

**Biennial Report (2021–2022) of the
Kansas Noxious Weed Advisory Committee**



**submitted to Mr. Mike Beam, Secretary
Kansas Department of Agriculture
December 31, 2022**

STATE NOXIOUS WEED ADVISORY COMMITTEE

Self-Nominated Members

Member	Nominating Authority	Appointee	County	Term End
Weed Specialist	Kansas State University	Walt Fick	Riley	2025*
Weed Specialist	Kansas State University	Anita Dille, Vice Chair	Riley	2026*
County Commissioner	Kansas Association of Counties	Shari Kaminska	Elk	2025
Weed Supervisor	County Weed Directors Association of KS	Mike Friesen	Meade	2026*
Weed Supervisor	County Weed Directors Association of KS	Jarrod McVey	Woodson	2024*
Agricultural Industries	Kansas Agribusiness Retailers Association	Johnny Schaben	Barton	2022
Kansas Biological Survey		Craig Freeman, Chair	Douglas	2025*
Kansas Cooperative Council		Bob Nutt	Franklin	2024*

Secretary Selected Members

Member	Appointee	County	Nominator	Term End
Natural Resources Management Professional	Dustin Mengarelli	Pratt	KDWPT	2025
Agricultural Producer (Traditional)	Ron Ohlde	Washington	Soybean Association	2026*
Agricultural Producer (Non-Traditional)	Jacob Thomas	Leavenworth	Specialty Crop Growers Association	2024*
Agricultural Producer (Organic)	Jack Geiger	Brown	Organic Crop Improvement Assoc.	2026
Agricultural Producer (Livestock)	Mike Collinge	Greenwood	Tallgrass Legacy Alliance	2025*

Ex-Officio Member

Kansas Department of Agriculture	Scott Marsh, Noxious and Invasive Weed Specialist
----------------------------------	---

*Second term

Introduction

In 2018, the Kansas Legislature passed revisions to the Kansas Noxious Weed Act (hereafter referred to as the act; K.S.A. 2-1313a – 2-1333), which creates a framework for controlling and eradicating plant species that have been designated as noxious in the state of Kansas. The primary changes in the act were that responsibility for listing noxious weeds was shifted from the Kansas Legislature to the Kansas Department of Agriculture (KDA), a committee was established to advise the Secretary of KDA on listing and management of noxious weeds, and KDA was given greater flexibility and discretion in reporting and funding elements of the act.

The KDA, through the Secretary, is responsible for carrying out and enforcing statutes under the act in collaboration with the counties. The department's primary responsibilities include: 1) determine which plant species are declared to be noxious, upon recommendation of the Advisory Committee (see below), and within which category each species should be placed; 2) consult, advise, or offer assistance to the County Weed Directors through the Noxious and Invasive Weeds Specialist, and must approve the County Weed Director's employment; 3) determine which, if any, plant species should be declared noxious under an emergency declaration; 4) develop official methods for the control and eradication of noxious weeds and publish them as the official control programs for each species and ensure that these methods include as many of the Integrated Weed Management techniques as are available; 5) approve the listing of plant species requested by a board of county commissioners to be a county option noxious weed; and 6) enter into agreements with any agencies of the federal government for cooperation in the control and eradication of noxious weeds in Kansas.

The act established the State Noxious Weed Advisory Committee (NWAC), with 13 voting members and the Secretary of KDA as a non-voting ex officio member, to provide oversight and assistance to KDA on matters relating to noxious and invasive weed species (see page 1). Specific responsibilities of the Committee include: 1) review the state weed management plan and recommend changes and updates; 2) recommend changes to the noxious weed list; 3) recommend changes to the noxious weed act and regulations; 3) recommend changes to the official methods for control; and 4) report to the Secretary on the expenditure of state funds on noxious weed control programs, the status of state and county noxious weed control programs, recommendations for the best use of state funds for noxious weed control, and recommendations on long-term noxious weed control needs.

The last of the aforementioned responsibilities, a report to the Secretary, is to be submitted before January 1 of each odd-numbered year. While the first meeting of the NWAC occurred in July 2019, work during the first 18-month period was focused on revisions to rules and regulations. Therefore, it was decided not to submit a biennial report at the end of 2020. Instead, activities for 2019 and 2020 would be integrated into the report prepared at the end of 2022. This biennial report, the first one prepared and approved by the Noxious Weed Advisory Committee, is submitted to the Secretary in fulfillment of its obligation.

Parts I and II of this report are based on data submitted annually by the counties to the Noxious and Invasive Weeds Specialist in the KDA. Because County Weed Directors must complete their annual surveys no later than October 31 of each year, which are reported with annual eradication efforts for that year along with a management plan for the coming year by March 15, statistics in this report are roughly one-year out of phase with the actual reporting period—this report summarizes data from 2020–2021. Data for calendar year 2022 will be reported in the biennial report submitted to the Secretary at the end of 2024.

For simplicity, county data are summarized by district. The five districts are: North Central (20 counties; Clay, Cloud, Dickinson, Ellis, Ellsworth, Graham, Jewell, Lincoln, Mitchell, Norton, Osborne, Ottawa, Phillips, Republic, Rooks, Russell, Saline, Smith, Trego, Washington); Northeast (20 counties; Atchison, Brown, Chase, Doniphan, Douglas, Geary Jackson, Jefferson, Johnson, Leavenworth, Lyon, Marion, Marshall, Morris, Nemaha, Pottawatomie, Riley, Shawnee, Wabaunsee, Wyandotte); South Central (20 counties; Barber, Barton, Comanche, Edwards, Ford, Harper, Harvey, Hodgeman, Kingman, Kiowa, McPherson, Ness, Pawnee, Pratt, Reno, Rice, Rush, Sedgwick, Stafford, Sumner); Southeast (20 counties; Allen, Anderson, Bourbon, Butler, Chautauqua, Cherokee, Coffey, Cowley, Crawford, Elk, Franklin, Greenwood, Labette, Linn, Miami, Montgomery, Neosho, Osage, Wilson, Woodson); and West (25 counties; Cheyenne, Clark, Decatur, Finney, Gove, Grant, Gray, Greeley, Hamilton, Haskell, Kearny, Lane, Logan, Meade, Morton, Rawlins, Scott, Seward, Sheridan, Sherman, Stanton, Stevens, Thomas, Wallace, Wichita). Data for individual counties are maintained by the Noxious and Invasive Weeds Specialist, and the most recent annual reports and management plans are posted on the Noxious Weed Control Program website.

Part III, which includes recommendations for the best use of state funds for noxious weed control and recommendations on long-term noxious weed control needs, is based on discussions held by NWAC informed by reports submitted to the KDA by the counties, input from the public, and other relevant information. Because state funds allocated to noxious weed control (see Part III.1. Funding) go mostly to support the State Noxious and Invasive Weeds Specialist position in KDA’s Noxious Weed Control Program, NWAC needs to discuss with the Specialist which possible strategies identified in Part III are feasible. Only then can NWAC prioritize its recommendations and identify ones that might leverage state funds allocated to noxious weed control in the state.

I. Expenditure of State Funds on Noxious Weed Control Programs

Funding for the statewide Kansas Noxious and Invasive Weeds Program in FY 2023 totaled \$111,500, with \$41,700 coming from state general funds budgeted to KDA. Those funds cover the salary of one full-time position—the State Noxious and Invasive Weeds Specialist—and other expenses associated with operation of the program.

Counties submit standardized reports annually to the KDA summarizing millage, budget, revenues (cost share herbicide sales, equipment & labor) and expenditures (personnel, chemical

purchases, contracts, other), as well as a capital outlay fund. Revenues and expenditures of funds for noxious weed control programs are summarized for 2020 (Table 1) and 2021 (Table 2). Some revenues and expenditures were reported by 87 and 90 counties in 2020 and 2021, respectively; however, only about 30% of counties provided information for all expenditure and revenue categories tracked by KDA.

Based on reports from 87 counties in 2020, \$23.603 million was budgeted statewide for noxious weed control. District budgets ranged from \$2.995 million (Southeast) to \$5.772 million (North Central). The average county budget statewide was \$271,294, ranging from \$191,475 (West) to \$381,430 (South Central). Total revenue statewide was \$19.580 million, ranging from \$2.712 million (West) to \$5.853 million (South Central). County revenues averaged \$225,056 statewide and ranged from \$129,125 (West) to \$309,192 (South Central). Cost share chemical sales (\$6.287 million) made up 32% of statewide revenue. Capital outlay revenues totaled \$1.177 million statewide.

Expenditures statewide in 2020 totaled \$19.381 million. District expenditures ranged from \$2.637 million (Southeast) to \$4.742 million (Northeast). Expenditures per county averaged \$222,766 statewide and ranged from \$154,183 (West) to \$314,627 (South Central). Cost share and county-use chemical purchases statewide (\$8.466 million) and contractual services statewide (\$1.133 million) accounted for 44% and 6% of expenditures, respectively. Capital outlay expenditures totaled \$1.284 million statewide. Based on reports from 75% of counties, the average monthly salary paid was \$3,330.

Reports from 90 counties in 2021 indicate that \$21.376 million was budgeted statewide for noxious weed control. District budgets ranged from \$2.649 million (Southeast) to \$5.505 million (Northeast). The average county budget statewide was \$237,514, ranging from \$147,154 (Southeast) to \$323,810 (Northeast). Total revenue statewide was \$21.010 million, ranging from \$3.065 million (West) to \$5.465 million (North Central). County revenues averaged \$233,443 statewide and ranged from \$145,947 (West) to \$337.266 (South Central). Cost share chemical sales (\$8.075 million) made up 38% of statewide revenue. Capital outlay revenues totaled \$1.200 million statewide.

Expenditures statewide in 2021 totaled \$20.190 million. District expenditures ranged from \$3.405 million (West) to \$4.996 million (North Central). Expenditures per county averaged \$224,332 statewide and ranged from \$162,141 (West) to \$261,612 (South Central). Chemical purchases statewide (\$9.354 million) and contractual services statewide (\$1.053 million) accounted for 46% and 5% of expenditures, respectively. Capital outlay expenditures totaled \$1.079 million statewide. Based on reports from 89% of counties, the average monthly salary paid was \$3,470.

II. Status of State and County Noxious Weed Control Programs

1. Status of State Noxious Weed Control Program

As noted in the introduction, this is the first biennial report prepared by NWAC. Primary objectives and activities of the Committee are summarized in the timeline in Figure 1. The Committee met in person four times in 2019 and for its first two meetings in early 2020. After February 2020, meetings were held by Zoom due to the COVID pandemic. That practice continued until early 2022, by which time the pandemic had abated significantly. Since early 2022, meetings have been carried out by Zoom with in-person attendance at the KDA office building in Manhattan as an option. Most members continue to participate in meetings by Zoom. The Committee's work since 2019 has focused on six primary activities (Figure 1): revising and adopting rules and regulations; revising and adopting a Weed Risk Assessment Tool; developing a list of candidate species for assessment; preparation of the State Weed Management Plan as required by statute; preparation of the Biennial Report of the NWAC for the Secretary of the Department of Agriculture; and governance and administration.

A. Rules and Regulations

By statute, the Kansas Noxious Weed Act, and rules and regulations enacted to support the act, must be reviewed every four years. This includes review of approved methods of control and eradication of weeds by both chemical and non-chemical methods. Revising the rules and regulations was the highest priority objective for the NWAC because provisions of subsection 2-1314 (declaring plants as noxious weeds; control and eradication) of the Kansas Noxious Weed Act expired on December 31, 2020. Consequently, most of the time at meetings in 2019 and much of 2020 was devoted to this process. Concurrently, starting with the then 12 statewide-listed noxious weeds and 2 county-option weeds, the Committee evaluated species for listing under the new rules and regulations it was developing. Species were considered for listing in one of three categories: A (not found in Kansas or limited in distribution in the state; subject to exclusion or active eradication wherever detected), B (discrete distribution in the state; subject to exclusion or active eradication wherever populations not established), and C (well-established in Kansas and with extensive populations; new populations subject to control efforts to reduce or eliminate these populations; known and existing populations managed by any approved control method).

Draft revised rules and regulations were submitted for legal review by the KDA in early 2020, followed by required 60-day review period for public comment, and final legal review in late 2020. The revised rules and regulations, and list of noxious weeds were adopted in March 2021. The 12 species listed and their designations included Category A: hoary cress [*Lepidium draba*], kudzu [*Pueraria montana* var. *lobata*], leafy spurge [*Euphorbia virgata*], pignut [*Hoffmannseggia densiflora*], quackgrass [*Elymus repens*], Russian knapweed [*Rhaponticum repens*]; Category B: Canada thistle [*Cirsium arvense*]; and Category C: bur ragweed [*Ambrosia*

grayii], field bindweed [*Convolvulus arvensis*], Johnsongrass [*Sorghum halepense*], musk thistle [*Carduus nutans*], sericea lespedeza [*Lespedeza cuneata*]).

Section 2-1314d of the Kansas Noxious Weed Act also allows a board of county commissioners, with approval of the KDA Secretary, to publish a list of species to be controlled in the county, and any species so listed is considered a noxious weed within the boundaries of that county. Three species currently are listed as county-option noxious weeds: Fuller's teasel (*Dipsacus laciniatus*) in Elk, Franklin, Greenwood, Linn, Washington, and Woodson counties; cutleaf teasel (*Dipsacus laciniatus*) in Elk, Franklin, Linn, Washington, and Woodson counties, and Caucasian bluestem (*Bothriochloa bladhii*) in Greenwood County.

B. Weed Risk Assessment Tool

Prior to the formation of the NWAC, Scott Marsh, the Noxious and Invasive Weeds Specialist at KDA, worked with Prof. Anita Dille, weed scientist at Kansas State University and member of NWAC, to develop a Weed Risk Assessment Tool for use in Kansas. The tool, a series of related Excel worksheets in which information about a species of interest is compiled and distilled into letter grades that estimate the species' potential threats, is based on similar tools in use in other states. The tool was used in Dr. Dille's graduate Weed Ecology course to evaluate the actual and potential range, economic and ecological impacts, invasive potential, and threats of species of interest, allowing a more objective method of assessing whether a species might be considered noxious. Before 2019, Dr. Dille's class had assessed 11 species. In early 2021, NWAC discussed the tool and suggested revisions, which were incorporated in mid-2021. The revised Risk Assessment Tool was reviewed by the NWAC in October 2021 and recommended for formal adoption subject to the Secretary's approval. The Weed Risk Assessment Tool has been approved and now is used to evaluate any species being considered for listing as noxious in Kansas.

C. Candidate Species for Assessment using the Weed Risk Assessment Tool

In early 2021, NWAC began to develop a list of candidate species for evaluation with the revised Weed Risk Assessment Tool. A list of 30 species was reviewed in February 2021 followed by more discussions in May and August of 2021. Species on the initial list included ones listed as noxious or on watch lists in nearby states, on regional or federal watch lists, or widely recognized in the United States as potentially invasive. Ten species/species groups were nominated for initial assessment using the Weed Risk Assessment Tool: autumn olive (*Elaeagnus umbellata*), black swallow-wort (*Vincetoxicum nigrum*), bull thistle (*Cirsium arvense*), common reed (*Phragmites australis*), Grecian foxglove (*Linaria lanata*), multiflora rose (*Rosa multiflora*), purple loosestrife (*Lythrum salicaria*), salt cedar (*Tamarix* sp.), teasels (*Dipsacus* sp.), and ventenata (*Ventenata dubia*). Six species/species groups assessed with the original version of the Weed Risk Assessment Tool were also reassessed with the modified tool, including bush honeysuckles (*Lonicera* sp.), Caucasian bluestem (*Bothriochloa ischaemum*), hydrilla (*Hydrilla verticillata*), Italian plumeless thistle (*Carduus pynoccephalus*), medusaehead

(*Taeniatherum caput-medusae*), spotted knapweed (*Centaurea stoebe*), and yellow toadflax (*Linaria* sp.).

The Committee also recommended that a nomination form be developed and posted on the Noxious Weed Control Program website for all members of the public to nominate species for consideration as candidates for listing as noxious. That form was developed and posted during the summer of 2022. As with all other species considered for listing as noxious, nominations from the public must be evaluated using the Risk Assessment Tool.

D. State Weed Management Plan

By statute, NWAC must review the State Weed Management Plan every five years and recommend changes and updates to the Secretary. The purpose of the management plan is to explain the regulatory framework, define the roles and responsibilities of government and private stakeholders, identify management priorities, articulate long-term objectives, and point out challenges and opportunities. Management plans and reports submitted annually by the counties help to inform development of the plan.

Preparation of the State Weed Management Plan has been one of the primary objectives of NWAC. To coordinate with this report, the Committee set December 31, 2022, as the submission date for the plan to the KDA Secretary. An outline was developed in early 2021, draft chapters were written by the KDA Noxious and Invasive Weeds Specialist in 2021 and early 2022, edited by members of the Committee, and a full draft completed in mid-2022. Public comment on the draft plan was solicited in November 2022, with parts of the plan revised based on that input. A final version of the State Weed Management Plan was reviewed by NWAC in December 2022 and subsequently submitted to the Secretary.

E. Biennial Report to the Secretary

Among its responsibilities as defined by statute, the NWAC must submit a report to the Secretary before January 1 of each odd-numbered year. The report should address four topics: 1) the expenditure of state funds on noxious weed control programs, 2) the status of state and county noxious weed control programs; 3) recommendations for the best use of state funds for noxious weed control, and 4) recommendations on long-term noxious weed control needs. This report fulfills that obligation.

Initial discussions occurred in early 2022. Information gathered and compiled annually by the Noxious and Invasive Weeds Specialist was made available to the Committee, a draft outline was prepared in mid-2022, and a subcommittee to write and review the draft plan was established in August 2022. The draft plan was reviewed by the entire Committee in December 2022, with revisions made that month and the final report then submitted to the Secretary.

F. Governance and Administration

When established, the 13 members of the Committee had staggered initial appointments of two years (six members), three years (four members), and four years (three members). All initial terms have expired, and most members have been reelected to serve a second and final, 4-year term. Since its first meeting, two self-nominated members and two Secretary-selected members have been replaced on the Committee.

The Committee must meet at least once and no more than four times annually. Because of the number of significant tasks on its plate, the Committee has met four times each year since its establishment, including 2019.

2. Status of County Noxious Weed Control Programs

Several metrics are available to assess the status of county noxious weed control programs. Annually, counties report the estimated number of acres infested by noxious weeds, estimated number of acres treated by species, and chemical dispersements. Counties also submit annual management plans, which identify goals and priorities for the coming year and next five years, species of concern in the county, goals to promote integrated weed management, estimated costs, plans to encourage compliance, plans for coordination with relevant federal and state agencies, plans for education and outreach, and available facilities and equipment. As with financials, county-level information on which summary data are based are available from the Noxious and Invasive Weeds Specialist at the KDA.

As summarized in Part I of this report, some revenues and expenditures were reported by 84% of counties in 2020 and 2021, but only about 30% of counties provided information for all financial categories tracked by KDA. Similarly, acres reported by species in 2020 and 2021 (89 and 81 counties reporting, respectively) and acres treated by species in 2020 and 2021 (88 counties reporting each year) represent 82% of counties reporting both categories of information over the two-year period.

Estimated acres infested by species, estimated acres treated by species, counties reporting, and average number of noxious weed species per county are summarized by district for 2020 and 2021 in Tables 3 and 4. Figures 2 and 3 show the estimated acres infested by species in 2020 and 2021, respectively. Figures 4 and 5 show the estimated acres treated by species in 2020 and 2021, respectively.

Counties reported an estimated 3.016 million acres infested by all noxious weed species in 2020 and 2.786 million acres in 2021 (Table 3). Averaged for the two years, this represents about 5.5% of the area of Kansas or roughly five times the area of Comanche County. The order of species ranked from most to fewest acres infested is nearly identical in both years, with Category C noxious weeds (*Ambrosia grayii*, *Carduus nutans*, *Convolvulus arvensis*, *Lespedeza cuneata*, *Sorghum halepense*) and Category B noxious weeds (*Cirsium arvense*) infesting the most

estimated acres statewide (Figures 2 and 3). Category A noxious weeds (*Elymus repens*, *Euphorbia virgata*, *Hoffmannseggia densiflora*, *Lepidium draba*, *Pueraria montana* var. *lobata*, *Rhaponticum repens*) collectively comprise an almost negligible percentage of the noxious weed acres reported in 2020 and 2021—0.04% and 1.3% respectively.

Counties reported an estimated 2.0263 million acres of noxious weeds treated in 2020 and 2.391 million acres in 2021 (Table 4), or roughly 4.2% of the area of Kansas each year. The rank order of the top four species in terms of acres infested is nearly the same as the rank order of acres treated except in both years, *Lespedeza cuneata* (ranked 2nd in acres infested but 3rd in acres treated) switched places with *Carduus nutans* (ranked 3rd in acres infested but 2nd in acres treated) (Figures 4 and 5). Less than 1,500 acres of each of the remaining eight noxious weed species were treated each year, with no acres reported as treated for any of four species in both years.

Trends should not be inferred from these numbers because they represent only two samples (2020 and 2021) and the number of counties reporting each year was different. Furthermore, survey methods used by the counties to obtain their estimates should be examined for suitability (do they provide the data they are intended to provide and are the samples appropriate for statistical analysis?) and consistency (are all counties conducting their surveys the same way?). Only after some basic questions are answered will it be possible to determine if general trends can be inferred from these and other, older data in KDA's possession.

Counties provide information about the type and amount of each herbicide used annually. Those numbers are available from the Noxious and Invasive Weeds Specialist at the KDA, and the full table as summarized by KDA is beyond the scope of this report. Tables 5 and 6 list the chemicals, amounts, and ranks of each chemical used statewide in 2020 and 2021. As with other information reported to KDA, not all counties provided information about their herbicide use; 86% and 85% reported in 2020 and 2021, respectively. The information provided indicates that 277,019 gallons of liquid herbicide and 23,696 pounds of dry herbicide were used in 2020. In 2021, those numbers were 284,180 gallons of liquid herbicide and 37,455 pounds of dry herbicide. The rank order of chemicals used from most to least was nearly identical both years, with all forms of 2,4-D, picloram, glyphosate, metsulfuron methyl, and aminopyralid the top five chemicals used for control of noxious weeds.

Again, trends should not be inferred from these numbers because they represent only two samples (2020 and 2021) and the number of counties reporting each year was different. Also, effectiveness cannot be inferred without some knowledge of non-chemical methods of control used either in concert with or independent of chemical methods. Weed directors are asked to provide information about integrated weed management goals and procedures in their annual management plans, but the Noxious and Invasive Weeds Specialist does not appear to receive information from the counties about the efficacy of biological, cultural, or mechanical controls employed or the number of acres treated with non-chemical methods.

III. Recommendations for the Best Use of State Funds and for Long-term Noxious Weed Control Needs.

Since its creation in 2019, the Noxious Weed Advisory Committee has met 16 times. Discussions at those meetings, information provided to NWAC by KDA, personal experience of many NWAC members, most of whom are weed management practitioners or knowledgeable about aspects of weeds or weed control, and input from the public have helped identify recommendations that could improve our understanding of the status and impacts of weeds in Kansas, and benefit long-term control efforts.

The list that follows is not prioritized. More time is needed to understand how complete, accurate, and relevant our information is about noxious weeds in Kansas, the effectiveness and efficiency of existing state and county programs dedicated to weed control, and the impacts non-native plants on the Kansas economy and ecology, including those already established here and those with the potential to become established here. Much of what is discussed in this section also is incorporated in some manner into the State Weed Management Plan.

1. Funding

Reliable, dedicated funding for noxious weeds management is necessary for effective and consistent control programs. The Kansas Noxious Weed Act assigns most responsibility for control and eradication of noxious weeds to the counties.

The statewide Kansas Noxious and Invasive Weeds Program is currently funded through state general funds budgeted to KDA by the state legislature. Only a small portion of those funds go to the Plant Protection and Weed Control Program, some of which funds one full-time position—the State Noxious and Invasive Weeds Specialist. No other funding is available at the state level.

By law, each county must hire and employ a County Weed Director, funding for whom comes from a millage that is assessed based on the acreage of infestation of noxious weeds in the county as determined by an annual survey. The Boards of County Commissions may also allocate general funds to their county weed control programs. Total funding available varies from county to county, with counties employing from one to five positions in their weed department. Many weed directors have multiple duties in their county, with some directors devoting as little as 20% of their time to noxious weed control. Much of each county weed program's budget is spent spraying noxious weeds and purchasing herbicides sold at cost share prices to landowners for noxious weed control. All funds received through either the tax or from general funds must be used for the control and eradication of noxious weeds. Any funds remaining in the noxious weed eradication fund at the end of the year must either be transferred to the noxious weed capital outlay fund for capital expenditures related to the control of noxious weeds or rolled over for use in the next year. Additionally, any income received through cost share chemical sales or equipment rental must be deposited into the Noxious Weed Fund, and any expenses incurred must be paid out of the fund.

Recommendations

Under the current funding model, financial support at the county level would provide the greatest leverage for control efforts. Opportunities to increase funding for control of noxious weeds at the state level are limited and come primarily from competitive federal grants. Some states have funding sources that Kansas might consider adopting. These include the statutory creation of a noxious weed trust fund to support county and state noxious weed programs. Another approach employed elsewhere is to allocate to weed control programs certain funds collected through pre-established registrations or taxes.

2. Surveying, mapping, monitoring, and other research

Effective control of noxious and invasive weeds begins with knowledge about their identity, occurrence, and basic biology. The Kansas Noxious Weed Act requires county weed directors to conduct annual surveys of noxious weeds to identify their locations and areas of infestation. Directors use this information to plan future weed management projects, to develop species-specific management priorities, and to determine the millage that can be levied to fund their program. The information also is shared with the KDA's Noxious and Invasive Weeds Program, where it is used to track and plan statewide management activities.

A. Surveying

The current method for determining the location, size, and extent of noxious weed infestations in Kansas was developed in the early 1990s. Annually, each county inspects ten randomly chosen sections of land within their county, not to exceed a total of 6,400 acres. Counties are requested to survey the sections multiple times each year to account for phenological differences in and among species. The total number of acres determined to be infested by a single species is then extrapolated for the entire county. Then, added to this estimate for each noxious weed species is the size of any infestations known within the county but outside of the surveyed sections.

B. Mapping

County noxious weed survey data are used by the Noxious and Invasive Weeds Specialist to produce statewide maps for each species with estimated abundances for each county. Those maps are available on the Noxious Weed Control Program website.

KDA encourages resource agency representatives, members of resource organizations, and members of the public to enter their sightings of noxious or invasive plant species into the Early Detection and Distribution Mapping System (EDDMapS.org) online or with the phone app. Sightings reported through EDDMapS are verified by the Noxious and Invasive Weed Specialist before being added to the national database and mapped. Other data collected in the EDDMapS database includes the area, density, and age class of the infestation, as well as the habitat

infested. EDDMapS allows any interested party to view occurrence data for noxious and invasive weed infestations. It also allows infestations to be labeled as treated so control efforts may be tracked. A check of several species in EDDMapS reveals observations from a variety of sources in the system for Kansas.

Individuals involved in control of noxious and invasive weeds should also be encouraged to report observations and provide specimens when possible, especially for newly discovered populations of invasive species, to the Kansas State University Herbarium or the R.L. McGregor Herbarium at the University of Kansas. These are the primary repositories for plant specimens from Kansas, providing information about native and naturalized plant species since the 1860s. Voucher specimens, which are permanent, physical records of species occurrences in space and time, are essential for understanding the status and trends of populations of noxious and invasive weed species.

C. Monitoring

Monitoring of known occurrences of noxious weeds, especially of perennial species with abundant, well-established populations, is critically important but often neglected due to the time, energy, and resources necessary to conduct it. Monitoring is necessary to ascertain the status of populations and the efficacy of control effort. Currently, there are no formal, population-level requirements for monitoring or reporting of monitoring data. Any efforts to monitor noxious weed populations likely are initiated by the counties, although the Noxious and Invasive Weed Specialist might occasionally monitor populations of a species of interest, especially where biological controls are being used for management.

D. Other Research

Kansas has academic institutions that employ faculty already contributing tangibly to our knowledge about noxious and invasive weeds, and they have the potential to contribute much more to our understanding. Kansas State University has strong agriculture and natural resources programs, robust research initiatives in grassland ecology, close ties with the state's agriculture industry through its extension service, and numerous faculty members engaged in weed-related research. The University of Kansas has research strengths in biodiversity informatics, predictive modeling, remote sensing, survey and inventory methods, and many aspects of ecology. Emporia State University, Fort Hays State University, Pittsburg State University, Wichita State University, and some of the state's colleges also have faculty that could contribute to our knowledge base.

Research is needed to understand the ecology of establishment and spread of non-native species, how species get here, and why some species become invasive while others do not. Better survey and inventory methods are needed for early detection and prevention of new weeds, and for more accurate estimates of where and how abundant weeds are, which can improve targeting of resources for control and eradication. Monitoring is another important but often neglected aspect

of weed control programs to which academic institutions might contribute. Research could also help evaluate the efficacy of control measures, develop more effective strategies where needed, identify integrated weed management approaches that might reduce dependency on chemical controls, and point to appropriate land restoration tactics for implementation after weed populations have been eradicated.

Recommendations

Current survey methods can exhibit large annual variance, and the reliability and reproducibility of the data have never been analyzed. A survey method that provides reliable, statistically defensible demographic data is needed. Dependable estimates are needed to ascertain the local, county, and statewide distribution and density of noxious weed populations. With them, more accurate allocation of resources to monitor and control those populations are possible. The application of several research tools, especially remote sensing and predictive modeling, could be tremendously helpful in identifying where noxious and invasive species occur, and how quickly and where they are spreading. Exactly how ancillary occurrence data are used, such as from EDDMapS, is not clear. However, these occurrence data could be used to train algorithms used to classify remotely-sensed data and in predictive models. Also, the issue of monitoring needs to be examined to get at local, regional, and statewide demographic trends and to allow examination of possible cause and effect relationships between management and demographics. Harnessing much of this research capacity will require funding, either directly from the state, KDA or other state agencies, or through federal or private grants available to researchers at academic institutions.

3. Reporting

County weed directors submit annual estimates of acres infested by each noxious weed species in their county. This information is used to track the number and size of infestations at the county and state levels. Infestations of other invasive species, especially those on watch lists, can be reported by anyone to county weed departments or to the Noxious Weed Control Program. These observations can be crucial for identifying previously unknown infestations of noxious weeds and new infestations of species previously not known in the state. As stated earlier, reports and management plans submitted to KDA in 2020 and 2021 were received from roughly 80–90% of counties, and many reports and plans were incomplete or had missing data.

One additional issue related to reporting is that while weed directors provide information about integrated weed management goals and procedures in their annual management plans, there does not appear to be any detailed information available about how biological, cultural, or mechanical controls employed in the county are working or how many acres were treated with non-chemical methods.

Recommendations

Control efforts would benefit from improved participation in reporting by the counties. One approach might be to use web survey forms that can be populated and submitted online directly to KDA. Also, to obtain a clearer picture of the use and efficacy of integrated weed management, data on the number of acres treated using biological, cultural, and mechanical control methods might be reported, as they are with chemicals.

4. Coordination

Coordination and collaboration among diverse stakeholders will be integral to the full and effective implementation of the State Weed Management Plan. Governmental agencies, from federal to local, usually have mechanisms that facilitate communication and coordination, but the effectiveness of their interactions can vary across the network. Each node in the network brings its own expertise, resources, and capabilities. In a resource-limited environment, using those dispersed resources and capabilities to maximize achievement of goals and objectives is a major challenge. The Noxious Weed Control Program is the point of contact for federal agencies, and it coordinates county-level efforts statewide. County weed departments provide essential connections to private and public landowners, and annual management plans include information about plans to work with state and/or federal agencies to control noxious weeds on public land. Some conservation or nature-focused non-profit organizations own and/or manage land, and have access to large volunteer workforces or expertise among their ranks. Private landowners, responsible for the vast majority of land in the state, are front line partners in efforts to control noxious and invasive weeds.

Recommendations

Resource limitations (funding, technical expertise, and dispersion of resources among stakeholders) and the onus on individuals, organizations, and agencies to control and eradicate noxious weeds on land that they own or manage make effective communication and coordination among all parties an imperative. The State Weed Management Plan should identify all stakeholders involved in future management of noxious and invasive weeds, spell out their role in the effort, and identify the resources and expertise they can contribute. Periodic meetings to discuss accomplishments, opportunities, and challenges should be scheduled to ensure regular communication and feedback. Also, counties should be encouraged to report their successes and challenges coordinating their efforts with federal, state, local, and private partners, information needed to track progress toward benchmarks in the State Weed Management Plan.

5. Education and outreach

Many individuals, organizations, and agencies across Kansas are actively engaged in efforts to manage, control, and eradicate noxious and invasive weeds. Many others are unaware of the problems posed by noxious weeds. Education and outreach are fundamental features of any

noxious and invasive weed control program, and weed directors describe their education and outreach plans annually in their management plans. Current, accurate information is needed about species identification, biology, and impacts, reporting options, and prevention, control, and management tactics. Historically, KDA has conveyed information about noxious and invasive weeds primarily through print (brochures, fact sheets, newsletters) and its website, with public presentations, and television and radio used infrequently. Increasingly, individuals and organizations are relying on social media to share information and discuss ideas.

Recommendations

A starting point to improve education and outreach efforts is with the Noxious Weed Control Program website ([Noxious Weed Control Program \(ks.gov\)](http://www.kdareg.org/NoxiousWeedControlProgram)). The site offers an extensive variety of information (program overview, list of noxious weeds with species descriptions and ways to prevent spread, recent survey data, nomination form for species for consideration as noxious, a link to the Kansas Noxious Weed Act and associated regulations, NWAC information, species-specific control programs, recent county reports, newsletters, publications, and related links). Some of the content needs to be edited and updated, overall site organization and navigation improved, and the site made more engaging.

Electronic messaging, especially by social media and social networking, appears to be a largely unused avenue for dissemination of information about noxious and invasive weeds. Services, like Google Groups, are platforms used for discussion by groups of people with common interests. Social media apps, like Facebook, also allow individuals with common interests to connect and share ideas. One of the major challenges with supporting and maintaining an active social networking effort is that it can require a significant investment of time, energy, and expertise. To maximize efficiency and impact, target audiences need to be identified, and messages tailored to those audiences through their preferred avenues of communication. Targeted messaging could be an effective way to keep large groups of people informed about relevant topics, and many organizations with Facebook pages routinely share postings of potential interest to their members, significantly amplifying the reach and impact of messages.

Table 1. Revenues and expenditures by district as reported for 2020.

2020	Average Millage	Budget	Revenues			Expenditures					Capital Outlay		
			Chemical	Equip & Labor	Total Revenue	Personnel Services	WD Monthly Salary	Contractual Services	Chemical Purchases	Other Commodities	Total Expenditures	Revenues	Expenditures
North Central	1.098	\$5,772,112.00	\$1,380,142.49	\$36,738.44	\$4,571,957.57	\$1,504,086.67	\$50,836.71	\$188,930.12	\$1,995,602.08	\$89,393.25	\$4,043,730.04	\$203,695.46	\$63,343.24
Northeast	41.477	\$5,092,616.69	\$1,342,166.82	\$84,273.53	\$3,395,360.42	\$2,284,328.85	\$60,534.11	\$290,430.18	\$1,971,367.69	\$183,473.87	\$4,742,482.93	\$269,280.85	\$810,696.63
South Central	1.519	\$5,721,452.00	\$1,542,117.16	\$113,549.32	\$5,852,879.91	\$1,794,192.81	\$57,630.11	\$384,864.07	\$2,092,324.39	\$205,474.98	\$4,719,406.76	\$196,250.00	\$16,068.65
Southeast	6.711	\$2,995,469.00	\$957,823.32	\$16,038.73	\$3,048,086.50	\$712,550.34	\$41,716.17	\$145,750.83	\$1,083,162.02	\$58,444.59	\$2,637,203.78	\$120,323.25	\$102,677.90
West	2.144	\$4,020,967.99	\$1,064,857.88	\$64,290.27	\$2,711,625.02	\$1,075,561.31	\$63,262.90	\$123,097.22	\$1,323,700.35	\$385,602.32	\$3,237,852.11	\$387,864.14	\$291,236.93
Total		\$23,602,617.68	\$6,287,107.67	\$314,890.29	\$19,579,909.42	\$7,370,719.98		\$1,133,072.42	\$8,466,156.53	\$922,389.01	\$19,380,675.62	\$1,177,413.70	\$1,284,023.35
Average	10.59						\$3,329.87	Average					
Counties Reporting a Millage	91	Counties Reporting	87				75%	Reporting					
Millage 1.5	32	Full	26										

Table 2. Revenues and expenditures by district as reported for 2021.

2021	Average Millage	Budget	Revenues			Expenditures					Capital Outlay		
			Chemical	Equip & Labor	Total Revenue	Personnel Services	WD Monthly Salary	Contractual Services	Chemical Purchases	Other Commodities	Total Expenditures	Revenues	Expenditures
North Central	1.182	\$5,428,551.25	\$1,881,613.33	\$47,420.27	\$5,464,855.71	\$1,668,855.82	\$3,291.85	\$244,637.45	\$2,526,675.85	\$162,174.59	\$4,995,644.41	\$322,103.26	\$242,322.92
Northeast	13.568	\$5,504,766.37	\$1,765,703.27	\$169,890.33	\$3,224,380.57	\$1,804,691.90	\$3,543.62	\$226,204.18	\$2,032,925.22	\$334,115.41	\$4,423,968.09	\$185,841.69	\$374,587.07
South Central	1.263	\$4,416,386.86	\$1,268,081.11	\$204,871.49	\$5,058,989.97	\$1,597,513.19	\$3,782.31	\$301,885.70	\$1,534,360.40	\$278,510.90	\$3,924,186.30	\$160,360.00	\$78,726.30
Southeast	5.727	\$2,648,766.44	\$1,832,936.19	\$177,628.28	\$4,196,806.20	\$1,051,676.70	\$3,015.83	\$151,621.61	\$1,689,229.43	\$572,108.22	\$3,441,148.20	\$160,323.25	\$79,497.91
West	27.339	\$3,377,810.78	\$1,326,795.43	\$120,924.05	\$3,064,876.50	\$1,083,696.38	\$3,714.13	\$128,894.35	\$1,571,219.67	\$285,787.84	\$3,404,952.27	\$371,180.88	\$304,058.42
Total		\$21,376,281.70	\$8,075,129.33	\$720,734.42	\$21,009,908.95	\$7,206,433.99		\$1,053,243.29	\$9,354,410.57	\$1,632,696.96	\$20,189,899.27	\$1,199,809.08	\$1,079,192.62
Average	9.816						\$3,469.55	Average					
Counties Reporting a Millage	85	Counties Reporting	90				89%	Reporting					
Millage 1.5	32	Full	38										

Figure 1. Timeline of objectives and activities of the Kansas Noxious Weed Advisory Committee: 2019–2022.

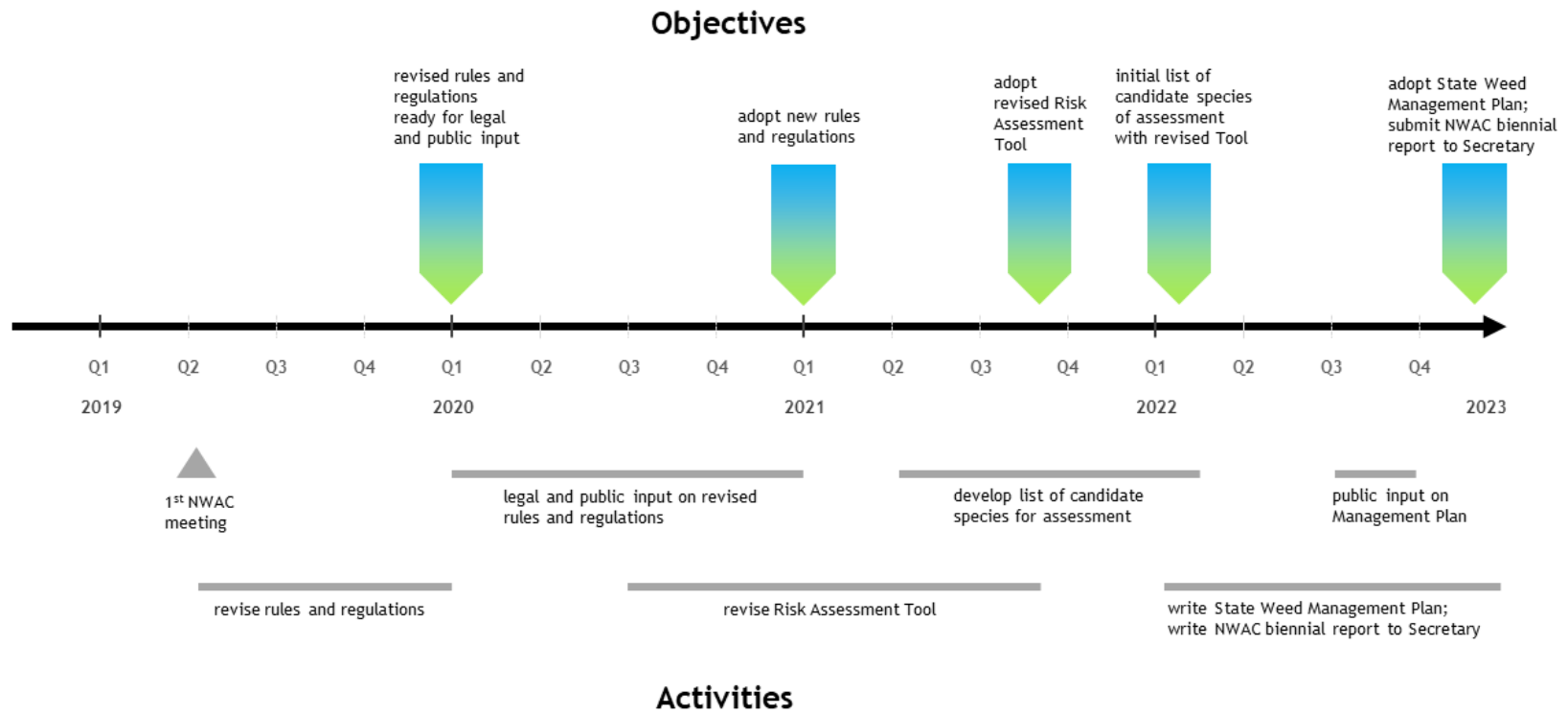


Table 3. Estimated acres of noxious weeds by district as reported for 2020 and 2021.

2020	Counties	Counties Reporting	% Counties Reporting	Field Bindweed	Musk Thistle	Johnson Grass	Sericea Lespedeza	Bur Ragweed	Canada Thistle	Leafy Spurge	Hoary Cress	Pignut	Quack Grass	Russian Knapweed	Kudzu	Other	TOTAL	Ave. Weeds/ County
North Central	20	18	90	330252.80	240671.10	42950.60	28859.00	125.50	2072.00	12.70	111.20	0.00	0.00	0.00	0.00	4199.00	649259.22	4.70
Northeast	20	18	90	148131.10	139689.78	60077.70	249057.50	0.00	76.70	601.00	4.00	0.00	95.00	0.00	0.00	5763.70	603500.70	4.20
South Central	20	17	85	460178.56	56379.96	69959.70	8344.30	7592.40	117.00	0.00	1.30	0.00	0.00	0.00	0.00	4489.40	607066.97	4.40
Southeast	20	14	70	38215.77	47590.59	232550.92	430491.02	0.00	2082.10	0.00	0.00	0.00	0.00	0.00	0.00	4305.40	755239.73	3.90
West	25	22	88	239169.79	26366.88	37961.50	153.00	83441.70	5805.00	0.00	150.10	210.00	0.00	0.00	0.00	6770.00	401382.02	4.00
TOTAL	105	89		1215948.02	510698.31	443500.42	716904.82	91159.60	10152.80	613.70	266.60	210.00	95.00	0.00	0.00	25527.50	3016448.64	4.24
2021	Counties	Counties Reporting	% Counties Reporting	Field Bindweed	Musk Thistle	Johnson Grass	Sericea Lespedeza	Bur Ragweed	Canada Thistle	Leafy Spurge	Hoary Cress	Pignut	Quack Grass	Russian Knapweed	Kudzu	Other	TOTAL	Ave. Weeds/ County
North Central	20	17	85	349971.00	226640.05	41651.30	9586.20	15.50	4916.10	12.00	1222.25	0.00	0.00	0.00	0.00	4067.00	638086.52	4.80
Northeast	20	16	80	87111.40	111720.20	42867.80	191853.20	0.00	70.00	605.00	15.00	0.00	60.00	0.00	0.00	184.80	434491.65	4.30
South Central	20	15	75	286644.30	65294.70	47456.30	7267.30	53938.50	125.10	0.00	0.10	0.00	0.00	0.00	0.00	1730.00	462450.43	4.10
Southeast	20	14	70	121118.76	46065.88	239032.68	449837.24	0.00	517.00	0.00	134.00	0.00	0.00	0.00	0.00	41752.40	899462.13	4.10
West	25	19	76	209455.74	12477.66	38504.30	153.00	82034.20	3581.60	0.00	1500.00	210.00	0.00	0.00	0.00	3270.80	351191.36	4.10
TOTAL	105	81		1054301.20	462198.49	409512.38	658696.94	135988.20	9209.80	617.00	2871.35	210.00	60.00	0.00	0.00	51005.00	2785682.09	4.28

Figure 2. Histogram of estimated acres of noxious weeds by district as reported for 2020.

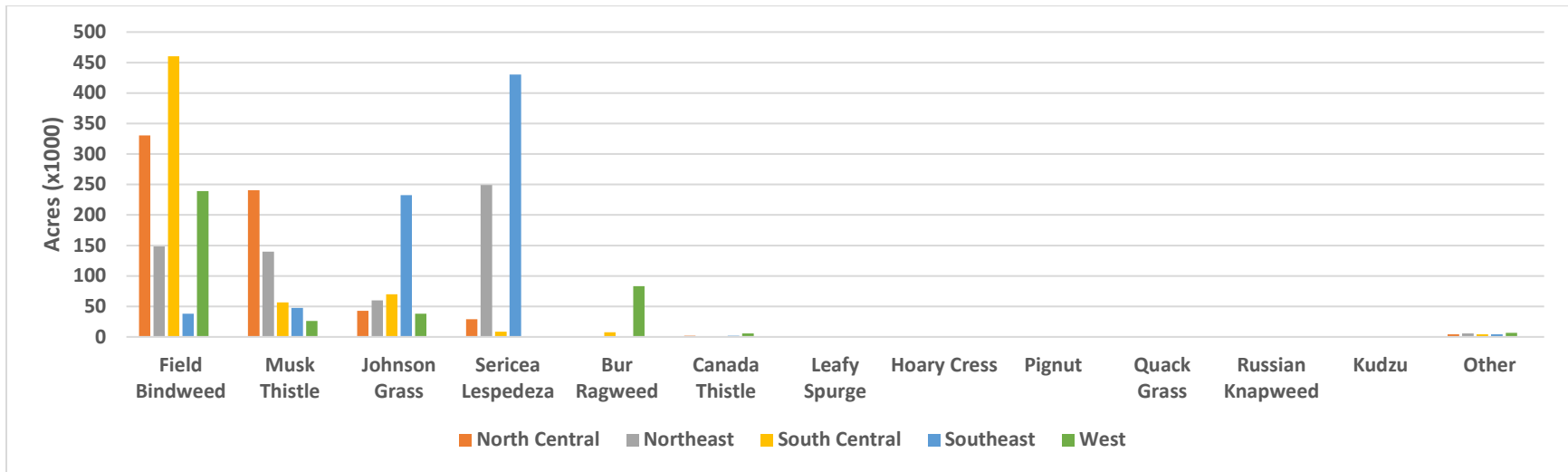


Figure 3. Histogram of estimated acres of noxious weeds by district as reported for 2021.

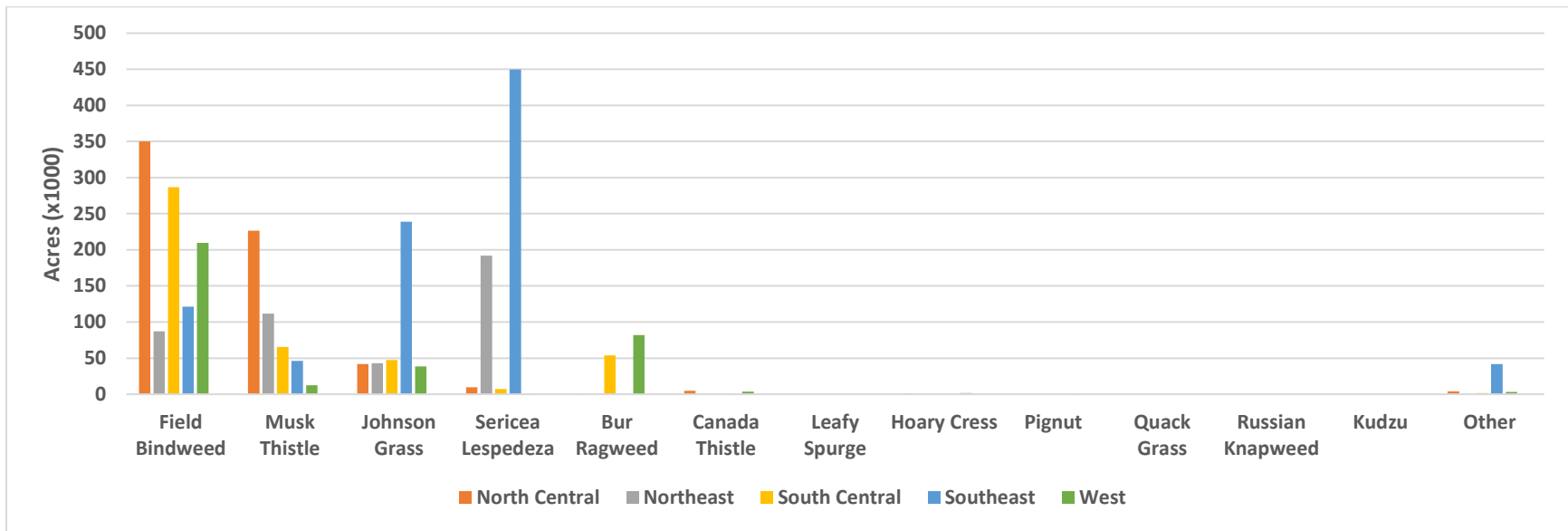


Table 4. Estimated acres of noxious weeds treated by district as reported for 2020 and 2021.

2020	Counties	Counties Reporting	% Counties Reporting	Field Bindweed	Musk Thistle	Johnson Grass	Sericea Lespedeza	Bur Ragweed	Canada Thistle	Leafy Spurge	Hoary Cress	Pignut	Quack Grass	Russian Knapweed	Kudzu	Other	TOTAL	Ave. Weeds/ County
North Central	20	17	85	281439.80	258135.50	3141.60	4584.50	95.00	136.40	0.00	0.00	0.00	0.00	0.00	0.00	2491.90	547532.80	3.80
Northeast	20	19	95	40979.70	214522.40	36995.80	235106.20	60.00	155.30	0.00	0.00	0.00	0.00	0.00	0.00	6535.90	527819.40	3.90
South Central	20	16	80	224233.50	53472.20	8434.80	922.80	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2772.50	287108.20	3.40
Southeast	20	14	70	30328.70	98619.00	44295.80	296702.30	380.00	644.00	0.00	0.00	0.00	0.00	0.00	0.00	6284.60	470969.80	4.10
West	25	22	88	156303.70	24385.90	7903.60	3328.20	823.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65755.50	192914.40	2.90
TOTAL	105	88		733285.40	649135.00	100771.60	540644.00	1403.00	935.70	0.00	0.00	0.00	0.00	0.00	0.00	83840.40	2026344.60	3.62
2021	Counties	Counties Reporting	% Counties Reporting	Field Bindweed	Musk Thistle	Johnson Grass	Sericea Lespedeza	Bur Ragweed	Canada Thistle	Leafy Spurge	Hoary Cress	Pignut	Quack Grass	Russian Knapweed	Kudzu	Other	TOTAL	Ave. Weeds/ County
North Central	20	19	95	295068.40	413523.90	4324.60	5576.40	1.00	3040.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	721636.70	3.50
Northeast	20	17	85	44518.50	260543.50	23156.60	396584.20	38.70	74.00	142.00	2.00	0.00	0.00	0.00	0.00	6098.40	725059.40	4.00
South Central	20	14	70	160408.90	59067.50	40348.80	1788.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48490.00	261614.00	3.60
Southeast	20	16	80	71582.00	55915.10	54330.90	299425.30	100.00	1394.00	120.00	0.00	0.00	0.00	0.00	0.00	9097.90	482687.30	3.90
West	25	22	88	184249.70	12414.10	2375.30	0.00	616.50	725.10	0.00	0.00	0.00	0.00	0.00	0.00	1138.60	200380.70	3.20
TOTAL	105	88		755827.50	801464.10	124536.20	703374.70	756.20	5233.60	262.00	2.00	0.00	0.00	0.00	0.00	64824.90	2391378.10	3.64

Figure 4. Histogram of estimated acres of noxious weeds treated by district as reported for 2020.

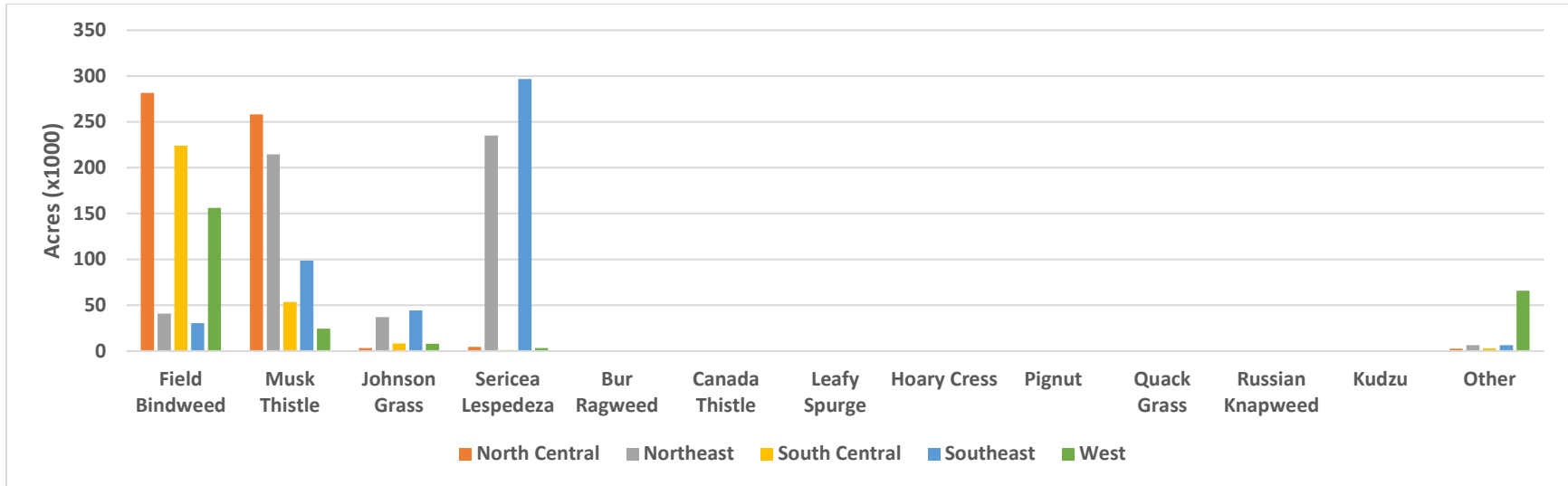


Figure 5. Histogram of estimated acres of noxious weeds treated by district as reported for 2021.

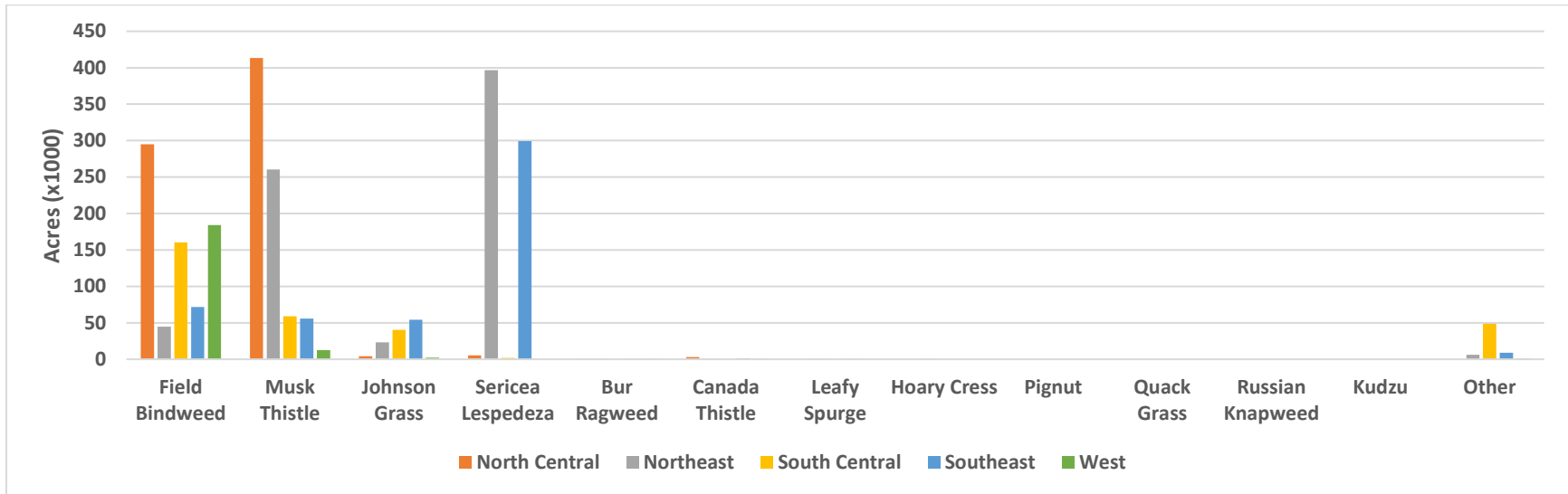


Table 5. Summary of herbicide use as reported by counties in 2020.

Liquid					Dry					Rank	County Use
Chemical Name			Gallons	Rank	Chemical Name			Pounds	Rank		
All 2,4-D			115,880.94	1	2,4-D	LBS.	4,280.00	4,280.00	2	1	All 2,4-D
Glyphosate	GAL.	29,756.95	29,756.95	6	Metsulfuron Methyl	OZ.	213,194.59	13,324.66	1	2	Picloram
2,4-D	GAL.	43,014.17	43,014.17	5	Imazapyr	LBS.	520	520	4	3	Glyphosate
2,4-D Ester	GAL.	48,573.99	48,573.99	2	Sulfosulfuron	OZ.	5,336.44	333.53	7	4	Metsulfuron Methyl
2,4-D Amine	GAL.	43,109.81	43,109.81	4	Glyphosate	BOX	8,608.50	4,046.00	3	5	Aminopyralid
Picloram	GAL.	44,007.58	44,007.58	3	Chlorsulfuron	OZ.	54.33	3.4	13	6	Dicamba
Dicamba	GAL.	28,787.27	28,787.27	7	Bromacil	LBS.	518	518	5	7	2,4-D Ester
Triclopyr	GAL.	19,583.89	19,583.89	8	Sulfometuron	OZ.	692.57	43.29	10	7	Triclopyr
Triclopyr + Fluroxypyr	GAL.	5,839.10	5,839.10	9	Tebuthiuron	LBS.	-	-	14	9	2,4-D Amine
2,4-D + Picloram	GAL.	5,588.35	5,588.35	10	Quinclorac	OZ.	2,067.50	129.22	8	10	Imazapic
Aminopyralid	QT.	8,602.71	2,150.68	12	Aminopyralid + Metsulfuron Methyl	LBS.	398.35	398.35	6	11	2,4-D
Imazapic	GAL.	1,902.61	1,902.61	13	Glyphosate + Diquat	BOX	7.5	3.53	12	12	Triclopyr + Fluroxypyr
Aminopyralid + 2,4-D	QT.	10,264.97	2,566.24	11	Diflufenzopyr	LBS.	40.5	40.5	11	13	Sulfosulfuron
2,4-D + Triclopyr	GAL.	557.3	557.3	14	Dicamba + Diflufenzopyr	LBS.	55.5	55.5	9	14	Quinclorac
Clopyralid + Fluroxypyr	GAL.	252	252	18	Rimsulfuron		-	-	14	15	2,4-D + Picloram
2,4-D + Dicamba	GAL.	478.04	478.04	15	Triasulfuron	OZ.	-	-	14	16	Imazapic
Fenoxaprop + Fluazifop	GAL.	-	-	24				23,695.96		17	Sulfometuron
Clopyralid	QT.	277.81	69.45	19						18	2,4-D + Triclopyr
Imazapyr	GAL.	320.55	320.55	17						18	Fluazifop-P- Butyl
Glyphosate + Imazapic	GAL.	-	-	24						18	Glyphosate (Dry)
Fluroxypyr	GAL.	367.45	367.45	16						18	Tebuthiuron
Fluazifop-P- Butyl	GAL.	43.85	43.85	20						22	2,4-D (Dry)
2,4-D + Fluroxypyr	GAL.	43.25	43.25	21						22	Fluroxypyr
2,4-D + Quinclorac + Dicamba	GAL.	5.25	5.25	22						22	Glyphosate + Imazapic
2,4-D + Metsulfuron	GAL.	-	-	24						22	Imazapic (Dry)
Triclopyr + Clopyralid	GAL.	-	-	24						26	2,4-D + Dicamba
2,4-D + Metsulfuron + Picloram	GAL.	-	-	24						26	Aminopyralid + 2,4-D
Bromacil	GAL.	1	1	23						26	Bromacil (Dry)
Sethoxydim	GAL.	-	0	24						29	Aminopyralid + Metsulfuron Methyl
Diquat	QT.	-	-	24						29	Bromacil
Glyphosate + Imazapic + Diquat	QT.	-	-	24						29	Glyphosate + Diquat
2,4-D + Glyphosate	GAL.	-	-	24						29	Triclopyr + Clopyralid
2,4-D + Diquat	OZ.	-	-	24						34	2,4-D + Glyphosate
Clopyralid + 2,4-D	GAL.	-	-	24						34	Chlorsulfuron
Fenoxaprop	GAL.	-	-	24						34	Clopyralid + 2,4-D
Fluroxypyr + Picloram	GAL.	-	-	24						34	Clopyralid + Fluroxypyr
Foramsulfuron	GAL.	-	-	24						34	Clopyralid
Nicosulfuron	GAL.	-	-	24						34	Dicamba + 2,4-D + Quinclorac
Primisulfuron	GAL.	-	-	24						34	Dicamba + Diflufenzopyr
Quizalofop-P	GAL.	-	-	24						34	Diflufenzopyr
Trifluralin	GAL.	-	-	24						34	Diquat
			277,018.79							34	Quizalofop-P

Table 6. Summary of herbicide use as reported by counties in 2021.

Liquid					Dry					Rank	County Use
Chemical Name			Gallons	Rank	Chemical Name			Pounds	Rank		
All 2,4-D			126,614.62	1	2,4-D	LBS.	4,925.08	4,925.08	3		1 All 2,4-D
Glyphosate	GAL.	33,873.02	33,873.02	6	Metsulfuron Methyl	OZ.	233,278.63	14,579.91	2		2 Picloram
2,4-D	GAL.	39,534.72	39,534.72	5	Imazapyr	LBS.	1,068.28	1,068.28	4		3 Glyphosate
2,4-D Ester	GAL.	46,311.24	46,311.24	3	Sulfosulfuron	OZ.	7,102.08	443.88	6		4 Metsulfuron Methyl
2,4-D Amine	GAL.	53,206.88	53,206.88	2	Glyphosate	BOX	31,405.09	14,760.39	1		5 Aminopyralid
Picloram	GAL.	43,831.18	43,831.18	4	Chlorsulfuron	OZ.	90.61	5.66	13		6 Dicamba
Dicamba	GAL.	26,252.17	26,252.17	7	Bromacil	LBS.	180	180	8		7 2,4-D Ester
Triclopyr	GAL.	22,921.67	22,921.67	8	Sulfometuron	OZ.	1,334.47	83.4	9		7 Triclopyr
Triclopyr + Fluroxypyr	GAL.	6,956.97	6,956.97	9	Tebuthiuron	LBS.	95	23.75	11		9 2,4-D Amine
2,4-D + Picloram	GAL.	1,310.50	1,310.50	13	Quinclorac	OZ.	5,920.31	370.02	7		10 Imazapic
Aminopyralid	QT.	7,709.56	1,927.39	12	Aminopyralid + Metsulfuron Methyl	LBS.	966.73	966.73	5		11 2,4-D
Imazapic	GAL.	3,800.37	3,800.37	10	Glyphosate + Diquat	BOX	55	25.85	10		12 Triclopyr + Fluroxypyr
Aminopyralid + 2,4-D	QT.	8,152.82	2,038.21	11	Diflufenzopyr	LBS.	4.25	4.25	14		13 Sulfosulfuron
2,4-D + Triclopyr	GAL.	724.77	724.77	14	Dicamba + Diflufenzopyr	LBS.	18	18	12		14 Quinclorac
Clopyralid + Fluroxypyr	GAL.	221.5	221.5	17	Rimsulfuron		-	-	15		15 2,4-D + Picloram
2,4-D + Dicamba	GAL.	489.74	489.74	15	Triasulfuron	OZ.	-	-	15		16 Imazapyr
Fenoxaprop + Fluazifop	GAL.	95	95	19				37,455.21			17 Sulfometuron
Clopyralid	QT.	236.44	59.11	20							18 2,4-D + Triclopyr
Imazapyr	GAL.	398.74	398.74	16							18 Fluazifop-P- Butyl
Glyphosate + Imazapic	GAL.	-	-	24							18 Glyphosate (Dry)
Fluroxypyr	GAL.	203.42	203.42	18							18 Tebuthiuron
Fluazifop-P- Butyl	GAL.	-	-	24							22 2,4-D (Dry)
2,4-D + Fluroxypyr	GAL.	19.2	19.2	21							22 Fluroxypyr
2,4-D + Quinclorac + Dicamba	GAL.	2.25	2.25	22							22 Glyphosate + Imazapic
2,4-D + Metsulfuron	GAL.	-	-	24							22 Imazapyr (Dry)
Triclopyr + Clopyralid	GAL.	-	-	24							26 2,4-D + Dicamba
2,4-D + Metsulfuron + Picloram	GAL.	-	-	24							26 Aminopyralid + 2,4-D
Bromacil	GAL.	2	2	23							26 Bromacil (Dry)
Sethoxydim	GAL.	-	0	24							29 Aminopyralid + Metsulfuron Methyl
Diquat	QT.	-	-	24							29 Bromacil
Glyphosate + Imazapic + Diquat	QT.	-	-	24							29 Glyphosate + Diquat
2,4-D + Glyphosate	GAL.	-	-	24							29 Triclopyr + Clopyralid
2,4-D + Diquat	OZ.	-	-	24							34 2,4-D + Glyphosate
Clopyralid + 2,4-D	GAL.	-	-	24							34 Chlorsulfuron
Fenoxaprop	GAL.	-	-	24							34 Clopyralid + 2,4-D
Fluroxypyr + Picloram	GAL.	-	-	24							34 Clopyralid + Fluroxypyr
Foramsulfuron	GAL.	-	-	24							34 Clopyralid
Nicosulfuron	GAL.	-	-	24							34 Dicamba + 2,4-D + Quinclorac
Primisulfuron	GAL.	-	-	24							34 Dicamba + Diflufenzopyr
Quizalofop-P	GAL.	-	-	24							34 Diflufenzopyr
Trifluralin	GAL.	-	-	24							34 Diquat
			284,180.03								34 Quizalofop-P