RNR 230L – Field Botany

Field Trip #2: Cienega Creek Natural Preserve

**1. Plant Descriptions:**

Banana Yucca: **Family: Asparagaceae, *Yucca baccata***

Banana yucca is a native, perennial shrub that can reach heights of up to 9 m. It can reproduce via basal buds or rhizomes. In addition, the plant’s flowers are commonly found in dense panicles; leaf clusters can be 60-75 cm high and twice as wide. These leaves are also thickened to aid in water storage, while CAM photosynthesis allows for efficient carbohydrate storage.

Whitethorn Acacia: **Family: Fabaceae, *Vachellia constricta***

Whitethorn acacia is a deciduous shrub that can tolerate drought, cold, and heat; it may be found in riparian or dry deserts. The plant may grow to be 6 m tall and has spines that may reach lengths of up to 2.5 to 6 mm. These occur in pairs. Further, the compound leaves are around 3 to 5 cm long, with one leaf having around three to six paired leaflets. The fruit produced is a legume.

Graham’s Nipple Cactus: **Family: Cactaceae, *Mammillaria grahamii***

This cactus is a perennial plant that flowers in spring and summer. It can grow to be 15 cm tall, and has pink or lavender flowers. The red fruits are long and thin. Further, the preferred habitat of this species includes dry, gravelly, arid regions. It grows best in full sun to partial shade, and requires moderately acidic soil. Drought tolerance is another feature of this plant.

Seep Willow: **Family: Asteraceae, *Baccharis salicifolia***

The seep willow is actually a sunflower. It is a perennial plant commonly found in the form of a shrub or tree. Its leaves have an alternate attachment, can be entire or sharply toothed, are linear or elliptic, and are shiny. The plant flowers from March-December, and is a native invader. In addition, the seep willow is a phreatophyte and has a taproot.

Mariola: **Family: Asteraceae, *Parthenium incanum***

Mariola produces latex to help ward off predators and insects. It is a deciduous shrub that grows to be 0.5 to 1 m tall with lobed leaves. The branches and leaves are pubescent which serves to create a grayish-whitish hue on the plant. Terminal heads are made up of small, white flowers. It blooms during July, August, September, and October, and prefers dry soil.

Blue Panic: **Family: Poaceae, *Panicum antidotale***

Blue panic is a perennial plant originally from North Africa. It is less robust than Johnsongrass, and loves to grow in areas with disturbance (including natural disturbance). It can grow to be 3 m tall, and prefers moist soil. Well-drained sandy, loamy, or clay soils are all suitable for this species. It doesn’t grow well in shady areas. In addition, the flowers are monoecious.

Johnsongrass: **Family: Poaceae, *Sorghum halepense***

Johnsongrass is a perennial graminoid that tends to be rhizomatous. These rhizomes usually form tough, tangled sods. Some plants of this species may be annuals in hot, arid environments, though. The culms of the plant are coarse and usually 0.5 to 1.5 m tall. The total plant may reach 3.7 m when in flower, and the inflorescence is an open panicle with paired spikelets.

Desert Zinnia: **Family: Asteraceae, *Zinnia acerosa***

Desert zinnia is a perennial forb that flowers from spring to fall. It is common in dry and arid regions on rocky slopes, grows well in soils with a high pH, and can persist on loose slopes. The plant does well in both sunny and partially shady environments, and grows to be 25 cm tall. Its flowers contain five to seven ray florets and eight to thirteen disc florets.

Goodding’s Willow: **Family: Salicaceae, *Salix gooddingii***

This willow is a deciduous, dioecious tree or shrub. It can grow to be 6 to 18 m and has leaves of 5 to 10 cm. The bark is rough and deeply furrowed. It prefers riparian zones and commonly grows in fine-grained soils; shallow water tables are also suitable. The plant has low shade and high flood tolerance, while the seeds are hairy and primarily dispersed via wind and water.

Tamarix: **Family: Tamaricaceae, *Tamarix spp.***

Tamarix is a salt-loving plant. It is an invader from Europe, can grow to be approximately 6 m tall, is typically upright, winter deciduous, and has seeds with tiny hairs. The plant can absorb as much as 757 L of water a day. In addition, it commonly grows along rivers, is a facultative phreatophyte, and exudes salt from its leaves once it drops them. This tends to prevent other plants from growing.

Desert Broom: **Family: Asteraceae, *Baccharis sarothroides***

Desert broom is a perennial, evergreen, dioecious shrub that can reach 3 m in height. It prefers desert, riparian, and upland zones. The plant grows in washes and disturbed areas, but may also be seen in wetlands. It flowers in the fall and winter with rayless flower heads. The leaves are sessile, thick, and linear, while its form can vary from upright and rounded to prostrate.

Burrow Bush: **Family: Asteraceae, *Ambrosia dumosa***

Burrow bush is a drought deciduous, monoecious, rhizomatous shrub that is 20 to 60 cm tall. The branches are stiff, slender, and covered in fine, white hairs, while the leaves are white and deeply lobed. The plant may grow in a variety of regions, including slopes, valley floors, and sand dunes. It flowers from April to November. The fruit is spherical in shape and has 5-9 mm spines.

Fremont Cottonwood: **Family: Salicaceae, *Populus fremontii***

Fremont cottonwood is a perennial plant that grows best in regions with much subsurface flow (since it isn’t a phreatophyte); shade is very important for this species as well. The seeds are wind and water dispersed. In addition, the plant has more controlled stomata than other species, falls apart when it dies, and has a tendency to help suppress saltcedar via shade.

**2. Species Checklist:**

**a. Site description of the water course/evidence of regular and extraordinary water flows:**

High water marks are measured with the use of signs symbolizing the max extent of a flood, more commonly recognized as Rapid-Water High-Water mark. This can be defined as the point of historic and current erosion using cut lines, wash lines, mud lines, and debris snags as references. Wave intensity and angular velocity determine the cut line. In riparian areas, flash floods cut through the surrounding streambed, eroding banks creating the streambed. Wash lines and mud lines can provide additional information in areas where a cut line isn’t present such as within the area of the streambed, though these signs won’t necessarily be as apparent as time passes. Debris snags last for extended periods of time and are only removed during the next flood. For this purpose, debris snags and cut lines bordering the ecotone of riparian to upland desert shrub were used to determine extraordinary water flow. Regular or ordinary high-water marks were determined by point where gravel met terrestrial grasses along the stream bank, where active erosion was occurring, and at the point of transition between aquatic and terrestrial plants.

This survey of the watercourse involved three measurements of total distance across the riparian area. These were averaged out to provide an approximate total width for the extraordinary water flows. Creek width was averaged in a similar way to provide an approximate ordinary/regular water flow.

**b. Total area of study site/diagram:**

The high water line on each side of the creek at the end of the allotted 100 m was first determined. From this point, two members of the group (one on each side of the creek) used their 20 m pace count to determine the distance from the high water line to the creek, essentially meeting in the middle. Both of these determined distances were then added along with the estimated width of the creek at this specific location (24.6 m + 21 m + 7 m = 52.6 m). To remain consistent, the same members then walked 50 m parallel to the creek. Here the same process was repeated (18 m + 23 m + 8 m = 49 m). Again, one final estimation was made at the other end of the 100 m segment (22 m + 35 m + 7.5 m = 64.5 m). To determine the approximate area, an average was first calculated of the three width distances (55.37 m). This was then multiplied by 100 m to calculate an approximate area of 5,536.67 m2.

Creek

100 m

64.5 m

49 m

52.6 m

100 m

55.37 m

5,536.67 m^2

**c. Sampling method:**

A group of five formed a line approximately 5 m across. They started at the northern point at the easternmost end of the north bank and began a transect south that led to the ordinary/regular watermark of the north bank. The observers then moved 5 m west and proceeded north until the extraordinary water mark was reached where the group moved over another 5 m. This was repeated 10 times. The process was continued on the opposite bank in reverse, so that the entire area was included except the creek. To get the percentage of area sampled, the creek area (7.5\*100 = 750 m2) was subtracted from the total area (5,536.67 m2), resulting in 4,786.67 m2 sampled. This resulted in an estimate of 86.4% of the total area sampled ((4,786.67 / 5,536.67) \* 100). Understandably, this was a result of the large size of the group.

**d. Species checklist:**

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| **Species Checklist:** | | |
| Common Name: | Latin Binomial + Authority: | Family: |
| Upland (west of riparian zone; may also occur in riparian zone) (5/53 spp.): |
| four-wing saltbush | *Atriplex canescens* (Pursh) Nutt. | Amaranthaceae |
| cane cholla | *Opuntia spinosior* (Engelm.) Toumey | Cactaceae |
| catclaw acacia | *Senegalia gregii* (A. Gray) Britton & Rose | Fabaceae |
| plains bristlegrass | *Setaria macrostachya* H.B.K. | Poaceae |
| graythorn | *Zizyphus obtusifolia* (Hook. ex. Torr. & Gray) | Rhamnaceae |
| Riparian zone(35/68 spp.): |  |  |
| Arizona foldwing | *Dicliptera resupinata* (Vahl) Kuntze | Acanthaceae |
| little leaf desert sumac | *Rhus microphylla* Engelm. ex A. Gray | Anacardiaceae |
| climbing milkweed/fringed twinvine | *Funastrum cynanchoides* (Dcne.) Schltr. | Apocynaceae |
| seep willow | *Baccharis salicifolia* (Ruiz & Pav) Pers. | Asteraceae |
| desert broom | *Baccharis sarothroides* A. Gray | Asteraceae |
| palmer amaranth | *Amaranthus palmeri* S. Wats | Amaranthaceae |
| fewflower beggarticks | *Bidens leptocephala* Sherff | Asteraceae |
| cocklebur | *Xanthium strumarium* L. | Asteraceae |
| New Mexico thistle | *Cirsium neomexicanum* A. Gray | Asteraceae |
| slimleaf bursage; ragweed | *Ambrosia confertifolia* DC. | Asteraceae |
| brownplume wirelettuce | *Stephanomeria pauciflora* (Torr.) A. Nels. | Asteraceae |
| London rocket | *Sisymbrium irio* L. | Brassicaceae |
| canyon/netleaf hackberry | *Celtis laevigata* var. *reticulata* (Torr.) L. Benson | Cannabaceae |
| trans-Pecos morning-glory | *Ipomoea cristulata* Hallier f. | Convolvulaceae |
| ivyleaf morning-glory | *Ipomoea hederacea* Jacq. | Convolvulaceae |
| sedge | *Cyperus* sp. | Cyperaceae |
| velvet mesquite | *Prosopis velutina* Woot. | Fabaceae |
| Arizona walnut | *Juglans major* (Torr.) Heller | Juglandaceae |
| rush | *Juncus sp.* | Juncaceae |
| desert blazing star | *Mentzelia desertorum* (Davidson) H.J. Thomps. & J.E. Roberts | Loasaceae |
| Arizona ash | *Fraxinus velutina* Torr. | Oleaceae |
| giant reed | *Arundo donax* L. | Poaceae |
| buffelgrass | *Cenchrus ciliaris* L. | Poaceae |
| bermudagrass | *Cynadon dactylon* (L.) Pers. | Poaceae |
| alkali sacaton | *Sporobolus airoides* (Torr.) Torr. | Poaceae |
| johnsongrass | *Sorghum halapense* (L.) Pers. | Poaceae |
| blue panic | *Panicum antidotale* Retz. | Poaceae |
| Canada wildrye | *Elymus canadensis* L. | Poaceae |
| white virgin’s bower | *Clematis ligusticifolia* Nutt. | Ranunculaceae |
| southwestern condalia | *Ziziphus obtusifolia* (Hook. ex Torr. & Gray) | Rhamnaceae |
| Fremont cottonwood | *Populus fremontii* S. Wats. | Salicaceae |
| Goodding’s willow | *Salix gooddingii* C.R. Ball | Salicaceae |
| yerba mansa | *Anemopsis californica* (Nutt.) Hook. & Arn. | Saururaceae |
| tamarisk | *Tamarix ramosissima* Ledeb. | Tamaricaceae |
| Pennsylvania pellitory | *Parietaria pensylvanica* Muhl. ex Wild. | Urticaceae |
| rush skeletonweed | *Chondrilla juncea* | Asteraceae |

**3. Most common herbaceous and woody species/sampling method:**

While walking transects to estimate percentage of cover, the observers also maintained a tally of each species encountered. By combining these tallies, the most commonly occurring species were deduced.

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| **Most Common Woody Plants:** | | |
|  | Common Name: | Latin Binomial and Authority: |
| 1 | Arizona Ash | *Fraxinus velutina* Torr. |
| 2 | Fremont Cottonwood | *Populus fremontii* S. Wats. |
| 3 | Goodding’s Willow | *Salix gooddingii* C.R. Ball |
| 4 | Seep Willow | *Baccharis salicifolia* (Ruiz & Pav) Pers. |
| 5 | Tamarisk | *Tamarix ramosissima* Ledeb. |

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| **Most Common Herbaceous Plants:** | | |
|  | Common Name: | Latin Binomial and Authority: |
| 1 | Bermudagrass | *Cynadon dactylon* (L.) Pers. |
| 2 | Blue Panic | *Panicum antidotale* Retz. |
| 3 | Johnsongrass | *Sorghum halapense* (L.) Pers. |
| 4 | Arizona Foldwing | *Dicliptera resupinata* (Vahl) Kuntze |
| 5 | Canada Wildrye | *Elymus canadensis* L. |

**4. Method for estimating plant species that account for the most vegetative cover in the overstory and understory vegetation layers:**

Six transects (three on each side of the creek) were walked along the length of the study area (100 m). The three on both sides included a transect on the bank of the creek, another next to the high water line, and a third between these two. The observers recorded the species encountered and the total area of the transect covered by each species. The average cover of these transects per species was then calculated as a percentage of 100 m, with the two plant species with the highest percentage being the dominant species.

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| **Plant Species Accounting for the Most Vegetative Cover:** | | | |
|  | Common Name: | Latin Binomial and Authority: | Average % Coverage of 100 m Transects: |
| Understory 1 | Bermudagrass | *Cynadon dactylon* (L.) Pers. | 23.9% |
| Understory 2 | Blue Panic | *Panicum antidotale* Retz. | 20.9% |
| Overstory 1 | Arizona Ash | *Fraxinus velutina* Torr. | 28.6% |
| Overstory 2 | Goodding’s Willow | *Salix gooddingii*  C.R. Ball | 22.7% |

**5. Species-area relationships:**

1. **Species-area curves for the group’s study site/the entire area sampled by the class as a whole:**



1. **Explanation of the two curves:**

The two curves were created in Excel by plotting area sampled versus number of species identified for each group. Two best fit lines were created, one curve to represent this group and one to represent the data from the entire class. The curves show a correlation between species identified and area sampled; the number of species increases as the area sampled increases. This indicates that there are probably more species existing in areas that simply were not identified in this survey.

1. **Would these curves look different if the study was repeated in the upland area near the parking lot of the preserve? Why or why not?**

If the experiment were to be repeated at the parking lot, the two curves would look quite different. Due to the differences in availability of water in the upland area when compared to the riparian area surveyed, it is very likely that the species-area curves would plateau very quickly for an upland survey area. Larger sample areas would not provide new species for the species checklists, indicating a generally lower number of species present.

1. **How might these curves change if the study was conducted in March? In June?**

In the Sonoran Desert, the month of March traditionally marks the period of time just before the summer monsoons, when soil water is at a relatively low percentage and very few, if any, plants are actively growing. Conducting a similar study in March would likely result in lower total numbers of species identified, because many identifiable structures would not be present. The opposite might be true in June, however, which is traditionally the start of the monsoon season and a period of active growth and flowering for many desert plants.