



Lake Meredith National Recreation Area Exotic Plants Monitoring Summary—2022

Purpose: To briefly summarize the results of the 2022 field season of Exotic Plant-Early Detection Protocol monitoring at Lake Meredith National Recreation Area.

Contacts: Please direct any questions to Vegetation Ecologist Merran Owen, at merran_owen@partner.nps.gov

Transects Surveyed: Panel 3 (4.8 kilometers)

Grid Points Surveyed: None

Number of Extra-Area Surveys Completed: None

Field Crew: M. Owen (crew lead)

Dates of Survey: May 26–27, 2022

Data Availability: All data are available to view and download through the Southwest Network Collaboration Exotics Dashboard, hosted on the NPS ArcGIS Portal.



Lake Meredith National Recreation Area, 2004. NPS/HEIDI SOSINSKI

Monitoring Protocol

Each year, the Southern Plains Inventory & Monitoring Network (SOPN) monitors pathways of exotic plant introduction at Lake Meredith National Recreation Area (NRA) (LAMR) and other network parks. The areas sampled are typically linear transects along roads, trails, boundary lines, and stream channels that are at high risk for exotic plant invasion and infestation. The transects for each park are divided into three panels, with one panel sampled each year. At LAMR, one of the panels is located within Alibates Flint Quarries National Monument. In select years, exotic plant data are also collected at predetermined grid points spaced 150 meters (m) apart at three regions within the park (Bates Canyon, Plum Creek, and north of the dam). Grid-point surveys are done to determine the extent and distribution of exotic plants within the park interior landscape. All transect and grid-point locations at LAMR are shown in maps A-1 through A-3. Surveys of additional areas, referred to as “extra-area surveys,” may also be completed upon request from park staff.

To sample transects, surveyors walk the transect length and map exotic plant infestations that occur within 30 m of the center line. Infestations are documented as points or polygons. Points are recorded as one of three size classes: under 1-m radius, 1.1 to 5-m radius, and 5.1 to 10-m radius. Infestations larger than a 10-m radius or those that exist as long, continuous stretches are recorded as polygons. Data collected for infestations include plant species name, the size of the patch, canopy cover, number of plants present in the patch, phenology (flowering or fruiting stage), and level of site disturbance. At grid points, surveyors record the exotic plant species found within a 10-m radius of the point, as well as canopy cover and phenology for each species.

Upcoming Changes to the Protocol

Historically, SOPN Exotic Plant-Early Detection surveys have recorded all exotic plants found at transects and grid points. Beginning with the 2023 field season, we will restrict surveys at LAMR to a short list customized to the park. Our intent is to document infestations for which we recommend treatment, and to monitor species of high concern. The new monitoring list for LAMR ([Table 1](#)) was drawn from the park’s Natural Resource Condition Assessment (NRCA), completed by Struthers et al. (2015). In the NRCA, exotic plants found in 2012–2014 LAMR surveys were ranked across a series of factors, following a system designed by Hiebert and Stubbendieck (1993). Factors were based on the plant’s innate pest potential, and included reproductive abilities, germination requirements, and competitive abilities. The rankings were then used to classify plants into the following categories: highest concern, high concern, medium concern, or low concern. The ten highest ranked plants were designated as high priority species for the park, all of which are included in our monitoring. For further detail, see the LAMR NRCA (Struthers et al. 2015).

Please contact the Vegetation Ecologist (see above) for further customization of the LAMR monitoring list ([Table 1](#)). Additional species will be added as requested.

Monitoring Results

In late May of 2022, we sampled the 4.8 kilometers (km) of transects in Panel 3 (maps A-2 and A-3). This panel includes Blue West, Fritch Fortress, and Bates Canyon roads. No grid-point or extra-area surveys were completed. The field crew observed exotic plants on each of the transects surveyed. A total of nine exotic plant species were recorded, four of which are designated as high priority species for the park ([Table 2](#)). All species recorded in 2022 have been observed in previous surveys of Panel 3 transects, except for tall fescue (*Schedonorus arundinaceus*; Map A-10) and stinkgrass (*Eragrostis cilianensis*; Map A-6). Both of these

grasses were mapped once, on Fritch Fortress Road. They are both common roadside exotics, and both are found on the LAMR species list, meaning that they have been known to occur in the park before.

Dominant Exotic Species

Yellow bluestem (*Bothriochloa ischaemum*; Map A-4) formed dense, roadside swaths along the majority of our transects, with infestations totaling an estimated 15.0 acres (Table 2). Cover values varied from low to high, and the plant was most abundant along Blue West Road. Yellow bluestem received a ranking of highest concern from Struthers et al. (2015). This perennial grass has a strong potential to impact native plant communities based on its drought tolerance, competitive growth, and high seed production. It can form monocultures if left untreated but is most commonly found in disturbed soils (Struthers et al. 2015).

Russian thistle (*Salsola tragus*; Map A-9) was the second most abundant species in our survey, with infestations totaling an estimated 1.43 acres (Table 2). Patches of seedlings were found along all surveyed roads, at low to moderate cover. Russian thistle is an aggressive colonizer of open, disturbed soils and is less likely to invade healthy prairie ecosystems. As an annual forb, this species germinates en masse in spring and early summer, flowers, sets seed, and dies by the end of the growing season. The number of plants emerging each spring is sensitive to the timing and amount of precipitation, meaning that population size may fluctuate widely from year to year. Russian thistle reproduces only by seed, which it produces by the thousands, but the seeds remain viable for only a few years (Beckie and Francis 2009).

Treatment Recommendations

Our survey found a small number of Siberian elm (*Ulmus pumila*; Map A-12) along Fritch Fortress Road and at the end of Bates Canyon Road. This species is a fast-growing tree that produces copious amounts of seed (USDA Forest Service 2014). If resources permit, we recommend these trees be located and removed.

Control of yellow bluestem is difficult and would require multiple chemical treatments followed by revegetation. Research in western Oklahoma has demonstrated that 2–3 herbicide applications within the same growing season (May, August, and September) can significantly reduce the cover of yellow bluestem. Mowing alone does not provide control, nor does a single herbicide treatment each year. Revegetation with native perennial grasses is recommended after such an intense regime of chemical control (Robertson et al. 2013). The eradication of dense trailside infestations may not be a feasible priority. If resources permit, we recommend prioritizing treatment of smaller, isolated patches of yellow bluestem found in the prairie landscape.

Research on Russian thistle control is limited, especially in non-agricultural settings. Mowing may be an effective form of control, though it does not kill the plant or necessarily prevent it from producing a second crop of seed. To control seed production, we recommend mowing when flowers first appear. Studies done on kochia (*Kochia scoparia*), a closely related forb with a similar life cycle, have demonstrated that mowing in late July or early August significantly reduced kochia in the following year and allowed seeded perennial grasses to grow and establish (Iverson and Wali 1987). Recent research conducted within Pecos National Historical Park provides further evidence of the value of mowing. When researchers hand-clipped small patches of dense kochia in midsummer, native grasses were able to expand into these areas (Abella et al. 2020). The short-lived seed banks of these species may further the success of mowing and/or hand-clipping plants before they can reproduce, but populations can recover quickly if left unmonitored. Chemical

treatments will also effectively control Russian thistle, but broadleaf herbicides reduce the cover and biodiversity of native forbs as well (Beckie and Francis 2009, Friesen et al. 2009).

Data Availability

Data for all exotic plant species recorded in 2022 are summarized in maps in Appendix A. Maps showing species distributions are presented in alphabetical order by scientific name. All data are available to LAMR park staff and Invasive Plant Management Teams through the Southwest Network Collaboration (SWNC) Exotics Dashboard (Figure 1), hosted on the NPS ArcGIS Portal. The dashboard is a user-friendly place to download spatial files showing exact locations and sizes of infestation points and polygons. You can also view, subset, and filter the data in the Portal interface. Exotic plant data collected by SOPN since 2009 may be accessed there. To open the dashboard, activate or sign-in to your ArcGIS Portal account, contact the SOPN Vegetation Ecologist to request your name be added to the SWNC Exotics Dashboard group, and then open this group on the ArcGIS Portal. There are two dashboards available, one including data from 2009–2019, collected under a previous protocol, and one with data from 2020 to the present, collected under the protocol described in this report.

To further discuss the results of the 2022 Exotic Plant-Early Detection survey, please contact the SOPN Vegetation Ecologist or Invasive Plant Management Team staff.

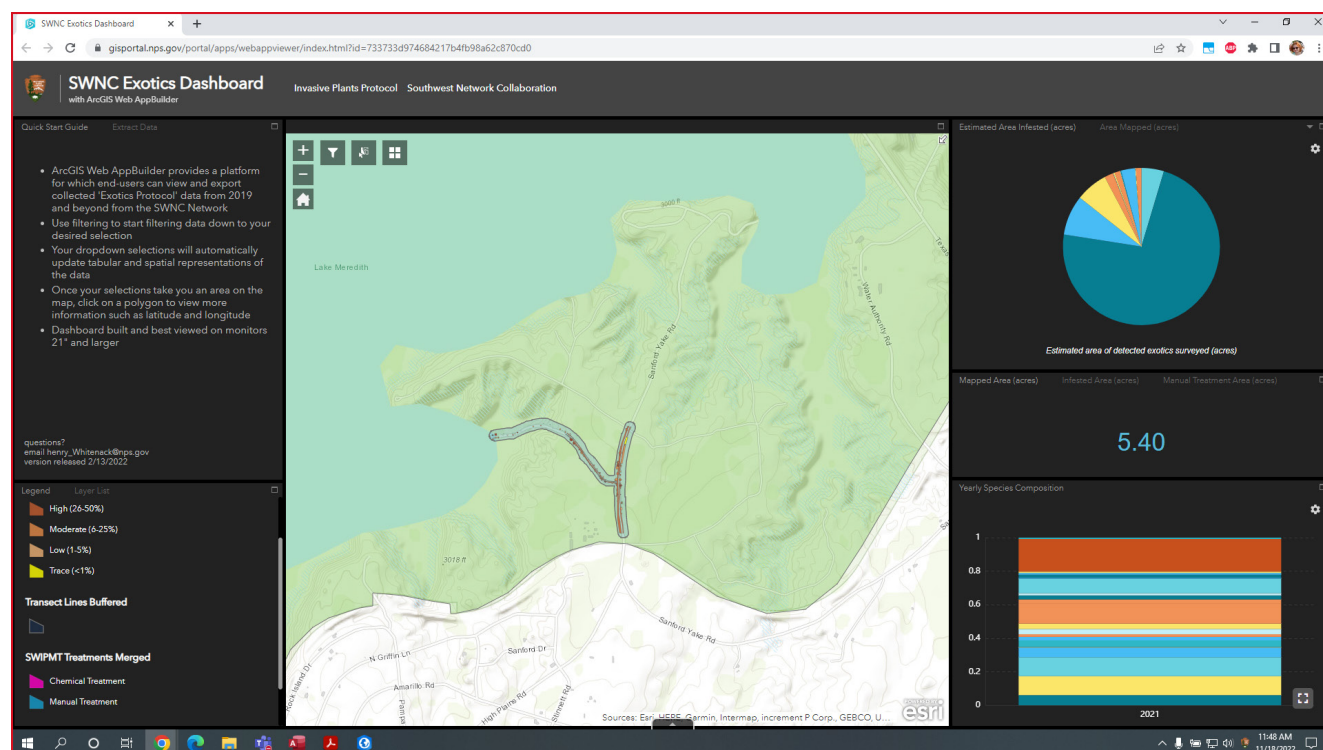


Figure 1. Screen shot of the Southwest Network Collaboration (SWNC) Exotics Dashboard, hosted on the NPS ArcGIS Portal, which can be used to view and download spatial files showing locations and sizes of exotic plant infestations.

Table 1. Exotic plant species to be included in future LAMR Exotic Plant-Early Detection surveys. Species determined as high priority in the Natural Resource Condition Assessment are marked with an asterisk. Rankings are based on the innate pest potential of the exotic plant, and categories include highest concern, high concern, medium concern, and low concern (Struthers et al. 2015).

Scientific Name	Common Name	Ranking
<i>Bothriochloa ischaemum</i> *	Yellow bluestem	Highest concern
<i>Bromus japonicus</i> *	Japanese brome	High concern
<i>Bromus tectorum</i> *	Cheatgrass	Highest concern
<i>Convolvulus arvensis</i> *	Bindweed	Highest concern
<i>Cynodon dactylon</i> *	Bermudagrass	High concern
<i>Elaeagnus angustifolia</i> *	Russian olive	Highest concern
<i>Kochia scoparia</i> *	Kochia	Medium concern
<i>Salsola tragus</i> *	Russian thistle	Medium concern
<i>Sorghum halepense</i> *	Johnsongrass	Highest concern
<i>Tamarix</i> sp.* ¹	Tamarisk	Highest concern
<i>Ulmus pumila</i> *	Siberian elm	Unranked

¹ In SOPN Exotic Plant-Early Detection surveys, species of *Tamarix* are identified to genus only.

Table 2. Exotic plant species observed in the 2022 LAMR Exotic Plant-Early Detection survey. Species determined as high priority in the Natural Resource Condition Assessment are marked with an asterisk. Infestation size is calculated as the total area mapped with the given species present. Because point infestations are recorded by size class, point acreage is estimated using the median of each class.

Scientific Name	Common Name	Life Form	Duration	Infestation Size (Est. Acreage)
<i>Bothriochloa ischaemum</i> *	Yellow bluestem	Graminoid	Perennial	15.0
<i>Salsola tragus</i> *	Russian thistle	Forb ¹ /Herb	Annual ²	1.43
<i>Sorghum halepense</i> *	Johnsongrass	Graminoid	Perennial	0.14
<i>Kochia scoparia</i> *	Kochia	Forb/Herb	Annual	0.09
<i>Bromus catharticus</i>	Rescue grass	Graminoid	Perennial	<0.01
<i>Eragrostis cilianensis</i>	Stinkgrass	Graminoid	Annual	<0.01
<i>Ulmus pumila</i>	Siberian elm	Shrub/Tree	Perennial	<0.01
<i>Schedonorus arundinaceus</i>	Tall fescue	Graminoid	Perennial	<0.01
<i>Melilotus</i> sp. ³	Sweetclover	Forb/Herb	Biennial ⁴	<0.01

¹ A forb is an herbaceous (non-woody) flowering plant that is not a grass. The colloquial term is “wildflower.”

² Annual plants germinate, flower, produce seed, and die in the space of one growing season, while perennials flower and produce seed for many years.

³ In SOPN Exotic Plant-Early Detection surveys, species of *Melilotus* are identified to genus only.

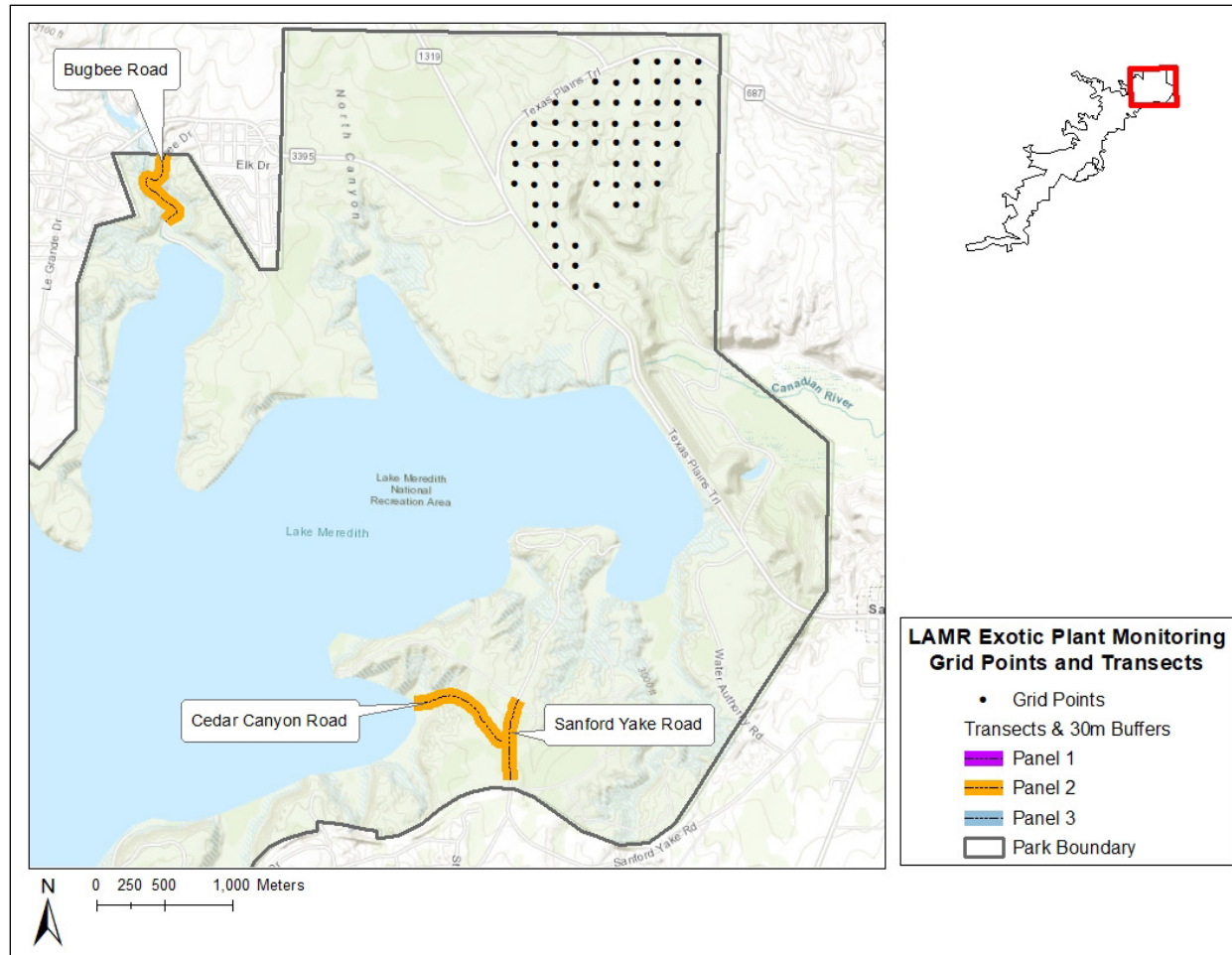
⁴ Biennial plants complete their life cycle in two years and generally do not flower in their first year.

Literature Cited

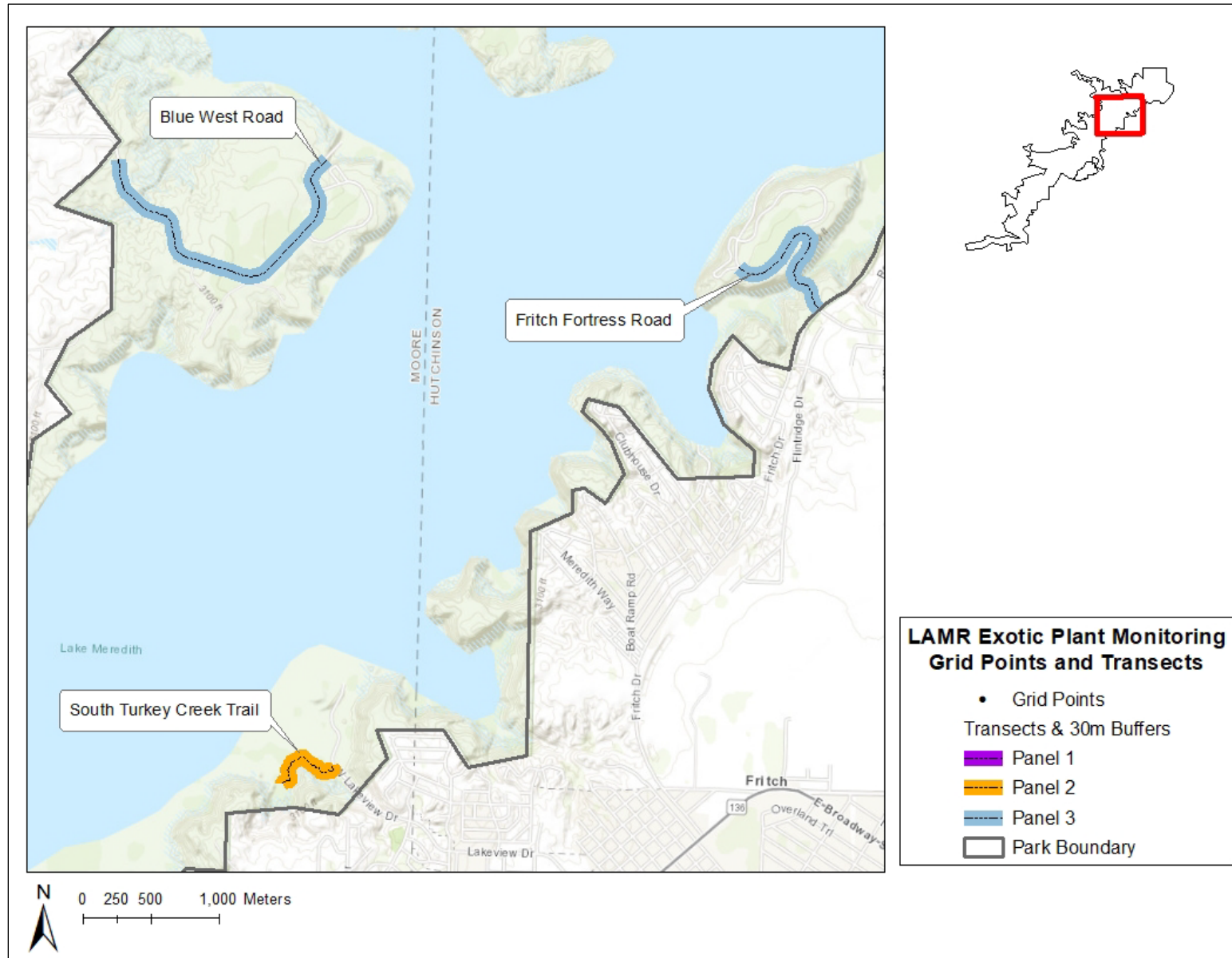
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Appendix A. Lake Meredith National Recreation Area Exotic Plant-Early Detection Survey Maps, 2022

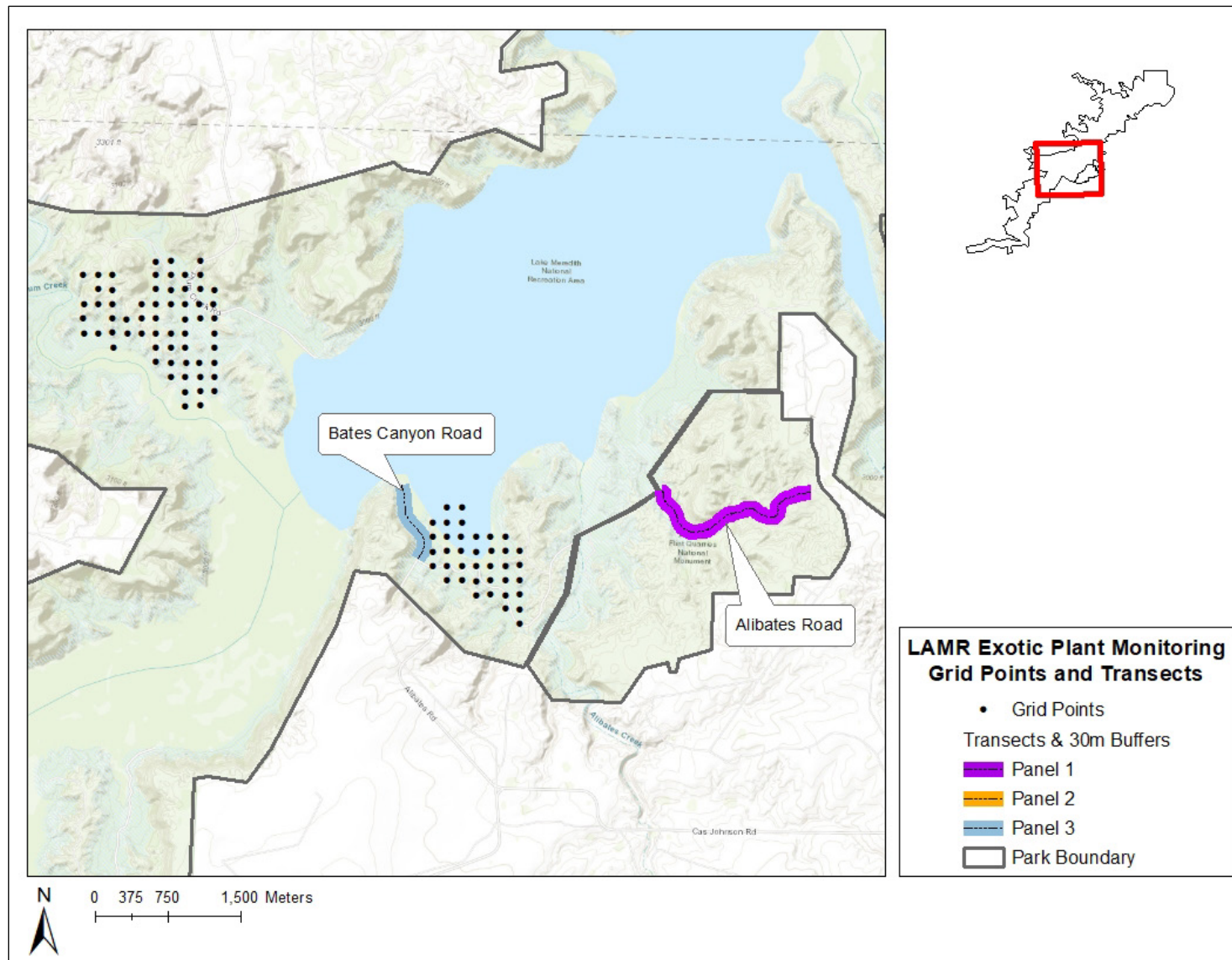
Map A-1. Map showing all exotic plant transect and grid-point locations for the northernmost region of Lake Meredith NRA. Transects are broken into three panels, with one panel surveyed each year. Panel 3, surveyed in 2022, is not located in this part of the park. Grid points are 150 m apart, and areas with >30% slope are excluded.



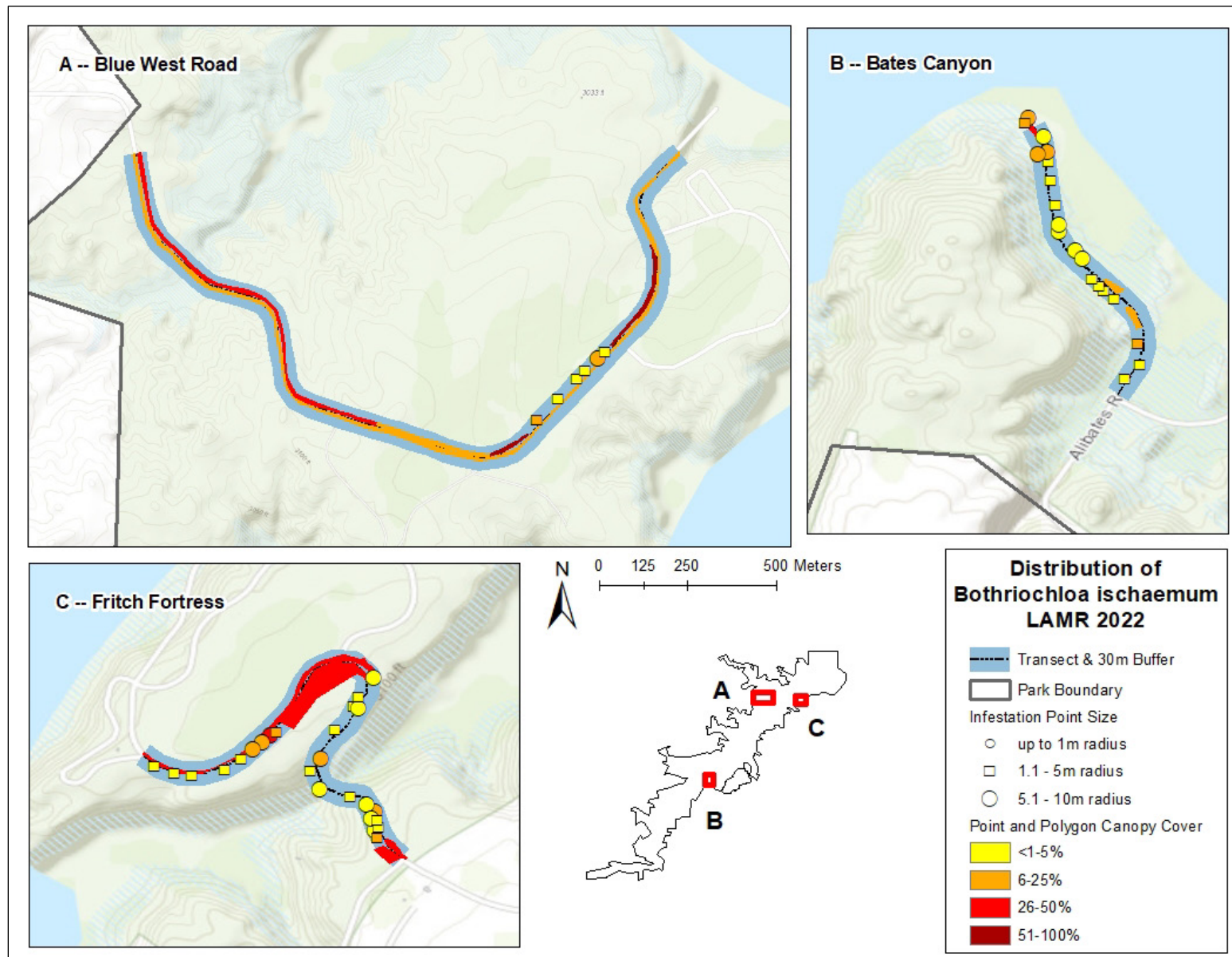
Map A-2. Map showing all exotic plant transect and grid-point locations for the Fritch region of Lake Meredith NRA. Transects are broken into three panels, with one panel surveyed each year. Panel 3 was surveyed in 2022. Grid points are 150 m apart, and areas with >30% slope are excluded.



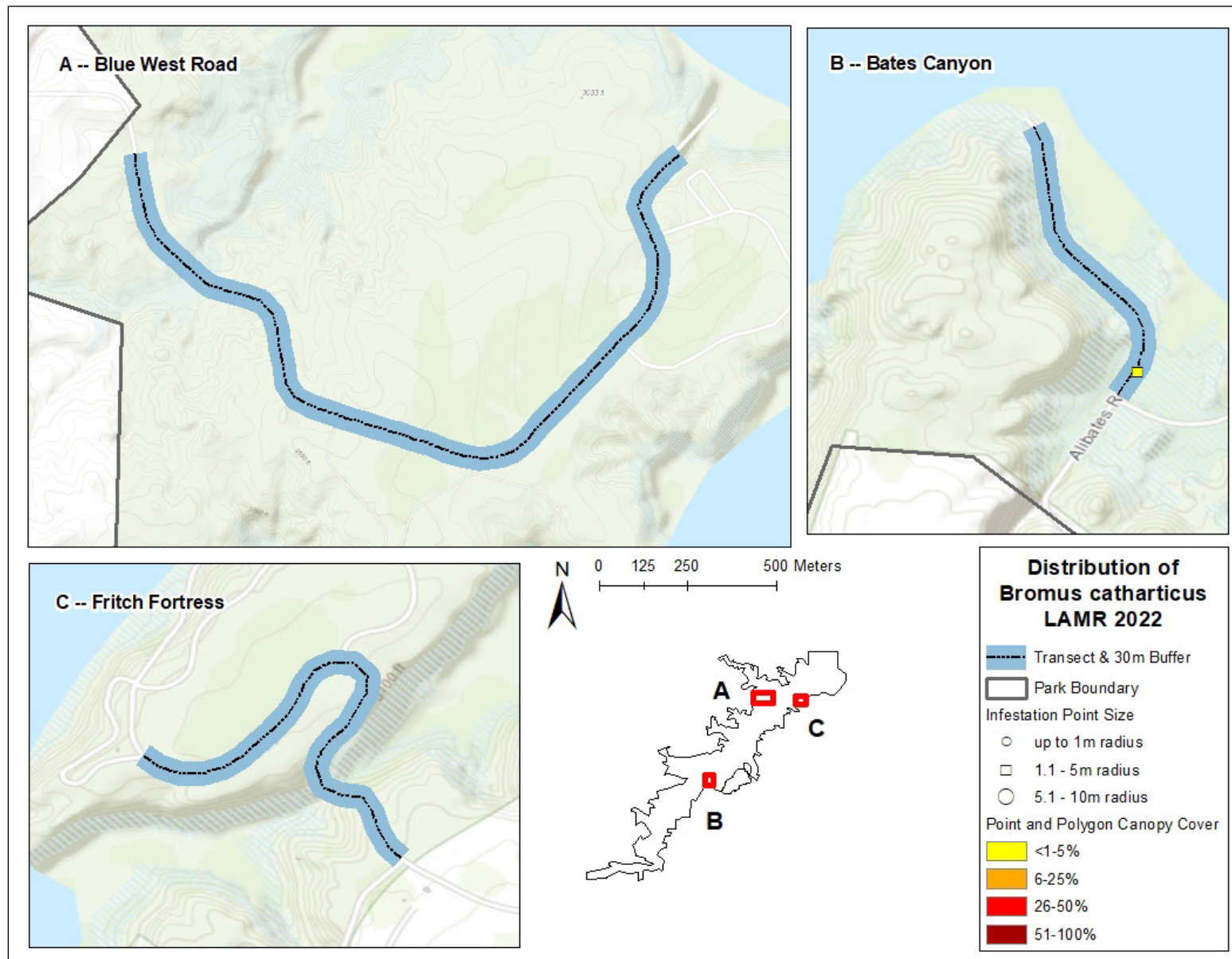
Map A-3. Map showing all exotic plant transect and grid-point locations for Alibates Flint Quarries NM and the surrounding region of Lake Meredith NRA. Transects are broken into three panels, with one panel surveyed each year. Panel 3 was surveyed in 2022. Grid points are 150 m apart, and areas with >30% slope are excluded.



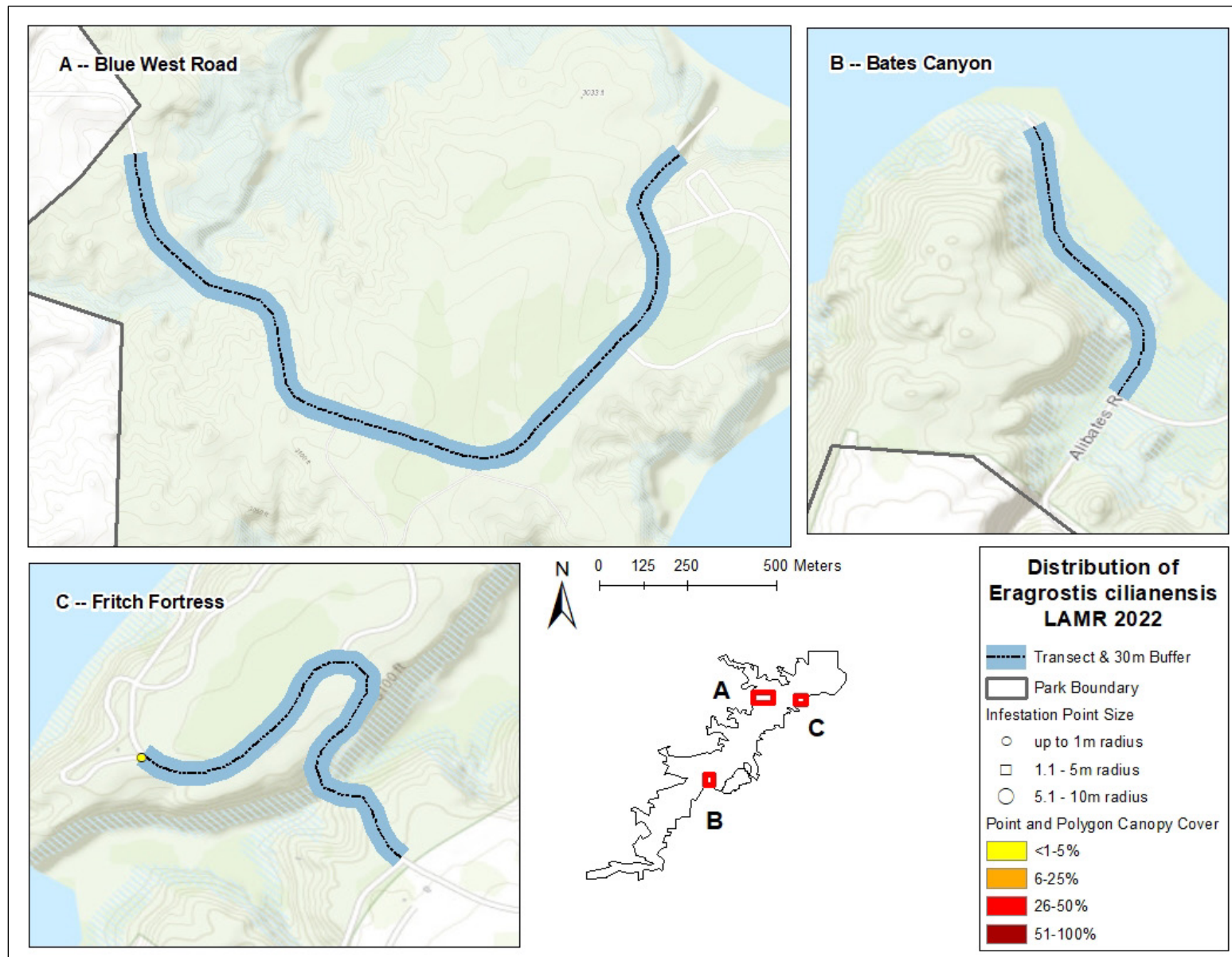
Map A-4. Yellow bluestem (*Bothriochloa ischaemum*) distribution, infestation size, and canopy cover recorded in May 2022 surveys.



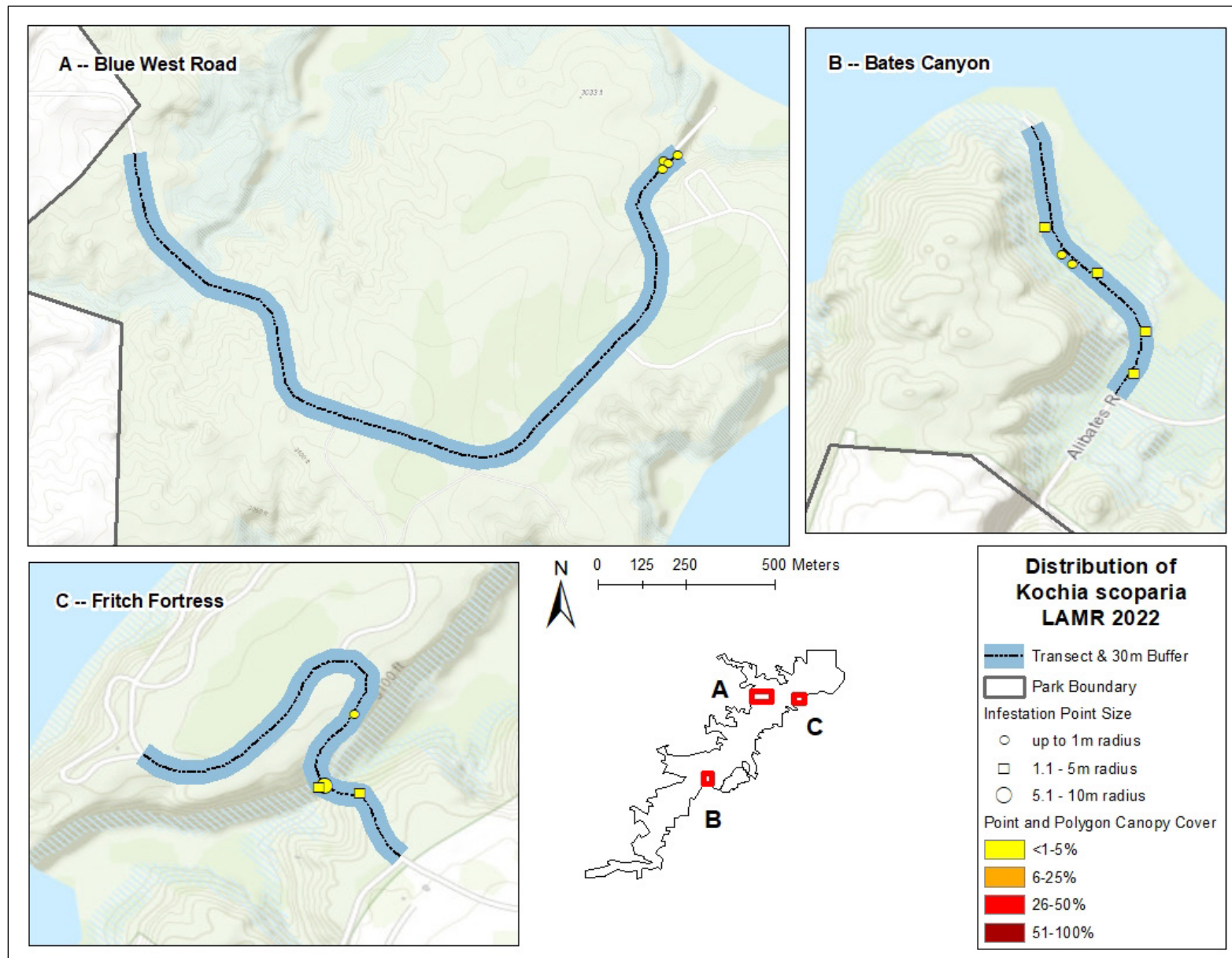
Map A-5. Rescue grass (*Bromus catharticus*) distribution, infestation size, and canopy cover recorded in May 2022 surveys.



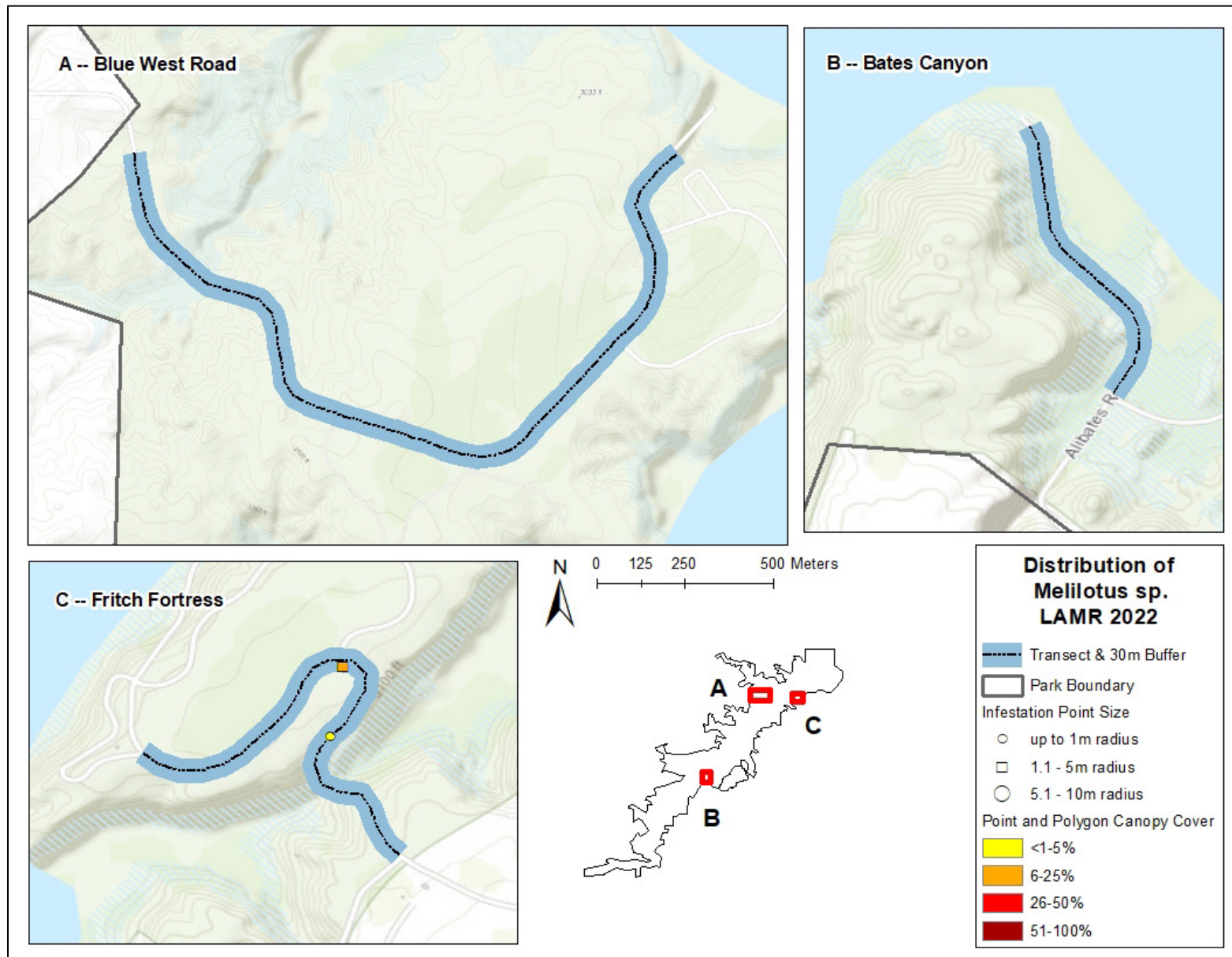
Map A-6. Stinkgrass (*Eragrostis cilianensis*) distribution, infestation size, and canopy cover recorded in May 2022 surveys.



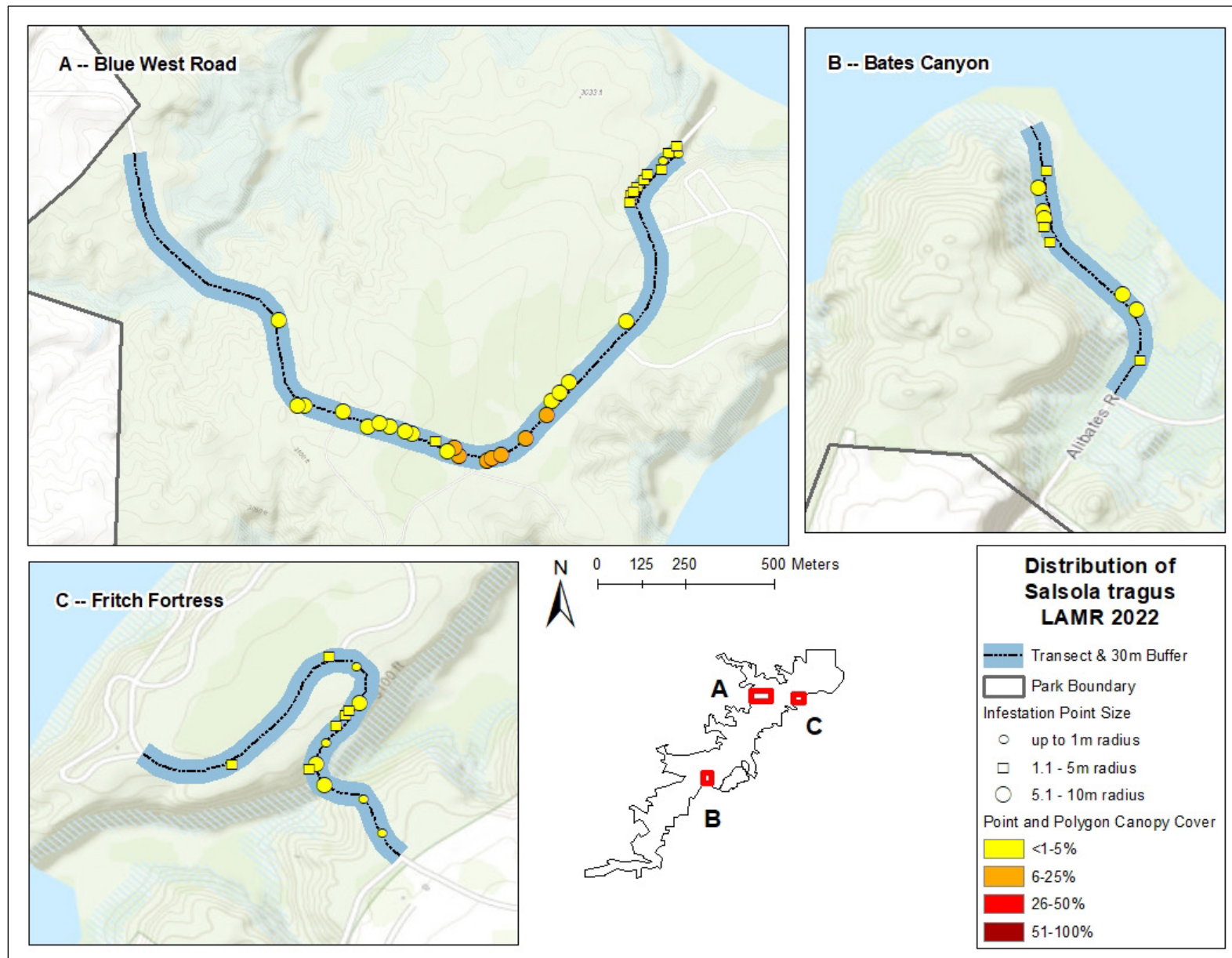
Map A-7. *Kochia (Kochia scoparia)* distribution, infestation size, and canopy cover recorded in May 2022 surveys.



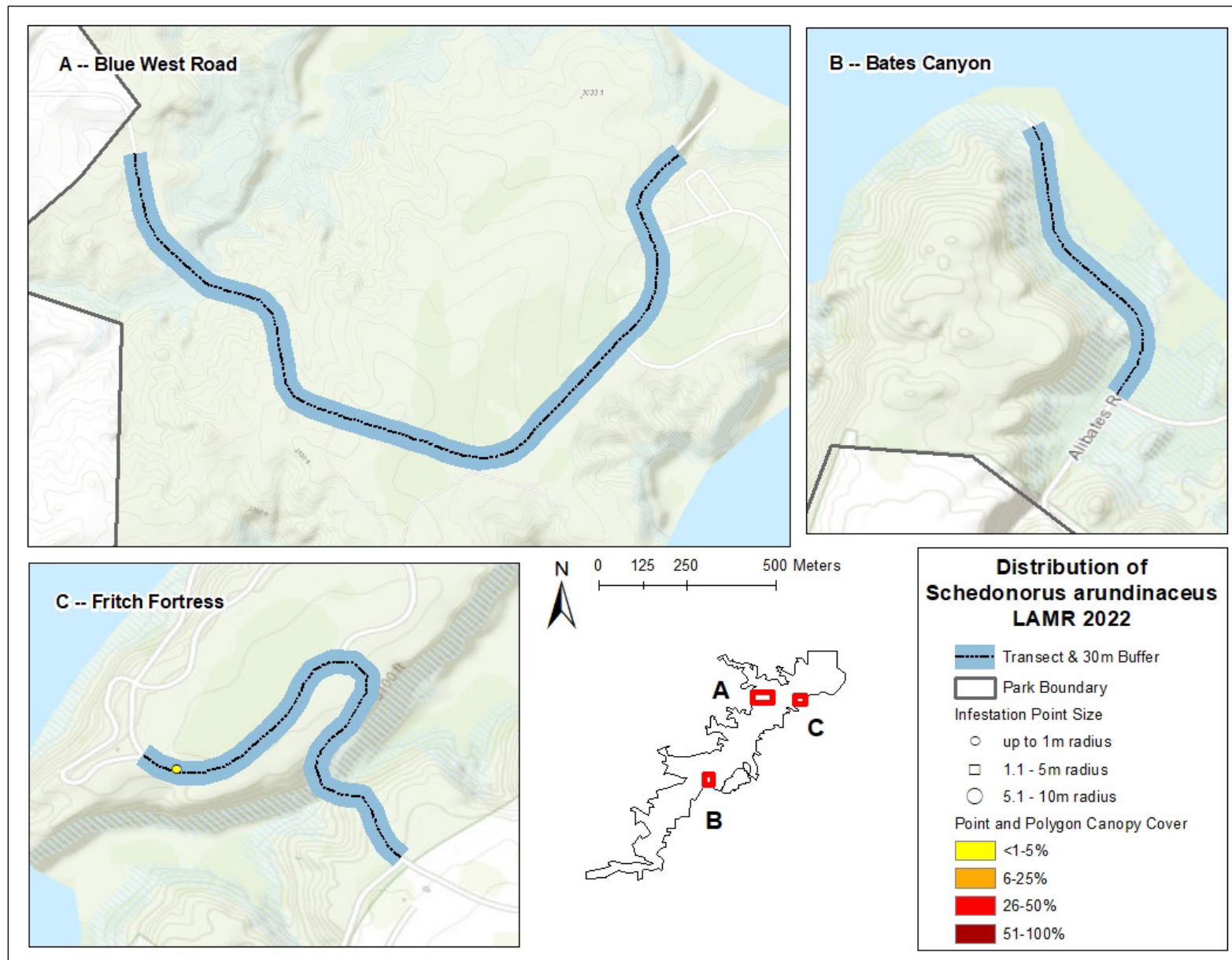
Map A-8. Sweetclover (*Melilotus* sp.) distribution, infestation size, and canopy cover recorded in May 2022 surveys.



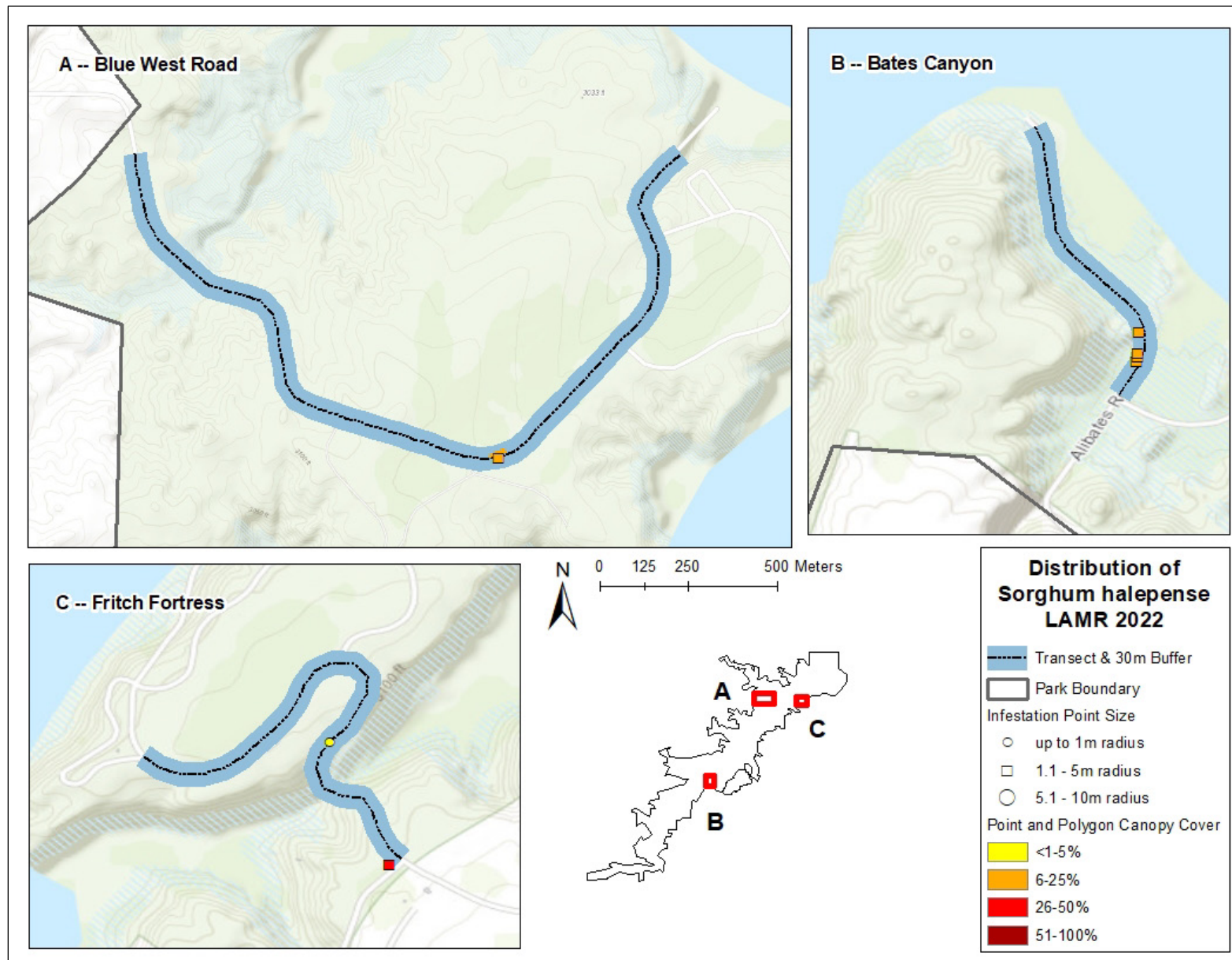
Map A-9. Russian thistle (*Salsola tragus*) distribution, infestation size, and canopy cover recorded in May 2022 surveys.



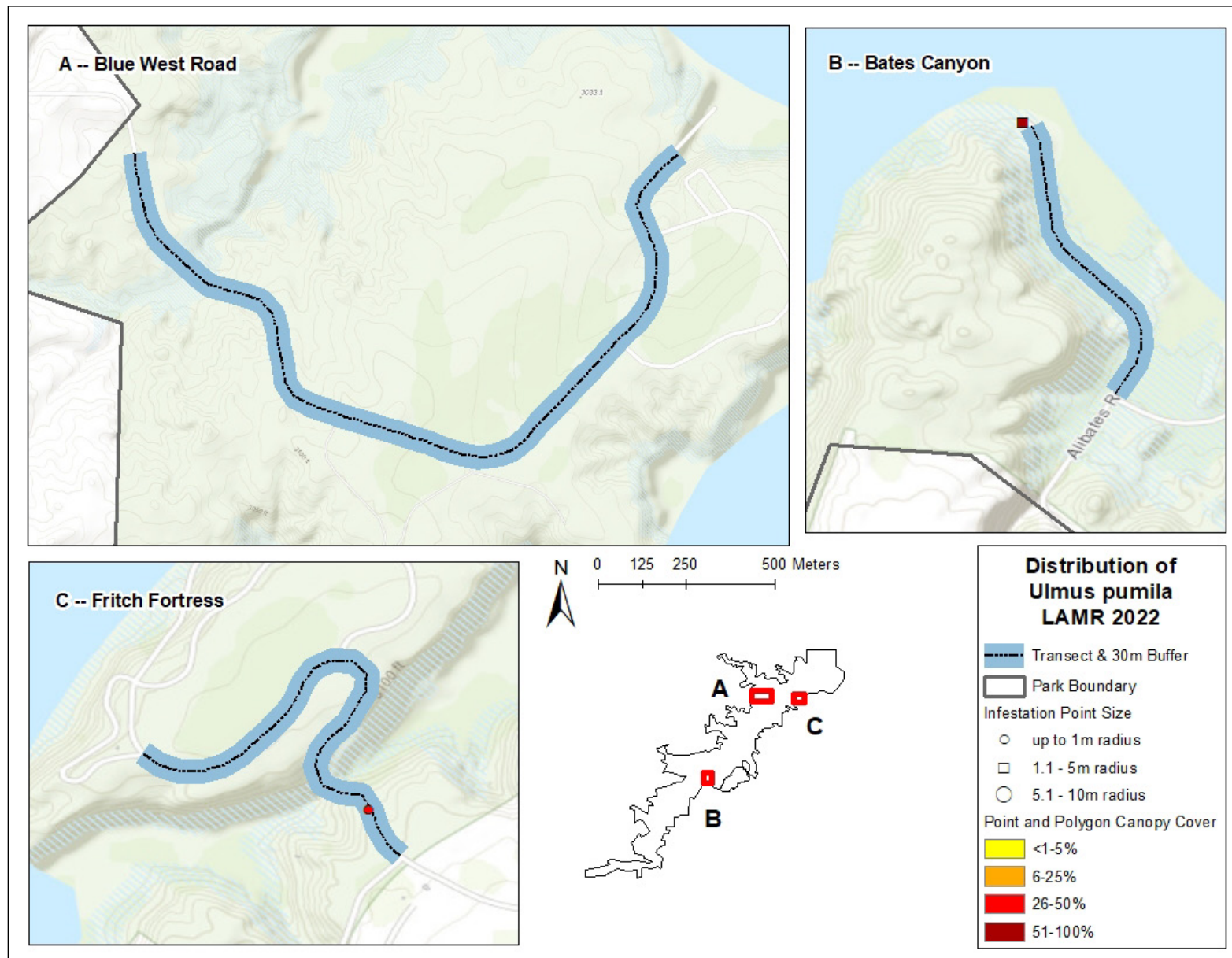
Map A-10. Tall fescue (*Schedonorus arundinaceus*) distribution, infestation size, and canopy cover recorded in May 2022 surveys.



Map A-11. Johnsongrass (*Sorghum halepense*) distribution, infestation size, and canopy cover recorded in May 2022 surveys.



Map A-12. Siberian elm (*Ulmus pumila*) distribution, infestation size, and canopy cover recorded in May 2022 surveys.



Report Disclaimer

This report received peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data, and whose background and expertise put them on par technically and scientifically with the authors of the information. Peer review helps to ensure that the information is scientifically credible, technically accurate, appropriate to its intended audience, and effectively presented. Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were summarized and interpreted within the guidelines of the protocols. Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

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