Mapping Occurrences of *Coniatus splendidulus* Across its Introduced Range Alongside *Tamarix* spp. Using Public Contributions

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Abstract. Little is known about the origins and ecology of the splendid tamarisk weevil (STW; *Coniatus splendidulus* Fabricius 1781) in its nonnative range of North America. This weevil is an obligate herbivore of tamarisk (*Tamarix* spp.), which has become widespread in its introduced range. Given the lack of baseline information about its distribution, we aim to create the first maps of the spread of the STW across its introduced North American range. We gathered location data for occurrence points from several public online databases and university collections. We used kernel density/heatmap methods to create distribution maps showcasing the spread of STW in relation to its host plant, tamarisk. Occurrence records suggest STW dispersed quickly following its introduction in 2006-2008. By 2012, STW had dispersed to five states: Arizona, Nevada, New Mexico, California, and Texas, and by 2016, it had reached three others: Colorado, Utah, and Oklahoma. Since 2016, STW occurrences have densified within this range, centered on tamarisk populations in the southwestern United States. STW had spread to Mexico in 2014, moving from Baja California to Sinaloa in 2021, indicating a southern range expansion. With an occurrence in southern Idaho in 2021, the STW may also spread north over time. Our results suggest a strong dispersal ability of STW and highlight the need for more work to understand how it was introduced and the potential ecological consequences of its spread.

Keywords: Nonnative species, Invasive Species, Riparian, Insects, Beetles

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Introduction

Riparian habitats have been ecologically altered and degraded due to the introduction of non-native plant species (Johnson 2013; Orr et al. 2014). Introducing herbivorous insects as biocontrol is a common management tool to help control non-native plant populations and restore riparian areas (DeLoach et al. 2004; Orr et al. 2014; Nagler et al. 2021). Biocontrol insects are studied intensively before release; however, unintentional introductions may impact restoration goals (DeLoach et al. 2004; Gaffke et al. 2022). In these cases, understanding the spread of these insects can help identify dispersal mechanisms and geographic areas of impact.

Tamarisk (*Tamarix* spp.), a non-native invasive shrub, was introduced to North America in the 1800s from Eurasia (Lehnhoff et al. 2011; Chew 2013; Nagler et al. 2021). This shrub is detrimental to riparian ecosystems as it outcompetes native flora, increases soil salinity, lowers the water table, and alters soil physicochemical properties to maintain a favorable environment for itself (Di Tomaso 1998; Pattison et al. 2011; Johnson 2013; Araya et al. 2022). Mature tamarisk plants can produce over half a million tufted seeds annually, germinating within 24 hours of moisture detection, facilitating germination while floating downstream (Warren & Turner 1975; Di Tomaso 1998). The widespread nature of this plant poses a threat to native plants and the biodiversity of riparian ecosystems, warranting methods of control.

Biocontrol methods have been intentionally introduced as tamarisk has multiple natural nonnative insect predators. Several species of tamarisk-eating beetles *(Diorhabda* spp.*)* have been released to be more effective in specific geographic regions, including *D. carinata, D. sublineata*, and *D. elongata* (Bean et al. 2013; Nagler et al. 2021; Gaffke et al. 2022). The Mediterranean tamarisk beetle (*Diorhabda elongata*) was extensively studied prior to release and has since been very successful in the southwestern United States (U.S.). The extensive defoliating capabilities of this beetle have sparked controversy, as tamarisk offers a breeding habitat for the endangered Southwestern willow flycatcher (SWFL; *Empidonax traillii extimus*) (Orr et al. 2014).

Along with *Diorhabda* spp., two other insects were considered for biocontrol of tamarisk in the U.S., a weevil (*Coniatus tamarisci*) and a mealybug (*Trabutina mannipara*), and were approved but not released (Eckberg & Foster 2011; Bright et al. 2013; Gaffke et al. 2022). A third insect, the splendid tamarisk weevil (STW; *Coniatus splendidulus* Fabricius 1781), which is a close relative to *C. tamarisci,* was never actually considered for release but has been introduced on tamarisk in North America (Fornasari 1997; Bean & Dudley 2023). It appears that this weevil may interact synergistically with *D. carinulata* to defoliate tamarisk, but it does not defoliate tamarisk well enough alone to meet the criteria of being a biocontrol agent (Stenberg et al. 2021; Gaffke et al. 2022). STW delivers a small amount of damage to tamarisk as it feeds on the flowers as larvae and oviposits on the tips of branches, possibly stunting plant growth (Anderson & Nelson 2013; Özsoy 2022; Bean & Dudley 2023). STW larvae and adults can be observed feeding on tamarisk throughout the year, with overwintering adults emerging in early spring and feeding new tamarisk shoot tips (Özsoy 2022). Female adults lay eggs near stem tips and on flower buds and pupation occurs in woven baskets attached to tamarisk leaves. Thus, the STW relies on tamarisk, being an obligate herbivore.

Coniatus species have not been officially released as biocontrol options in the U.S.; however, STW was found in the southwest U.S. around 2006-2008 (Eckberg & Foster 2011; Bright et al. 2013; Hassenflu et al. 2018). There is speculation about the source and date of its introduction, with unofficial claims of the weevil appearing in Maricopa County, Arizona, in 2006 and the earliest published occurrence in Nevada in 2010 (Eckberg & Foster 2011). Since then, STW has spread across southwest North America.

Our study examines how STW has spread in North American since its earliest recorded occurrence. We use publicly accessible databases of arthropod occurrences to create distribution maps of the temporal spread of STW with the objective to identify spread rates and geographic extent. We aim to understand the speed of STW spread in its introduced range to better inform its potential for dispersal and possible introduction point.

Methods

This study examined the range expansion of the STW since its introduction to North America, spanning 2008 through 2025. Data were collected from publicly accessible databases to compile range estimates per year. Specifically, data were compiled from BugGuide (VanDyk 2023), Ecdysis (Ecdysis Portal 2024), Symbiota Collections of Arthropods Network (SCAN; SCAN 2019), iDigBio (iDigBio Portal 2025), iNaturalist (iNaturalist 2024), and Global Biodiversity Information Facility (GBIF; GBIF 2024). From each database, occurrence data were filtered to only include research-grade points within this study region. These data were then cleaned in R ver. 4.4.1 (R Core Team 2024) using the distinct function within the dplyr package (Wickham et al. 2023) to remove duplicate catalog IDs. Any remaining duplicates that were not caught in this process were removed using data management tools within the ArcGIS program.

STW is an obligate herbivore on tamarisk (Eckberg & Foster 2011; Hassenflu et al. 2018; Gaffke et al. 2022; Bean & Dudley 2023). Therefore, this study examined the range of the weevil in relation to the range of tamarisk in North America. Tamarisk data were collected from SEINet and GBIF (Jarnevich et al. 2013; SEINet Portal Network 2025; GBIF 2025). Maps were created using Esri ArcGIS® software. ArcGIS® is the intellectual property of Esri and are used herein under license (Esri 2024).

Creating a Minimum Convex Polygon (MCP) for tamarisk.

A tamarisk occurrence point dataset was pulled from SEINet (SEINet Portal Network 2025) and GBIF (GBIF 2025) to provide the extent of tamarisk distribution. Using the Minimum Bounding Geometry tool, a Minimum Convex Polygon (MCP) was created for this tamarisk dataset. The geometry type used for all points was “convex hull”. This MCP was created to serve as an extent/boundary and includes all tamarisk occurrence points.

Creating Kernel Densities/Heatmaps.

A Kernel Density mapping technique was chosen to showcase the density of occurrence points of STW within an area (Silverman 1986; Izenman 1991), which requires the use of the kernel density tool in ArcGIS Pro (Esri 2024).

First, STW data were used to create the STW kernel density map, and the tool was allowed to auto select the search radius. Geodesic methods were used with the area units in square kilometers. The extent of this tool was set as the tamarisk MCP that had been previously created. The mask layer, “World_Countries” (Esri 2024), was used as a mask to prevent densities from spanning into the ocean.

A secondary heatmap was created for the tamarisk dataset using the same mask layer (Esri 2024) as the mask. The mask layer previously stated was also used to serve as the extent of the tool. The search radius and output cell size were also auto selected for this tamarisk run.

Assembling Occurrence Distribution Maps.

In assembling the main distribution map, the STW kernel density layer was added first. The symbology was altered to highlight the year 2008, which encompassed the earliest occurrences, with a star icon. The boundary of Maricopa County as an outline was added via the “CountyMaricopa” layer (Maricopa County GIS 2012) to highlight the region in which the STW was rumored to have been introduced. Then, the “Human Geography Base” (Esri et al. 2017) basemap layer was added. The “World Adminstrative Divisions” (Esri 2022) layer was added to the map to provide political boundaries.

Next, a series of maps were put together to show the spread over time, with key year segments defined to show periods of STW spread. Six single maps were made using the STW occurrence dataset, where the “select by attributes” tool was used to separate points into unique layers by year. These layers were overlaid to show time progression. The basemaps used here were “Human geography base” and “Human geography detail” (Esri et al. 2017). The “World Adminstrative Divisions” (Esri 2022) layer was added to these maps.

Lastly, a map was created that encompassed all STW occurrence points from all study years with the tamarisk heatmap layer overlaid. The “Human geography base”, “Human geography detail” (Esri et al. 2017), and “World Administrative Divisions” (Esri 2022) layers were all used in this map product as well.

Results

The earliest recorded occurrence of the STW in North America took place in Phoenix, AZ, U.S., in the year 2008. Phoenix resides within Maricopa County, AZ, which reflects a region of densely clustered STW occurrence points (Fig. 1). Some dense clusters of STW occurrences appear near the California-Arizona border and in Las Vegas, Nevada. Most dense STW occurrences appear within Arizona. Other southern States, such as Utah, Colorado, California, and Texas, have some clustering of points but do not reflect hotspots. These densely populated areas reflect a higher kernel density than areas with little or no clusters of occurrences.

In 2010, STW was discovered in Nevada, 408.6km northwest from the first occurrence in Arizona in 2008. In 2012, STW was recorded in Texas. In 2013, STW was seen in Colorado nearly 595km northeast of Arizona. In 2024, STW was found in Utah and Baja California, Mexico. In 2015, STW was recorded in Oklahoma, 1,398.1 km from its original discovery in Arizona. In 2021, STW was found in Idaho (Fig. 2E). Additional occurrences have been documented throughout these locations (Fig. 2F). By 2025, STW spread out from Arizona 455.1km west to the California, 970km north to Idaho, 388.9km south to Mexico, and 1398.1km east to Oklahoma.

Some tamarisk populations have no reported occurrences of STW, while several STW occurrences occur outside or in sparsely populated tamarisk ranges (Fig. 3). Although these outlier STW populations do remain within the minimum kernel density value expressing tamarisk range, based on automative bandwidth, expressing that STW remains within tamarisk ranges. Phoenix, AZ is also a region that is densely populated with tamarisk (Fig. 3).

Discussion

Occurrence records highlight that the splendid tamarisk weevil (STW) became widespread across most tamarisk populations in the western U.S. by 2016. STW was first recorded in Mexico in 2014, with less spread observed in this southernmost region. This suggests STW was quick to disperse following its introduction in 2006-2008. This study suggests a focal point within Maricopa County, near Phoenix, AZ, as a region of densely clustered STW occurrences arose in conjunction with densely clustered tamarisk populations. STW is an obligate herbivore of tamarisk (Eckberg & Foster 2011; Özsoy 2022; Bean & Dudley 2023), thus, it is unsurprising that STW distributions closely match tamarisk distributions. Both STW larvae and adults rely on tamarisk for food, shelter (for pupation and adult overwintering), and mating purposes (Özsoy 2022).

Denser occurrence records near Phoenix, AZ, suggest a larger STW population near its potential introduction point to North America. It was rumored to have been introduced to

Maricopa County, Arizona, sometime in 2006 (Brummermann 2010). This date is widely reported on internet blogs but not officially documented. The earliest recorded occurrence found in this study dated to 2008 in Maricopa County, which is two years earlier than the first published STW occurrence near Las Vegas, NV, in 2010 (Eckberg & Foster 2011).

STW quickly spread outwards from Maricopa County, AZ to Nevada as soon as 2010, uploaded to iNaturalist (Eckberg & Foster 2011). By 2011, some occurrence points in surrounding states were observed in southern California and New Mexico. Early STW occurrences in California were reported in BugGuide, reuploaded to SCAN. The earliest New Mexico occurrences were uploaded to GBIF and Ecdysis. In 2012, the first occurrence in Texas was reported in SCAN (reuploaded from BugGuide), reinforced through a *Diorhabda*-based tamarisk biocontrol project enacted in the summer of 2012. Surveyors noted the first occurrence of STW at Prairie Dog Town Fork of the Red River, Texas (Michels et al. 2013). After further surveying, STW was noted to be established in three counties in Texas and had been expected to spread to Oklahoma (Michels et al. 2013; Hassenflu et al. 2017). The first occurrences of STW in western Colorado were in 2013, recorded in BugGuide and reuploaded to SCAN (Bright et al. 2013; Uhey et al. 2020). The earliest STW occurrences in Utah (uploaded to GBIF) and Baja California, Mexico (iNaturalist) were posted in 2014. Then, Oklahoma was reached by STW in 2015, first uploaded to BugGuide, then reuploaded to SCAN. The final state to be recorded was Idaho, where STW arrived in 2021, reported in iNaturalist. These early occurrences were mainly reported on BugGuide (reuploaded to SCAN) and iNaturalist, emphasizing the importance of publicly accessible data. Early data were reported by researchers and nature-goers who spotted STW and took pictures, documenting key sightings.

These final states may indicate that STW will continue expanding its range to the east, through Oklahoma and Texas, and to the northwest, moving throughout Idaho. Tamarisk has been noted in Kansas; thus, it may be within STW range for future movements (Vorster et al. 2018). An indicator that STW may move north is expressed as Utah and Idaho were ventured to much later than surrounding western states. Tamarisk has been noted in the Pacific Northwest, with a tentative distribution of STW moving toward southern Idaho (Kerns et al. 2009; Özsoy 2022). One occurrence was recorded here, suggesting STW may densify in population in the future. STW also appears to have southbound spreading capabilities, furthered by its first published occurrence in Baja California, Mexico, recently (Silva et al. 2018), emphasizing probable population establishment. At this time, there are few documented occurrences in Mexico, but the location of these occurrences, being near the U.S. border, indicates potential for future spread. With four states traveled in under four years (2008-2012), STW has moved fast and is becoming widespread in the southwestern U.S. and Mexico and seems likely to continue spreading across North America.

Spread of STW to additional states appears to have slowed after 2016, and occurrence frequencies within the current locations have increased. The native range of STW is within the Mediterranean region east to the Caucasus and Iraq (Hoffman 1954; Eckberg & Foster 2011; Bright et al. 2013), suggesting that the southwestern U.S. and northwestern Mexico offer similar suitable climates for STW. Across most of the United States temperatures have risen over 1.0˚C since 1950, with another 1.5-2.0˚C of warming expected by 2050 in conjunction with increased aridity (Karmalkar & Bradley 2017). This warming and drying is predicted to facilitate tamarisk invasions into the northwest (Kerns et al. 2009) and eastwards, potentially reaching New York by 2050 (Allen & Bradley 2016; Allen 2017). It seems likely that STW will expand its range alongside tamarisk (Morisette et al. 2006).

STW is reported to fly, yet the extent to which they disperse is not well documented. Closely connected tamarisk stands likely promote STW movement, as dense stands of tamarisk in riparian corridors provide short flight distances. Geographic barriers such as mountain ranges and large distances between tamarisk populations likely limit STW range expansion. The distance between distant tamarisk stands may be too great for the STW in many regions, which may explain the lack of occurrences in some remote tamarisk populations. The extremes of STW distribution do not appear clustered, providing the notion that these tamarisk stands may not be as hospitable as the southwestern occurrences. Another possibility is that STW occurrences in these areas have not been recorded yet. Limitations arise in occurrence databases of STW as occurrences may go undocumented, especially considering the small size (~3mm) of STW which makes it difficult to see (Özsoy 2022). Thus, our maps show only the minimum range and speed of dispersal for STW.

While the ecological impacts of the tamarisk leaf beetle are well studied, little is known about STW ecology. In general, defoliation by tamarisk leaf beetles has been viewed as positive for controlling tamarisk (Bean & Dudley 2024), however concerns have been raised for the endangered southwestern willow flycatcher which nests in tamarisk (Orr et al. 2014). STW can work alongside the tamarisk beetles to fully defoliate tamarisk (Stenberg et al. 2021; Gaffke et al. 2022), which may help control tamarisk but also threaten the southwestern willow flycatcher nesting habitats. However, the southwestern willow flycatcher prefers native plants to nest in, suggesting that restoration of native plants following defoliation of tamarisk will limit harm to this endangered species (Sogge et al. 2008; York et al. 2011). STW may be valuable to riparian food chains in the southwestern US. Mahoney et al. (2017) found STW provides a valuable food source for several native insectivorous birds such as Lucy's warbler (*Oreothlypis luciae*) and the yellow warbler (*Setophaga petechia*). Still, much remains unknown about STW's trophic relationships and defoliation impacts. Our study highlights the widespread range of STW and the need for further research on its ecology.

As of 2025, STW occurrence points in the U.S. have been documented in Texas, Oklahoma, Utah, Colorado, Arizona, California, New Mexico, Idaho, and Nevada. STW has also been found in Mexico, near Baja California, Sinaloa, and along the U.S. border. STW has expanded its range quickly and appears to be well established in the southwestern U.S. at this time, with possible range expansion in each extreme direction. These results provide a baseline coverage of STW ranges and highlight more populous regions that may be impacted by this species. This is key to understanding one piece of the STW mystery, as we may pinpoint suitable habitats and monitor changes. We know that riparian habitats have been ecologically altered and degraded over time with non-native species integration (Johnson 2013; Orr et al. 2014), thus future studies should aim to understand the ecological implications of STW, a non-native insect. Considering STW was not a listed biocontrol option and has been able to spread rapidly, we should identify the mode of introduction and the methods of dispersal across geographic barriers in further endeavors. With this information, we may be able to note regions of future spread, assisting in understanding the capabilities of STW. More investigation should be done into the capacity for STW to be a biocontrol option in the future, as it may be able to assist in cultivating healthier riparian zones.

References

Allen, J.M., and B.A. Bradley. 2016. Out of the weeds? Reduced plant invasion risk with climate change in the continental United States. Biological Conservation 203: 306-312.

Allen, J.M. 2017. The Geography of Invasion Risk - New York Invasive Species Research Institute. New York Invasive Species Research Institute. https://www.nyisri.org/2017/01/geography-invasion-risk/ Accessed: 06 April 2025.

Andersen, D.C., and S.M. Nelson. 2013. Floral ecology and insect visitation in riparian *Tamarix* sp. (saltcedar). Journal of Arid Environments 94: 105-112.

Araya, T., A.V. Mlahlwa, M.A. Elbasit, and S.W. Newete. 2022. The impact of *Tamarix* invasion on the soil physicochemical properties. Scientific Reports 12.

Bean, D., T. Dudley, and K. Hultine. 2013. Bring on the Beetles! The History and Impact of Tamarisk Biological Control. In: A. Sher, and M. F. Quigley (eds.). *Tamarix*: A Case Study of Ecological Change in the American West. Oxford University Press, New York. Pages 377-399.

Bean, D., and T. Dudley. 2018. A synoptic review of *Tamarix* biocontrol in North America: tracking success in the midst of controversy. BioControl 63: 361–376.

Bean, D., and T. Dudley. 2023. Saltcedar Biocontrol Agents: History and Ecology in North America. In: R.L. Winston (Ed.). Biological Control of Weeds in North America. North American Invasive Species Management Association, Milwaukee, WI. NAISMA-BCW-2023-33-SALTCEDARS-A.

Bright, D. E., B.C. Kondratieff, and A.P. Norton. 2013. First record of the “splendid tamarisk weevil”, *Coniatus splendidulus* (F.) (Coleoptera: Curculionidae: Hyperinae), in Colorado, USA. Coleopt. Bull. 67: 302-303.

Brummermann, M. 2010. Arizona: Beetles bugs birds and more. www.arizonabeetlesbugsbirdsandmore.blogspot.mx/2010/05/weevil-for-biological-control-of.html Accessed 06 April 2025.

Chew, M.K. 2013. Tamarisk Introduction, Naturalization, and Control in the United States, 1818–1952, pp. 269-283. *In* A. Sher and M. F. Quigley [eds.], *Tamarix*: A Case Study of Ecological Change.

DeLoach, C.J., R.I. Carruthers, T. Dudley, D. Eberts, D.J. Kazmer, A.E. Knutson, D.W. Bean, J. Knight, P.A. Lewis, L.R. Milbrath, et al. 2004. First results for control of saltcedar (*Tamarix* spp.) in the open field in the western United States, pp. 505-513. *In* Cullen, J.M., D.T. Briese, D J . Kriticos, W.M. Lonsdale, L. Morin and J.K. Scott [eds.], Proceedings of the XI International Symposium on Biological Control of Weeds. CSIRO Entomology.

Di Tomaso, J.M. 1998. Impact, Biology, and Ecology of Saltcedar (*Tamarix* spp.) in the Southwestern United States. Weed Technology 12: 326–336.

Ecdysis Portal. 2024. Biodiversity occurrence data published by: Ecdysis Portal, accessed through the Ecdysis Portal. https://ecdysis.org Accessed 08 April 2025.

Eckberg, J.R. and M.E. Foster. 2011. First account of the splendid tamarisk weevil, *Coniatus splendidulus* Fabricius, 1781 (Coleoptera: Curculionidae) in Nevada. Pan Pacific Entomologist 87: 51–53.

Esri. 2024. *ArcGIS Pro* (Version 3.3.0) [Software]. https://www.esri.com/en-us/arcgis/products/arcgis-pro/overview Accessed 08/2024-04/2025.

Esri. 2022. “World Administrative Divisions” [Feature Layer]. No Scale Given. https://hub.arcgis.com/datasets/COAGIS::world-countries-political-boundaries/about Accessed 15 April 2025.

Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community. 2017. “Human Geography Base” [Vector Tile Layer]. No Scale Given. https://basemaps.arcgis.com/arcgis/rest/services/World_Basemap_v2/VectorTileServer Accessed 11 April 2025.

Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community. 2017.“Human Geography Detail” [Vector Tile Layer]. No Scale Given. https://basemaps.arcgis.com/arcgis/rest/services/World_Basemap_v2/VectorTileServer Accessed 11 April 2025.

Fornasari, L. 1997. Host Specificity of *Coniatus tamarisci* (Coleoptera: Curculionidae) from France: Potential Biological Control Agent of *Tamarix* spp. in the United States. Environmental Entomology 26: 349–356.

Gaffke, A.M., T.L. Dudley, D.W. Bean, G.M. Drus, M.J. Johnson, A.E. Knutson, D.K. Weaver, S.E. Sing, B K. Orr, and D.C. Thompson. 2022. *Tamarix* Biological Control in Karmalkar, A.V., and R.S. Bradley. 2017. Consequences of global warming of 1.5 C and 2 C for regional temperature and precipitation changes in the contiguous United States. PloS one. 12(1).

North America, pp. 329-355. *In* Van Driesche, R.G., R.L. Winston, T.M. Perring, and V.M. Lopez [eds.], Contributions of Classical Biological Control to the U.S. Food Security, Forestry, and Biodiversity. FHAAST-2019-05. USDA Forest Service.

GBIF. 2025. GBIF Occurrence Download https://doi.org/10.15468/dl.rf4qjn Accessed 07 April 2025.

GBIF. 2025. GBIF Occurrence Download https://doi.org/10.15468/dl.mabhmd Accessed 10 April 2025.

Hassenflu, A.M., C.M. Ritzi, and A.M. Hilscher. 2017. First Account of the Splendid Tamarisk Weevil, *Coniatus splendidulus* (Fabricius), in the Trans-Pecos Region of Texas. Southwestern Entomologist 42: 901-904.

Hassenflu, A., N. Taylor, and C.M. Ritzi. 2018. New Locality Records of Splendid Tamarisk Weevil, *Coniatus splendidulus* (Fabricius), and Chionaspis scale in West Texas and New Mexico. Southwestern Entomologist 43: 527-530.

Hoffmann, A. 1954. *Cole´opte`res Curculionides (Deuxie`me partie)* – Faune de France, 29. Fe´de´rationfrancaise des socie´tie´s de sciences naturelles, Paris, France.

iDigBio Portal. 2025. https://www.idigbio.org/portal/recordsets/31c140bc-e6f1-4acc-beaf-b825cf288ad9 (24 records) https://www.idigbio.org/portal/recordsets/b8fa8ac9-a1b0-4b73-8dfb-69b5e93139c6 (4 records) https://www.idigbio.org/portal/recordsets/bf897c17-06cc-48c1-a7cc-f41b45166880 (2 records). 30 records accessed 07 April 2025.

iNaturalist. 2024. Dataset available from https://www.inaturalist.org/taxa/332448-Coniatus-splendidulus Accessed 9 April 2025.

Izenman, A.J. 1991. Review paper: recent developments in nonparametric density estimation. Journal of the American Statistical Association 86: 205–224.

Jarnevich, C.S., P. Evangelista, and J. Graham. 2013. Measuring Extent and Projections of *Tamarix* Distribution in North America, pp. 29-40. *In* A. Sher and M. F. Quigley [eds.], *Tamarix*: A Case Study of Ecological Change.

Johnson, T. 2013. *Tamarix*: Passenger or Driver of Ecosystem Change?, pp. 256-263. *In* A. Sher and M. F. Quigley [eds.], *Tamarix*: A Case Study of Ecological Change.

Kerns, B.K., B.J. Naylor, M. Buonopane, C.G. Parks, and B. Rogers. 2009. Modeling Tamarisk (*Tamarix* spp.) habitat and climate change effects in the northwestern United States. Invasive Plant Science and Management 2: 200-215.

Lehnhoff, E., F.D. Menalled, and L.J. Rew. 2011. Tamarisk (*Tamarix* spp.) establishment in its most northern range. Invasive Plant Sci. Manag. 4: 58–65.

Mahoney, S.M., T.C. Theimer, M.J. Johnson, and J.T. Foster. 2017. Similar dietary but different numerical responses to nonnative tamarisk (*Tamarix* spp.) by two native warblers. Biol. Invasions 19: 1935-1950.

Maricopa County GIS. 2012. “CountyMaricopa”. [Map Image Layer]. No Scale Given. https://gis.maricopa.gov/arcgis/rest/services/IndividualService/CountyMaricopa/MapServer Accessed 11 April 2025.

Michels, G.J., T.A. Royer, E.N. Jones, R.A. Lange, E.D. Bynum, D.C. Ruthven, J.L. Tracy, and J.B. Bible. 2013. New establishment and county records for *Diorhabda* spp. (Coleoptera: Chrysomelidae) and *Coniatus splendidulus* (Coleoptera: Curculionidae) in the Texas Panhandle and Western Oklahoma. Southwestern Entomologist 38: 173–182.

Nagler, P.L., J.B. Hull, C. van Riper, P.B. Shafroth, and C.B. Yackulic. 2021. The Transformation of dryland rivers: The future of introduced tamarisk in the U.S. U.S. Geological Survey Fact Sheet 2020–3061.

Orr, B.K., G.T. Leverich, Z E. Diggory, T.L. Dudley, J.R. Hatten, K.R. Hultine, M. P. Johnson, and D. A. Orr. 2014. Riparian restoration framework for the upper Gila River in Arizona. Compiled by Stillwater Sciences in collaboration with Marine Science Institute at U.C. Santa Barbara, Columbia River Research Laboratory of U.S. Geological Survey, Desert Botanical Garden, and Colorado Plateau Research Station at Northern Arizona University. Prepared for the Gila Watershed Partnership of Arizona

Özsoy, Z. 2022. Identification of the Origins of *Coniatus sp*., a Non-Native Weevil in Western North America. https://riversedgewest.org/sites/default/files/2022-06/Ozsoy-weevil.pdf Accessed 03 June 2024.

Pattison, R.R., C.M. D’Antonio, T.L. Dudley, K.K. Allander, and B. Rice. 2011. Early impacts of biological control on canopy cover and water use of the invasive saltcedar tree (*Tamarix* spp.) in western Nevada, USA. Oecologia 165: 605–616.

R Core Team. 2024. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/.

SCAN. 2019. http//:scan-bugs.org/portal/index.php. Accessed 07 April 2025.

SEINet Portal Network. 2025. Biodiversity occurrence data published by: SEINet Portal Network. https://swbiodiversity.org/seinet/collections/listtabledisplay.php?country=USA%3B%20Mexico%3BUnited%20States%3BU.S.A.%3BUnited%20States%20of%20America&hascoords=1&comingFrom=newsearch&taxa=Tamarix&usethes=1&taxontype=2&comingFrom=newsearch Accessed 10 April 2025.

Silva, S.O., M.S. Hernández, I.V.L. Sánchez, L.D.C. Peña, J.L.D. Ángeles, and J.C.C. Hernández. 2018. First record of *Coniatus splendidulus* (Fabricius) (Coleoptera: Curculionidae) in Baja California, Mexico, collected from *Tamarix hohenackeri* Bunge (Tamaricaceae). Coleopterists Bulletin 72(2): 388–389.

Silverman, B.W. 1986. Density Estimation for Statistics and Data Analysis. Chapman & Hall, London.

Sogge, M.K., S.J. Sferra, and E.H. Paxton. 2008. *Tamarix* as Habitat for Birds: Implications for Riparian Restoration in the Southwestern United States. Restoration Ecology 16: 147-151.

Stenberg, J.A., I. Sundh, P.G. Becher, C. Björkman, M. Dubey, P.A. Egan, H. Friberg, J.F. Gil, D.F. Jensen, M. Jonsson, M. Karlsson, S. Khalil, V. Ninkovic, G. Rehermann, R.R. Vetukuri, and M. Viketoft. 2021. When is it biological control? A framework of definitions, mechanisms, and classifications. J. Pest Sci. 94: 665–676.

Uhey, D.A., A.K. Rowe, and D. Kendall. 2020. Tamarisk alters arthropod composition, but has little negative effect on richness and abundance in Southwestern Colorado. Southwestern Entomologist 45: 585-600.

VanDyk, John, ed. 2023. BugGuide.Net: Identification, Images, & Information For Insects, Spiders & Their Kin For the United States & Canada. Iowa State University. https://bugguide.net/. Accessed via GBIF.org on 2025 April 8.

Vorster, A.G., B.D. Woodward, A.M. West, N.E. Young, R.G. Sturtevant, T.J. Mayer, R.K. Girma, and P.H. Evangelista. 2018. Tamarisk and Russian Olive Occurrence and Absence Dataset Collected in Select Tributaries of the Colorado River for 2017. Data. 3: 42.

Warren, D.K., and R.M. Turner. 1975. Saltcedar (*Tamarix chinensis*) seed production, seedling establishment, and response to inundation. J. Arizona Acad. Sci. 10: 135–144.

Wickham, H., R. François, L. Henry, K. Müller, and D. Vaughan. 2023. dplyr: A Grammar of Data Manipulation. R package version 1.1.4, https://github.com/tidyverse/dplyr, https://dplyr.tidyverse.org.

York, P., P. Evangelista, S. Kumar, P. York, J. Graham, C. Flather, and T. Stohlgren. 2011. A habitat overlap analysis derived from maxent for tamarisk and the south-western willow flycatcher. Front. Earth Sci. 5: 120–129.

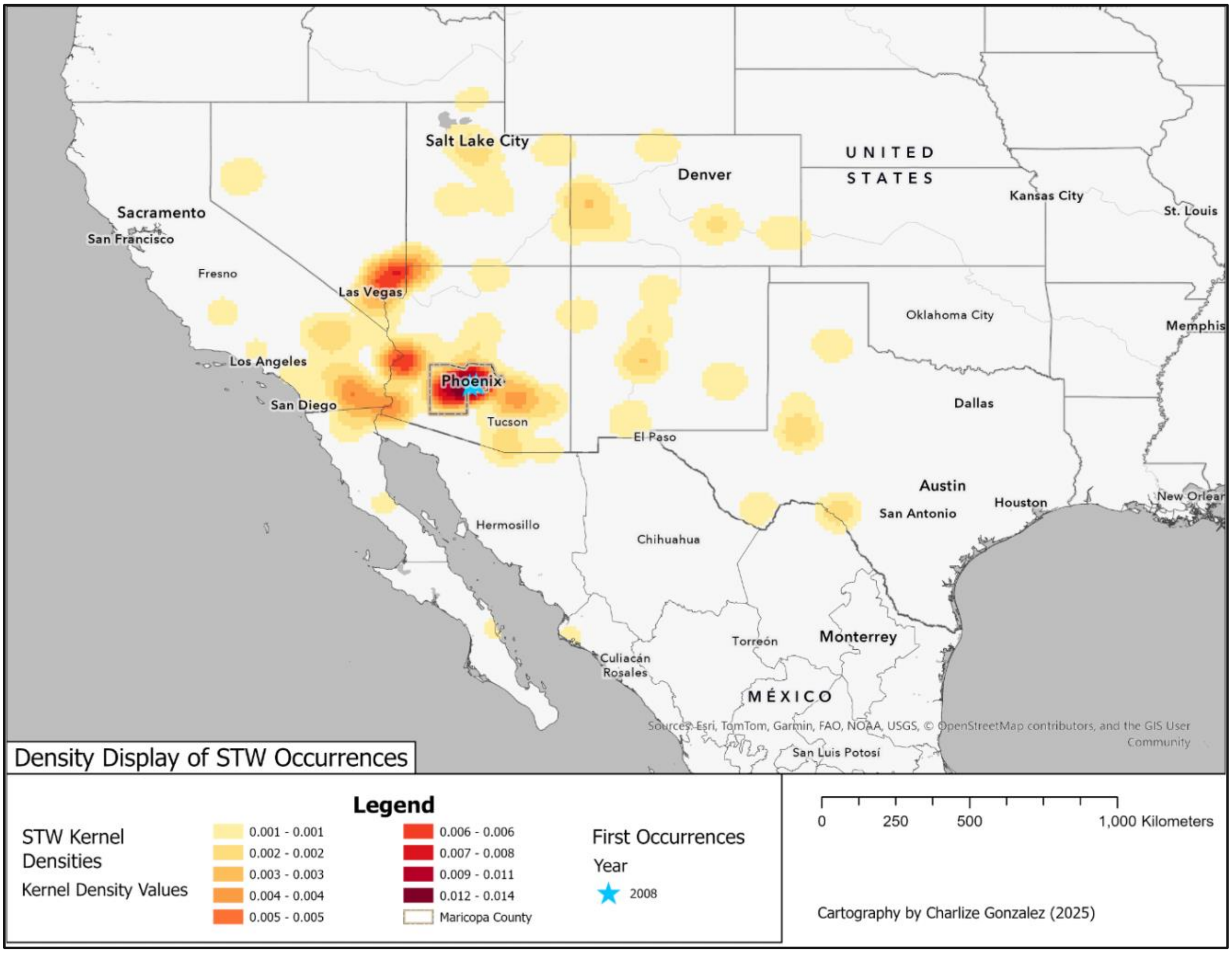


Figure 1. Mapped Kernel Densities of STW across its Introduced Range. Darker colored areas signify a denser cluster of occurrence points, while areas containing less clustered points become lighter in color. Occurrences within the year 2008 are highlighted, showing the earliest records. Maricopa County is highlighted as the county of introduction. (Data: STW occurrence dataset, Basemap credits: "Human geography base" (Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community), "CountyMaricopa" (Maricopa County GIS 2012), World Administrative Divisions (Esri 2022)).

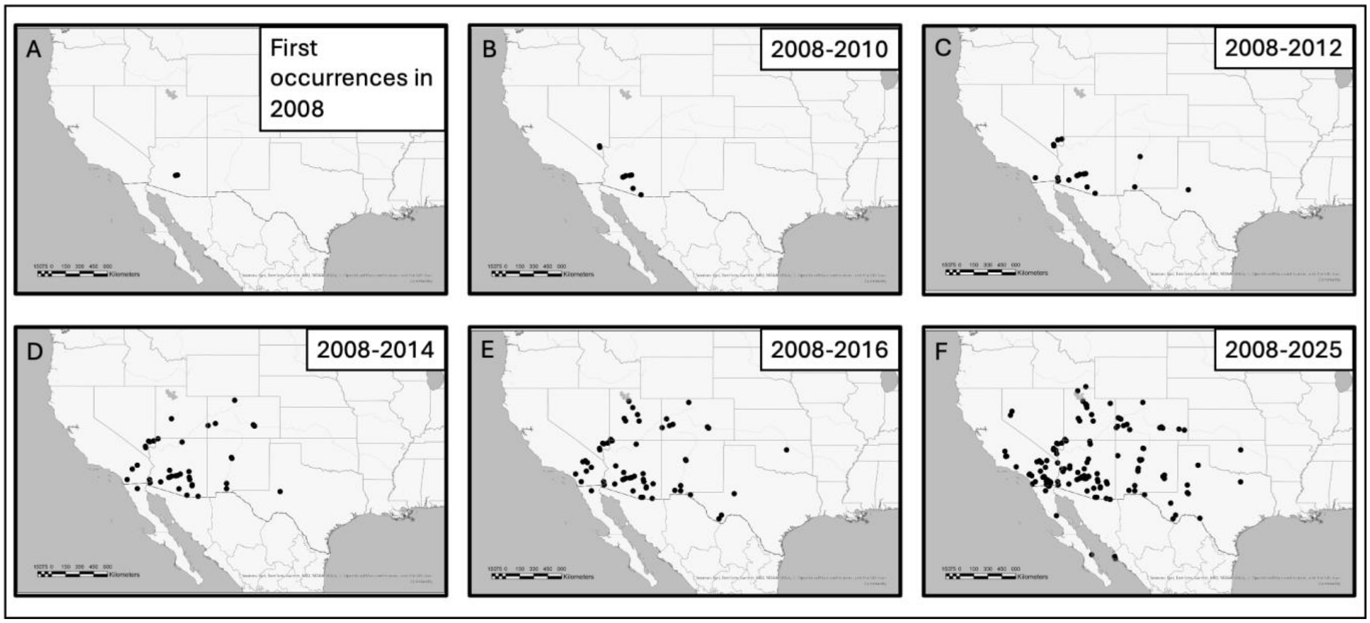
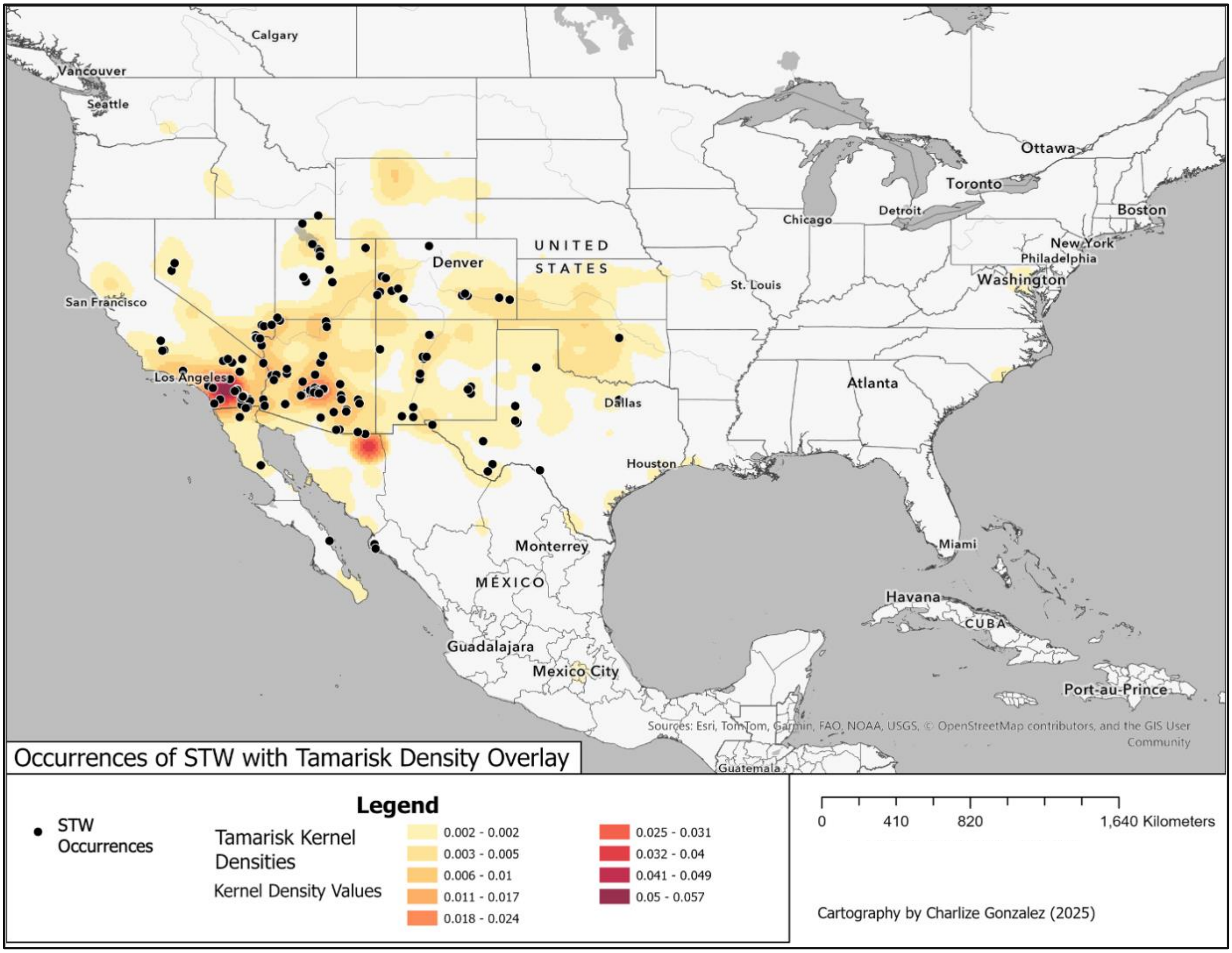


Figure 2. Time Series of the Spread of STW Occurrences. Maps A-F: Gradual increase of occurrence points over time, with key 2-year periods of spread labelled from 2008-2016. (Data: STW occurrence dataset, Basemap Credits: "Human geography base" (Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community), World Administrative Divisions (Esri 2022)).


Occurrences of STW with Tamarisk Density Overlay

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Cartography by Charlize Gonzalez (2025)

Figure 3. Mapped Occurrences of the STW with tamarisk (*Tamarix* spp.) Density Overlay. Occurrence points of STW are displayed against a kernel density/heatmap representation of tamarisk distribution. Darker tones signify dense clusters of tamarisk occurrence points, while areas containing less clustered points become lighter in tone. STW occurrences are reflected by points on the map. (Data: STW occurrence dataset and *Tamarix* spp. occurrence dataset, Basemap credits: “Human geography base” and “Human geography detail” (Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community), World Administrative Divisions (Esri 2022)).

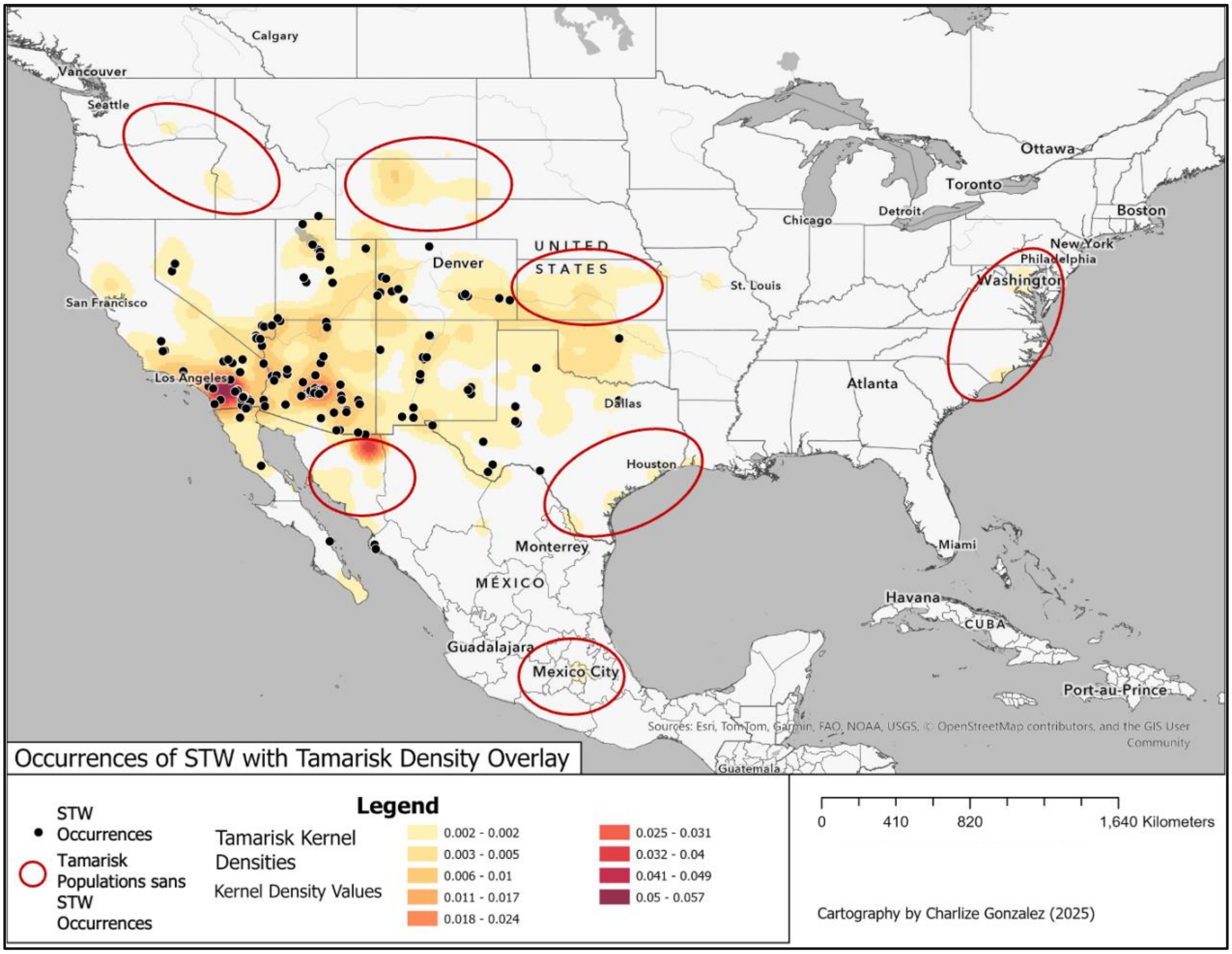


Figure 4. Mapped Occurrences of the STW with Tamarisk (*Tamarix* spp.) Density Overlay, Highlighting Tamarisk Populations Without STW Occurrences. Occurrence points of STW are displayed against a kernel density/heatmap representation of tamarisk distribution. Darker tones signify dense clusters of tamarisk occurrence points, while areas containing less clustered points become lighter in tone. STW occurrences are reflected by points on the map. Red circles highlight where tamarisk populations occur without documented STW occurrences. (Data: STW occurrence dataset and *Tamarix* spp. occurrence dataset, Basemap credits: "Human geography base" and "Human geography detail" (Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community), World Administrative Divisions (Esri 2022)).

Figure 5. Splendid tamarisk weevil (STW). Dorsal (left image) and left side view (right image). Image credits: Derek Uhey.

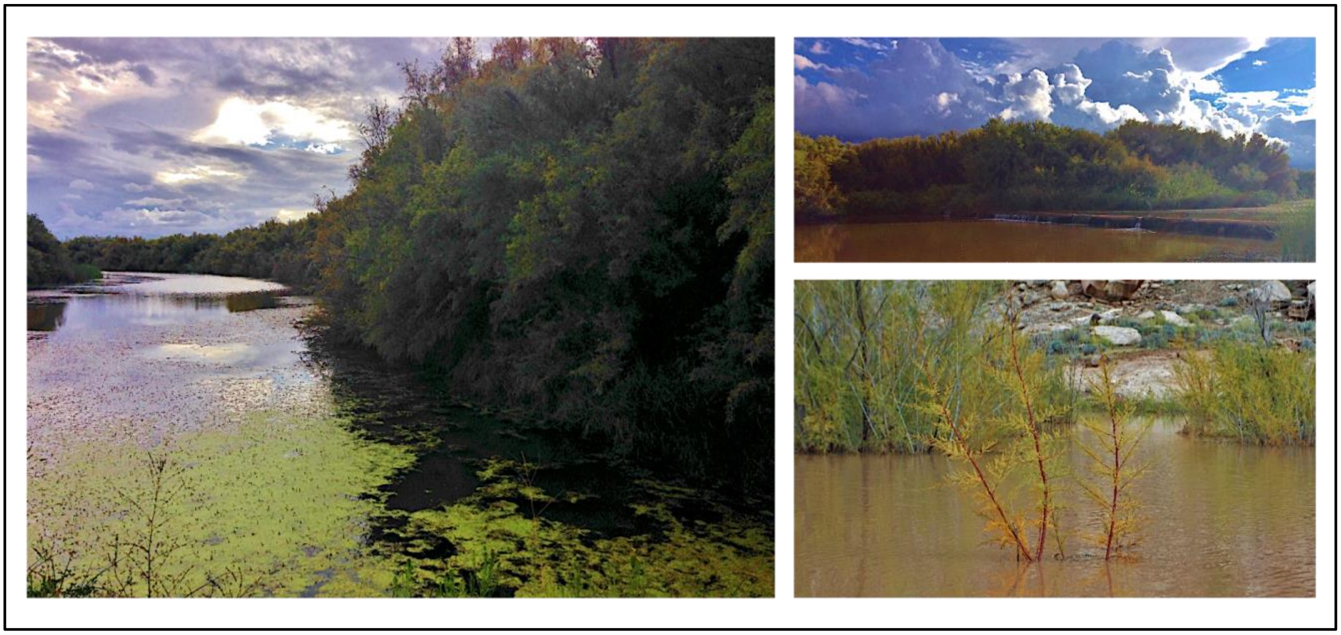


Figure 6. Tamarisk (*Tamarix* spp.) in riparian habitats along the Little Colorado River near Winslow, Arizona. Image credits: Derek Uhey.

Appendix

STW Occurrence Dataset

ID	Year	Month	Day	Country	State	Latitude	Longitude
17164582	2013	6	2	USA	Colorado	38.21	-108.97
57879569	2014	6	13	USA	Colorado	40.640246	-106.40703
57879571	2017	6	5	USA	Colorado	39.057322	-108.54847
57879573	2018	10	20	USA	Colorado	37.975941	-102.4024
57879575	2015	10	8	USA	Colorado	39.057322	-108.54847
57879578	2015	9	29	USA	Colorado	38.530984	-107.93833
36072892	2014	6	29	USA	New Mexico	35.145	-106.717
64945846	2023	4	29	USA	Texas	34.6046187	-101.08406
60773825	2019	8	31	USA	Utah	40.54255	-109.5511
19987949	2013	4	25	USA	California	34.0297	-116.2792
19991448	2012	5	30	USA	Nevada	36.74	-114.22
49767686	2013	9	17	USA	Nevada	36.087933	-114.97873
49783181	2010	7	7	USA	Nevada	36.086746	-114.98725
49982607	2016	5	2	USA	California	34.936974	-116.61062
50253394	2017	4	20	USA	California	34.2195811	-114.20674
50254774	2017	4	21	USA	California	34.9363655	-116.61213
50292243	2017	5	2	USA	Arizona	34.3058319	-113.45417
50316392	2017	5	25	USA	Nevada	36.0873256	-114.98594
50428380	2017	7	11	USA	New Mexico	34.1136167	-106.88658
50428382	2017	7	11	USA	New Mexico	34.1033028	-106.88275
50428384	2017	7	11	USA	New Mexico	34.0590472	-106.87558
50428388	2017	7	11	USA	New Mexico	34.0383388	-106.86813
50438365	2017	7	13	USA	New Mexico	34.3032917	-106.85031
50482181	2017	8	6	USA	California	33.2015333	-115.59714
50581076	2017	8	6	USA	California	33.201215	-115.59717
50690101	2017	6	5	USA	Texas	32.7053751	-102.1218
50696571	2017	5	21	USA	Arizona	34.864348	-111.79231
50754769	2018	3	1	USA	Texas	31.9654235	-102.12246
50754770	2018	3	1	USA	Texas	31.9654315	-102.12246
50775443	2018	3	25	USA	California	33.5175717	-115.93741
50801489	2018	4	7	USA	Texas	29.5089584	-100.90742
50801490	2018	4	7	USA	Texas	29.5089584	-100.90742
50801491	2018	4	7	USA	Texas	29.5089584	-100.90742

50834825	2018	4	24	USA	Arizona	32.3925467	-111.13213
50835937	2018	4	24	MX	Baja California	32.6630278	-115.44707
51173525	2014	7	20	USA	Colorado	38.2842167	-104.60847
51535087	2011	3	27	USA	California	33.0234534	-114.61856
51984754	2019	5	14	USA	Nevada	36.089035	-114.98604
52388734	2014	8	5	USA	Nevada	36.7172997	-114.70667
52421992	2017	8	14	USA	California	35.0416358	-115.67101
53711009	2020	4	6	USA	Texas	31.9669866	-102.1219
54022502	2020	4	26	USA	California	34.207703	-114.22083
54022508	2020	4	26	USA	California	34.2077249	-114.22082
54022512	2020	4	26	USA	California	34.207599	-114.22103
54053096	2020	4	29	USA	California	34.2076198	-114.22082
54053102	2020	4	29	USA	California	34.2075669	-114.22071
54495518	2020	6	27	USA	Nevada	35.70768	-114.70777
54729784	2020	5	15	USA	California	34.2129447	-114.21379
55576465	2020	9	26	USA	Arizona	33.3924579	-112.26394
40084206	2015	8	29	USA	Arizona	33.5473	-111.6449
40084207	2016	4	16	USA	Arizona	33.4191	-111.9397
40084208	2017	4	12	USA	Arizona	33.993381	-114.1035
40084209	2017	4	12	USA	Arizona	33.993381	-114.1035
40084210	2017	4	12	USA	Arizona	33.993381	-114.1035
40084211	2017	4	12	USA	Arizona	33.993381	-114.1035
40084212	2017	4	12	USA	Arizona	33.993381	-114.1035
40084213	2017	4	12	USA	Arizona	33.993381	-114.1035
40084214	2017	4	12	USA	Arizona	33.993381	-114.1035
40084215	2017	4	12	USA	Arizona	33.993381	-114.1035
40084216	2017	4	12	USA	Arizona	33.993381	-114.1035
40084217	2017	4	12	USA	Arizona	33.993381	-114.1035
40084354	2017	8	26	USA	Arizona	33.5052	-111.6173
40085216	2014	9	19	USA	Arizona	33.5472	-111.645
34725983	2015	8	21	USA	Oklahoma	36.079224	-96.97526
34777329	2010	4	10	USA	Arizona	32.12824	-111.78302
34777330	2010	5	5	USA	Arizona	33.346542	-112.49554
34777331	2010	6	10	USA	Nevada	36.214237	-115.01382
34777332	2011	3	23	USA	Nevada	36.214237	-115.01382
34777333	2011	3	23	USA	Nevada	36.214237	-115.01382
34777334	2016	5	2	USA	California	34.85722	-116.1812
34777335	2016	5	28	USA	Texas	31.766403	-106.24139

34777336	2016	6	17	USA	Arizona	31.525734	-110.84523
34777337	2016	8	7	USA	California	34.85722	-116.1812
34777712	2011	7	19	USA	New Mexico	35.054	-106.66907
34835057	2016	11	4	USA	New Mexico	32.184483	-107.74664
34985108	2011	12	30	USA	California	33.023605	-116.77612
34985109	2012	4	24	USA	Texas	31.870895	-102.02433
34985110	2013	4	7	USA	Arizona	33.78962	-110.81187
34985111	2013	4	30	USA	Arizona	33.346542	-112.49554
34985112	2013	5	12	USA	Colorado	38.413425	-108.26304
34985113	2014	6	29	USA	New Mexico	35.054	-106.66907
34985114	2013	6	2	USA	Colorado	38.413425	-108.26304
34985115	2014	7	6	USA	Colorado	38.17066	-104.48989
34985116	2015	4	18	USA	Texas	29.808996	-103.25246
34985117	2015	4	18	USA	Texas	29.808996	-103.25246
34985119	2015	4	20	USA	California	34.85722	-116.1812
34985120	2016	4	4	USA	Arizona	33.346542	-112.49554
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069b921e-5791-475a-aede-396115d41955	2017	6	5	USA	colorado	39.057322	-108.54847
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5088070128	2025	3	16	MX	Baja California Sur	26.003644	-111.33908
5087942227	2025	3	15	USA	California	33.161486	-115.64932
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5087839151	2025	3	15	USA	California	33.161633	-115.64955
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4954291698	2024	7	7	USA	New Mexico	36.237124	-106.39219
4936531143	2024	8	23	USA	New Mexico	35.521167	-108.83183
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4935667558	2024	8	23	USA	New Mexico	35.521153	-108.83183
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4868042213	2024	5	19	USA	Nevada	36.046941	-114.79672
4855324623	2024	5	4	USA	New Mexico	33.521308	-104.47483
4855183613	2024	5	2	USA	California	34.829912	-114.62559
4855023084	2024	4	18	MX	Baja California	32.604069	-115.4897
4852394018	2024	4	4	MX	Baja California	32.635281	-115.41329
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4531547037	2014	9	11	USA	Arizona	33.023889	-110.74222
4531547036	2015	5	16	USA	Utah	38.8478	-111.2023
4531547012	2015	5	16	USA	Utah	37.0868	-113.9284
4531547010	2015	5	16	USA	Utah	37.0868	-113.9284
4531547009	2015	5	16	USA	Utah	37.0868	-113.9284
4531547000	2013	5	15	USA	Arizona	33.023889	-110.74222
4531546997	2013	5	15	USA	Arizona	33.023889	-110.74222
4531546988	2010	7	15	USA	Arizona	33.221667	-112.75883
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4531546981	2010	4	6	USA	Arizona	33.221667	-112.75883
4531546977	2010	7	15	USA	Arizona	33.221667	-112.75883
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4531546936	2012	3	4	USA	Arizona	32.719444	-114.55833
4531546935	2012	3	4	USA	Arizona	32.719444	-114.55833
4531546934	2012	3	4	USA	Arizona	32.719444	-114.55833
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4531546931	2012	3	4	USA	Arizona	32.719444	-114.55833
4531546930	2012	3	4	USA	Arizona	32.719444	-114.55833
4531546929	2012	3	4	USA	Arizona	32.719444	-114.55833
4531546906	2012	3	4	USA	Arizona	32.719444	-114.55833
4531546905	2012	3	4	USA	Arizona	32.719444	-114.55833
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4531546900	2010	7	15	USA	Arizona	33.221667	-112.75883

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4531546469	2010	3	25	USA	Arizona	31.520023	-111.00917
4531546467	2015	6	7	USA	Arizona	32.82	-109.85
4531546359	2014	4	11	USA	Nevada	36.6331	-111.4786
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4531546336	2011	4	19	USA	Arizona	32.796437	-113.54103
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4515950506	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950504	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950501	2010	4	6	USA	Arizona	33.223667	-112.7045
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4515950491	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950488	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950486	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950480	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950473	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950470	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950468	2010	4	6	USA	Arizona	33.223667	-112.7045

4515950465	2010	4	6	USA	Arizona	33.223667	-112.7045
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4515950459	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950449	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950446	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950423	2010	4	6	USA	Arizona	33.223667	-112.7045
4515950415	2008	5	9	USA	Arizona	33.377697	-112.10897
4512009660	2014	10	18	USA	Arizona	36.95	-113.797
4512009659	2012	5	1	USA	Nevada	36.6539	-114.6011
4512009658	2012	4	3	USA	Arizona	32.719444	-114.55833
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4512009656	2015	6	9	USA	Utah	40.7468	-112.1856
4512009653	2014	10	18	USA	Arizona	36.95	-113.797
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4512009650	2014	10	18	USA	Arizona	36.95	-113.797
4512009600	2013	5	20	USA	Arizona	33.021	-110.73867
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4512009561	2015	4	17	USA	Arizona	32.82	-109.85
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4512009545	2013	5	20	USA	Arizona	33.021	-110.73867
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4512009542	2013	5	20	USA	Arizona	33.235333	-110.782
4512009535	2013	5	15	USA	Arizona	33.023889	-110.74222
4512009520	2012	5	1	USA	Nevada	36.6539	-114.6011
4512009519	2014	10	18	USA	Arizona	36.95	-113.797
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4512009517	2012	5	1	USA	Nevada	36.6539	-114.6011
4512009515	2014	11	21	USA	Arizona	33.021	-110.73867
4512009512	2014	11	21	USA	Arizona	33.024	-110.74
4512009510	2014	11	21	USA	Arizona	33.024	-110.74
4512009495	2014	10	18	USA	Arizona	36.95	-113.797
4512009494	2010	6	3	USA	Arizona	33.221667	-112.75883
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4512009490	2013	4	3	USA	New Mexico	32.645833	-107.192
4512009489	2010	6	3	USA	Arizona	33.221667	-112.75883
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4512009457	2015	5	16	USA	Utah	37.0868	-113.9284

4512009456	2015	5	16	USA	Utah	37.0868	-113.9284
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4512009435	2015	7	29	USA	Utah	40.1431	-111.8034
4512009432	2014	10	18	USA	Arizona	36.95	-113.797
4512009431	2015	11	16	USA	Utah	39.4653	-111.3451
4512009429	2011	7	15	USA	Nevada	36.6539	-114.6011
4512009418	2014	7	22	USA	Nevada	36.733333	-114.21833
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4442697484	2023	8	22	USA	Nevada	36.718446	-114.71357
4430687997	2023	10	19	USA	Arizona	35.191266	-111.65507
4407398197	2023	6	24	USA	Colorado	38.07111	-102.92764
4177394577	2023	8	13	USA	Nevada	39.7866	-119.0262
4165561233	2023	7	19	USA	New Mexico	35.141868	-106.52231
4162243760	2023	7	11	USA	Colorado	38.284917	-104.61071
4153722274	2023	7	6	USA	Arizona	33.314245	-111.98302
4153361717	2023	6	1	MX	Baja California	29.750596	-114.74374
4138244084	2023	6	21	USA	New Mexico	33.65752	-104.32374
4134489311	2023	4	29	USA	Texas	34.604619	-101.08406
4134180563	2023	5	27	USA	California	33.440912	-116.04339
4127423819	2023	5	26	USA	Colorado	38.356728	-108.8359
4121226872	2023	5	16	USA	Nevada	36.717884	-114.70039
4121213526	2023	5	19	USA	Arizona	36.900045	-111.52181
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3966488784	2008	5	1	USA	Arizona	33.413623	-111.91574
3860196366	2022	6	26	USA	Nevada	39.7867	-119.0261
3773351039	2022	4	29	USA	Arizona	33.606146	-112.07063
3772943364	2022	4	29	USA	Arizona	33.606146	-112.07063
3772869823	2022	5	2	USA	Arizona	33.606146	-112.07063
3759982185	2022	4	3	MX	Baja California	32.59	-115.46241
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3704454400	2015	10	8	USA	Colorado	39.057322	-108.54847
3704419405	2017	6	5	USA	Colorado	39.057322	-108.54847
3704418402	2018	10	20	USA	Colorado	37.975941	-102.4024
3704414397	2014	6	13	USA	Colorado	40.640246	-106.40703
3465976783	2022	1	20	USA	California	33.176783	-115.61536
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3456160713	2021	12	11	USA	California	33.50217	-115.91459
3455841162	2021	8	12	USA	New Mexico	33.317355	-104.33089
3455485494	2021	11	29	USA	California	32.767907	-115.70561
3399028090	2018	7	20	USA	California	34.447722	-118.61612
3333489543	2015	4	18	USA	Texas	29.454273	-103.49198
3333485513	2021	7	18	USA	California	33.702153	-117.35872
3330828562	2021	7	20	USA	Idaho	42.15291	-111.90734
3124678693	2021	5	23	USA	Nevada	36.097474	-115.01933
3112315293	2021	5	1	USA	Arizona	33.316783	-112.00096
3109415478	2021	4	28	USA	Arizona	33.482115	-112.30353
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2897596235	2017	4	12	USA	Arizona	33.993381	-114.1035
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2897596218	2016	4	16	USA	Arizona	33.4191	-111.9397
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2823135108	2020	5	15	USA	California	34.212945	-114.21379
2817902456	2020	5	5	USA	Arizona	33.4121	-111.9547
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2634249898	2020	4	26	USA	California	34.207703	-114.22083
2634010899	2020	4	26	USA	California	34.207599	-114.22103
2633982940	2020	4	26	USA	California	34.207725	-114.22082
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1880454863	2018	3	25	USA	California	33.517572	-115.93741
1880454026	2018	3	1	USA	Texas	31.965431	-102.12246
1880454025	2018	3	1	USA	Texas	31.965423	-102.12246
1847414663	2018	4	7	USA	Texas	29.508958	-100.90742
1839262229	2018	4	24	MX	Baja California	32.663028	-115.44707
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1572393865	2017	7	11	USA	New Mexico	34.103303	-106.88275
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3444577	2011	9	1	US	Nevada	36.6539	-114.6011
3444578	2012	5	1	US	Nevada	36.6539	-114.6011
3444580	2012	5	1	US	Nevada	36.6539	-114.6011
3444581	2012	5	1	US	Nevada	36.6539	-114.6011
3444582	2012	5	1	US	Nevada	36.6539	-114.6011
3444594	2012	5	1	US	Nevada	36.6539	-114.6011
3444601	2014	10	18	US	Arizona	36.95	-113.797
3444602	2012	5	1	US	Nevada	36.6539	-114.6011
3444603	2012	7	1	US	Nevada	36.6539	-114.6011
3444608	2014	10	18	US	Arizona	36.95	-113.797
3444609	2014	10	18	US	Arizona	36.95	-113.797
3444610	2014	10	18	US	Arizona	36.95	-113.797
3444614	2013	4	3	US	New Mexico	32.645833	-107.192
3444617	2011	7	1	US	Nevada	36.6539	-114.6011
3444620	2012	5	1	US	Nevada	36.6539	-114.6011
3444621	2014	10	18	US	Arizona	36.95	-113.797
3444622	2011	10	21	US	Nevada	36.6539	-114.6011
3444623	2012	5	1	US	Nevada	36.6539	-114.6011
3444625	2014	11	21	US	Arizona	33.021	-110.73867
3444627	2014	11	21	US	Arizona	33.024	-110.74
3444629	2014	11	21	US	Arizona	33.024	-110.74
3444630	2013	5	20	US	Arizona	33.02	-110.74
3444631	2013	5	20	US	Arizona	33.021	-110.73867
3444632	2013	5	20	US	Arizona	33.021	-110.73867
3444634	2013	5	20	US	Arizona	33.235333	-110.782
3444639	2013	5	15	US	Arizona	33.023889	-110.74222
3444640	2015	4	17	US	Arizona	32.82	-109.85
3444657	2014	10	16	US	Utah	38.8669	-112.5043
3444658	2015	4	17	US	Arizona	32.82	-109.85
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3444660	2012	3	15	US	Nevada	36.6539	-114.6011
3444661	2014	7	22	US	Nevada	36.733333	-114.21833
3444662	2014	7	22	US	Nevada	36.733333	-114.21833
3444663	2014	7	22	US	Nevada	36.733333	-114.21833
3444664	2014	7	22	US	Nevada	36.733333	-114.21833
3444677	2014	10	18	US	Arizona	36.95	-113.797
3444678	2015	11	16	US	Utah	39.4653	-111.3451
3444680	2015	7	29	US	Utah	40.1431	-111.8034

3444686	2015	5	16	US	Utah	37.0868	-113.9284
3444687	2015	5	16	US	Utah	37.0868	-113.9284
3444688	2015	5	16	US	Utah	37.0868	-113.9284
3444689	2008	5	9	US	Arizona	33.377697	-112.10897
3444708	2013	5	20	US	Arizona	33.021	-110.73867
3444709	2015	6	9	US	Utah	40.7468	-112.1856
3444723	2012	4	3	US	Arizona	32.719444	-114.55833
3444724	2015	6	9	US	Utah	40.7468	-112.1856
3444729	2015	6	9	US	Utah	40.7468	-112.1856
3444732	2010	6	3	US	Arizona	33.221667	-112.75883
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3444734	2010	6	3	US	Arizona	33.221667	-112.75883
3444735	2010	6	3	US	Arizona	33.221667	-112.75883
3444736	2010	6	3	US	Arizona	33.221667	-112.75883
3513148	2008	5	9	US	Arizona	33.377697	-112.10897
3513149	2010	4	6	US	Arizona	33.223667	-112.7045
3513152	2010	4	6	US	Arizona	33.223667	-112.7045
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3513168	2010	4	6	US	Arizona	33.223667	-112.7045
3513169	2010	4	6	US	Arizona	33.223667	-112.7045
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3521329	2012	3	4	US	Arizona	32.719444	-114.55833
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3521332	2012	3	4	US	Arizona	32.719444	-114.55833

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3521346	2010	7	15	US	Arizona	33.221667	-112.75883
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3521358	2010	4	6	US	Arizona	33.221667	-112.75883
3521371	2015	5	16	US	Utah	37.0868	-113.9284
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3521379	2015	5	16	US	Utah	37.0868	-113.9284
3521381	2013	5	15	US	Arizona	33.023889	-110.74222
3521389	2013	5	15	US	Arizona	33.023889	-110.74222
3521390	2013	5	15	US	Arizona	33.023889	-110.74222
3521393	2014	9	11	US	Arizona	33.023889	-110.74222
3521396	2015	5	16	US	Utah	38.8478	-111.2023
3521403	2008	5	9	US	Arizona	33.377697	-112.10897
3521413	2008	5	9	US	Arizona	33.377697	-112.10897
3521414	2008	5	9	US	Arizona	33.377697	-112.10897
3521416	2011	7	7	US	Arizona	33.377697	-112.10897
3521428	2014	3	24	MX	Baja California	34.4035	-115.79533
3535183	2014	3	23	MX	Baja California	32.154667	-115.79033
3535185	2014	3	23	MX	Baja California	32.154667	-115.79033
3535188	2011	7	5	US	New Mexico	32.145833	-107.192

3535191	2013	4	14	US	Arizona	33.909667	-112.67517
3535194	2013	4	14	US	Arizona	33.909667	-112.67517
3535195	2017	4	18	US	Arizona	33.3296	-111.8663
3535198	2017	4	18	US	Arizona	33.3296	-111.8663
3535199	2010	3	25	US	Arizona	31.520023	-111.00917
3535202	2010	3	25	US	Arizona	31.520023	-111.00917
3535203	2010	3	25	US	Arizona	31.520023	-111.00917
3535205	2010	3	25	US	Arizona	31.520023	-111.00917
3535206	2015	6	7	US	Arizona	32.82	-109.85
3535226	2016	5	13	US	Utah	39.105	-112.633
3535253	2013	8	22	US	Arizona	31.406389	-109.9325
3535269	2011	4	19	US	Arizona	32.796437	-113.54103
3535286	2014	4	11	US	Nevada	36.6331	-111.4786
4058892	2014	6	13	US	Colorado	40.640246	-106.40703
4058893	2017	6	5	US	Colorado	39.057322	-108.54847
4058894	2018	10	20	US	Colorado	37.975941	-102.4024
4058895	2015	10	8	US	Colorado	39.057322	-108.54847
4058896	2015	9	29	US	Colorado	38.530984	-107.93833

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