Insect Pest Updates

Bertha Armyworm in Western Canada in 2016

M. Vankosky, O. Olfert, S. Meers, S. Hartley, J. Gavloski, J. Otani

The coordinated program for monitoring bertha armyworm (*Mamestra configurata*) throughout the prairie region was implemented in 2016 following the protocol used in previous years. The monitoring program provides an early warning of the risk of armyworm populations reaching a level of economic importance in the current growing season. Pheromone traps were installed by provincial agriculture departments on farms and were maintained by grower co-operators throughout the period of moth flight to determine the density and distribution of adult moths.

Populations in Alberta were low in 2016 and decreased in southern Alberta compared to 2015 (Figure 1). Moth populations were generally low in Manitoba in 2016. Much higher trap catches were recorded in south-central Saskatchewan in 2016 compared to 2015. However, peak trap catches of bertha armyworm coincided with peak emergence of cutworm moths. Distinguishing cutworm and bertha armyworm moths is difficult when specimens are recovered from pheromone traps, so bertha armyworm populations may have been artificially inflated in 2016. As in 2015, pesticide applications were used less frequently than in past years. Although a cumulative moth count of 0 - 600 is considered a low risk category, actual larval density within the crop is typically very sporadic, which may cause large variations in infestations between fields.

Site-specific interpretation of trap counts can be difficult because they are based on male moths, while it is female moths that select where the eggs are laid. However, male counts can be a good estimate of the infestation risk in the following year because bertha armyworm pupae overwinter in the soil. In most years, bertha armyworm populations are controlled by natural control factors such as unfavourable weather, parasites, predators and diseases. As a result, outbreaks of bertha armyworm in western Canada have occurred at varying intervals. Increased canola production has coincided with an increase in the regularity of outbreaks that occur regionally about 8-10 years apart. Localized outbreaks rise, peak and generally subside over a three-year period. Outbreak peaks are not usually synchronized across the entire prairie region. Rather, peaks in Alberta tend to follow peaks in the other provinces. The last extensive outbreak occurred in 1994-1996.

The damage potential of bertha armyworm larvae is influenced by larval density, larval stage, plant growth stage, and temperature. In areas where bertha armyworm is reported, and particularly in areas with higher populations of adults, growers should begin monitoring their crops about two weeks after peak trap catches to determine larval numbers. Monitoring should continue until the crop is sprayed or swathed. An insecticide application is recommended when the economic threshold of larvae in the crop is reached.

Additional information on the biology, monitoring, economic thresholds and control methods for the bertha armyworm can be found in Growing for Tomorrow - Bertha Armyworm Fact Sheet from government agencies and provincial extension personnel, or at:
http://www.agriculture.gov.sk.ca/Default.aspx?DN=defc273b-db17-48fd-a341-32a7c541fbe0

Funding for the surveys was provided by the WGRF, SaskCanola, AB Wheat Commission, MB Canola Growers, SK Pulse Growers, and SaskFlax. The network of pheromone traps was implemented and monitored by Alberta Agriculture, Food & Rural Development; Saskatchewan Ministry of Agriculture; Manitoba Agriculture, Food & Rural Initiatives; and Agriculture & Agri-Food Canada. The map was prepared by AAFC - Saskatoon.

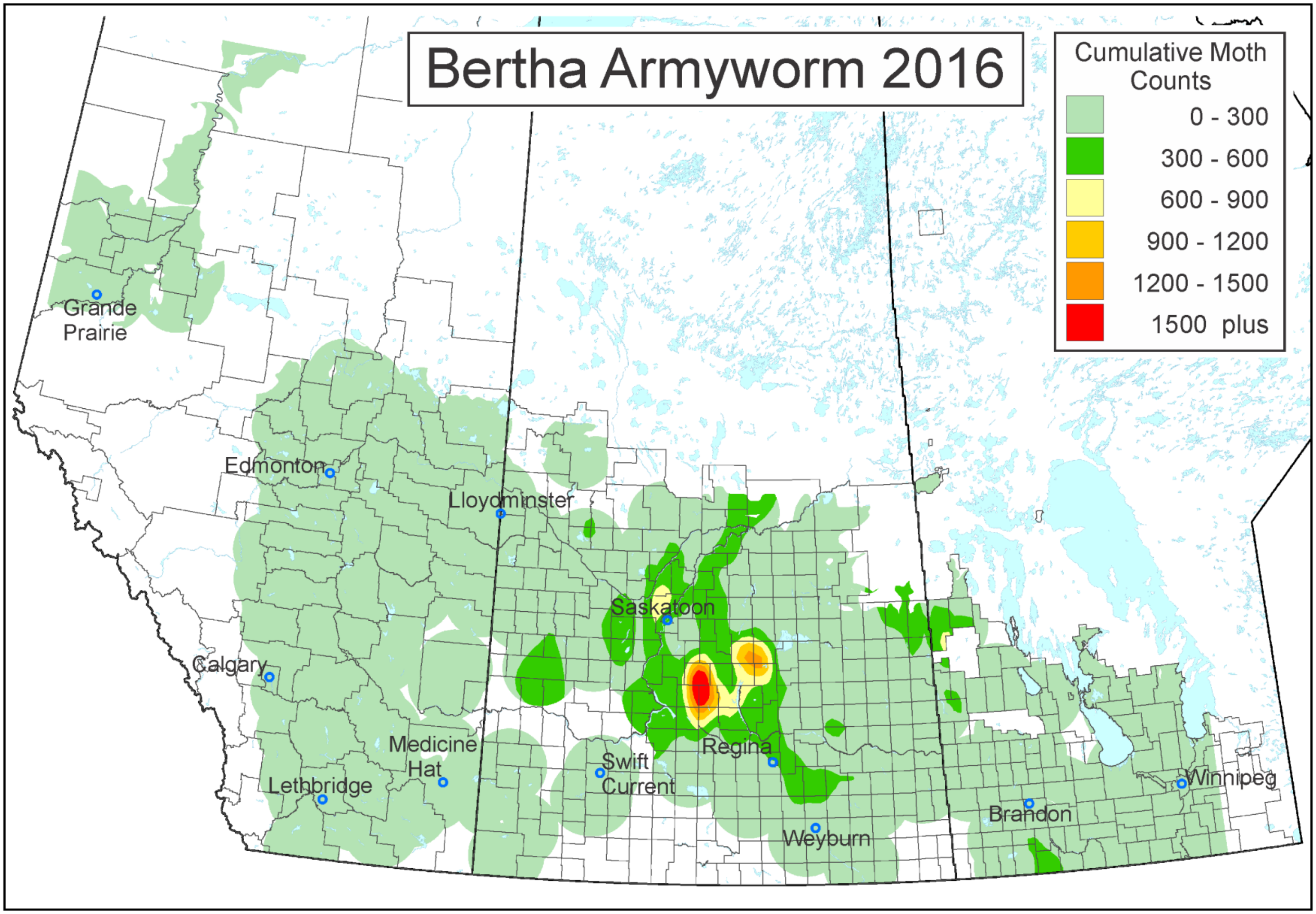

Figure 1. Bertha armyworm counts across the Canadian prairies in 2016 based on the number of male moths captured in pheromone traps.

The Prairie Grasshopper Forecast for 2017

M. Vankosky, O. Olfert, S. Hartley, J. Gavloski, S. Meers, D. Giffen, J. Otani

Grasshopper forecasts are based on estimates of adult grasshopper density obtained from an annual survey conducted in the fall of the previous year, as well as on weather and biotic factors that affect grasshoppers. The fall survey estimates the number of adult grasshoppers that are capable of producing eggs prior to winter (Figure 2). Grasshopper populations tend to be higher in the warmer zones of the prairies. Heat in late summer and fall encourages mating and egg-laying. A warm, dry fall enhances egg development and a warm, dry spring increases survival of the hatchlings and the potential for subsequent damage to crops. Producers should be aware that actual levels of infestation in field crops may differ from those predicted because of variations in the climatic factors.

Warm, dry weather in early spring 2016 raised the grasshopper risk across the prairies. However, high amounts of rain in late May and June counteracted the effects of the warm spring, and grasshopper populations developed slowly through. Summer weather was hot, encouraging nymph development, but also wet. Although weather was warm in September, October, and November, soil was saturated, likely reducing egg-laying in the fall of 2016.

Saskatchewan/Manitoba – Very light and negligible populations were recorded in 2016 throughout both provinces. *Alberta* – Light to moderate risks are predicted for south eastern Alberta in 2017, as well as counties in central Alberta. The risk of significant grasshopper populations is predicted to increase in parts of southern Alberta, including Foothills, Vulcan, Willow Creek, and Lethbridge counties.

Field margins, roadsides and crops grown on stubble must be watched closely when hatching begins in the spring. Action thresholds for grasshoppers on most crops occur when populations reach 8 - 12 grasshoppers/m^2. In lentils, two or more grasshoppers/m^2 at flowering and the pod stage can cause yield loss. Studies also indicate that two-striped grasshoppers feed preferentially on lentil pods thus causing direct and significant yield loss at a lower threshold.

Take note of precautions regarding user safety, correct use, presence of beneficial insects (*e.g*. honey bees), and proximity to environmentally sensitive areas (*e.g*. water, wildlife habitat) when using broad spectrum insecticides. Keep in mind that the objective is to sensibly protect the crop, and not to achieve 100% removal of grasshoppers. Updates of the current status of grasshopper populations in the Prairie region will be available in the spring.

Funding provided by the WGRF, SaskCanola, AB Wheat Commission, MB Canola Growers, SK Pulse Growers, and SaskFlax. The surveys were implemented and conducted by Alberta Agriculture, Food & Rural Development; Saskatchewan Ministry of Agriculture; Manitoba Agriculture, Food & Rural Initiatives; and Agriculture & Agri-Food Canada (AAFC). The map was prepared by AAFC - Saskatoon.

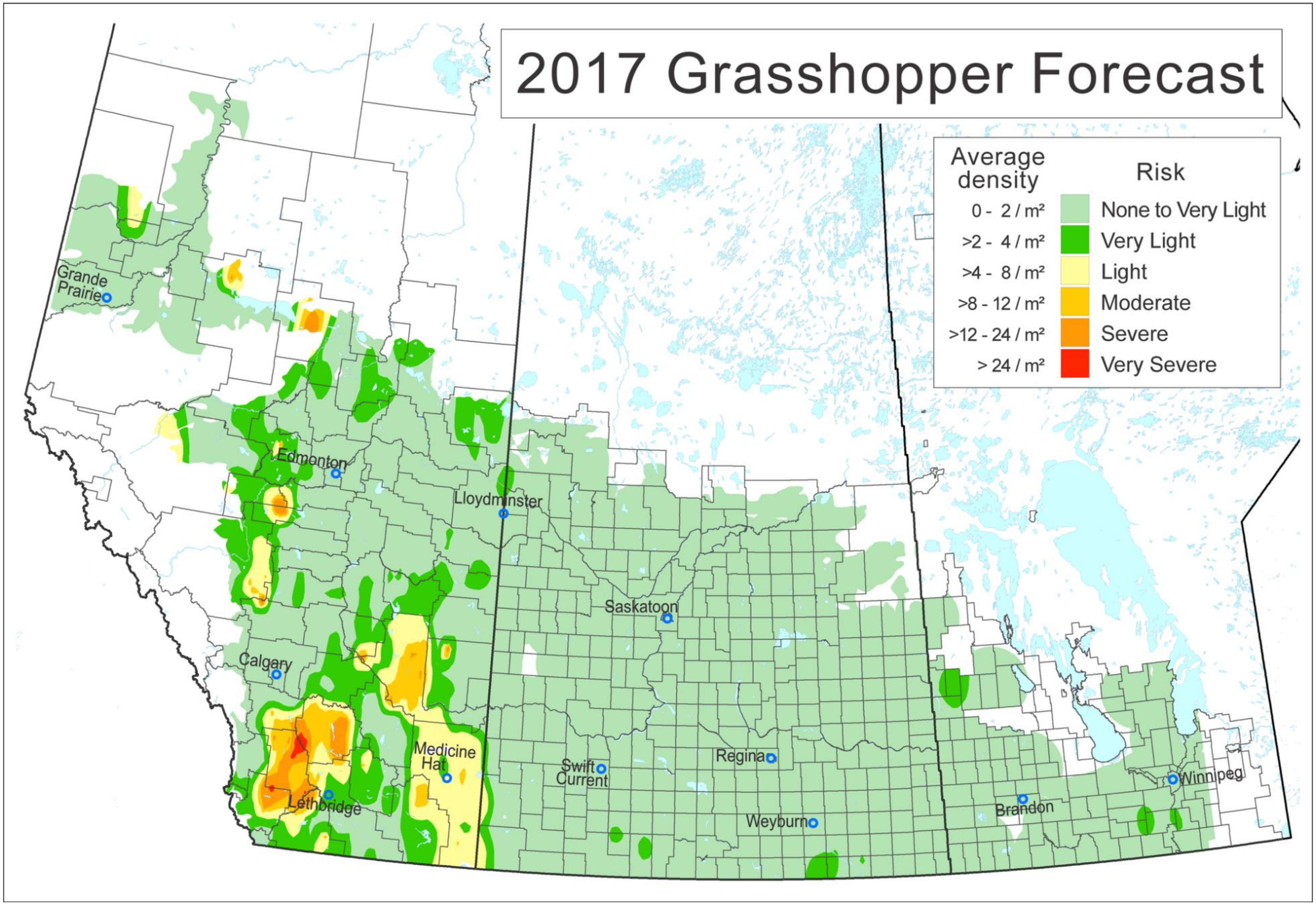

Figure 2. The 2017 grasshopper forecast for the Canadian prairies, based on population sampling conducted in fall 2016.

Wheat Midge Forecast in Saskatchewan and Alberta for 2017

M. Vankosky, O. Olfert, S. Hartley, S. Meers, J. Otani, B. Elliott.

The larval cocoon survey conducted in fall 2016 indicates that economic infestations of wheat midge may occur in 2017 in both provinces. As in recent years, wheat midge is predicted to be more troublesome in Saskatchewan than Alberta. Distribution of wheat midge, as illustrated in the 2017 Forecast map (Figure 3), is based on non-parasitized cocoons present in soil samples collected in fall 2016. Although a number of factors influence over-wintering survival of the midge, the survey and map provide a general picture of existing densities and the potential for infestation in 2017. Climatic conditions, especially temperature and moisture, will ultimately determine the extent and timing of midge emergence during the growing season.

In Saskatchewan, severe midge population levels are predicted to occur in south eastern Saskatchewan, south and west of Swift Current, near Prince Albert, and east of North Battleford. Small pockets of high populations in the soil were recorded in the eastern half of the province from Moose Jaw to Prince Albert and north of Saskatoon. Severe midge populations are expected in eastern Alberta, especially in Two Hills, Minburn, and Wainwright counties. Populations of wheat midge remain low in most of the Peace River region. As in the past, caution is recommended in interpreting these results due to the fact that northern populations have not responded to degree-day accumulation like southern populations do. One small area of moderate risk is predicted in the British Columbia Peace River region, near the Alberta-BC border.

Wheat midge larvae feeding on kernels can affect grain yield, grade, and quality. Severely damaged kernels that are lost during threshing will lower yield. Moderately damaged kernels that are harvested reduce the grade. All areas, even those indicating less than 600 midge per square metre, are susceptible to significant crop damage. Growers in all areas where wheat midge is present are urged to monitor wheat fields during the susceptible period (emergence of the wheat head from the boot until flowering begins) and while adult midge are active.

Typically, an insecticide application is recommended when adult midge density reaches one per 4 to 5 heads during the period when wheat heads emerge from the boot leaf until the initial stages of anthesis (*i.e*. when the yellow anthers appear). However, in areas where growing conditions are favourable to production of No. 1 Grade wheat, insecticide should be used if adult midge population density reaches one per 8-10 heads during the susceptible period. By anthesis, the wheat develops resistance to midge larvae and insecticides are not cost-effective because larvae would have already caused damage, and the late-hatching larvae are poorly developed, posing no significant threat to the crop. Late applications should also be avoided to avoid adverse effects on populations of biological control agents such as parasitic wasps.

Parasitism of midge larvae by small wasps can keep midge populations below the economic threshold. Parasitism rates can range from 0 to 90%. Midge densities on the forecast maps represent populations of non-parasitized larvae. Agriculture and Agri-Food Canada will monitor degree-day conditions during 2017 to determine the expected emergence and flight of wheat midge adults. Updates of current conditions and wheat midge emergence will be provided during the growing season.

The surveys were conducted by Sharon Nowlan (SK), Alberta Agriculture, Food & Rural Development and Agriculture & Agri-Food Canada. The surveys were funded by Saskatchewan Crop Insurance; Saskatchewan Wheat Development Commission; Alberta Agriculture, Food & Rural Development; and by WGRF, SaskCanola, AB Wheat Commission, MB Canola Growers, SK Pulse Growers, and SaskFlax. The forecast was prepared by AAFC- Saskatoon.

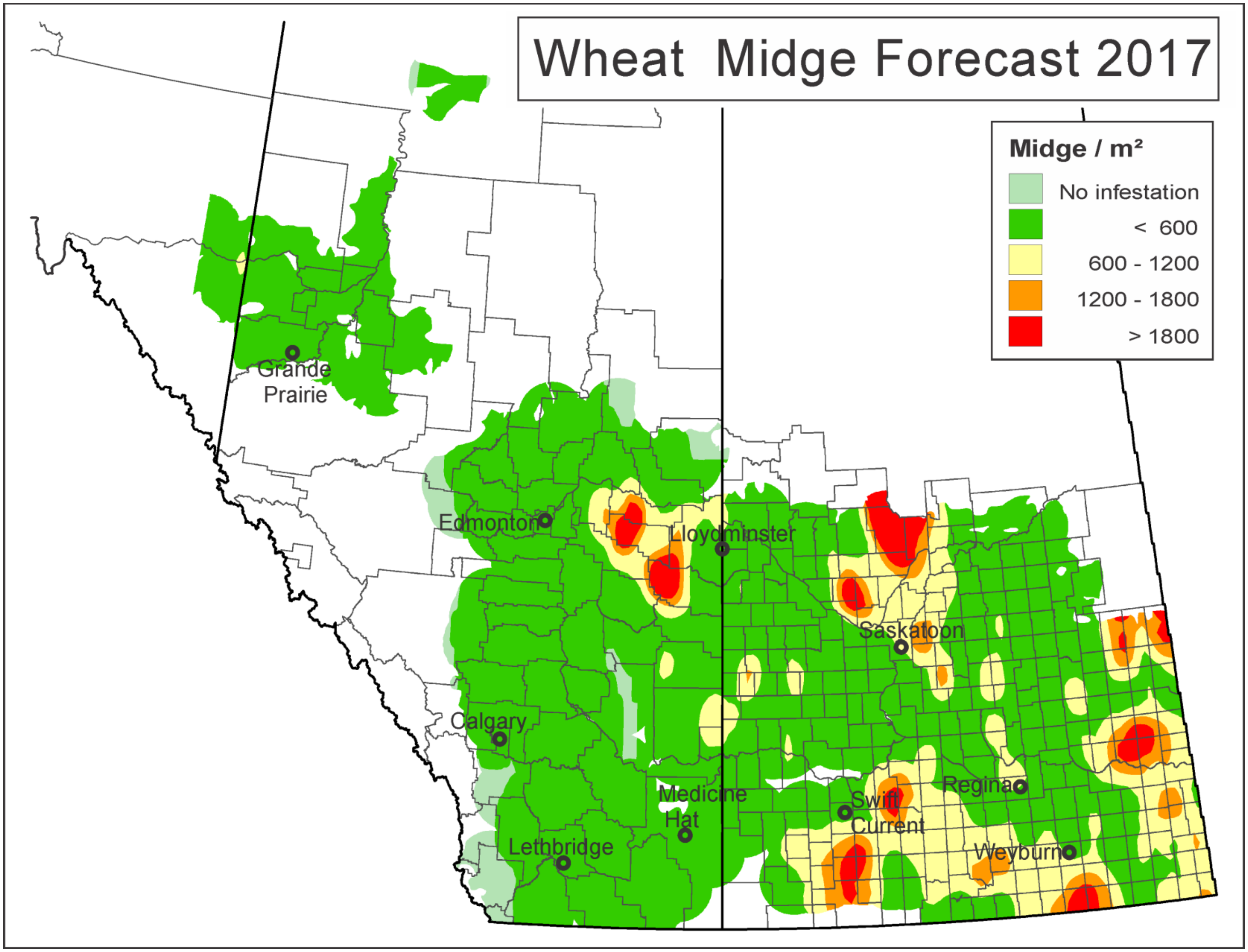

Figure 3. The 2017 wheat midge forecast, based on the number of unparasitized pupae collected in soil samples in fall 2016.

Cabbage Seedpod Weevil in Alberta and Saskatchewan in 2016

M. Vankosky, O. Olfert, S. Meers, S. Hartley, J. Otani

Due in part to suitable moisture conditions in some areas of Alberta and Saskatchewan, cabbage seedpod weevil (*Ceutorhynchus assimilis)* populations remained abundant in 2016 in the current range. The range expanded again in 2016 (Figure 4).

In Saskatchewan, 388 fields were sampled in 2016, down slightly from 2015 because only two fields per RM were sampled in the southwest corner of the province where populations are firmly established. The average number of weevils per 25 sweeps in positive fields was 21.6 with a range of 1 to 409 per 25 sweeps. The highest densities were found in south central and south west Saskatchewan. Of note is that the populations are continuing their northward distribution, with weevils consistently found around Saskatoon. *In Alberta*, the 2016 survey once again encompassed all the canola-growing areas. Generally, economic population levels were still only found in southern Alberta, with increasing severity near Red Deer and populations present as far north as Parkland County. No weevils were found in the Peace River region.

Both types of canola (Polish and Argentine) are susceptible to weevil damage. Brown mustard (*Brassica juncea*) is also at risk. White mustard (*Sinapis alba*) is resistant, because of its hairy seedpods, as are non-cruciferous crops (e.g. wheat, barley, corn, potatoes, sugar beet).

Cabbage seedpod weevil can affect yield in several ways. Adults feeding on flower buds cause bud to die off (bud-blasting). Larvae infested pods are prone to shattering even after swathing. Secondary infection by fungal pathogens may occur if humid conditions exist after larvae bore exit holes into canola pods. Feeding by adults can also cause severe damage to late-seeded canola. When new generation adults emerge late in the season, they feed on seeds within green pods to build up fat stores for overwintering. This can be very destructive to the crop.

The cabbage seedpod weevil produces a single generation each year. Adults are ash-grey, 3 to 4 mm long, with a prominent curved snout typical of many weevil genera. In winter, they remain dormant beneath leaf litter in areas like shelterbelts. When spring air temperatures reach 10°C, they take flight in search of cruciferous plants like wild mustard, volunteer canola, flixweed, and stinkweed. Adults are attracted to canola fields when the crop reaches the bud to early flowering stage. Female weevils lay eggs individually into recently formed pods. Canola and brown mustard fields should be monitored regularly from the bud stage until the end of flowering (when weevil populations are highest). The best monitoring tool is a standard insect sweep net. Adult weevil counts should be made from a sample of ten, 180° sweeps taken at ten different locations within a field. The "rule of thumb" threshold is 3 to 4 adult weevils per sweep. When weevils first arrive they may be more abundant on field edges leading to overestimated populations unless sampling is also conducted at least 100 m into the field. Insecticides are registered for control of cabbage seedpod weevil: please check for details in the most recent Crop Protection Guide for your province.

The surveys were conducted by Alberta Agriculture, Food & Rural Development; Saskatchewan Ministry of Agriculture; and Agriculture & Agri-Food Canada. Funding was provided by WGRF, SaskCanola, AB Wheat Commission, MB Canola Growers, SK Pulse Growers, and SaskFlax. The map was prepared by AAFC - Saskatoon.

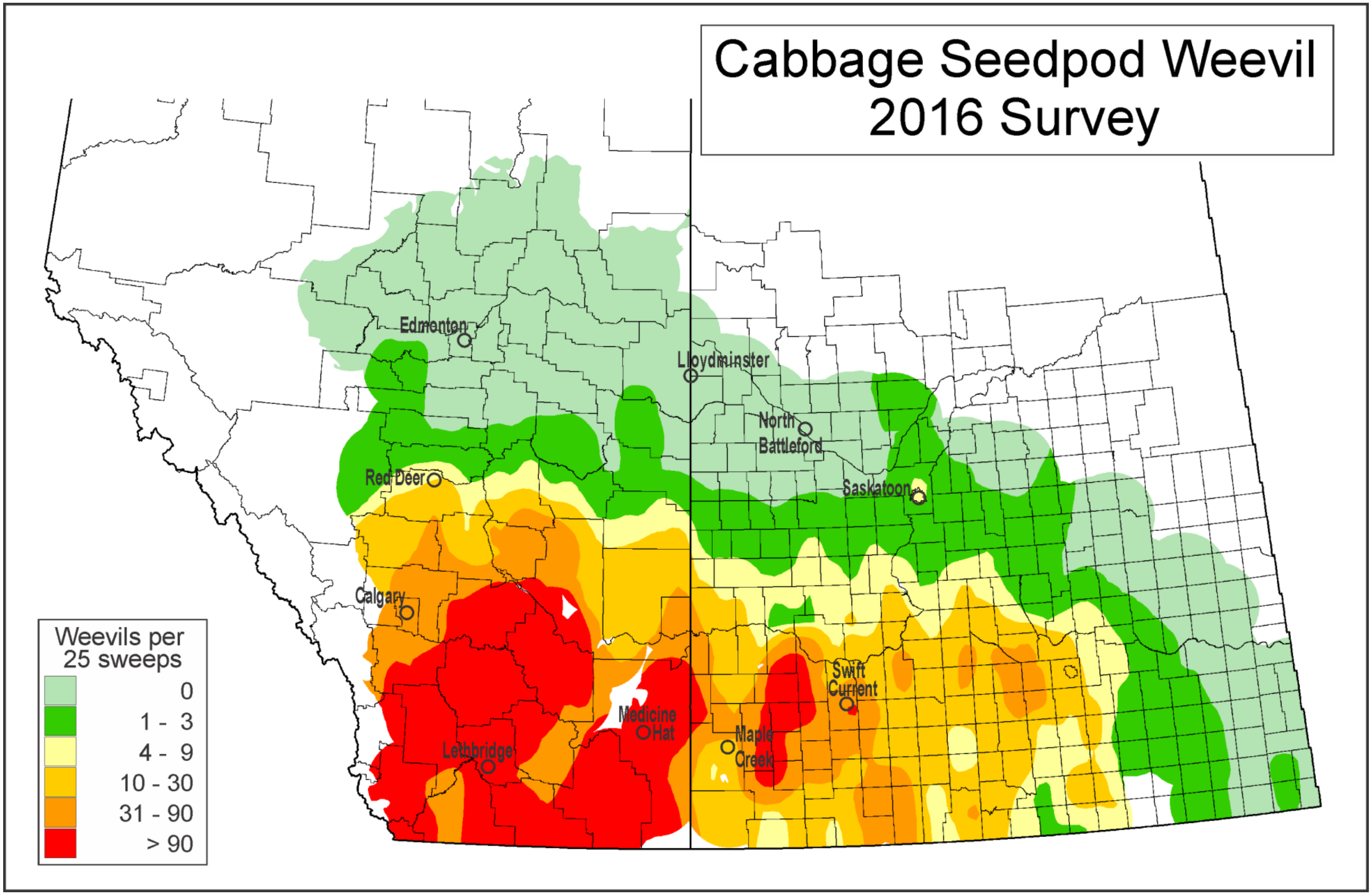

Figure 4. Distribution and density of cabbage seedpod weevils, sampled using 180° sweep net samples, in summer 2016.

Wheat Stem Sawfly in Alberta in 2016

M. Vankosky, O. Olfert, S. Meers, H. Carcamo

Wheat stem sawfly, (*Cephus cinctus*), has long been an agricultural pest of wheat in Canada. The adult is not a strong flier so warm, sunny, calm weather following spring rains supports its dispersal. Excessively wet conditions tend to be detrimental to both sawfly and parasitoid populations and activity. The primary hosts for the wheat stem sawfly are cultivated cereal crops with the preferred hosts being spring and durum wheat. Rye, triticale and barley can also be affected. Broadleaf crops such as canola, flax, and alfalfa are not susceptible to wheat stem sawfly. Sawfly damage presented in the map is based on cut stem counts sampled in fall 2016.

and has recently become a major problem due in large part to the warm and dry summers in the last few years.

A survey of Alberta wheat fields conducted in 2016 indicates that the area at risk of economic sawfly populations has increased slightly in Willow Creek, Newell and Wheatland. Other areas sampled in 2016 had very low populations of wheat stem sawfly (Figure 5). Factors contributing to consistently low populations since 2011likely include the use of solid stem wheat varieties and parasitism. In 2016, wet conditions in most of the summer and fall may also be a contributing factor.

Sawfly damage may result in economic losses due to reductions in yield and/or lower quality. Many producers consider the wheat stem sawfly to be a problem only in field margins. Although crop injury by the wheat stem sawfly is usually more prevalent within the first 20 metres of the field edges, the survey showed that damage is not confined to the margins. In extreme cases entire fields have been affected, some with estimates of more than 50 per cent damage. There are no insecticides registered for control of wheat stem sawfly; therefore, management is primarily through agronomic and cultural practices. The most effective strategy is planting resistant cultivars and/or crops. If wheat is in the current rotation, solid stem wheat varieties (AC Lillian, AC Eatonia, AC Abbey) should be planted, as they are significantly more resistant to sawfly than hollow-stem cultivars. Producers are encouraged to consider management strategies if 10 - 15 per cent of stems suffered damage the previous year.

The survey was conducted by Alberta Agriculture, Food & Rural Development; Agricore United; Chinook Applied Research Association; County of Lethbridge; and the United Farmers of Alberta. The map was prepared by AAFC - Saskatoon.

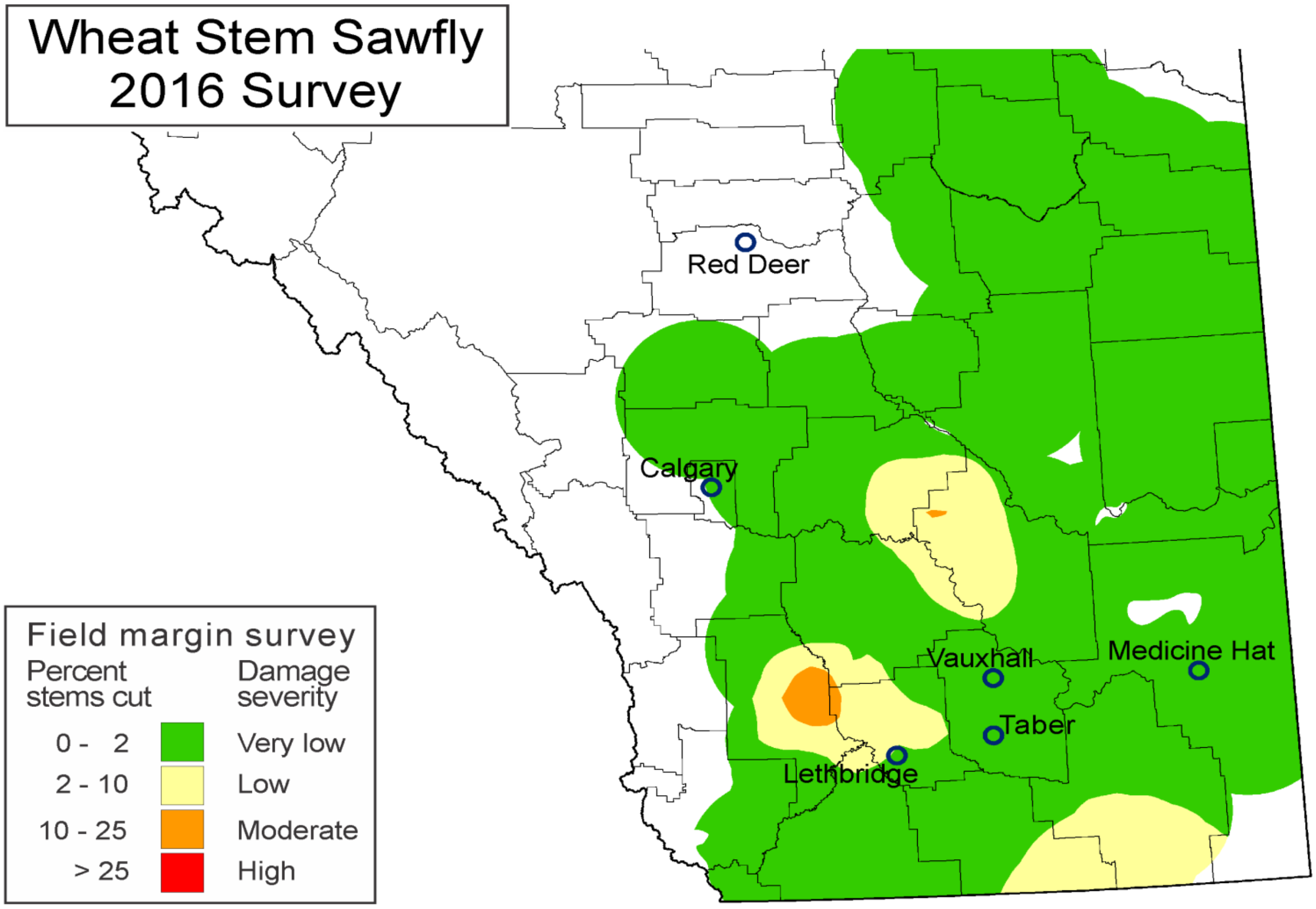

Figure 5. The distribution and density of wheat stem sawfly in southern Alberta in 2016, based on counts of cut stems.

Pea Leaf Weevil in Alberta and Saskatchewan in 2016

M. Vankosky, O. Olfert, S. Meers, H. Carcamo, S. Hartley

Native to Europe, pea leaf weevil (*Sitona lineatus*) has recently become an economical insect pest of field peas in southern Alberta. The distribution of pea leaf weevil on the prairies is expanding, especially in Saskatchewan. The weevil was first recorded attacking peas near Lethbridge in 2000 and was found in southwest Saskatchewan in 2007. Feeding by the adults produces a characteristic notched appearance on leaves. The survey is conducted when field peas are in the two to three node growth stages. Population size is estimated by determining the average number of leaf notches per plant.

The distribution of pea leaf weevil damage to field peas remained relatively unchanged in Alberta in 2016, although some northward expansion was recorded and population densities increased in the northern edges of the distribution in 2016 compared to 2015 (Figure 6). Fields with significant notching (average > 27) were observed in Warner, Willow Creek, Starland, Red Deer, and Lacombe counties. Significant damage in Alberta is now being observed north of Highway 1. In Saskatchewan, population densities increased, such that most sampled fields had foliar damage.

Host plants include a range of cultivated and wild legumes. Field peas and faba beans are the primary hosts, and are at greatest risk in southern Alberta and Saskatchewan. Adults feed on leaf tissue. In extreme cases, (i.e., large populations infesting fields of first node seedlings), significant damage can result. Compared to foliar damage, larval feeding on nitrogen-fixing nodules results in greater economic losses for producers. In western Canada, pea leaf weevil produces one generation per year. Adults overwinter in alfalfa or other perennial legumes. Females can lay up to 1500 eggs in while feeding on seedlings in May through June. Upon hatching, larvae migrate to root nodules and begin to feed, resulting in inhibition of nitrogen fixation by the plant. Mature larvae pupate in the soil and emerge as adults later in the growing season (late July through August) and consume green legume foliage. Adult beetles feed on leaf margins and growing points of legume seedlings. Adults generally only fly when temperatures are above 12°C. Both fall and spring migration involves flight; distribution within fields occurs on foot.

Soil treatment to control larvae is not practical as larvae are concealed within root nodules. Insecticides are registered for foliar application to control adult populations; however, there is no field scale evidence that this tactic protects against yield losses. The nominal action threshold for the weevil occurs when 30% of seedlings (2^{nd} and 3^{rd} node stages) have feeding damage on the clam leaves. Insecticide seed treatments protect seedlings from foliar damage up to the 8^{th} node stage and can ensure seedling establishment, although yield benefits from seed treatments are not consistent, as yield is also influenced by soil nitrogen availability and *Rhizobium* inoculation. Producers experiencing severe damage to field peas in 2016 should consider using seed treatment in 2017 to reduce the impact of pea leaf weevil.

The survey was conducted by Alberta Agriculture, Food & Rural Development and the Saskatchewan Ministry of Agriculture. The map was prepared by AAFC - Saskatoon.

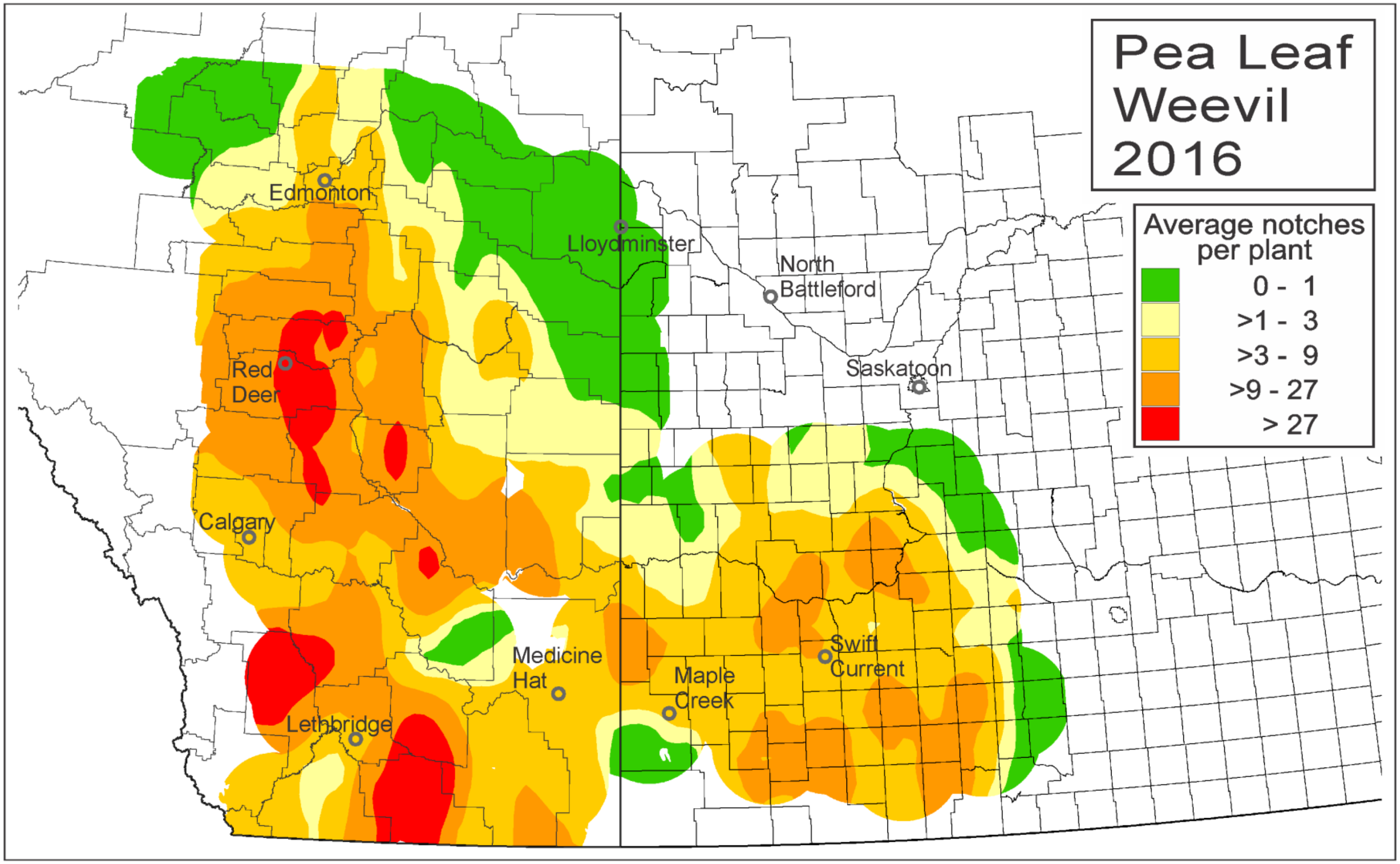

Figure 6. Pea leaf distribution and estimated density based on per plant averages of foliar damage in Alberta and Saskatchewan in May-June 2016.

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