

Residual Weed Population Shifts in Alberta – 1973 to 2023

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Objectives

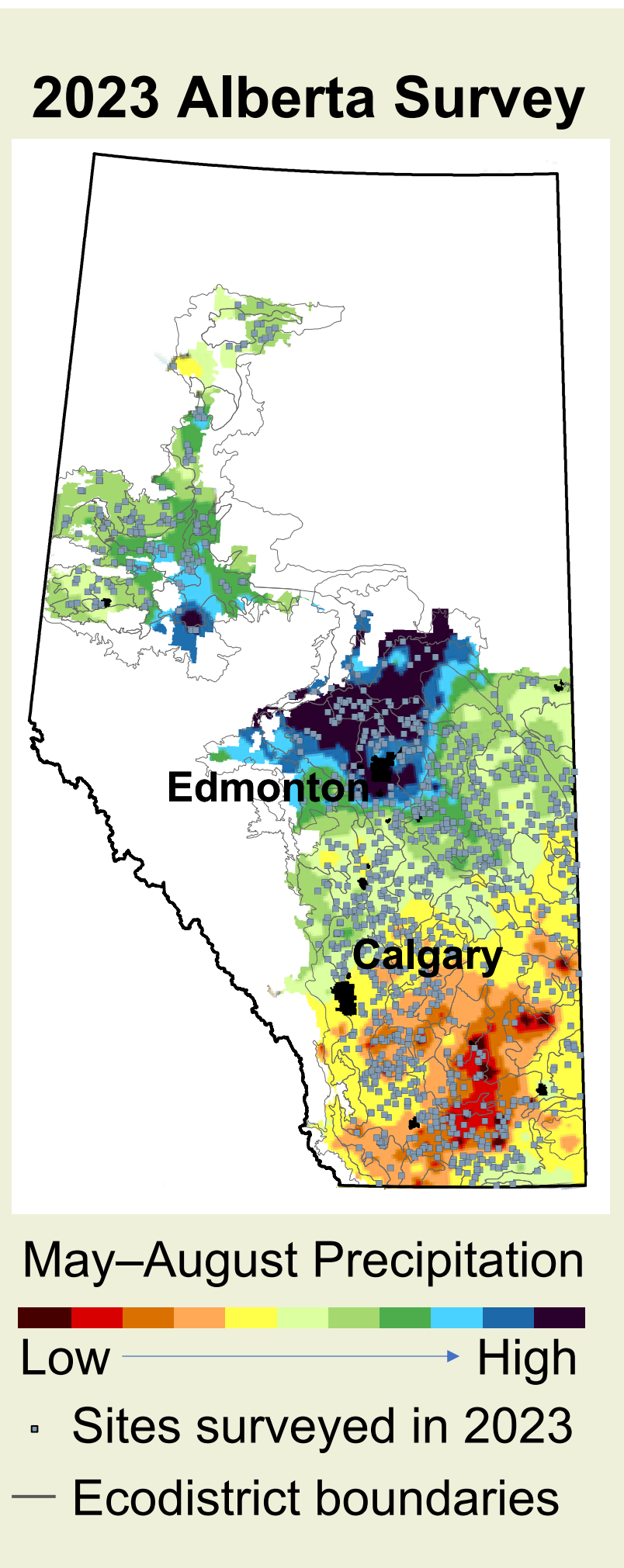
- Present the top twenty-five species in Alberta based on a provincial weed survey of annual crops conducted in 2023
- Compare the density and relative abundance of weeds in recent survey with results from past provincial surveys



Wheat with chickweed

Methods

- Used a stratified random sampling procedure to select fields in ecodistricts shown on map
- Surveyed 1121 fields of annual crops including spring wheat, canola, barley, pea, durum, oat, and lentil
- Counted weeds in 20 quadrats (50 by 50 cm) per field in late summer
- Summarized weed data using a relative abundance index based on frequency, field uniformity and density
- Frequency = % of fields in which species occurred
- Uniformity = % of quadrats in which species occurred
- Density = Average density of species in all fields
- Compared to top twenty-five species from surveys of:
 - 1232 fields in 2017
 - 1333 fields in 2010 (2009-2010)
 - 1153 fields in 2001
 - 684 fields in 1997
 - 1086 fields in 1980's (1987-1989)
 - 3109 fields in 1970's (1973-1977)
- Data weighted based on distribution of surveyed crops in 2016 census
- 2009 irrigated field data down-weighted to reflect the relative irrigated area



Top 25 Species in 2023 Survey

Relative Abundance Index	Weed Species	Frequency (%)	Uniformity (%)	Density ^a (m ⁻²)
38	Chickweed	19.2	48.9	41.3
35	Canola	31.0	41.4	11.6
32	Wild oats	27.2	31.2	15.9
28	Wild buckwheat	43.2	27.4	3.9
25	Lamb's-quarters	30.1	26.2	4.2
22	Wheat	15.6	40.9	11.2
19	False cleavers	17.7	27.6	7.1
16	Spiny annual sow-thistle	18.4	26.0	4.4
13	Kochia	13.2	29.1	8.2
10	Green foxtail	7.0	38.4	25.1
7	Dandelion	16.7	22.1	3.0
4	Field horsetail	12.4	23.8	6.0
1	Canada thistle	18.3	14.2	1.6
1	Shepherd's-purse	12.5	24.7	4.6
1	Hemp-nettle	12.9	23.8	3.2
1	Barley	7.4	30.9	13.0
1	Low cudweed	7.3	21.5	11.6
1	Annual blue grass	2.8	22.2	50.1
1	Broad-leaved plantain	8.1	17.3	4.7
1	Foxtail barley	6.5	17.1	7.6
1	Stork's bill	6.5	22.3	5.7
1	Pale smartweed	8.0	17.6	3.1
1	Redroot pigweed	5.1	26.3	9.6
1	Stinkweed	6.4	23.4	4.6
1	Barnyard grass species	4.1	21.1	14.6

^aAverage density and uniformity in occurrence fields

Species Shifts

Weed Species	Relative Abundance Rank						Change ^b	
	1970's	1980's	1997	2001	2010	2017		2023
Foxtail barley		92	40	31	26	22	20	72
Annual blue grass		64 ^c			77 ^c	27	18	46
False cleavers	41	28	9	7	6	6	7	34
Low cudweed		47	25	39	12	19	17	30
Spiny annual sow-thistle		37	27	15	10	11	8	29
Wheat		29	21	20	19	7	6	23
Barnyard grass species		48	42	70	54	30	25	23
Stork's bill	37	32	31	29	27	21	21	16
Kochia	25	23	23	19	17	15	9	16
Broad-leaved plantain	29	41	33	38	39	36	19	10
Canola/rapeseed	12	19	20	16	4	4	2	10
Barley		25	26	25	31	18	16	9
Shepherd's-purse	21	9	6	11	16	17	14	7
Chickweed	6	5	1	3	7	1	1	5
Dandelion	15	18	10	10	5	10	11	4
Pineappleweed	34	30	18	23	25	40	32	2
Field horsetail	14	10	11	13	15	12	12	2
Lamb's-quarters	5	6	8	6	8	3	5	0
Wild buckwheat	3	1	3	1	1	2	4	-1
Wild oats	2	3	2	2	2	5	3	-1
Canada thistle	9	12	5	5	3	9	13	-4
Common groundsel	32	15	15	24	35	42	37	-5
Narrow-leaved hawk's-beard	22	13	12	17	11	16	28	-6
Green foxtail	4	4	17	8	18	8	10	-6
Hemp-nettle	7	8	7	9	9	13	15	-8
Clover species		16	24	26	24	24	27	-11
Perennial sow-thistle	17	17	14	18	14	28	30	-13
Russian thistle	13	7	29	22	28	29	26	-13
Redroot pigweed	10	14	19	21	20	23	23	-13
Pale smartweed	8	11	13	12	22	20	22	-14
Corn spurry	11	22	22	27	21	25	29	-18
Stinkweed	1	2	4	4	13	14	24	-23
Quack grass	23	21	16	14	23	31	54	-31
Wild mustard	16	35	47	36	40	45	48	-32
Ball mustard	24	31	48	41	56	66	72	-48
Flixweed	18	24	37	30	30	52	66	-48
Bluebur	19	20	28	28	43	58	71	-52
Tartary buckwheat	20	27	38	73	34	67	-	-109

^bNumbers in italics are changes from the 1980's surveys to 2017

^cAnnual blue grass was not distinguished from other blue grass species until 2017

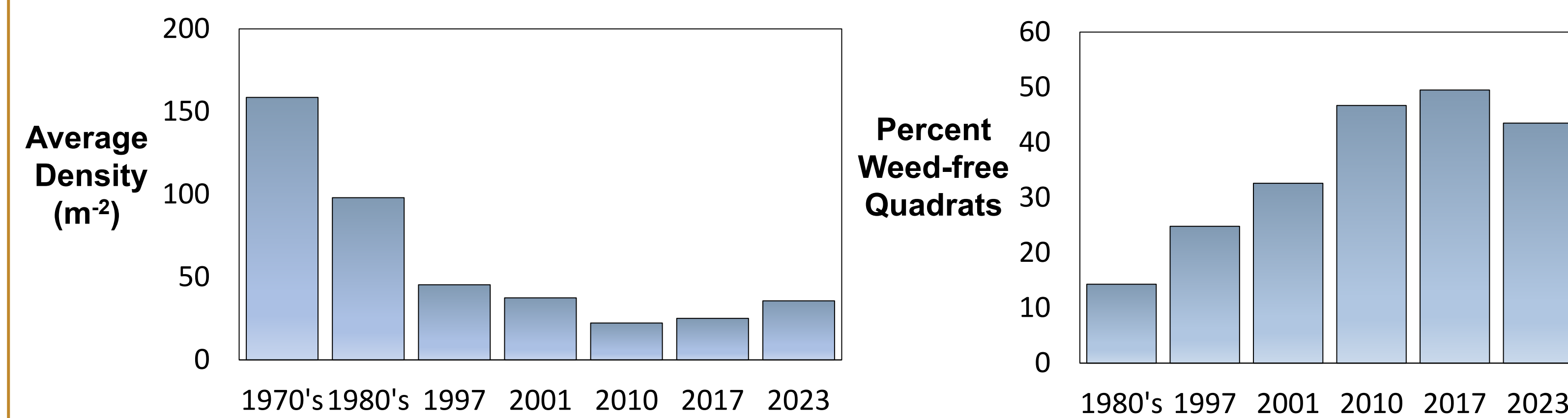
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Changes in Total Density and Weed-free Quadrats



Summary

- Overall, the total weed densities in 2023 were slightly higher than the previous two surveys, due, in part, to wet conditions in the northern areas
- Chickweed was ranked number one, as observed in the previous survey, due to the high density and uniformity in occurrence fields
- Volunteer canola, wild oats, wild buckwheat and lamb's-quarters were more widespread than chickweed in Alberta but were found in lower densities
- Volunteer canola ranked second in 2023, higher than in any previous survey
- Annual blue grass, barnyard grass species, and broad-leaved plantain were found in the top twenty-five for the first time
- Foxtail barley, spiny annual sow-thistle, wheat, kochia and barley continued to steadily increase, ranking higher in 2023 than any previous survey
- False cleavers and stork's bill have also increased since the earlier surveys, but did not increase in relative abundance rank in 2023 relative to 2017
- Low cudweed has increased over time, but is more abundant in wet years



Weeds that have increased the most since the 1970's. Left to right: Foxtail barley, annual blue grass, false cleavers, low cudweed, spiny annual sow-thistle, wheat, barnyard grass species, stork's bill, kochia, broad-leaved plantain, canola, barley, shepherd's-purse, and chickweed