South Saskatchewan River Watershed
Agri-Environmental Technical Services

Nov 2020

What is Critical Habitat?

Rachel Turnquist MAgr, PAg, Government of Saskatchewan, Land Management Specialist

Ranching in Saskatchewan is a compatible activity with maintaining and enhancing critical habitat for species at risk. Large ranches in the south western part of the province are home to many species at risk such as the greater sage-grouse, burrowing owl and swift fox. Other species at risk like Sprague's pipit can be found throughout the southern part of the province to north of Saskatoon. Even further north, another species at risk, woodland caribou, unobtrusively roams the boreal forest.

Every species at risk has unique habitat requirements that are necessary to its survival or recovery. This is its critical habitat. For instance, a burrowing owl co-exists with black-tailed prairie dogs in their colonies and also lives in other similar habitats. Burrowing owls need pastures that have a combination of short and tall vegetation but are free of woody vegetation. They use the prairie dog burrows in the ground to mate, live and seek protection in.

After the critical habitat is identified, human activities or natural events are assessed for their impact on species at risk critical habitat requirements. For example, loggerhead shrike critical habitat is large natural grasslands that are close to shrubs like thorny buffaloberry. These shrubs may be surrounding a wetland, or planted in a shelterbelt or yard site. Some examples of activities that reduce loggerhead shrike habitat include removing shrubs from shelterbelts and yard sites, converting native prairie to annual crop production and overgrazing to the point that prey habitat for the shrikes is reduced.

Ranching practices can enhance critical habitat, consider Sprague's pipit. The critical habitat for this species at risk is large areas of healthy upland native prairie, with limited woody vegetation and limited invasion of exotic grasses. Planned grazing management is a tool a rancher can use to ensure their rangeland is healthy. Planned grazing management advises providing adequate rest for recovery of the pasture in the growing season, balancing livestock demand with forage supply, managing timing of grazing and animal distribution as well as managing intensity frequency and duration of grazing. Planned grazing management also includes infrastructure planning for livestock water, fences and buildings. Determining the species at risk, its critical habitat and human activities that interact with the habitat prior to implementing infrastructure changes can help prevent inadvertently harming critical habitat.

Many species at risk can be found in Saskatchewan. Identifying each species critical habitat and planning to maintain and enhance it will help sustain species at risk populations. For more information, contact the Agriculture Knowledge Centre 1-866-457-2377.

Under the **Farm Stewardship Program** & the **Farm and Ranch Water Infrastructure Program** project locations are checked to determine if there is critical habitat that may be impacted by works.

Your **Agri-Environmental Techs** are contracted by the Government of Saskatchewan and are available to assist with project applications. There is no cost to the producer for this service.
In the South Saskatchewan River Watershed call Kerry at 306-460-4987 for more information.

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Are you Planning a New Well, Dugout or Buried Pipeline?

There is cost shared funding available through the **Farm and Ranch Water Infrastructure Program** for new water development for ag purposes. Contact us for help with the checklist (to be reviewed before your project starts) and/or your rebate application.

If you have done a new water project since October of 2017 it still may be eligible for funding as this is a rebate program and producers have until December 31, 2022 to file their paperwork.

Variable Rate Mapping

The only beneficial management practice (BMP) under the Farm Stewardship Program that is a rebate is the Variable Rate Mapping BMP. This BMP provides 30% cost-shared funding to a maximum of $2,000. Producers must have an **Environmental Farm Plan** (no update necessary) or other sustainability initiative such as Verified Beef+, 4R Nutrient Stewardship or an International Sustainability and Carbon Certificate (ISCC).

Are you Considering Seeding Forages next Spring?

Start planning now!

Producers looking to convert highly erodible and/or saline land from annual grain production to permanent cover can apply for the **Permanent Tame Forage** BMP.
There is also cost shared funding under the **Permanent Native Forage** BMP**.**

These BMPs are **pre-approval.** Before starting your project or purchasing your seed contact your Agri-Environmental Specialist with the Ministry of Agriculture to discuss your seed mix.

Stewardship Actions

This chart first appeared in our 2007 newsletter!

Establishment of:
- Shelterbelts
- Remote watering systems
- Non-economic cover crops
- Perennial Forages

Enhancement / Restoration of:
- Native Rangelands
- Natural Ecosystems
- Riparian Areas / Buffers
- Wildlife Habitat

Relocation of:
- Livestock Facilities
  - away from Riparian Areas

Aquifer Protection through:
- Proper Well Management
- Proper Well Decommissioning
- Water Quality Testing

Use of:
- Water & Nutrient-Use Efficient Irrigation Techniques / Systems
- Zero or Low Tillage techniques
- Recycled "grey" water

Improvement of:
- Grazing Management Systems
- Manure Management Treatment, Storage & Application

Proper Storage & Disposal of:
- Hazardous Materials and Chemicals

Reduction of:
- Cultivation by Waterbodies
- Grazing Impacts
- Water, Soil & Wind Erosion

Control of:
- Invasive Plant Species
- Farmyard Run-off

Elimination of:
- Point Source Contaminants

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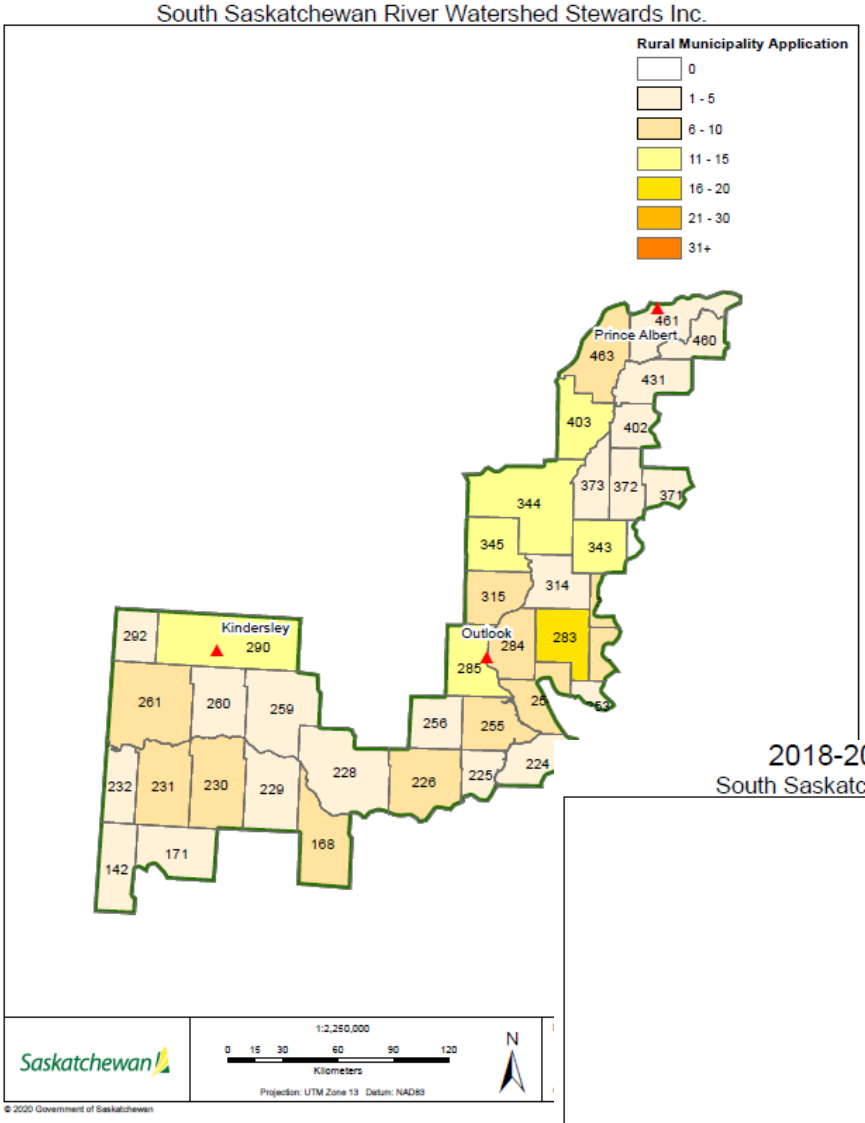
2018-2020 Total FRWIP Applications

South Saskatchewan River Watershed Stewards Inc.

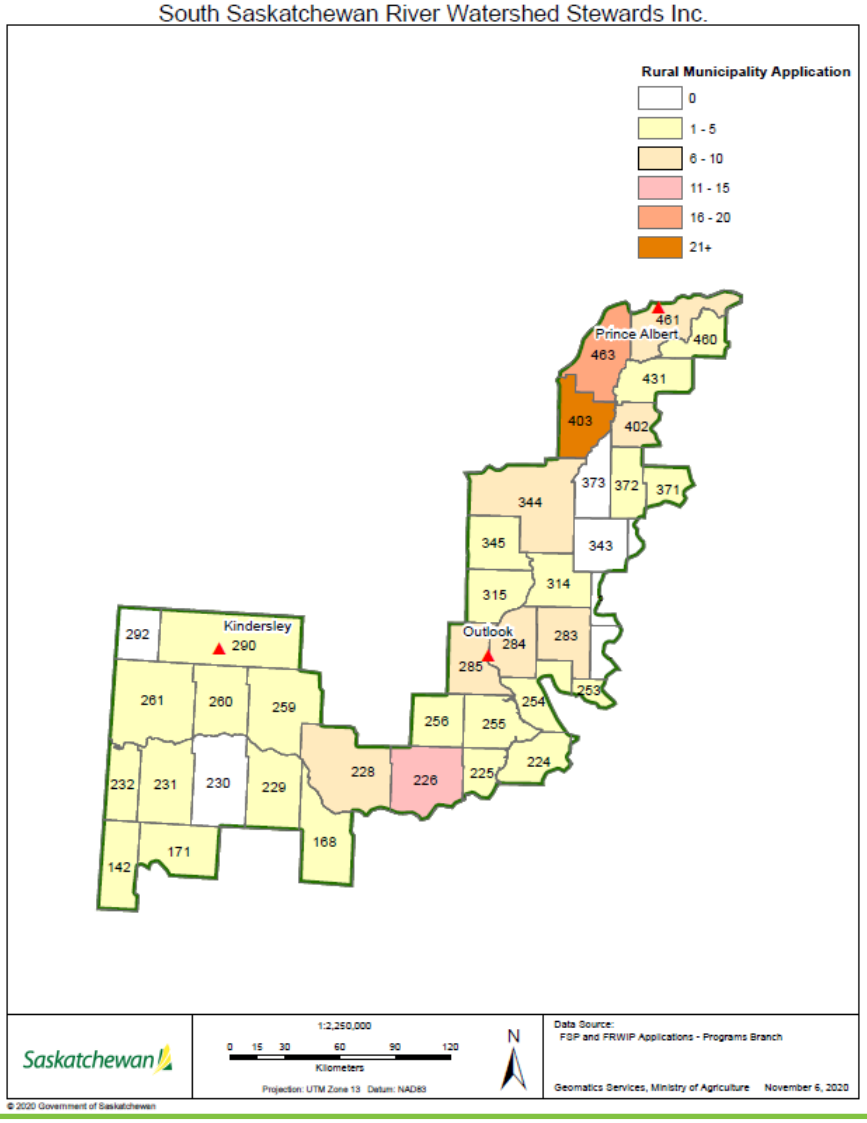


What Have We Been up To?

Approximately 30% of all Farm and Ranch Water Infrastructure Program applications are sent in with assistance of the AETS

2018-2020 Total FSP Applications

South Saskatchewan River Watershed Stewards Inc.



Approximately 90% of all Farm Stewardship Program applications are sent in with assistance of the AETS

In the first two and a half years of the CAP program SSRWSI technicians assisted over 250 producers with their projects and applying for funding.

Farm Stewardship Program Funding

Beneficial Management Practice	Funding Level
Livestock Stewardship: pre-approval **Includes relocation of livestock confinement facilities, run-off control, manure storage enhancements, carcass disposal and nutrient management planning.**	50% of eligible costs to maximum of $100,000
Native Rangeland Grazing Management: pre-approval	50% of eligible costs to maximum of $10,000
Riparian Grazing Management: pre-approval	50% of eligible costs to maximum of $10,000
Permanent Native Forage: pre-approval	90% of eligible costs to maximum of $10,000
Permanent Tame Forage: pre-approval	50% of eligible costs to maximum of $10,000
Invasive Plant Biocontrol and Targeted Grazing: pre-approval	50% of eligible costs to maximum $45,000/yr
Drainage Stewardship: pre-approval **Addresses impacts of existing private drainage works**	50% of eligible costs to maximum of $20,000
Variable Rate Mapping: rebate	30% of eligible costs to maximum of $2,000
Farm & Ranch Water Infrastructure Program	
Dugout, Pipeline, Well: rebate	50% of eligible costs, program maximum $50,000
Well Decommissioning: pre-approval	90% of eligible costs to a max of $10,000 per well

Agri-Environmental Technical Service (AETS) technicians are contracted by the Ministry of Agriculture (MOA) to assist producers with both the Farm Stewardship Program and the Farm and Ranch Water Infrastructure Program applications to ensure they are meeting all requirements and obtaining all the necessary paperwork to have projects approved. As MOA contracts technicians through watershed stewardship groups, all of their work is **free of charge** for producers. Technicians can also assist you in obtaining any permits, approvals, or permissions that may be required depending on the type of project. They have a network of contacts and experience with completing all of the forms, permits, plans and assessments required for all BMP's.

Contact Kerry Lowndes at 306-460-4987 or Bonnie Simonson at 306-846-7401
your Agri-Environmental Technical Services reps with the
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FIELD DAY/WORKSHOPS

Agri-Environmental technicians work with Rural Municipalities and producers throughout the watershed. In addition to helping producers with the Farm Stewardship Program and the Farm and Ranch Water Infrastructure Program, technicians can help arrange field days and workshops.

Would you be interested in a **water well workshop** with presentations from people working in the field?

In Alberta something similar is hosted: **Working Well: Clean Water Protected**. For their fact sheets visit:
https://open.alberta.ca/publications/working-well-clean-water-well-protected-2019

U of S HOME TO NOTABLE WATER RESEARCH PROJECTS

Global Institute for Water Security– U of S

- one of the most advanced hydrology research centres in the world
- dedicated to protecting freshwater resources
- funds Global Water Futures

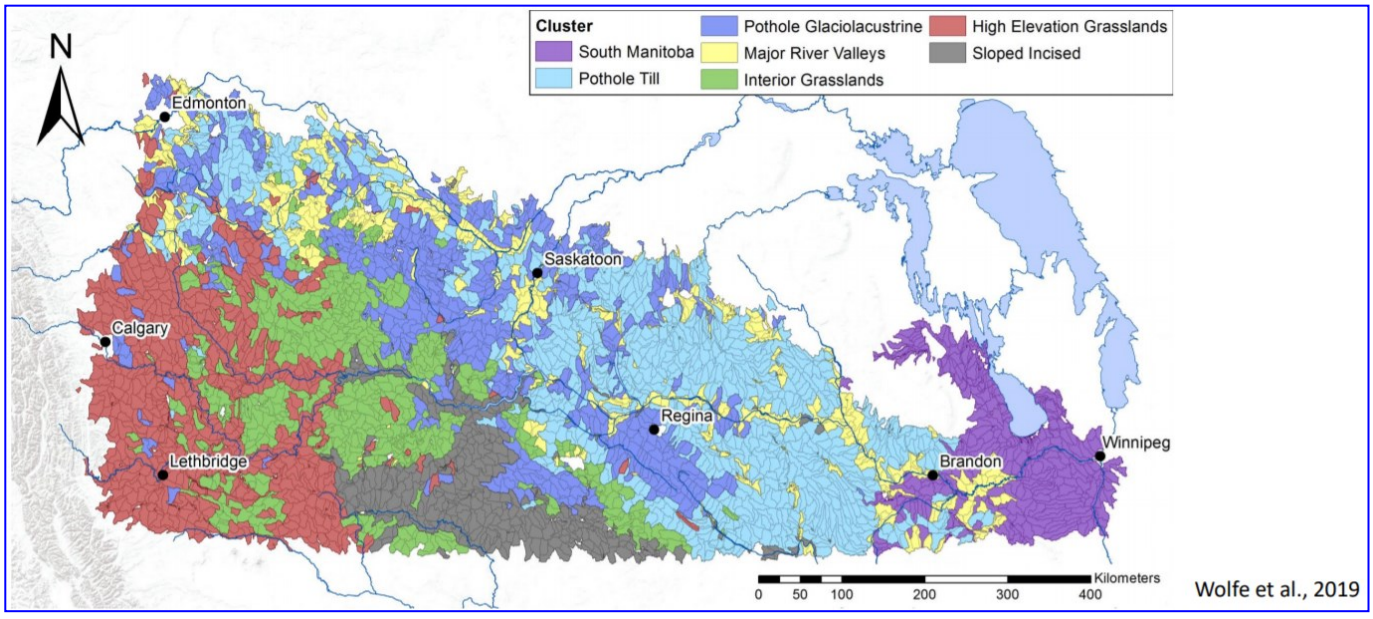
Global Water Futures– U of S

- global leader in water science in cold regions
- delivers risk management solutions in Canada
- funds Prairie Water

Prairie Water– U of S

- water research addressing ground & surface water availability, water management & economics and aquatic ecosystem health on the Canadian Prairies

One such project was to **classify catchments** across the prairies as seen in the map below. This can then be used to simulate water supplies under different climate and management scenarios.



Powerpoint slides on this project can be found at:
https://gwf.usask.ca/prairiewater/resources/spence-c_pwapm2020_hydrology-update.pdf

These works are in development and as such are not yet peer reviewed, however, it is interesting to know what is being worked on and watch the progress.

If you are interested to see other presentations, visit their website at:
https://gwf.usask.ca/prairiewater/resources/presentations.php

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Precision Management of Cattle Manure

Researchers:

Dr. Jeff Schoenau (PhD), Soil Science, College of Agriculture and Bioresources, University of Saskatchewan- jeff.schoenau@usask.ca

University of Saskatchewan: Stephen Froese, Ryan Hangs, Rich Farrell, Diane Knight, Jane Elliott, Natacha Hogan, Markus Brinkmann, T. Fonstad, C. Rinas, Deborah Ayanwale (MSc student), Jocelyn Thresher (MSc student)

Background:

The means to achieve maximum benefits from feedlot cattle manure applied to cropland as a source of plant nutrients and organic matter while minimizing impacts on water and air is addressed through precision manure management research conducted on Section 21 at the Livestock and Forage Centre of Excellence (Clavet), University of Saskatchewan.

What They Will Do:

The treatments in the three management zones are:

1. Constant rate (traditional) land application of manure at the rate of 60 tonne per hectare every second year across the entire watershed area.

2. Precision (variable) rate of application of manure across the watershed area. Variable rate application will be made using capabilities provided by a GPS-linked manure spreader with variable rate application capability and the prescription developed based on detailed soil and landscape assessment and available remote sensing data. The variable rate application will be made according to management zones within the watershed identified primarily by soil measurements (properties, nutrient amounts and supply rates), by landscape (elevation, surface curvature maps), and by remote sensing tools where available (aerial imagery, reflectance, yield maps), as well as by distance from water body. Variable rate application will vary 50 per cent below and 50 per cent above the constant rate application. Approximately the same total amount of manure is applied to the landscape as the constant rate treatment.

3. No manure application and crop grown with commercial fertilizers under normal practice as required and recommended.

Preliminary findings as of spring 2020:

Fresh cattle manure applied provides sufficient phosphorus (P) but not enough available nitrogen (N) in the year of application for silage barley due to high carbon to nitrogen (C:N) ratio of manure. Manured fields can benefit from addition of supplemental fertilizer N in first couple of years but do not require fertilizer P in order to provide a yield similar to commercial fertilizer only fields.

Over time as available N levels increase from mineralization of manure organic N, supplemental fertilizer N may be reduced or eliminated. Reducing or eliminating cattle manure application in the identified high productivity, fertility lower slope regions of the landscape and in the catchment basin centers was found to increase overall efficiency of nutrient use, reducing nutrient accumulation in regions of the landscape where it is susceptible to loss.

Precision manure application with variable rate according to long-term productivity and soil assessments (reduce rate on high productivity, maintain or increase rate on low productivity and do not apply in basin centers or sloughs) appears to have agronomic and environmental benefits. Precision manure application appears to be an effective approach to reducing greenhouse gas emissions in the landscape and nutrient concentrations in run-off water. No hormones that were tested for so far that could originate from the feedlot could be identified in the manure from the feedlot or in soils receiving the feedlot manure.

To find information on other research taking place at the Livestock & Forage Centre of Excellence visit:
https://lfce.usask.ca/research.php#CurrentResearch

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Digital Soil Mapping

Glenn Cheater: Originally published in Agknowledge, University of Saskatchewan College of Agriculture and Bioresources

Zoom in with Google Earth and you can count the roof vents on Angela Bedard-Haughn's office in the Agriculture Building at the U of S. But the view over her hometown of St. Brieux, 150 kilometres north-east, starts getting fuzzy at a height of three kilometres above the land.

That digital disparity is even greater below ground- something that Bedard-Haughn and other Canadian soil scientists are trying to change. Their efforts include the Saskatchewan Soil Information System (sksis.usask.ca), a newly launched soil database and digital mapping initiative.

This is precisely the sort of tool that humanity will need as the population heads to 10 billion on a planet undergoing climate change, says Bedard-Haughn. "We're increasingly hearing about folks talking not just about food security and water security, but about soil security," says the dean of the College of Agriculture and Bioresources. "Because of the role that soil plays in producing food, because of the role that soil plays in filtering and controlling the flow of water, it is critical for both of those things. Healthy, high-functioning soil is really key to the longevity of the human species."

Students of history know that soil degradation played a big role in the collapse of ancient civilizations. Early Prairie residents knew it, too. Teams of soil surveyors spent decades methodically categorizing soil types across Western Canada. But their old maps are as lacking in detail as the fuzzy Google Earth view over St. Brieux. A 1940s-era soil survey of that area used catch-all terms (covering three or more different soil categories) to describe entire quarter sections (which cover one-quarter of a square mile).

"The limitations of mapping of that time were based on how much detail you could meaningfully show on a printed map," says Bedard-Haughn. "A lot were done at a rural municipality scale and there were all these rules of thumb in terms of how much detail you could put on there."

Detail matters. A lot.

Instead of making up names to describe different mixes of different soil types, it's now possible to pinpoint the precise location of every different type of soil in a field.

"You can then link that spatial information to hydrology, detailed information on land management, and even bring it into the precision agriculture realm," she says. "Then you can bring together GIS (geographic information system) layers to inform management decisions, do predictive modelling of change, or figure out how water might be distributed based on soil texture."

Such a database would be valuable to prospective buyers of land, priceless to those responding to a chemical spill threatening a water supply, and also help efforts to reduce greenhouse gas emissions.

"For example, you can look at wetter areas that don't produce the best yields," says Bedard-Haughn. "Rather than continue to apply nitrogen fertilizer that gets blown off as greenhouse gases or leaches into groundwater, we could look at alternative uses for those areas, such as for water retention that mitigates downstream flooding risk".

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Digital mapping is also a way to leverage the data revolution taking place on today's farms.

GPS-guided tractors and combines equipped with devices such as yield monitors are collecting all sorts of information on a submetre scale. But each farm tends to be an island of data unto itself.

"You could take all that information the farmer is collecting —what inputs they applied where, their yields, any soil sampling they've done — and combine it with the soil information, and you can really tweak it," says Bedard-Haughn.

In this case, think of Google Maps. They don't just show you locations of businesses or community facilities, they act as portals to all sorts of information contributed by a host of collaborators.

A digital soil database works the same way. Some contributors might tie in the spread of crop diseases or pests while others craft ways to boost carbon sequestration, mitigate flooding from major storms, or boost yields on the most productive land.

"Even if you don't understand all the information that's there, there are parts that folks can put into use right away," says Bedard- Haughn. "In that sense, it's transformative. You can start from that foundation and begin to understand how the pieces fit together by playing around with that information."

The technology is there. It's people who are in short supply.

The federal government once had dozens of soil surveyors but almost all are retired. And there's no coordinated national effort as in countries like the Netherlands and Australia, world leaders in digital soil mapping. So it has fallen to scientists who volunteer for a working group set up under the auspices of the Canadian Society of Soil Science "to keep things moving forward."

"It seems a little Wild West sometimes, but we have a loosely affiliated group of soil enthusiasts doing what they can."

The Saskatchewan Soil Information System was created by U of S researchers who started by digitizing old soil survey maps and overlaying them with satellite photos. Data collected with modern digital mapping techniques (which provide 100 times better resolution than old paper maps) and from LiDAR (light detecting and ranging) flights will be added as they become available.

As contributors upload additional data — soil profiles, photos, drone video, and documents — to the searchable database, the tool will become more and more useful. And that will only spur more people to help expand it further.

"There's been a lot more recognition in recent years of the essential role of soils," says Bedard-Haughn. "I'm also seeing a lot more interdisciplinary collaboration. There's the obvious ones, such as plant or rangeland scientists, but there's also a lot more environmental and economic collaborations."
Given the challenges ahead, that sort of information will be in high demand.

"We need soil to be in a high-functioning state," she says. "We need to be looking at innovations. We need to manage our soils to build them up or at least maintain them."

sksis.usask.ca is one of the tools that Agri-Environmental technicians
use when qualifying soils for the
Permanent Tame Forage BMP under the Farm Stewardship Program.

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