Fall 2025 Bi-National Beaver Survey of the San Pedro River: Survey Methods & Results

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Watershed Management Group

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Fall 2025 Executive Summary

Beavers were once a keystone species in the rivers of southeastern Arizona but were extirpated by trapping over 100 years ago. In an effort to revive the species locally and to regain the ecosystem services provided by beaver, the Arizona Game and Fish Department (AZGFD), in partnership with Bureau of Land Management (BLM), reintroduced beaver to the San Pedro River. Building on previous monitoring efforts, Watershed Management Group (WMG) and partners launched an annual bi-national beaver survey along the San Pedro River in 2021. Through a community-science collaboration, WMG and partners collected evidence of beaver presence in the watershed, including dams, tracks, and beaver chews.

In Fall 2025, WMG conducted the fifth and most recent annual bi-national beaver survey on the San Pedro River. This was the second year we surveyed river reaches in the lower San Pedro River. Last year, Fall 2024 was the first year we surveyed river reaches in the middle San Pedro. This year in Fall 2025, we did not survey the middle San Pedro river reaches because of a lack of flowing water and landowners had said they had not seen any beaver activity. Based on survey responses along the river reaches that were surveyed, we estimate that there are approximately 33-46 beavers present on the San Pedro River. Of the total, we estimate that there are approximately 12-16 beavers, including three family groups present in the reaches surveyed in Sonora. Within Arizona, we estimated 21-30 beavers, including 3-4 families. The San Pedro Riparian National Conservation Area (SPRNCA), managed by the BLM, had an estimated 11-15 beavers, including one family, while the lower San Pedro had 10-15 beavers with 2-3 family groups. These results highlight a slight increase in the beaver population along the San Pedro River.

Introduction

Historically, beavers played a key role in maintaining watershed health for the Santa Cruz and San Pedro Rivers and were once considered a keystone species in these watersheds. However, they were extirpated from the local watersheds by over-trapping in the 1800s. Beavers were reintroduced to the San Pedro Riparian National Conservation Area (SPRNCA) in 1999 and 2000 with Arizona Game and Fish Department (AZGFD) leading beaver translocation and initial monitoring efforts. The Bureau of Land Management (BLM) later continued monitoring for several years. The beaver population initially grew to over 100 individuals by 2010, but has since sharply declined. The loss of this “ecosystem engineer” species threatens the health of these rivers, especially in the face of the ongoing Southwest megadrought. To reverse the decline of beavers and protect their vital role in rehydrating our watersheds, a better understanding of local beaver activity is needed.

In 2015, Mike Foster, a local resident, and Steve Merkley from Cochise College began informal surveys to continue monitoring the health of the beaver population. In 2020, Watershed Management Group (WMG) partnered with Foster and Merkley to support community-science driven survey efforts in the SPRNCA, building on Foster’s experience with previous BLM surveys. In 2021, WMG expanded and formalized this effort by implementing a beaver survey data collection application (Survey123), developing standardized methodologies and protocols, and establishing partnerships to coordinate survey efforts between Arizona and Sonora, Mexico.

The goal of the bi-national survey is to better understand the population size and distribution of beaver along the San Pedro River and to track changes in population and movement over time. Survey results provide valuable information to inform management and restoration of habitat in the SPRNCA and can inform efforts to support beaver reintroduction in other areas of southern Arizona. Additionally, the survey helps WMG and its partners better understand and forecast beaver reintroduction dynamics in southern Arizona.

The Bi-National Beaver Survey is part of WMG’s “Release the Beavers” campaign, which aims to advocate for beaver reintroduction, monitor the health and distribution of beaver populations, and restore creeks and rivers by utilizing beavers to slow flows, spread water across floodplains, and recharge aquifers. Re-establishing beaver populations is a proven, cost-effective strategy to enhance groundwater recharge and improve habitat for native wildlife species. As a keystone species, beavers create conditions that restore surface flows, mitigate flood impacts, and increase ponding. This benefits the habitats of a number of other native species, including bird species that support Arizona’s recreation economy (Johnson and Van Riper, 2014). Through education, community science and advocacy, beavers can return to southern Arizona’s creeks and rivers.

Methods

These survey methods are based on community science models and informed by a comprehensive literature review of similar studies, as well as consultations with local experts. All volunteers were required to attend or view the recording of a virtual training, which outlined the

purpose of the beaver surveys, survey procedures, necessary gear, and what to expect during the survey.

During the surveys, volunteers and staff traversed riverbanks while documenting evidence of beaver activity, including tracks, tree chews, dams and lodges. Volunteers were organized into groups of four to eight, each led by at least one WMG staff member, intern, or representative from a partner organization. Observations were recorded using the ESRI ArcGIS Survey123 app for data collection. The volunteers also gathered information about trees within a 50-foot radius of the identified activity, focusing on riparian species such as willow, cottonwood, ash, sycamore, jarilla, and hackberry. Volunteers were also asked to assess river flow levels and provide photo evidence. A section was included for additional notes, and photo evidence was required to showcase the identified activity. The beaver survey questionnaire included an option to document cattle activity, such as tracks, dung, or the presence of cattle along the river. All cattle observations are recorded and reported to the BLM for the SPRNCA river reaches. For detailed methodology please refer to prior annual survey reports found online.

Fall 2025 Survey

A total of 63.5 river miles of the San Pedro River and tributaries were surveyed from the headwaters in Sonora Mexico, to the lower San Pedro downstream of Mammoth, Arizona (see Figure 1). WMG designated 23 reaches in total to survey: five reaches in Sonora totaling 13.5 miles, 14 reaches in the Upper San Pedro River, also known as the San Pedro Riparian National Conservation Area (SPRNCA) totaling 41 miles, one reach along the lower Babocomari River totaling 3 miles, and four reaches in the lower San Pedro totaling 9 miles.

Within the SPRNCA, volunteer groups completed nine surveys totalling 25.6 miles on November 15th and two surveys totalling 5.9 miles on December 6th. On December 4th Mike Foster completed the first two reaches, covering 4.2 miles from the U.S.–Mexico border to Arizona State Route 92 (SR 92) and 2.3 miles from Arizona State Route 92 (SR 92) to Casa de San Pedro B&B. Additionally, Watershed Management Group staff completed the 3 mile survey on the lower Babocomari creek on January 5th. Within the lower San Pedro River, volunteer groups completed 4 surveys totalling 9 miles on December 6th.

In Sonora, Mexico along the San Pedro River and a tributary just south of the U.S.–Mexico border surveys totaling 13.5 miles were completed on November 25th and 26th by WMG staff and partners organizations Comisión Nacional de Áreas Naturales Protegidas (CONANP) and Profauna Mexico.

In total, about 120 volunteers participated in the Fall 2025 survey efforts.

Data Analysis Methods

To analyze the Fall 2025 results in ArcGIS Online, each entry indicating recent signs of beaver activity such as chews, dams, lodges, slides, food caches, tracks and scat was reviewed and confirmed by WMG to verify whether the sign was indeed recent.

In the map viewer, unique symbols were assigned to each activity sign type: chews, dams, lodges, slides, food caches, tracks, and scat. These unique symbols helped to distinguish between observation signs to identify family groups from those of individual roaming beavers.

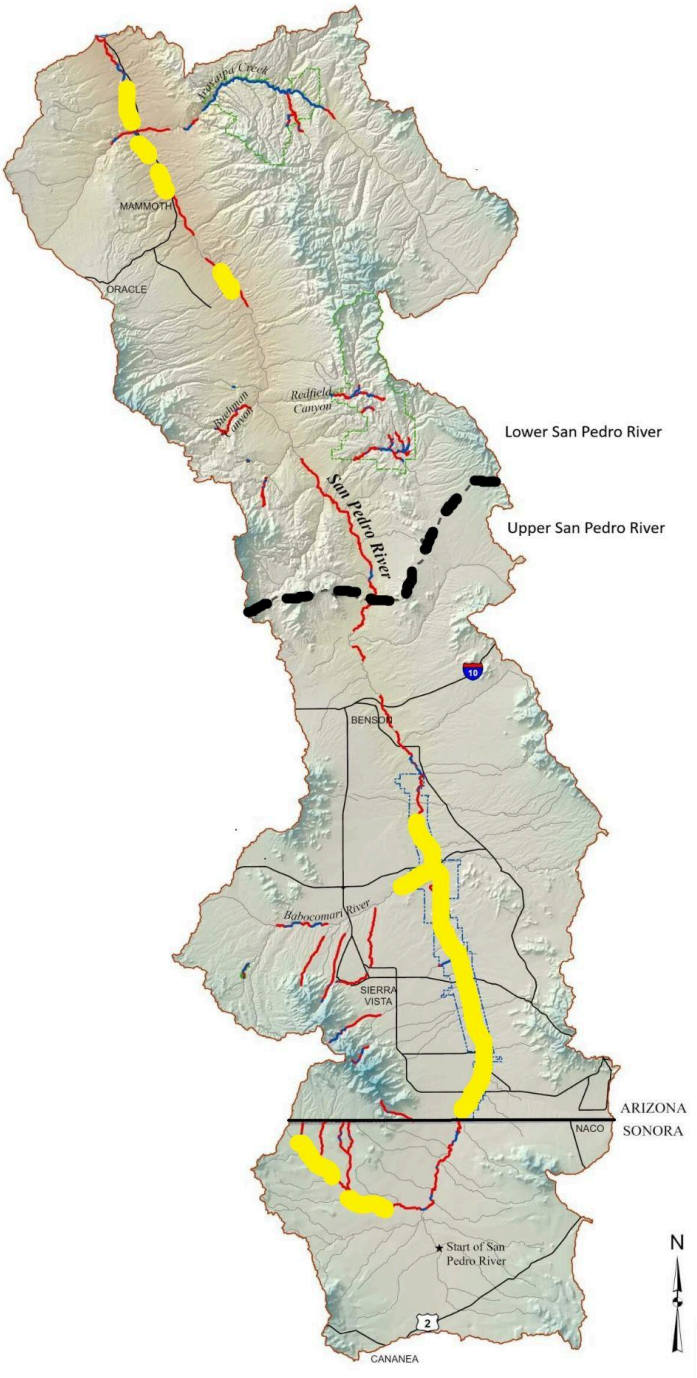


Figure 1: Map of reaches that were surveyed in the Fall 2025 San Pedro Beaver Survey highlighted in yellow. Base map credit: The Nature Conservancy

Protocol For Estimating Beaver Populations
Based on the proximity of each beaver sign, we were able to estimate where and differentiate between family groups and individual roaming beavers along the reaches of the San Pedro River in Arizona and Sonora.

Family groups were identified by clusters of activity that include one or more of the following: an active dam with recent repairs or nearby fresh chews, an active lodge with recent herbivory, tracks, or scat, extensive herbivory across multiple banks, downed and possibly moved trees, food caches, or bank slides. These clusters suggest residency and typically represent a family group of about four beavers, with each family spaced at least ½ mile apart.

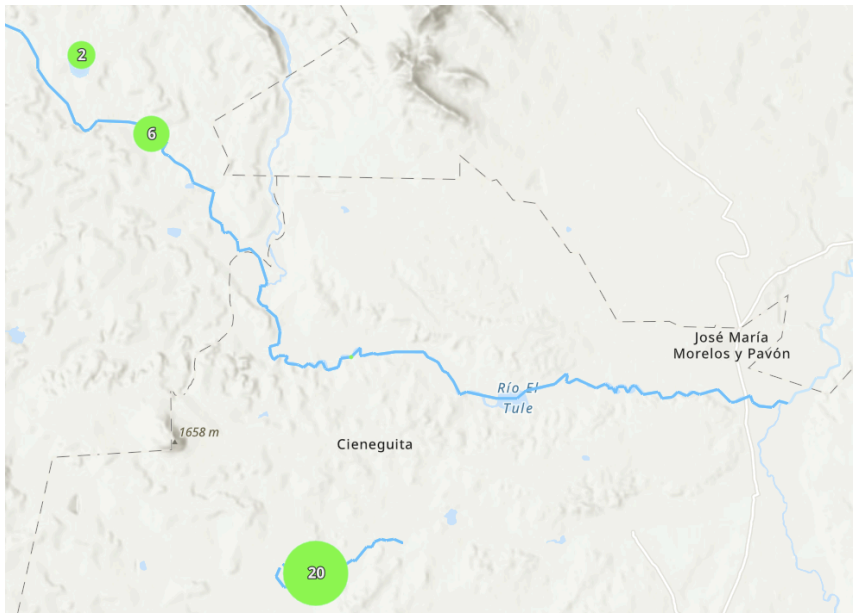
In contrast, roaming individuals are identified by smaller clusters of activity—usually a few fresh chews—without a dam or lodge within a ½ to 1-mile radius.

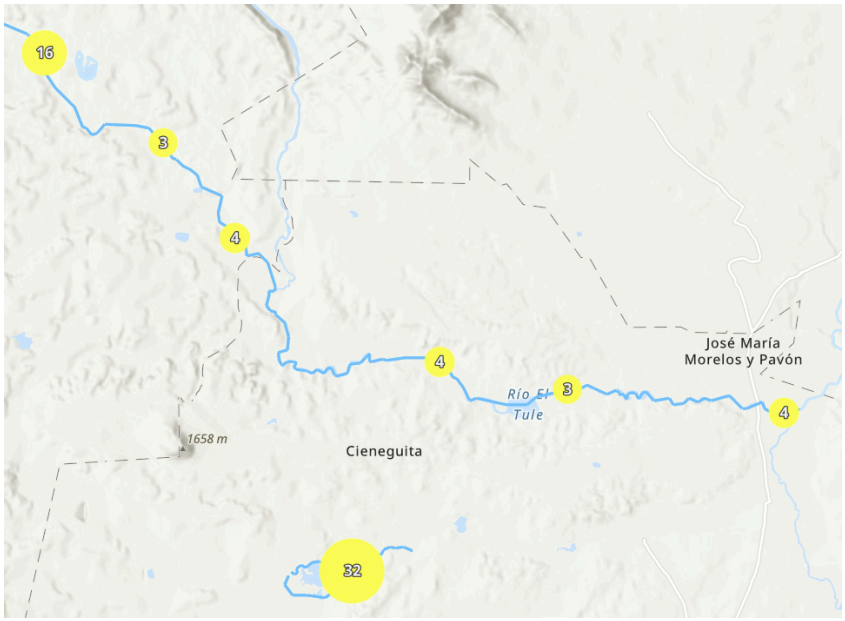
Population estimates are based on protocols informed by BLM research, literature reviews, and field observations. While the BLM generally uses a 1-mile spacing standard, WMG adopts a minimum ½-mile separation based on additional data sources (Campbell-Palmer et al. 2021). These protocols were also peer reviewed by Dr. Steve Merkley, Biology instructor at Cochise College and Mike Foster, Local Naturalist & Videographer and interpretive staff for the Friends of the Huachuca Mountains at the Carr House Information Center.

Results

Based on survey responses along the river reaches that were surveyed, we estimate that between 33-46 beavers are present on the San Pedro River and surveyed tributaries (see Table 1). Of the total, we estimate that there are approximately 12-16 beavers, including three family groups present in the reaches surveyed in Sonora. Within Arizona, we estimated 21-30 beavers, including 3-4 families. The SPRNCA had an estimated 11-15 beavers, including one family, while the lower San Pedro had 10-15 beavers with 2-3 family groups.

In Sonora, of the five reaches surveyed, two reaches (La Calera 1 and 2) showed recent signs of beaver activity (see Figure 2). La Calera 1 had one family with approximately four beavers in that family. La Calera 2 had two families, with an estimated eight individual beavers. In total, these results give an estimate of 12 beavers in the San Pedro River headwaters in Sonora based on observed data. However, because the Cieneguitas area, where in prior years we had observed beaver activity, was not surveyed this Fall, we present the Sonora total as a range of 12-16 beavers to account for the possible presence of an additional family group.





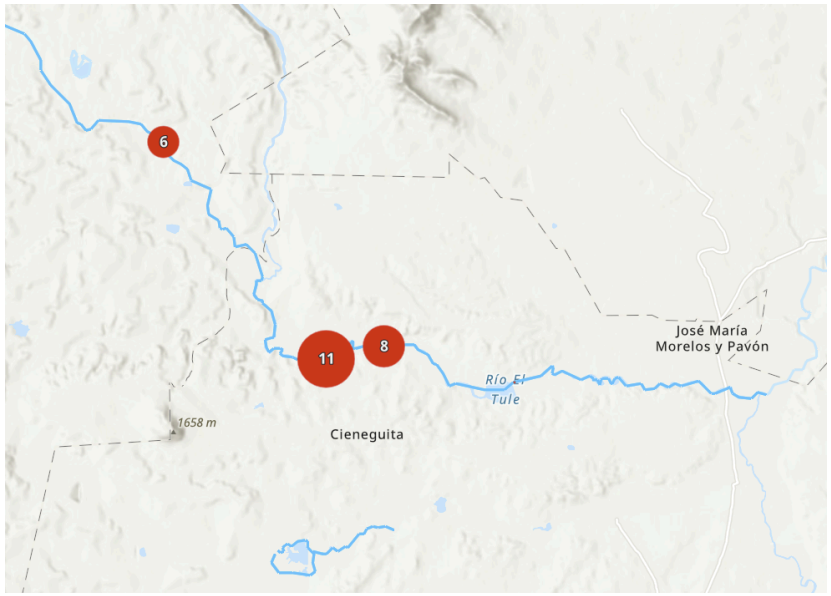


Figure 2: Maps of recent beaver signs seen in reaches surveyed from 2021-2024 San Pedro Beaver Surveys in Sonora. Fall 2021 (Green), Winter 2022-2023 (Yellow), Spring 2024 Not Surveyed, Fall 2024 (Red) and Fall 2025 (Purple).

In Arizona, surveys were conducted in the SPRNCA as well as downstream in the lower San Pedro. In the SPRNCA (see Figure 3), of the 14 reaches that were surveyed, seven of the reaches (Reach 3, 4, 5, 7, 8, 9 and 14) showed recent signs of beaver activity. Reach 3 had one to two roaming individual beavers; Reach 4 had 1 family with an estimated four individuals in the family and one roaming beaver; Reach 5 had one to two individual roaming beavers; Reach 7 had possibly one roaming beaver, Reach 8 had one to two roaming beavers along that stretch; Reach 9 had one roaming beaver; Reach 14 along the lower Babocomari River had two beavers. Overall, there were an estimated 11-15, including one family in the SPRNCA. In the lower San Pedro (see Figure 4), of the four reaches surveyed, three reaches (Reach 18.4, 19.5, and 20.6) showed recent beaver activity. Reach 18.4: San Manuel has an estimated 2-3 family groups, with 8-12 individuals overall. Although we can confidently estimate 2 families based on survey results, an additional family was estimated based on communication from Fall 2024 with an AZGFD staff member.

Overall, compared to the previous years of the survey results, Fall 2025 presents a slight increase in the beaver population along the San Pedro River.

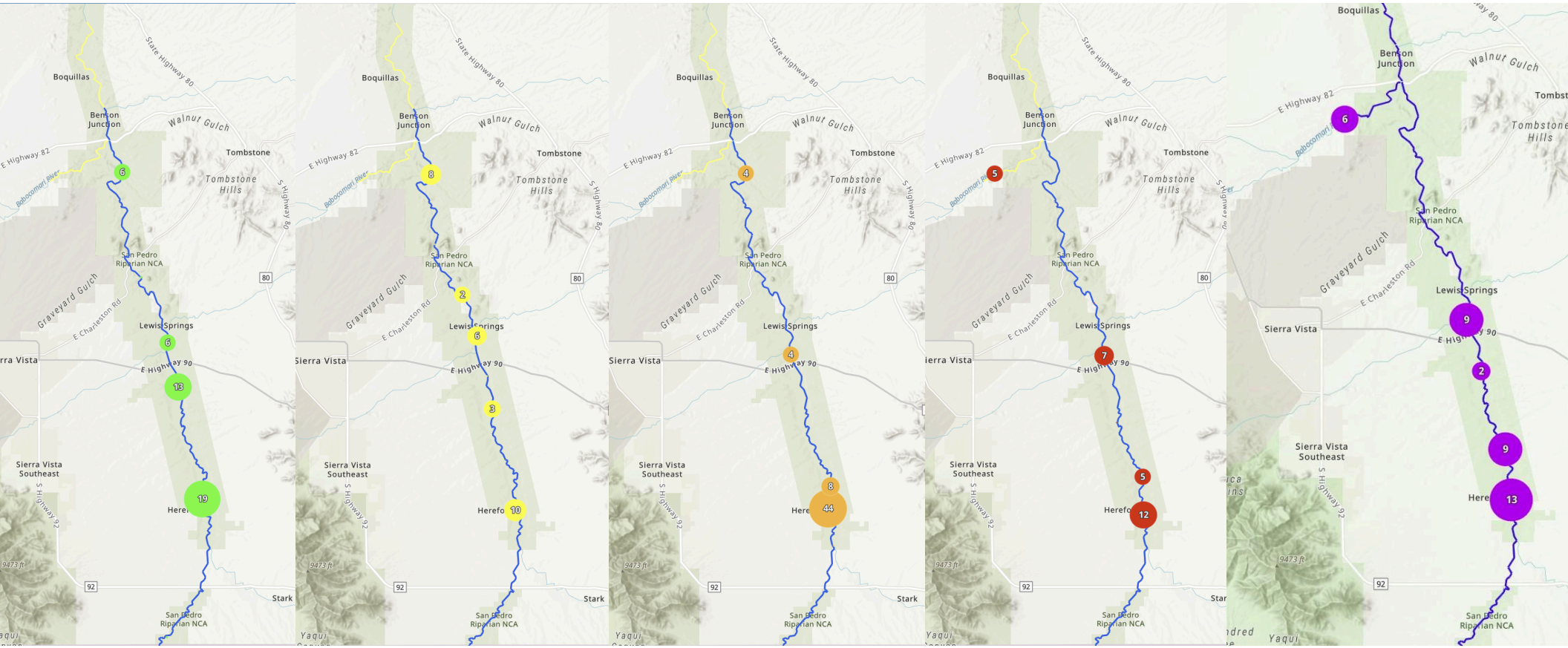


Figure 3: Maps of recent beaver signs seen in reaches surveyed from 2021-2024 San Pedro Beaver Surveys in SPRNCA. Fall 2021 (Green), Winter 2022-2023 (Yellow), Spring 2024 (Orange), Fall 2024 (Red) and Fall 2025 (Purple).

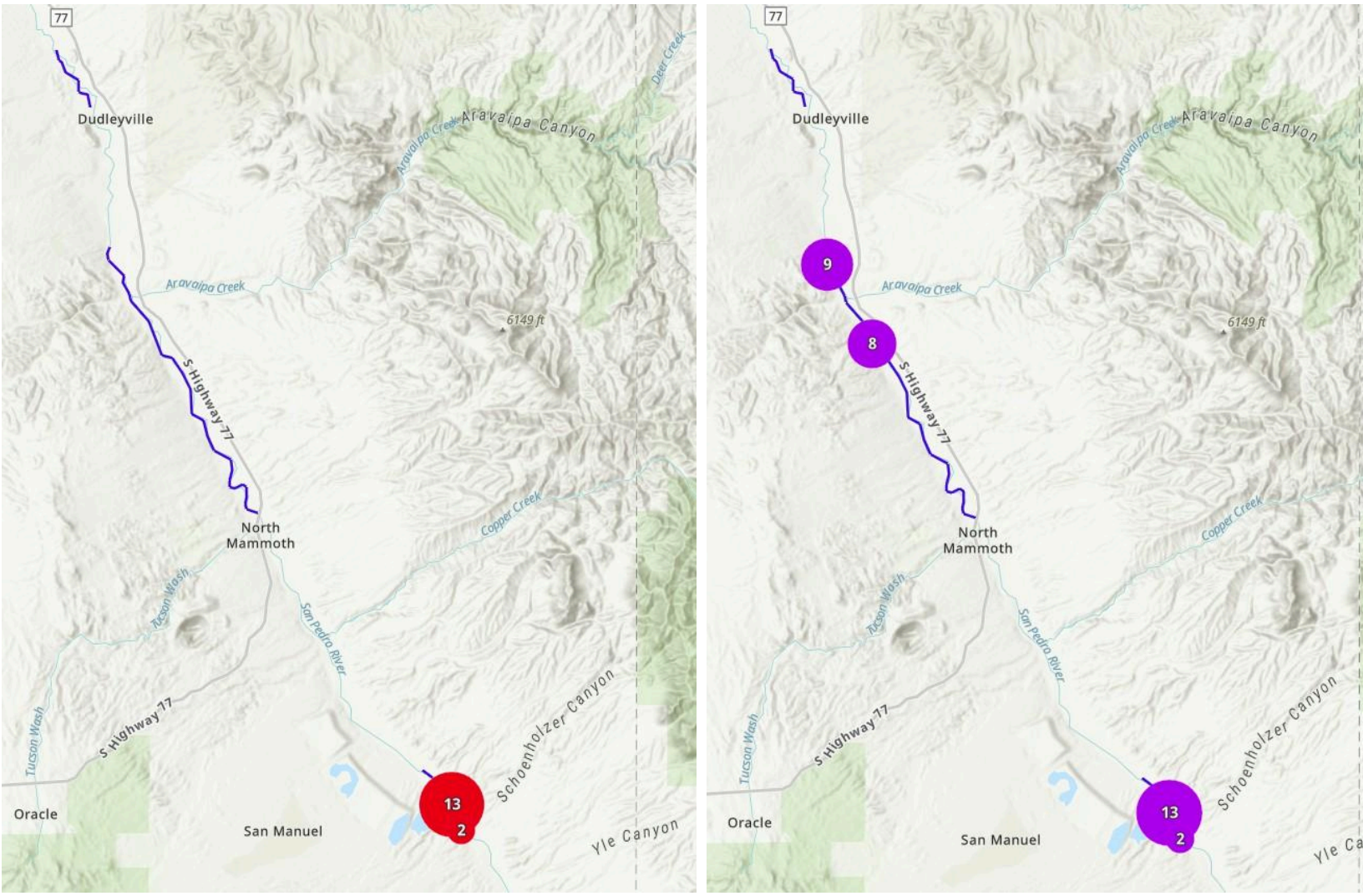


Figure 4: Map of recent beaver signs seen in reaches surveyed from 2024-2025 along the lower San Pedro River. Fall 2024 (Red) and Fall 2025 (Purple)

Estimate of San Pedro Beaver Population by Survey Year					
Location	**Survey Year**				
	Fall 2025	**Fall 2024**	**Spring 2024**	**Winter 2022-23**	**Fall 2021**
San Pedro Headwaters, Sonora, MX	12-16	13-17	-	24-26	20-32
Upper San Pedro, AZ, US	11-15	9	11-14	13-17	16-20
Lower San Pedro, AZ, US	10-15	8-12	-	-	-
Total	33-46	30-38	11-14	37-43	36-52

Table 1: San Pedro Beaver population estimate by year and section of the river.

*Note: Different water years for Fall 2024 and Spring 2024

Discussion

Compared to Fall 2024, the Fall 2025 survey results indicate a slight increase in the beaver population along the San Pedro River, with an estimate rising from 30-38 individuals in 2024 to 33-46 individuals in 2025. Despite this increase, the population remains substantially below the peak of over 100 individuals observed around 2010 in just the SPRNCA alone. Long-term recovery of this population remains uncertain.

The observed increase in 2025 appears to be driven primarily by changes within Arizona reaches, particularly in the SPRNCA and lower San Pedro. In the lower San Pedro, the increase in estimated abundance is likely attributable to the Arizona Game and Fish Department's (AZGFD) relocation of a male and female pair of beavers trapped at the Arlington Wildlife Area along the Gila River into the Lower San Pedro River Wildlife Area. Per communication with AZGFD, this pair was relocated because they were considered a nuisance to where they were trapped, and have been released into the Lower San Pedro River Wildlife Area to assist with riparian restoration efforts. This translocation likely contributed to the recent beaver activity documented during this survey period, and should be considered when interpreting population increase on the lower San Pedro River.

In the SPRNCA, the observed increase in recent beaver activity detections may reflect a combination of ecological and behavioral responses rather than a true increase in population size. During drier conditions, the beavers may be expanding their foraging ranges beyond their

core territories in response to reduced resource availability, thus increasing detectability along surveyed reaches. Additionally, this pattern may reflect increased juvenile dispersal, as subadults leave natal territories to establish new home ranges, a process that can temporarily elevate observations of solitary or roaming individuals without corresponding increases in stable family groups. In previous survey years partners have attributed the decrease in population to fluctuating low and high flow monsoon seasons in recent years, seasonal and annual drought conditions, and increased predation by local species such as mountain lions, but these have not been investigated in detail.

In Sonora, population estimates remained relatively stable compared to Fall 2024, with minor variation likely influenced by differences in survey coverage and the continued absence of the Cieneguitas area from sampling effort. As in previous years, this introduces uncertainty into regional estimates and limits direct year-to-year comparability. However, year-to-year comparisons of individual reaches are tracked.

Spatially, beaver activity in 2025 remains concentrated in core areas identified in previous surveys, suggesting limited range expansion despite increased detections. While more reaches showed evidence of activity, this may reflect a combination of improved detectability, dispersal behavior, and localized augmentation rather than broad-scale population recovery.

Overall, although Fall 2025 results indicate a slight increase in estimated abundance, interpretation of this estimate should account for translocation events, potential ecological-driven changes in movement and foraging behavior, and ongoing environmental stressors such as drought and flow variability. Continued long-term monitoring will be essential to distinguish between short-term fluctuations and sustained population change.
WMG will continue to advocate for beaver conservation in southern Arizona and northern Mexico and use the results of this year's survey to highlight that need. Recent and ongoing habitat restoration efforts in the lower San Pedro River and lower Babocomari River provide notes of progress in enhancing habitat along specific reaches and supporting a beaver response in both locations. Conversations with land managers and partner organizations along other sections of the river and watershed offer hope for future habitat enhancements to stabilize and help recover the beaver population.

Acknowledgements

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References

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