

Invasive Weeds in Rangeland

PCAP Webinar Series
 Augusts 30, 2022
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 Ministry of Agriculture

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What makes a Plant Invasive?

Invasive Alien Plants (IAPs) are typically:

- EXOTIC - species not native to our environment
- INVASIVE - easily spread to other areas – by seeds or roots
- DESTRUCTIVE - will cause serious harm or economic loss
- They are a concern for:
 - agriculture, forestry, or other natural resource based industries,
 - human health,
 - Infrastructure,
 - the environment,
 - the economy

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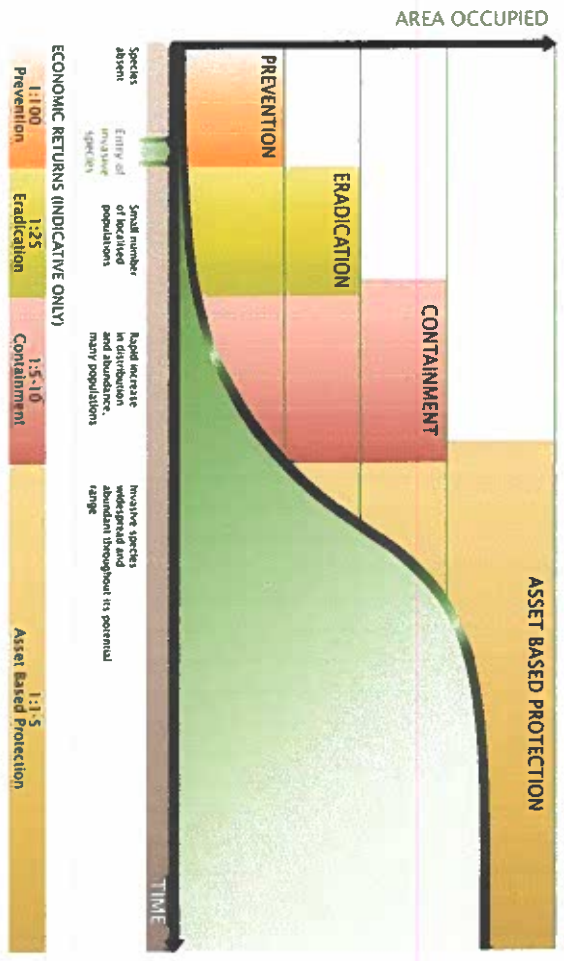
“Invasive species are second only to direct habitat destruction (AKA human development activities) as the greatest threat to decreasing global biodiversity.”

The United Nations

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GENERALISED INVASION CURVE SHOWING ACTIONS APPROPRIATE TO EACH STAGE



Source: State of Victoria Agriculture Department, Australia

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The Weed Control Act (WCA)

- Provincial Law**
 - places responsibility for weed control on owners
- Enabling legislation**
 - Gives powers local municipalities to enforce control of regulated weeds
- Focused on Prevention of Introduction and Spread**
 - Establishes weed regulatory priorities based on prevalence within the province
 - Give clear direction on intensity of enforcement based on the species and size of infestation

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History of Regulating Plants in Saskatchewan

- Noxious Weeds Ordinance**
 - Ordinances of the Northwest Territories
 - from as early as 1883
- The Noxious Weeds Act**
 - passed into law in 1909 shortly after Sask. became a province 1905
 - Most recent version 1984
- The Weed Control Act**
 - Came into force on December 1, 2010



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Weed Control Legislation

- Weed Control Legislation consists of 3 parts:**
 - The Weed Control Act** – provides a core of required activities, standards, and municipal powers and responsibilities.
 - The Weed Control Regulations** contains:
 - additional definitions not in the Act (domestic animal and machine)
 - Agreement and Order Forms** (formatted functional forms are available at http://www.agriculture.gov.sk.ca/Weed_Inspectors)
 - Minister's Order to designate Prohibited, Noxious and Nuisance Weeds**
 - weed lists

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Weed Categories

Criterion and Enforcement Goals

- Prohibited** - Absent or rare and threatening plant with demonstrated aggressiveness
- Prohibited list** *current or former ornamental or medicinal species)

<ul style="list-style-type: none"> African rue common barberry* common crupina curly-leaved pondweed* Darnel ryegrass Dalmation toadflax* 	<ul style="list-style-type: none"> diffuse knapweed Eurasian water milfoil* field scabious* flowering rush* garlic mustard* giant foxtail giant hogweed* halogeton 	<ul style="list-style-type: none"> hound's-tongue* jointed goatgrass perennial pepperweed poison hemlock* puncturevine* red bartisia salcedar* 	<ul style="list-style-type: none"> spotted knapweed squarrose knapweed wooly cupgrass yellow star-thistle yellow floating heart* wild chervil*
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Prohibited Weeds

- When a Prohibited Weed is found:
 - A municipality may declare a *Prohibited Area* by bylaw:
 - Contains infested area plus any required buffer
 - May last for 5 years from the last occurrence of the weed at the site
 - May authorize the spending of any money needed to eradicate the weed
 - Must inform director of Crops Branch
 - The weed inspector:
 - shall monitor the site from spring to fall for occurrences of the weed
 - shall treat any plants that emerge with the most effective measures available to eradicate the plants
 - shall post the boundary of the *Prohibited Area* with signs
 - May erect a safe barrier to prevent entry
 - May prohibit the seeding of crops or entry of any person, machine or domestic animal to the *Prohibited Area*
 - May order the destruction of the crop

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Noxious Weeds

In the case of a *Noxious Weed* a weed inspector may make agreements or issue orders to:

- If less than 5 ha per quarter section, cause the weed to be *eradicated*
 - May order the destruction of a 'crop'
- If greater than 5 ha, cause the infestation to be contained and controlled;
 - cause the weed infestation to be *contained* using eradication measures in a boundary area (up to 20 m beyond infestation) and,
 - within the contained area cause *integrated weed control* measures to be introduced that reduce the impact of the weed and prevent it from spreading
 - Orders and Agreements may span a period of three years
- Prohibit the movement of any material, machine, or domestic animal if they contain or have adhered to them noxious weeds

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Weed Categories

Criterion and Enforcement Goals

Noxious - Established in Sask. beyond practical eradication but still spreading in non-infested areas

- Enforcement goal is to prevent the spread of noxious weeds

- **Noxious list** *(current or former ornamental or medicinal species)

<ul style="list-style-type: none"> • absinth[*] • baby's-breath[*] • black henbane[*] • bladder campion • bull thistle[*] • Canada thistle • cleavers • false cleavers[*] • common burdock • common tansy[*] • cypress spurge[*] 	<ul style="list-style-type: none"> • Dame's rocket[*] • downy brome • European buckhorn[*] • field bindweed[*] • hoary alyssum[*] • hoary cress (Cardaria spp.) • Japanese brome • Kochia[*] • leafy spurge • narrow-leaved hawk's-beard 	<ul style="list-style-type: none"> • night-flowering catchfly • nodding thistle • oxeye daisy[*] • Persian dandelion • prickly lettuce • purple loosestrife[*] (all Lythrum spp.) • round-leaved mallow • Russian knapweed 	<ul style="list-style-type: none"> • scentless chamomile[*] • sow-thistle • perennial • common annual • Spiny annual • stork's-bill • wild pansy[*] • white cockle • yellow toadflax[*]
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Weed Categories

Criterion and Enforcement Goals

Nuisance

- Widely established across Saskatchewan - still a problem for agriculture
- could include native species

Nuisance list

<ul style="list-style-type: none"> • blue lettuce[*] • dandelion 	<ul style="list-style-type: none"> • foxtail barley • meadow goat's-beard • povertyweed, 	<ul style="list-style-type: none"> • quack grass • Russian thistle
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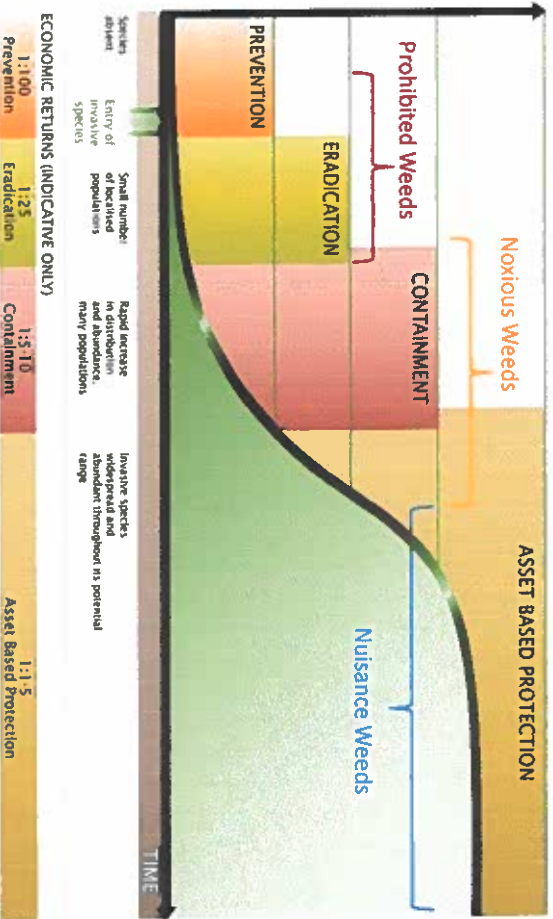
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Nuisance Weeds

- In the case of *Nuisance Weeds*:
 - Weed inspector will act only upon a complaint
 - Enforcement will involve the implementation of integrated weed management to correct the reason why the weed is out of control
 - Orders and Agreements may span a period of three years (as with Noxious)

AREA OCCUPIED



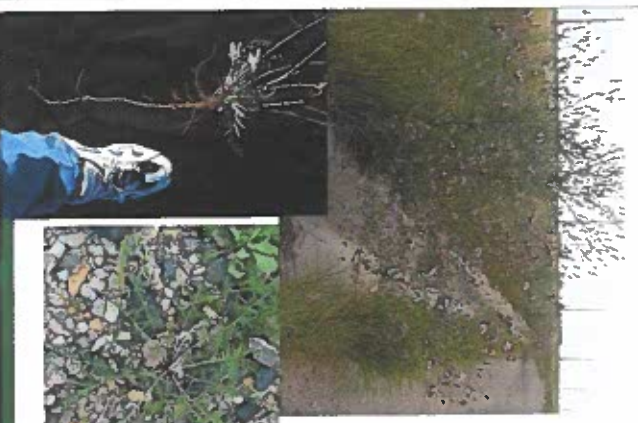
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Version 1.0: 30 April 2009

Prohibited Weeds

Goal:

Early Detection & Rapid Response
(Rapid Response = Eradication)



Spotted Knapweed

Gentauria maculosa

- Description**
- Tap rooted perennial
 - Stems 30 to 100 cm tall
 - Rosette leaves are twice divided into narrow long lobes
 - Thistle-like flowers - pink to purple (occasionally white)
 - Buds are egg shaped w dark fringed bracts creating "spotted" appearance

Photos:
Saskatchewan Agriculture



Spotted Knapweed

Centauria maculosa

- 30% of seed is still viable after 8 years in soil.
- Expands rapidly from initial infestation point
 - Allelopathic root exudates (catechin)
 - Unpalatable to cattle (calcin)
- Can cause up to 85% loss in productivity of pasture and loss of wildlife habitat

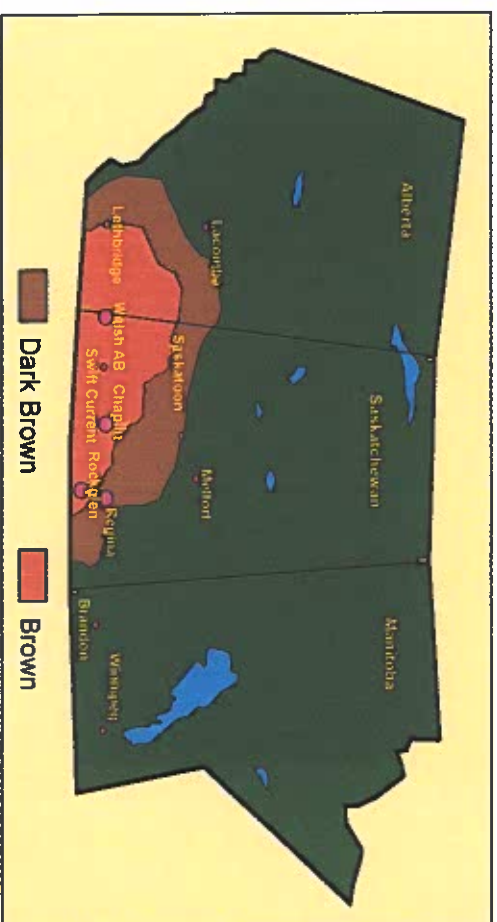


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Spotted Knapweed

Centauria maculosa

Adapted to dark brown soils in Saskatchewan



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Diffuse Knapweed

Centauria diffusa

- Biennial, but can be annual or short lived perennial
- Deep tap root
- Leaves similar to spotted knapweed, but finer lobes and divisions

Description



Photos: Saskatchewan Agriculture & California Department of Agriculture

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Diffuse Knapweed

Centauria diffusa

- Typically white flowers but can be pink
- Similar flower shape to spotted knapweed
- Bud bracts are tipped with a single rigid spine 0.25" to 0.3" long with several pairs of lateral spines rather than black hairs (spotted)
- Hybrids of diffuse and spotted knapweeds have been reported
- Impacts are similar to spotted knapweed



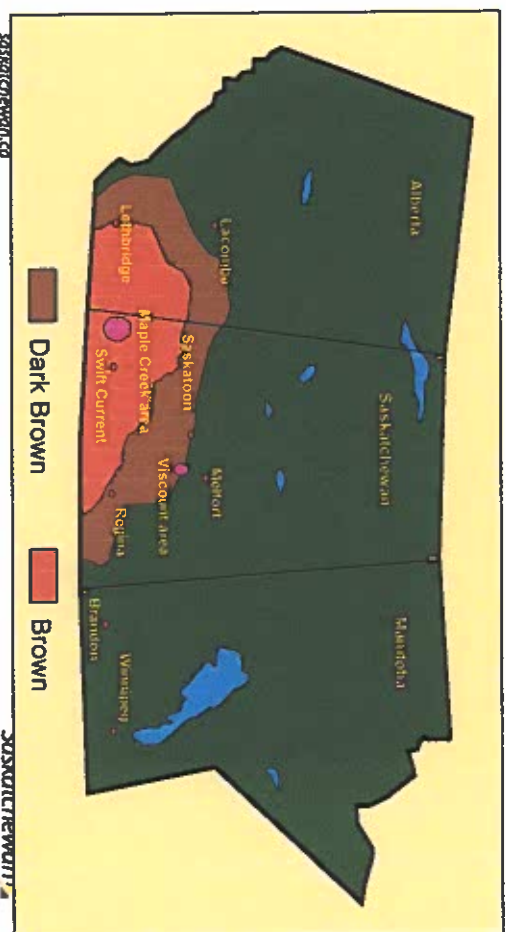
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Diffuse Knapweed

Centauria diffusa

Adapted to brown soils in Saskatchewan

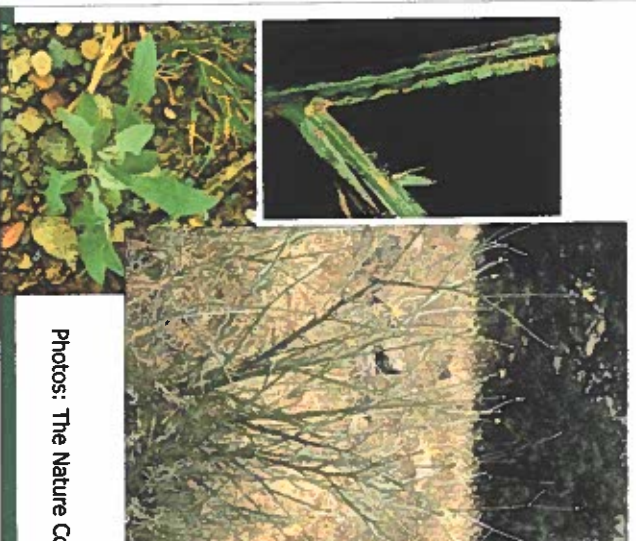


Yellow Star-thistle

Centauria solstitialis

Description

- Winter annual w deep tap root
- Stem 1 to 2 m tall
- Rosette leaves deeply lobed
- Stem leaves fused to stem to create winged appearance
- Entire plant covered with fine cottony hair = greyish colour



Photos: The Nature Conservancy

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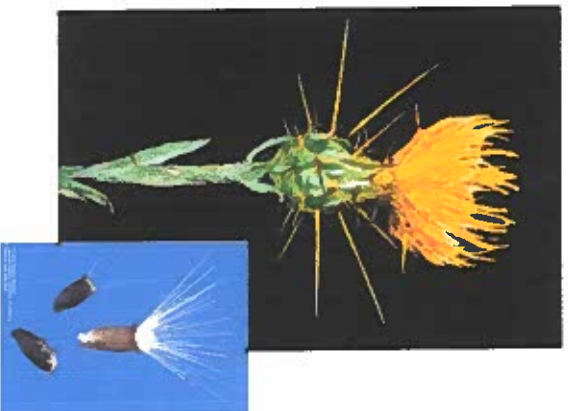
Photos: The Nature Conservancy & UC Davis

Yellow Star-thistle

Centauria solstitialis

Flowers

- Yellow flower similar in shape to other knapweeds
- Bud scales (bracts) tipped with a stiff spine from 1/4" to 2" long
- Small pair of lateral spines also present
- One plant can produce up to 100,000 seeds
- Seeds can germinate immediately or lay dormant for up to ten years



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Biology and Impacts

- Prefers deep well drained soils
- Can form dense stands that eliminate grazing potential
- Livestock avoid infested areas
- Injury to grazing livestock
- Can also be a problem in annual crops
- Contains chemical **Repin** that causes "Chewing Disease" in horses

Photos: The Nature Conservancy

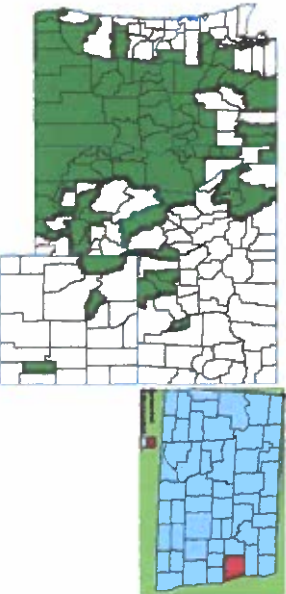
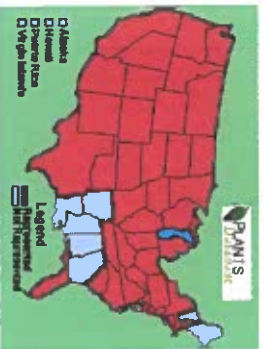
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Yellow Star-thistle

Centurea solstitialis

Distribution

- Widely distributed through the continental USA
- Heaviest in the mountainous regions of the west
- Is moving north & into the great plains region



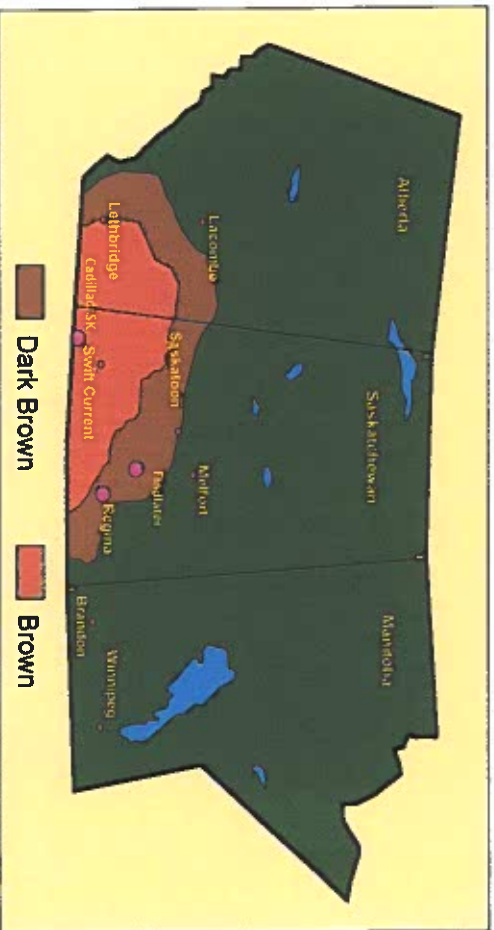
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Saltcedar

Tamarix spp.

Adapted to riparian areas



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Saltcedar

Tamarix spp.

Description

- Deciduous shrub or small tree
- Reddish brown or dark brown to deep purple
- Small scaly leaves that turn yellow-orange in fall
- White to pink flowers, 4 or five petals
- Can produce large numbers of small seeds
- Can reproduce from buried stems
- Very tolerant of saline soil
- Concentrates salt in leaves
 - Leaf litter causes salinity to increase under plant
- Displaces native vegetation
- Establishes along riparian areas

Photos: The Nature Conservancy

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Common or European Barberry

Berberis vulgaris

- A deciduous shrub 8 to 10 feet tall & 6 feet wide.
- **Stems:** Bark gray with sharp spines at nodes and the inner wood is yellow. Spines are double- or triple-branched.
- **Leaves:** small, toothed, ovate, alternate, dull green above and grayish below borne in clusters on branches. Leaves on young sprouts are spiny.



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Common or European Barberry

Berberis vulgaris

- **Flowers:** Yellow ½ inch long borne in drooping racemes 1 to 2 inches long with an unpleasant odor.
- **Fruit:** small oblong berries scarlet red to purple containing 1-3 small, black seeds.



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Garlic Mustard

Alliaria petiolata

- **Stems :** up to 40in. tall,
- **Leaves:** May germinate in the fall; lower stem leaves alternate, broad and kidney-shaped, initially; upper leaves triangular, 2/5-3in. long and wide, with acute tip and coarsely toothed margins;
- **Flowers:** small, white, with 4 petals, the lowermost 1-3 flowers and seedpods may be in the axils of small leaves;



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Garlic Mustard

Alliaria petiolata

- The whole plant has a distinctive onion-like or garlic-like odour. Flowers from May to June.

Habitat: moist woods, swampy areas and ditches and along roadsides and railway embankments.

- **2011 update – reported in Edmonton**



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Garlic Mustard

Alliaria petiolata

- Creeping perennial Mustard Family
- **Stems:** 0.3 to 1 metre tall or more
- **Leaves:** lance-shaped, **waxy, distinctive white mid-veins;** lower stalked; upper short stalked or stalkless do not clasp the stem;
- **Flowers:** 4 petal; white borne in dense, rounded clusters at branch tips
- **Seeds:** 2 reddish-brown seeds in each tiny, lens shaped and slightly hairy fruit -
- Distinguished from horseradish by **plenum running across the narrow part of the pod**



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Perennial Pepperweed

Lepidium latifolium

Poison hemlock

Conium maculatum

- A biennial member of the carrot family that grows 3 to 8 feet tall. Reproducing only by seed. **Highly poisonous**
- Stems: thick, hollow, ridged, and purple-spotted & a thick, white taproot
- Leaves: shiny green, 3 to 4 times divided, and clasp the stem at the obvious nodes. Crushed foliage and roots have a foul odor.



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Poison hemlock

Conium maculatum

- Flowers: small, white, and borne in umbrella-shaped clusters about 3 inches across (appearing in early summer). It reproduces from seeds ridged and flattened, with 2 seeds borne together. It has that may easily be mistaken for wild parsnips.
- Habitat: generally on dry-to-moist soils, and can even tolerate poorly drained soils. It is usually found along streams, irrigation ditches, and the borders of pastures and cropland, and can gradually invade perennial crops.



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Hound's-tongue

Cynoglossum officinale

- A biennial tap-rooted weed growing 0.5 to 1.2 metres tall;
- Leaves: soft, hairy rosette leaves (7 to 30 cm long) produced in first year resemble the shape of a dog's tongue; stem leaves are shorter and stalkless;
- Flowers: dull reddish-purple produce 4 rounded triangular nutlets (seeds) that are covered with hooked prickles



Photo by
Richard Old
www.saskatchewan.ca

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Hound's-tongue

Cynoglossum officinale

- easily spread by seed attachment to clothing and animals
- contains toxic alkaloids that can cause liver damage in grazing animals
- well adapted to forested areas, roadsides and meadows



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Puncturevine

Tribulus terrestris

- Annual, branching from the base and spreading along ground to form dense mats;
 - Leaves: hairy; grow in opposite pairs; divided into 4 to 8 pairs of oval leaflets;
 - Flowers: yellow borne in leaf axils;
 - Fruit: has 5 sections that form tough, sharp sometimes curving spines that easily penetrate leather, and skin and can flatten rubber tires
- Was grown in SK as a nutraceutical crop



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Field Scabious

Knautia arvensis

- Introduced from Europe possibly in wildflower mixes
- Simple perennial with a strong tap root
- Member of the Teasel family related to domestic Blue buttons (*Scabiosa caucasica*)
- Invasive and aggressive in undisturbed areas
- Prefers moist, high organic matter habitats, but will grow in dry as well



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Field Scabious

Knautia arvensis

- Leaves
- Leaves opposite on stem and nodes can be one foot apart or more
- Leaves near the base of the plant are deeply lobed
- Leaves near the top of the plant are feather shaped
- Leaves are from 4 to 10 inches long
- Entire plant covered with coarse stiff hairs



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Field Scabious

Knautia arvensis

- Flowers
- Disc type flower platform with deep pink to pale blue tubular flowers (occasionally white)
- creates a dome of coarse seeds when mature
- Seeds shatter quickly – some before seed is mature
- Can produce 2000 seeds per plant



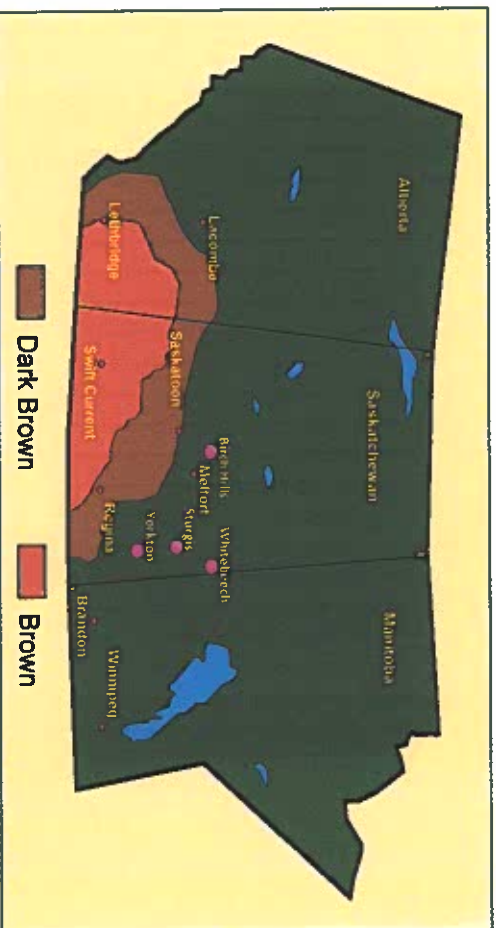
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Field scabious

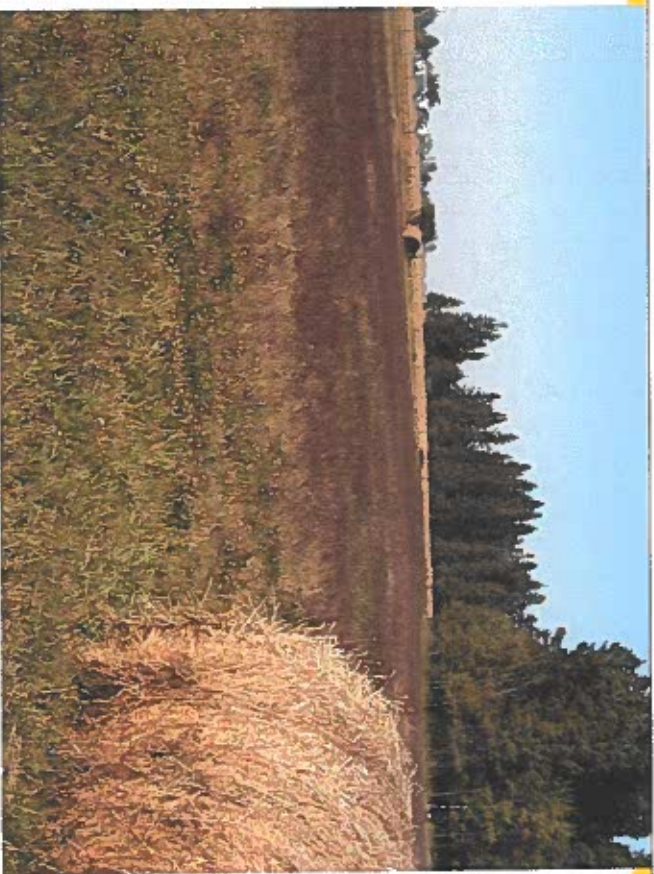
Knautia arvensis

Adapted to dark brown soils in Saskatchewan



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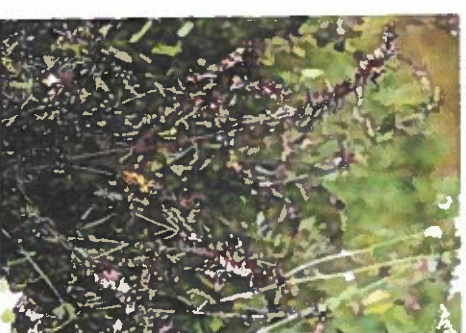
- Annual weed reproducing only from seed – germinates in late spring
- Hemiparasitic
 - Can grow independently but
 - Will attach itself to the roots of other plants and co-opt their roots to supply its needs
- Does not persist in annual cropping
- Invasive in hayland, pasture, and roadsides – even lawn
- Livestock will not eat

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Red Bartsia

Odontites vernus

Photo: Wisconsin Herbarium



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Hoary alyssum

Beretta incana

- Winter annual member of the mustards
- Whole plant covered in fine hair = grey
- Stems – upright, much branched
 - Mostly leafless stems are comprised of mostly flowers or seed pods
- Flowers – 4, deeply cleft, white
- Plant prefers sandy soils with little competition
- Can cause laminitis (hoof inflammation) in horses if consumed in hay
- Found in Regina along 9th Avenue between Lewvan & McCarthy as well as Highway #1 at White City

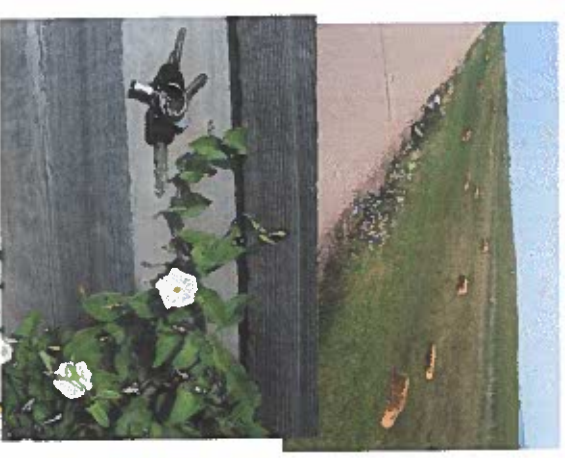


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Field bindweed

Convolvulus arvensis

- Deep, creeping rooted, persistent perennial member of the morning glory family
- Stems prostrate but will twine around vertical structures
- Leaves spade shaped up to 2 inches – more than 2x longer than wide
- Base of leaf point outward
- White to pale pink trumpet shaped flowers - 5 fused petals
- Spreads via seed and creeping roots
- Seeds last in soil for up to 50 years



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Noxious Weeds

Goal:

Eradication of Isolated infestations (<5 ha)
Containment and Integrated control of Established Infestations (>5 ha)

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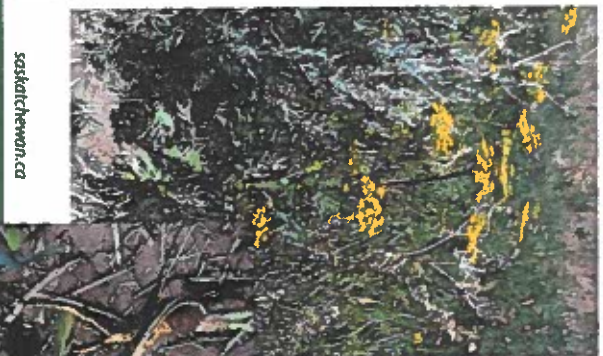
Wild Parsnip

Pastinaca sativa

Photos: Saskatchewan Agriculture

Description

- Wild relative of the domestic parsnip
- **Monocarpic perennial!**
 - produces fruit once then dies
 - may take 2 or more years to flower
 - requires a cold period to flower
- Grows from 1 to 5 ft. high on hollow & deeply grooved stems.
- Large fleshy carrot-like tap root
- General colour = light green
- The flowers are borne in umbels



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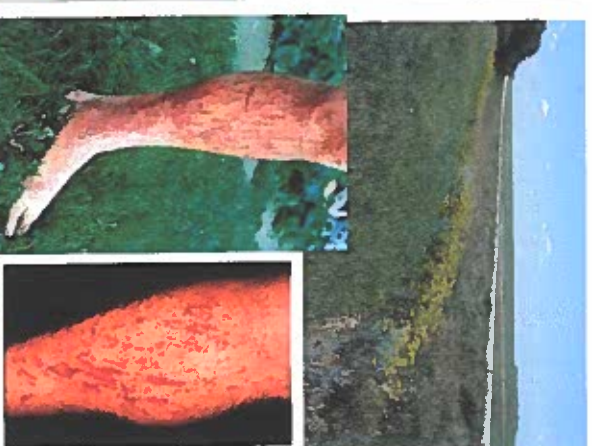


Wild Parsnip

Pastinaca sativa

Biology and Impacts

- Grows in sunny occasionally disturbed habitats on roadsides, waste places and occasionally fields
- Juice of the plant contains **furocoumarins**
 - cause severe burns to skin when exposed to a combination of sap and sunshine
- Current infestations known in Saskatchewan are
 - Rural roadsides and marshes between Osler and Hague
 - Hwy 48 from Kendall to Montmartre
 - headwaters of Moose Mountain Creek



Photos: Saskatchewan Agriculture, Wisconsin Natural Resources Magazine and Centre for Disease Control, Atlanta, GA

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Ox-Eye Daisy

Leucanthemum vulgare

- Creeping rooted, perennial daisy
- Wild ancestor of Shasta daisy
- Shasta may revert to the wild type – do not buy ox-eye for gardens
- Several unbranched stems from the same crown
- Spatula shaped leaves with scalloped edges
- Leaves reduced higher on the plant
- Outcompetes desirable forage
- Taints milk in when grazed by dairy cattle
- Common in pockets in SK – Including Regina



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Purple Loosestrife

Lythrum sp.

- All *Lythrum* species included in list due to ability to cross with the wild type *L. salicaria*
 - including hybrids of *L. vertigatum* and *L. alatum* bred in AAFC Morden
- **Stems** – angular (4 or more sides)
 - Hollow and coarse
- **Leaves**
 - opposite and attached directly to stem
 - Lobes wrap around stems somewhat
- **Flowers** – Magenta to purple
 - Borne on single spike
 - Attached directly to the stem
- Presently over 100 small locations in SK
- Many domestic planting in Regina



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Dames Rocket

Hesperis matronalis

- Simple tap-rooted perennial
- One of the only purple flowered mustards
- Introduced as an **ornamental**
- Single unbranched stems from the crown except for flowering branches higher in canopy
- Long triangular leaves with serrated edges attached direct to stem
- Outcompetes desirable forage and native rangeland
- Common in ornamental plantings in SK – including Regina



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Common Tansy

Tanacetum vulgare

- Coarse perennial largely petal-less member of the daisy family
- Introduced as an **ornamental**
- Deep compound lobed leaves of dark green
- Plant produces a wide range of chemical compounds – some of which cause livestock poisoning or abortions
- Grows in thick clumps that outcompete desirable forage
- Relatively common in SK north of Hiway 15
- Prefers moist habitats



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Leafy spurge

Euphorbia esula

- Persistent, deep rooted perennial with creeping roots
- Linear leaves that are pale green
- Plant produces a white latex sap through the entire plant that can cause skin irritation
- Grows in thick colonies that outcompete desirable forage
- Adapted leaves replace the function of petals around flowers
- Spits seeds up to 20 ft.



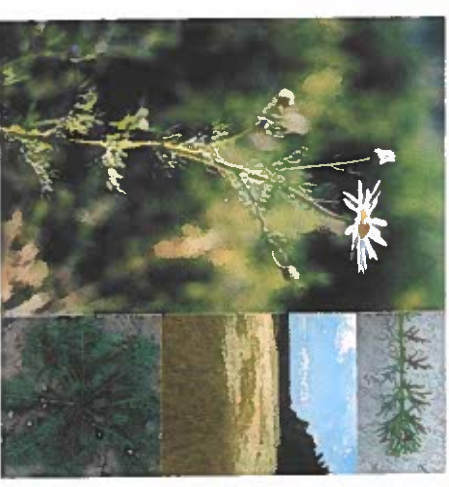
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Scentless chamomile

Tripleurospermum inodorum

- May be annual, winter annual, biennial or short lived perennial
- Leaves -- several times divided, lacy
- Flowers
 - Daisy-like flower initiated under long photoperiods
 - Plants emerging later in the season form rosettes to bloom the following year
 - A single large plant or one square meter of a solid infestation can produce 300,000 to 1 million seeds



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Proposed Review of Minister's Order Designating Prohibited, Noxious and Nuisance Weeds (Weed List) for The Weed Control Act

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New Prohibited

Himalayan balsam (*Impatiens glandulifera*)

- Annual introduced as an ornamental
- Grows up to 4 cm per day and achieves heights of 1 to 3m
- Explosive seed dehiscence = 7m from parent
- Can reroot from adventitious roots at nodes
- Outcompetes neighbouring vegetation and lays land bare to invasion from other invasive weeds
- Significant infestation in Prince Albert



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New Prohibited

Orange & Meadow Hawkweed (*Hieracium aurantiacum* & *H. caespitose*)

- Low lying perennials with aerial flower stalks
- Entire plant covered in dense hair
- Leaves are spatula shaped
- Aerial flower stalks bear 3 to 4 ray shaped flowers (bright orange or yellow for meadow)
- Reproduce via creeping lateral stolons or wind-borne seeds
- Tolerate shade
- Displace desirable vegetation
- Specimens found in Moose Jaw and Regina



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Prohibited?

Waterhemp & Palmer Amaranth (*Amaranthus tuberculatus* & *A. palmeri*)

- Diecious members of the pigweed family (separate male and female plants)
- Waterhemp has longer and narrower leaves than typical pigweeds
- Palmer amaranth has petioles longer than the egg-shaped leaf blade
- Both are hairless
- Both carry high levels of herbicide resistance to several different herbicide modes of action (Groups)
- Both compete aggressively with crops

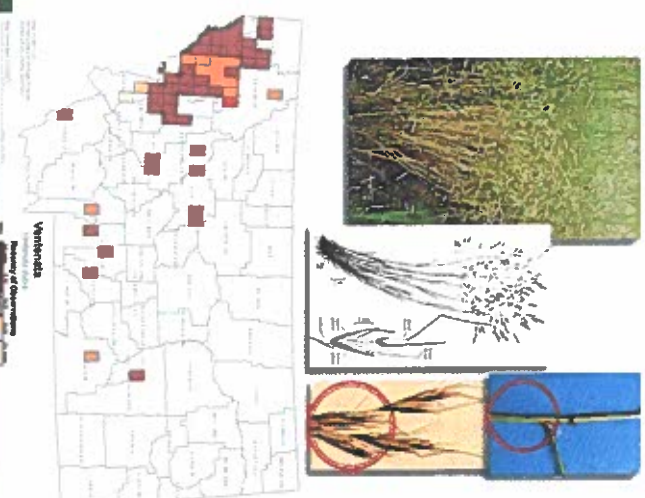


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New Prohibited

Ventenata/North Africa Grass (*Ventenata dubia*)

- Winter annual grass
- Invades rangeland, hay, roadsides
- Similar negative characteristics to downy brome
- Reported in Montana and southern Alberta



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New Noxious

Viper's bugloss/Patterson's curse (*Echium vulgare* & *E. plantagineum*)

- Perennial & Winter annual
- Invasive
- Draws bees from desirable nectar plants
- Toxic to livestock and nectar can transfer toxin to honey
- Introduced as an ornamental
- Viper's bugloss is present in SE Saskatchewan



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New Noxious

Common mullein (*Verbascum thapsus*)

- Tap rooted perennial
- Invasive during wet cycles & retracts during dry cycles
- Can be particularly problematic in sparsely vegetated areas
- Found sporadically throughout Saskatchewan

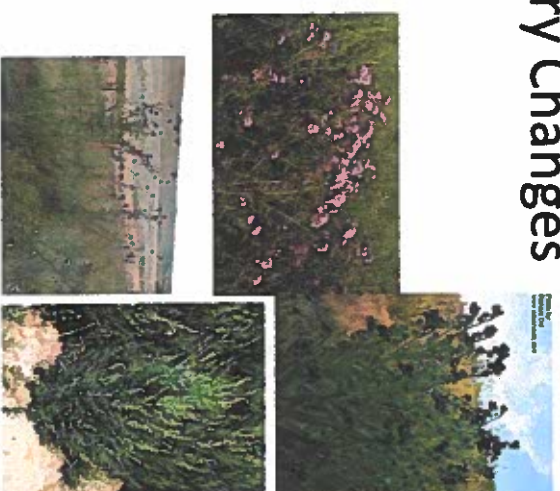


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Category Changes

- Prohibited to Noxious
 - Hound's-tongue
- Noxious to nuisance
 - Canada thistle
 - Kochia
 - Nodding thistle
- Additional suggestions welcome
 - Sow-thistles?
 - Cleavers (incl. false cleavers)?



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Questions?

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