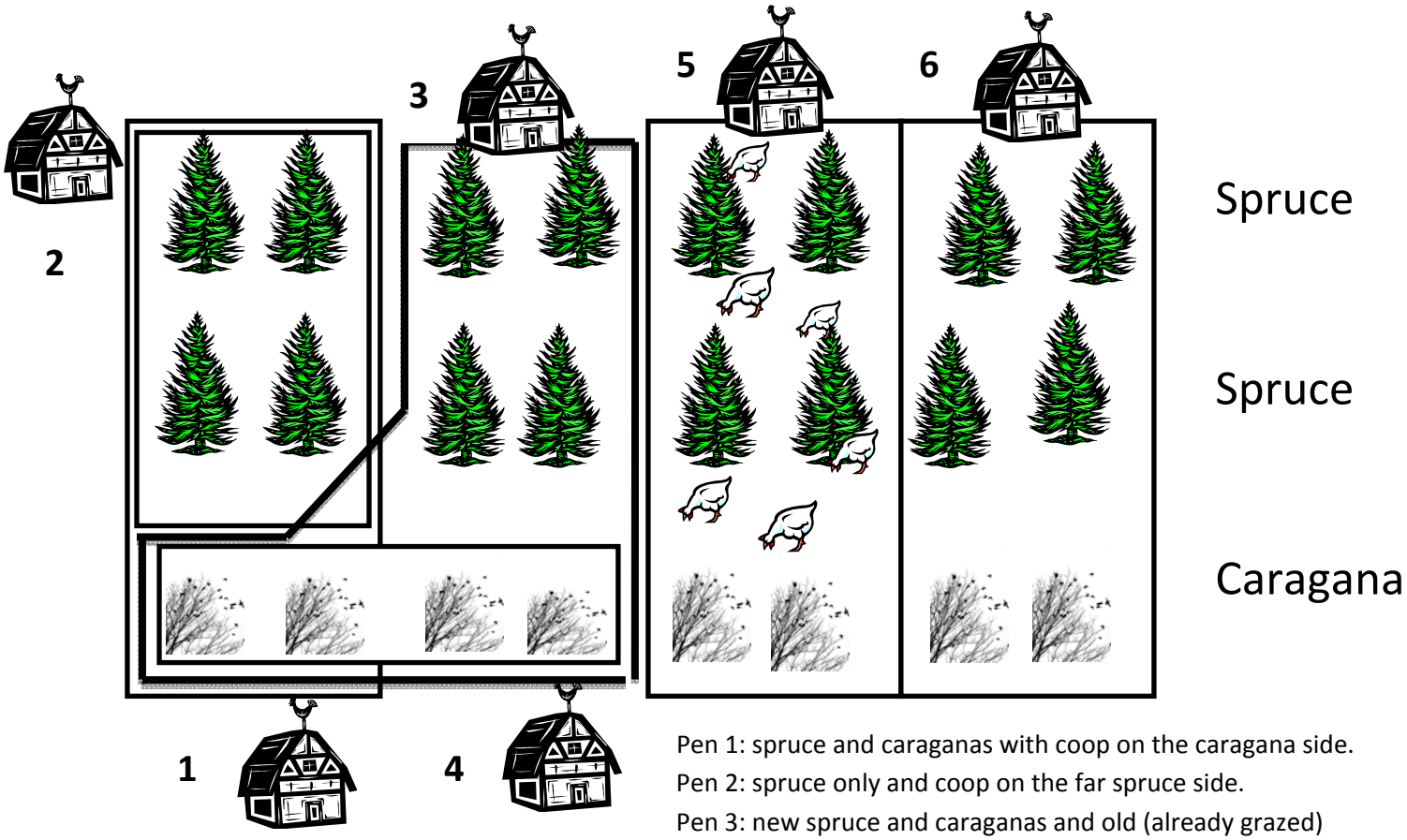
Initially an electric poultry fence was placed around the home coop and the chickens had a trial test of the fence – this was called our training period. Our poultry fence stood 42 inches tall with built in spiked-posts every 12 feet for easy moving, it has a netting feature with 3 inch squares.

Our training period lasted 2 weeks and we had good response from the chickens towards the electric fence.

2-week training Period



Following the training period, the chickens were introduced to the shelter belt on July 20th. They were moved to various portions of the shelterbelt with periodic movement (approximately 2 weeks apart) of the fencing and portable coop. A total of six different pens were used as illustrated below.



Pen 1: spruce and caraganas with coop on the caragana side.
Pen 2: spruce only and coop on the far spruce side.
Pen 3: new spruce and caraganas and old (already grazed) caraganas.
Pen 4: all caraganas.
Pen 5 & 6: all new but coop placed on spruce side of shelterbelt

Observations indicate an overall positive control of weeds and grass. The chickens significantly reduced various weed regrowth without harming the trees, although they did show interest in the caragana in late July. It was found that placement of the coop, water and supplements on the spruce side of the shelterbelt eliminated intake of caragana leaves.

Pigweed seemed to be the most undesirable weed; however slight consumption and a lot of trampling reduced the overall weed production. Established sweet clover and Canada thistle seemed undesirable, though at different stages of development the weeds were appetizing to the chickens, so timing seemed to be a factor in whether there was consumption of these two plants. Various other weeds such as sow thistle, dandelion, Hawkweed, Cinquefoil were consumed and trampled by the chickens. The chickens remained in the shelterbelt until September 9th.

The electric mesh fence used to contain the chickens in various pens throughout the shelterbelt also provided protection from predation. No chickens were lost to predation or died during the trial. Placement of the chicken coop, water and supplements determined the chickens behaviour; as they would remain near these necessities. Burrowing nests and dust bathing were evident under the trees indicating the trees being a secure area for the chickens.

Dust Bathing

The grass production appears to have surpassed the weed production in the areas of the shelterbelt that have been grazed. The shelterbelt will be monitored to see whether there is hindered production of weed in the years to come. Both the chickens and the trees have been positively impacted with this experiment thus far.

Grass regrowth after chickens grazed weeds and grass

CARA Shelterbelt Demonstration

Cooperator: Donna Scory, Oyen

Shelterbelt Demonstration

CARA continues to maintain and monitor a Shelterbelt Demonstration site adjacent to the CARA Centre at Oyen. It was initially developed in the summer of 2004 with seedlings obtained from the PFRA Shelterbelt Enhancement Program. Eight tree species, including Colorado Spruce, Green Ash, Manitoba Maple, Chokecherry, Villosa Lilac, Hawthorn, Sea Buckthorn and Silver Buffaloberry were planted in rows 100 metres long on May 28, 2004. Once the seedlings were planted, a drip tape irrigation system was laid out at the base of the trees. Black plastic mulch, which comes in rolls four feet wide, was placed along the entire length of the row out using an applicator pulled by a small tractor. Two discs, one on each side of the unit, cut a small trench in the soil when the machine moves forward. As the mulch unrolls, discs near the back of the unit throw soil over each edge of the plastic, securing it to the ground. A small hole is then cut where each seedling has been planted and the tree is gently pulled upright. The drip tape irrigation system consists of a plastic tape which has outlets at regular intervals that allow a slow trickle of water to be delivered directly to the root systems of the seedlings. At the CARA Centre, the water source consists of two 1250 gallon water tanks on either side of the equipment storage shop. Rain water is collected from the roof of the shop and then piped to the trees. Rainfall was abundant in 2010 so the drip tape was only used in the fall when the water tanks were drained for the winter. In 2011, the trees were watered twice during the summer and once late in the fall.

The progress of all species included in the demonstration has been maintained and monitored. Few losses have occurred and most species are showing reasonable growth for our prairie climate. The plastic mulch has become weathered in places, particularly where it was not held firmly to the soil. Deer hooves have broken the plastic in several places. Damage from wildlife has also caused leaks in the drip tape. Adding wood chips as a mulch to the rows where the plastic mulch was not installed was considered in 2009, but the cost was prohibitive.

In 2012, the trees were not watered until just prior to freeze-up due to adequate rain during spring, summer and fall. The rows were weeded during the summer and grass between the rows was mowed periodically. The Green Ash were pruned in early fall.

Wildlife damage has been observed in the pines located in the outer rows of the nursery, indicating some sort of barrier or buffer may be needed to protect the trees.

2013 plans include planting of a multi-species weaving shelterbelt demonstration as well as new trees to replace trees that have died. The site will be marked for self-guided tours.