

River Bar Biodiversity Studies:
Aerial Insects, Vegetation Structure and Bird Habitat
Progress Report – Years I and II



Middle Rio Grande Bosque Initiative

2007



NATURAL HERITAGE
NEW MEXICO



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River Bar Biodiversity Studies: Aerial Insects, Vegetation Structure, and Bird Habitat

Progress Report¹ - FY 2003 and 2004²

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Introduction

Vegetated river bars are a significant element of the Middle Rio Grande ecosystem, comprising upwards of 18% of vegetation throughout the Albuquerque Reach (Milford et al. 2003). Yet, while considerable attention has been devoted to the ecology and biodiversity of the neighboring riparian bosque (Hink and Ohmart 1984; Crawford et al 1993), little is known about the bars. The bars occur along the margins of the active channel (alternate bars or point bars) or in the channel itself (island bars) where they are subject to varying stream flows and ground water fluctuations along with flooding and shifting sediment loads. Typically, they initially support young wetland and riparian vegetation, and of particular note, they are the sites where most natural regeneration of cottonwoods takes place. Hence, in these highly dynamic environments, the expectation is that bars may be the most diverse and biologically active component of the bosque ecosystem. In previous studies, we have found that both native and exotic-dominated river bars support significantly different plant and ground-dwelling arthropod communities than the surrounding mature bosque (Milford and Muldavin, 2004). In this study, we examine how and if these differences in vegetation translate up the food chain to aerial insects with respect to abundance and diversity, and ultimately, to their effects on avian habitat use. We report here on the first two years (fall 2003-fall 2005) of a multi-year study looking at the vegetation and aerial insects of a variety of different types of river bar habitats. This work forms the baseline for our recently initiated (2006) measurements of bird use of the bar habitats that will lead to inferences about the relationship between the vegetative diversity, aerial insect abundance, and structure of and avian communities in the Middle Rio Grande.

Methods

Study Area

The project area included 12 study sites located within the greater Albuquerque reach of the Rio Grande between Corrales, NM and the I-25 bridge over the Rio Grande south of the city (Fig. 1). Climatically, the Middle Rio Grande through Albuquerque is located in a semi-arid zone where precipitation ranges from 138 to 477 mm (5.42 to 18.8 in) around a mean of 252 mm

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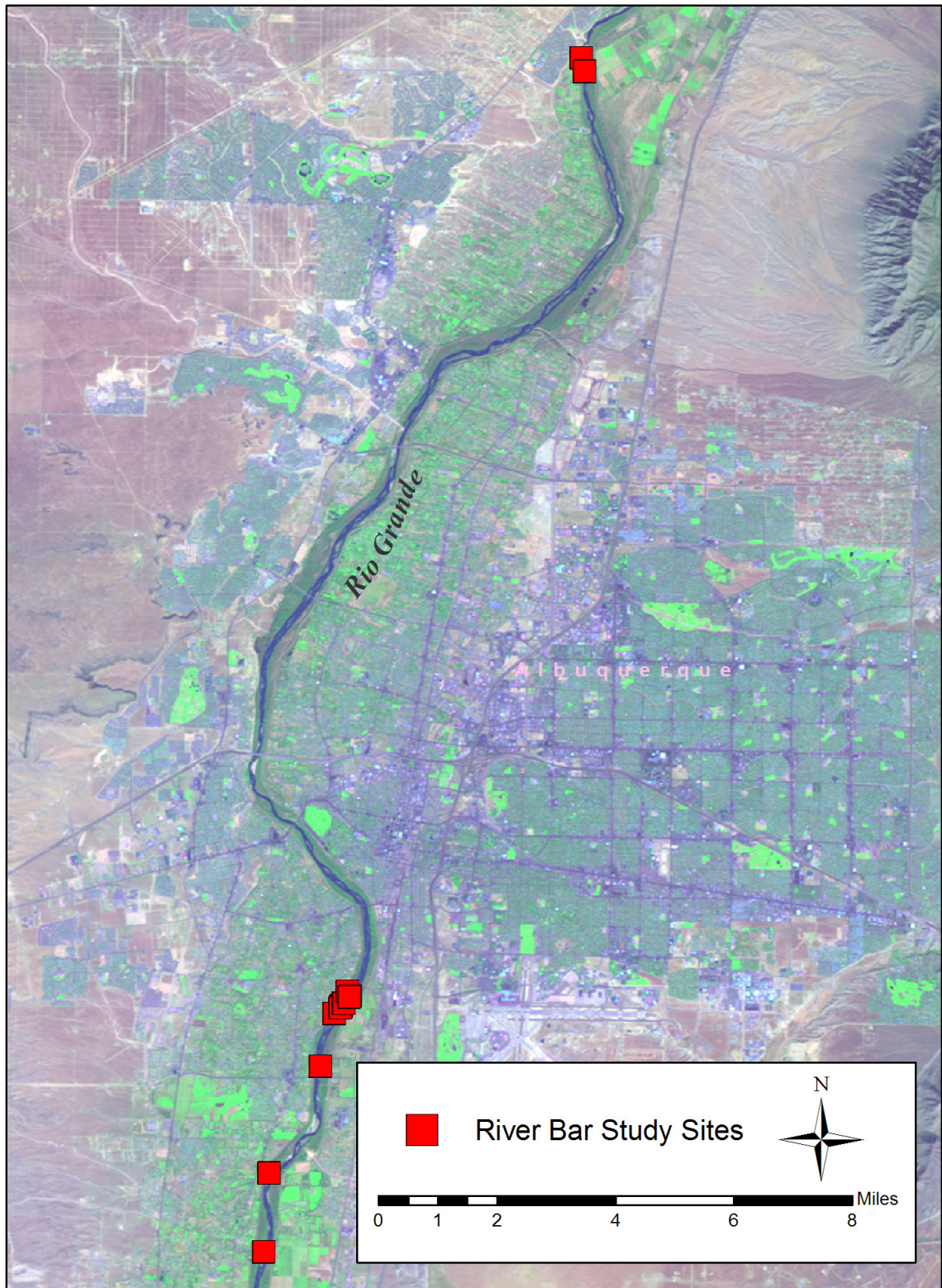


Figure 1. Overview of study site locations.

(9.92 in) as reported at Los Lunas, NM, 15 miles to the south along the river corridor. About 50% of the precipitation arrives during the four-month summer "monsoon" season (June-September). Precipitation was also highly variable from month to month, an important factor when comparing arthropod values among sampling periods.

Flooding is historically a significant factor in vegetation dynamics along the Middle Rio Grande, but has been significantly reduced since completion of the Cochiti Dam in the 1970s. However, for river bars, especially lower bars, flooding can still be a significant hydrological factor. This was especially true in the spring of 2005, when the water releases from Cochiti Dam to the Middle Rio Grande were exceptionally high and of long duration compared to most years since flow regulation began in 1972. Water flows exceeded 4,000 cfs at Albuquerque for 66 days between April 19 and June 23, 2005. While releases and durations such as this were relatively common in the 1970's and early 1980's (four events), since 1985 the flows of 2005 were exceeded once (84 days in 1995 above 4,000 cfs). In contrast, the five years leading up to 2005 were marked by severe droughts with little or weak spring discharges of relatively short duration. In the 2005 the majority of the study sites were either under active flowing water, or had ground water levels rise to the point of surface saturation. Only three sites did not have water at the surface during the flood: the two mature bosque forest sites and the Russian olive/Siberian elm site. A fourth site, the grassy Russian olive site, was in an area that became inaccessible during the flood, and may or may not have had standing surface water, but probably did not get covered with active flows. The dry willow site in Corrales was also not under active flood waters, but was surrounded by active back channel flows, and the entire site surface was moist, with some standing water.

Study Sites

Our objectives were to broaden our comparative biodiversity studies of river bars and bosque in the Middle Rio Grande to include measurements of aerial insects and vertical vegetation structure as a measure of bird habitat, and to include in biodiversity studies of transient wetland island bars (ephemeral bars) a variety of vegetation zones within a bar restoration area (Albuquerque Overbank Project). Accordingly, we chose a mixture of study sites, some of which had been included in our previous river bar biodiversity studies and some of which were new sites in a young wetland and on a restored bar. In total, twelve sites were chosen in 2003 for the study. They included four willow-dominated sites, three Russian olive-dominated sites, two mature bosque sites, a young cottonwood stand, a young herbaceous wetland, and a drier upland herbaceous site. These sites represented the wide range of variation in both vegetation and moisture regime common on bars throughout the Albuquerque reach of the Middle Rio Grande bosque. Appendix A contains a table that lists the site names, locations, and dominant vegetation type for each site. In June 2004 one of the Russian olive sites burned. We continued to monitor the vegetation and collect insects, although the site composition was significantly altered by the fire.

Sampling

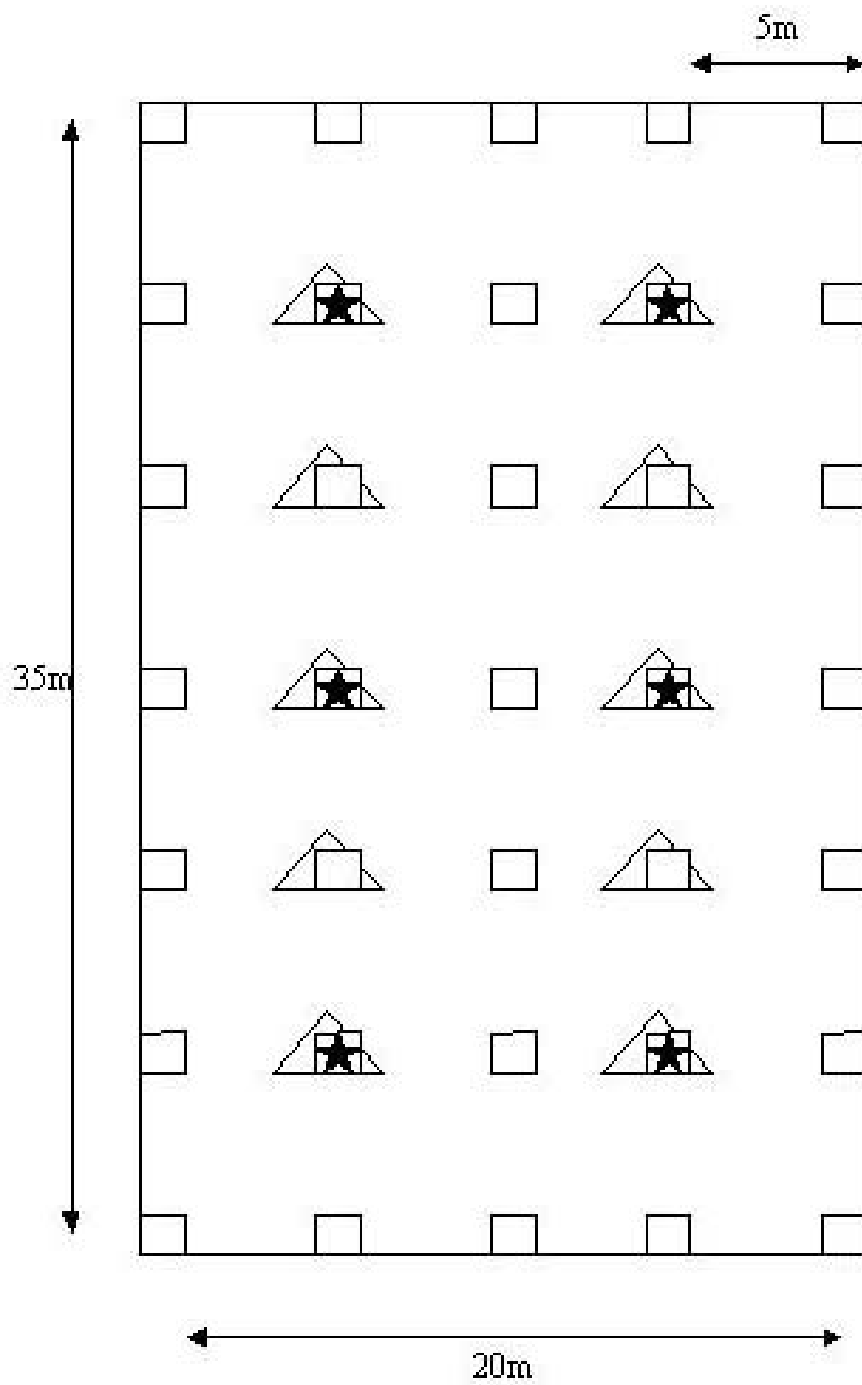
Within each site, we selected stands that were homogenous with respect to tree/shrub dominance, on a uniform geomorphic surface, and that were away from obvious public access

routes and impacts. A sampling grid of 35 points was established on five-meter centers in a five-by-seven configuration (Fig. 2). Each grid point was monumented with a four-foot rebar stake. The corner rebar stakes were jacketed with white PVC pipe, labeled with aluminum tags, and had a GPS position taken.

One of the most important components of bird habitat is vertical vegetation structure. In 2003 we conducted a first sampling of vertical vegetation structure on the bar sites. Vertical vegetation was measured at 10 points within each site, at rebars two through six along the second (B) and fourth (D) lines - considering the site to consist of five lines (A-E) of seven (1-7) rebars each. Vertical vegetation was measured every decimeter using a range pole 7.6 m tall. All species within one decimeter of the range pole were recorded for each decimeter segment. In the mature bosque forest sites where vegetation extended beyond the height of the range pole, the height of intersecting vegetation was estimated up to 18 meters.

In addition to vertical vegetation, in 2004 and 2005 we collected vegetation cover, density, and diversity measurements at the same sites to provide a comprehensive picture of these sites for analyzing bird habitat preferences. For vegetation cover measurements, one-meter-square quadrats made of rigid PVC were extended off the northeast corner of all 35 site rebars. The opposite corner of the quadrat was marked with a surveyor pin flag to aid spatial replication. The orientation of the quadrats was noted on the data sheets. Percent canopy cover was recorded for all species within and over-hanging the quadrat along with litter, soil, rock, and total herbaceous cover. Voucher specimens were collected and later identified and deposited at the University of New Mexico Herbarium. A complete plant species list is provided in Appendix B, while Appendix C provides cover averages by species, site and year. Besides cover, tree and shrub stems were counted in two-inch diameter classes along with an estimate of modal height within each one-meter quadrat. Vegetation cover sampling was conducted in the fall of 2004 and 2005.

To examine the potential prey base available for birds we collected aerial insects at all sites in October 2003, June, August, and October 2004, and July, August and October 2005. The June sample for 2005 was delayed until July due to flooding which made most of the study sites inaccessible. Aerial arthropods were collected using 3x5-inch yellow sticky strip traps hung in shrubs or trees according to the dominant vegetation of the site. At the two herbaceous river bar sites where woody vegetation was limited, traps were hung from three-foot-tall aluminum poles set over the rebar. The traps were hung using twist ties. Six traps were hung at all bar sites, and nine traps were hung in the bosque sites. At the bar sites traps were hung in the site dominant shrub species – i.e. coyote willow at the willow-dominated sites; Russian olive at the Russian olive-dominated site, etc. Within the bosque sites three traps were hung from mature cottonwoods, and six traps were hung from understory trees and shrubs. At each site, the traps were placed in the shrub or tree of the appropriate species nearest to the B2, B4, B6, D2, D4, and D6 rebar. Most traps were hung approximately 1.5-2 m off the ground, with the exception of those on the poles in the herbaceous sites and those placed in the mature cottonwoods at the bosque sites. Traps were tied only onto living branches near leaves. Flagging was used so that trap locations could be repeated sample to sample, and the locations were only moved in cases where the branch died between sample periods. The sticky traps were left out for 48 hours



- Vegetation Cover Quadrant
- △ Vertical Vegetation
- ★ Sticky Trap

Figure 2. Diagram of site design.

during all sample periods except for October 2003, when they were left out for 120 hours. Collections of traps occurred in the same order as the traps were set. Clear plastic coverings were placed on both sides of the traps after they were removed from the vegetation. Each trap was labeled with site, date, and vegetation type where the trap was hung. All traps were frozen immediately after collection

Identification of the arthropods was completed using a Nikon stereo-zoom microscope with 20x/12.5 eyepieces and accompanying lens micrometer. The arthropods were left in place on the sticky cards for identification. The number of specimens on the card, the visibility of the crucial body parts such as the wings, legs, and antennae, and the condition of the specimen determined the classification of each arthropod. Specimens were identified to family if possible. All individuals that were at least 50% intact were measured, counted, and marked. The length was measured to the nearest millimeter from the tip of the head to the tip of the abdomen, not including antenna, ovipositors, or wings. The length of incomplete specimens was estimated by the length of the present body parts and the average size of other individuals of the same taxa. A color-coded ink dot was placed beside each measured individual to prevent duplicates. Blue indicated a classification at least to class, red indicated that only the phylum of the individual could be determined and was recorded as “unknown.”

Arthropod biomass was calculated using the following equation from Sample et al. (1993).

$$y = e^{b(x)^a}.$$

Where y = mg biomass per individual; e = a constant of 2.71828183; b and a are taxonomic group specific constants as determined by Sample et al. (1993), and x = the length times the width of an individual insect. Individuals were grouped into half- or full millimeter length categories, for which an average length and width were calculated. For each taxonomic group the average biomass was then calculated by size category. This was only done for taxonomic groups for which there were constants available in the literature. These Orders included the Coleoptera, Diptera, Hemiptera, Homoptera, Hymenoptera, Lepidoptera, Neuroptera, and Thysanoptera. Where constants were available calculations were made for sub-order groupings. There were five of these sub-order groupings used, three in the Diptera (Sub-orders Nematocera and Brachycera, and Infraorder Muscomorpha), one in the Homoptera (family Cicadellidae) and one in the Hymenoptera (family Chalcidoidea).

The vegetation and arthropod data were entered into the NHNM Ecology Group relational database (Microsoft Access platform), and quality controlled through error checking routines and manual read backs.

Results

Site Descriptions

The sites fall into four main categories: willow-, Russian olive-, cottonwood- and herbaceous-dominated. The willow sites included a mesic four-year-old stand on a restored bar

(W-YM), a wetter stand in a sidebar swale (W-OM), an established willow stand on a dry, sandy sidebar (W-D), and an established stand on a high bar where significant die off occurred during the drought years of 2002-2005 (W-DO). The Russian olive stands were all older, established stands. One was a dense mesic stand of Russian olive and Siberian elm with a mesic grassy understory (RO-E). The second was a moderately mesic dense stand of Russian olive with a grassy understory (RO-G). The third site was a drier and sparser stand with a moderate mixed forb and upland grass understory (RO-B). Both of the mature bosque sites were dominated by a mature cottonwood overstory, but one had an understory composed almost exclusively of exotic shrubs (CW-E), while the other had an understory composed of native shrubs and herbaceous species (CW-N). The young cottonwood stand (CW-YM), which was four years old, the herbaceous wetland (H-W), and the upland herbaceous site (H-U) were all located on the restored bar site (AOP) and represented rare but biologically important vegetation types.

After a fire in June of 2004, the dry Russian olive site (RO-B) shifted from a site dominated by scattered mature Russian olives with an upland herbaceous understory to a site of resprouting Russian olives and sparse, weedy herbaceous vegetation. This same site was flooded during the high flows in the summer of 2005 and had a subsequent bloom of herbaceous growth, resulting in yet another significant change of habitat type.

Vegetation Composition and Structure

The vegetation structure and composition differed among sites, with apparent trends related to the dominant species' life form and origin. The herbaceous sites were dominated by a wide variety of grasses and forbs (Figs. 3 & 4). However, the wetland site (H-W) had over twice the species density of the drier upland (H-U) counterpart and was one of the most diverse sites overall (Figs. 3, 5 & 6). Graminoid cover was consistently high at the upland site, while at the wetland site graminoid cover declined by over 81% from 2004 to 2005 as the active river channel moved away from the site, and it developed from an herbaceous-dominated wetland into a young native shrubland dominated by willows. The vertical vegetation structure also demonstrated the transitional state of the wetland, with many young trees and shrubs under 1.5 meters, while the more established upland had few, taller shrubs, and lacked tree reproduction (Fig. 3). Forb cover tended to be highly variable across years and sites, but was especially so at the herbaceous upland where it dropped more than 78% in 2005. This drop was largely due to a decline in the exotic annual species prickly Russian thistle (*Salsola tragus*) and common kochia (*Kochia scoparia*) (Appendix C).

The four willow-dominated sites had clear differences in structure related to moisture regime (Fig. 7). The mesic willow stands (W-YM and W-OM) had high density of herbaceous species in height between 0-2m (Figs. 7a & b). This herbaceous layer at the mesic sites was dominated by native grasses, while at the dry willow site there was very little herbaceous structure or cover (Figs. 4, 5 & 7). Following the 2003 drought the W-DO site had the least structure of any of the willow sites with both low shrub and herbaceous structure. Following the flood of June 2005, the W-DO site had rebounded, with a graminoid cover similar to the W-YM site (Fig. 4). Shrub cover at all four of the willow sites was similar and dominated by native coyote willow (*Salix exigua*) (Fig. 4). The willow sites, with the exception of the dry site, were more species rich than the Russian olive or mature bosque sites (Fig. 6).

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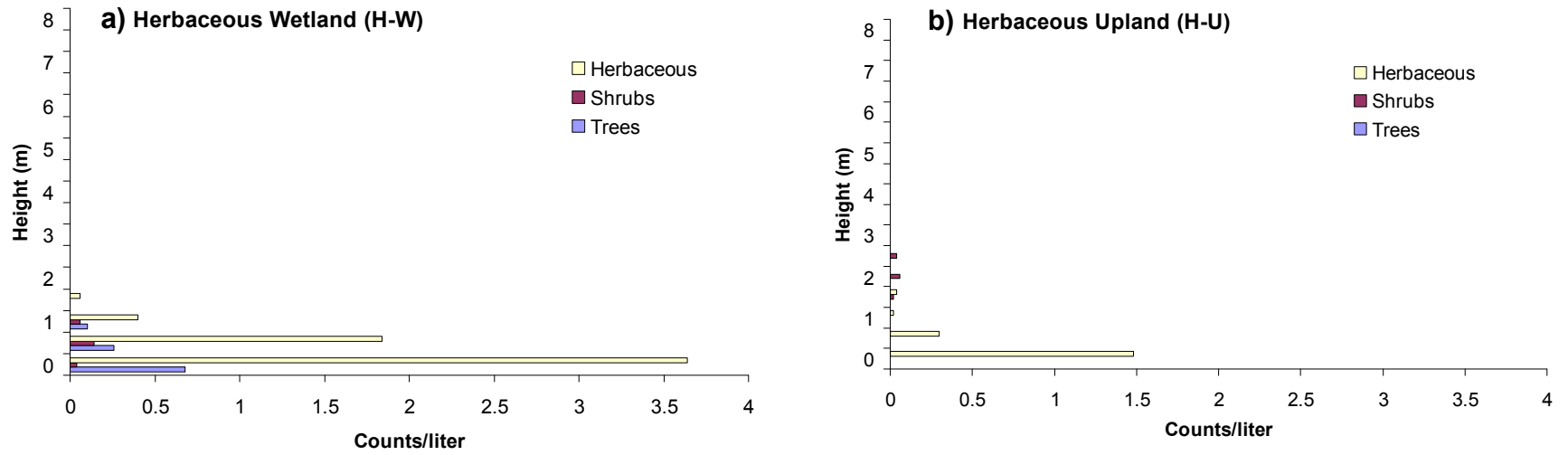


Figure 3 Vertical vegetation for the herbaceous sites showing average count of species per liter by half-meter and lifeform.

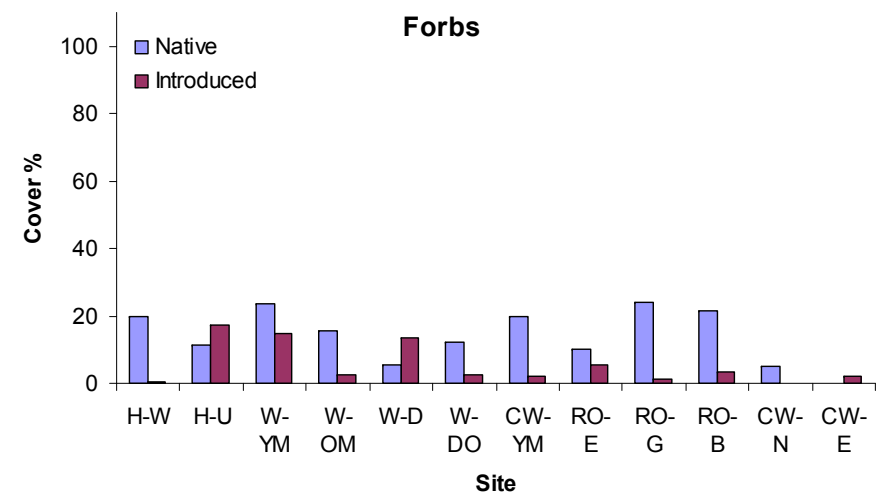
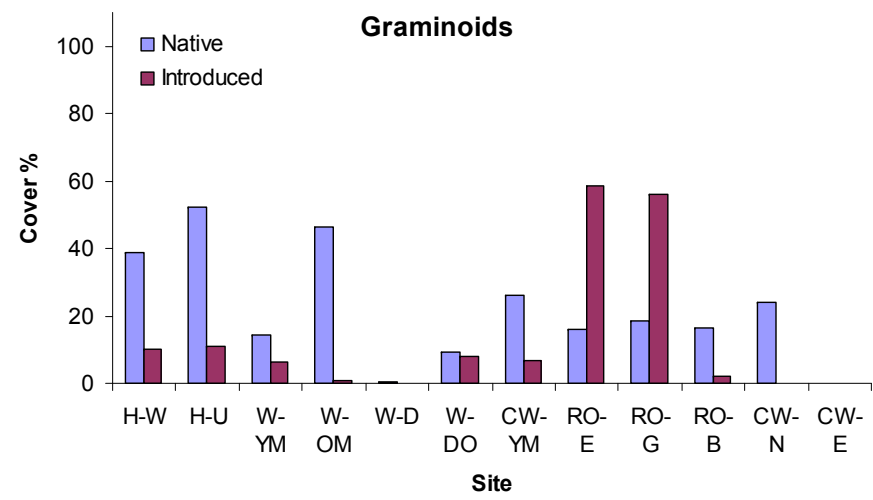
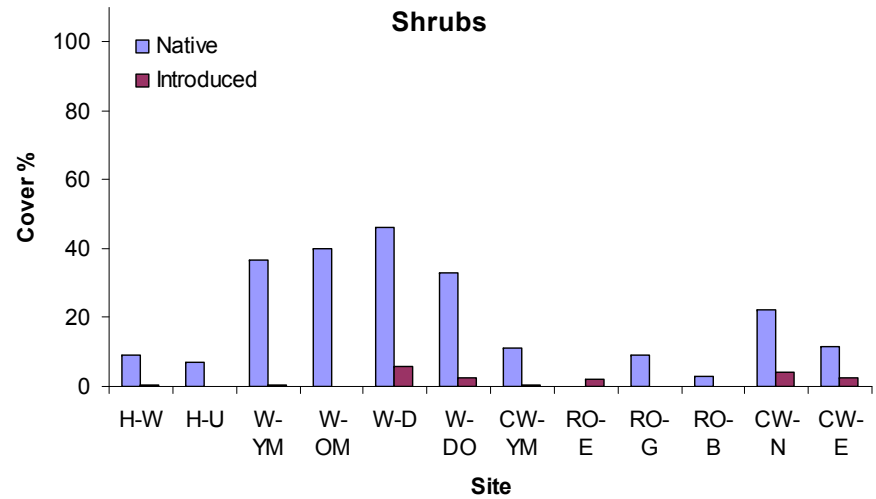
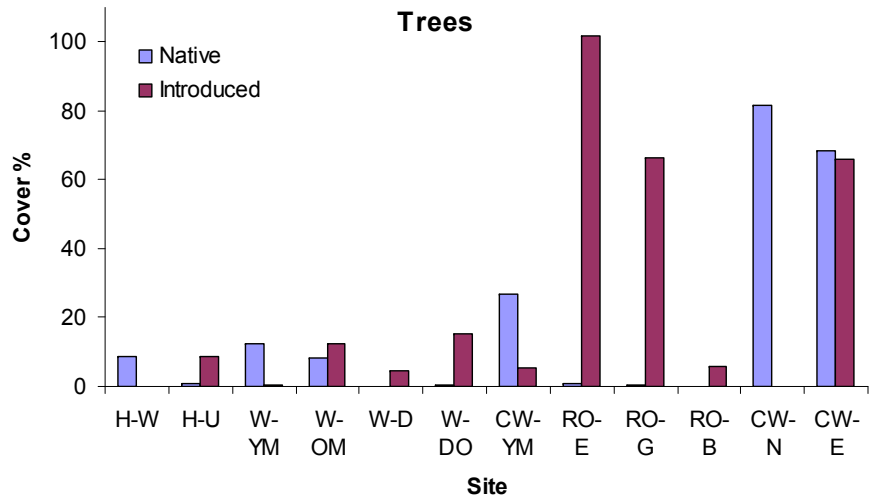


Figure 4. Cover by life form and origin for all sites averaged over 2004-2005. H-W=Herbaceous wetland; H-U=Herbaceous upland; W-YM=Willow-young mesic; W-OM=Willow-old mesic; W-D=Willow-dry; W-DO=Willow drought die-off; CW-YM=Cottonwood-young mesic; RO-E=Russian olive/elm-grassy; RO-G=Russian olive-grassy; RO-B=Russian olive-burned; CW-N=Bosque-native; CW-E=Bosque-exotic.

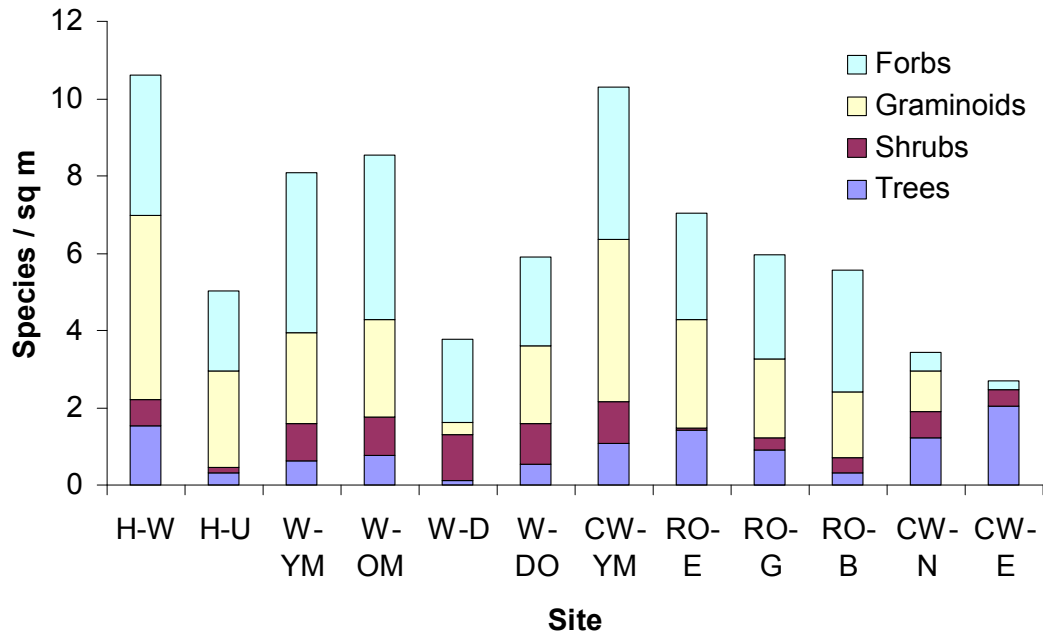


Figure 5. Average number of species per square meter across all years by site. H-W=Herbaceous wetland; H-U=Herbaceous upland; W-YM=Willow-young mesic; W-OM=Willow-old mesic; W-D=Willow-dry; W-DO=Willow drought die-off; CW-YM=Cottonwood-young mesic; RO-E=Russian olive/elm-grassy; RO-G=Russian olive-grassy; RO-B=Russian olive-burned; CW-N=Bosque-native; CW-E=Bosque-exotic.

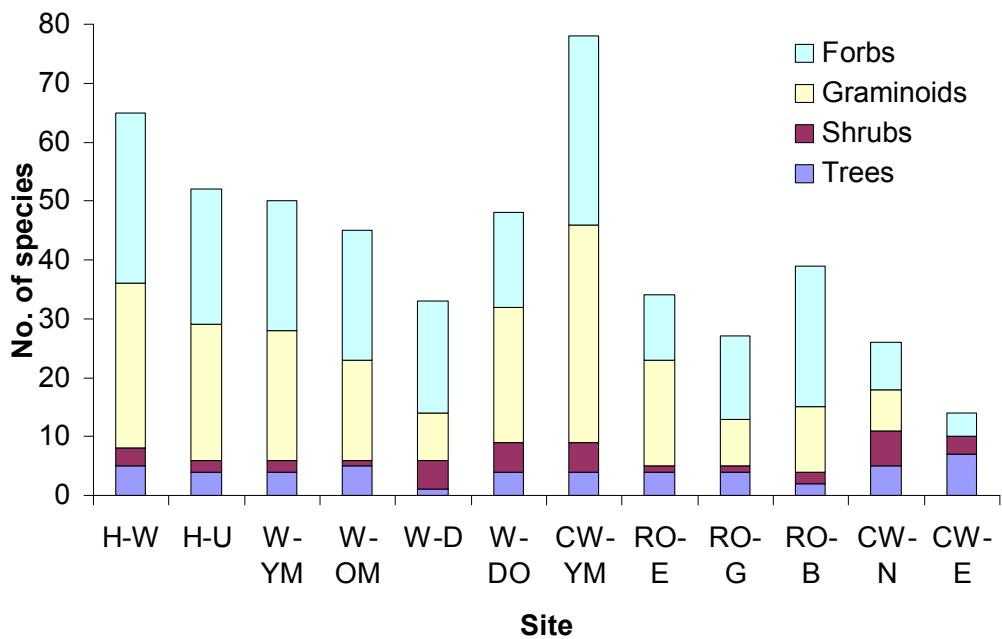


Figure 6. Total number of species observed over all years by site. H-W=Herbaceous wetland; H-U=Herbaceous upland; W-YM=Willow-young mesic; W-OM=Willow-old mesic; W-D=Willow-dry; W-DO=Willow drought die-off; CW-YM=Cottonwood-young mesic; RO-E=Russian olive/elm-grassy; RO-G=Russian olive-grassy; RO-B=Russian olive-burned; CW-N=Bosque-native; CW-E=Bosque-exotic.

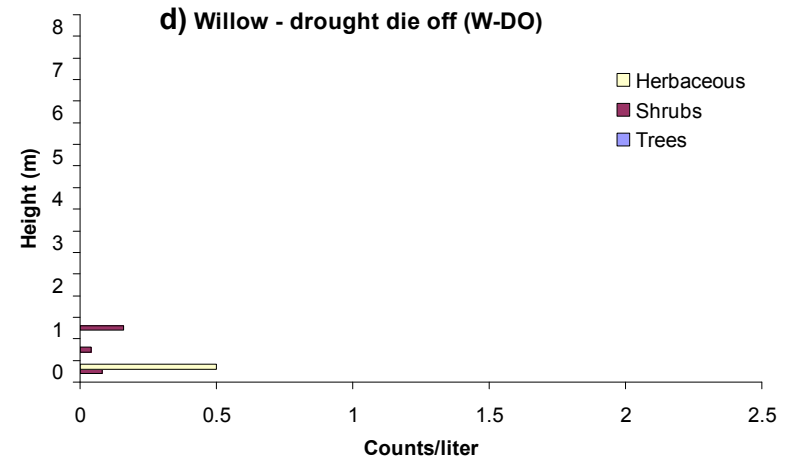
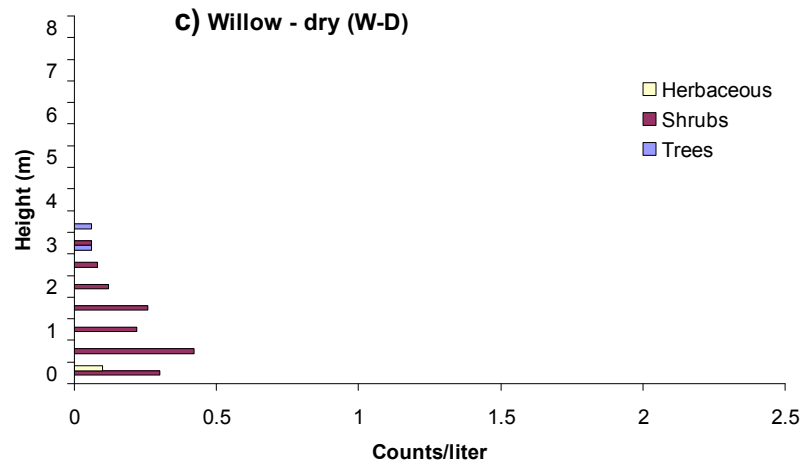
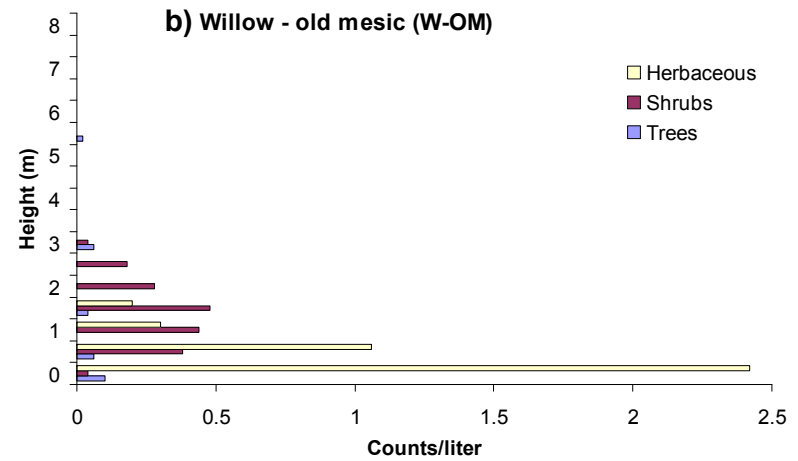
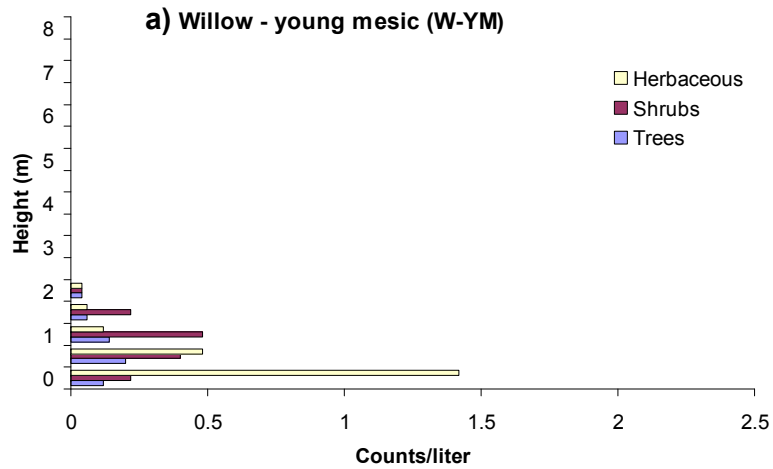


Figure 7. Vertical vegetation for the willow sites showing average count of species per liter by half-meter and lifeform.

The Russian olive sites (RO-E, RO-G & RO-B) had similar vertical structure to the willow sites, but with a taller woody layer that was composed mostly of trees (predominantly Russian olive) rather than shrubs (Fig. 8). Like the willow sites, there were strong trends in cover at the Russian olive sites relative to moisture regime. The more mesic sites (RO-E & RO-G) had much higher tree and grass cover than the dry RO-B site (Fig. 4). Both the tree and grass cover at the mesic Russian olive sites was dominated by introduced species (Fig. 4). The Russian olive sites were among the lowest in overall species richness (Fig. 6), although species richness per square meter was moderately high (Fig. 5).

The young cottonwood site (CW-YM) was unique among the woody-bar vegetation types. Its vertical structure was similar to the Russian olive sites (Fig. 8), but it had higher species richness per square meter than all sites except for the herbaceous wetland (Fig. 5). In cover it resembled none of the other sites in that it was moderate in overall cover among trees, graminoids and forbs, and was dominated by native species in all lifeform groups (Fig. 4). Although moderate in overall cover, it was the most species rich of all the sites in the study (Fig. 6).

Vegetation at the mature cottonwood bosque sites (CW-N and CW-E) was much taller than any of the bar types, extending 16-18 meters to the top of the canopy with complex understories (Fig. 9). The native and exotic bosque sites differed in that the native site had some herbaceous cover in the 0-0.5 meter zone, while the exotic had none. In addition, at the CW-E site, the trees and shrubs created a relatively dense woody understory at 0-6 m dominated by exotic species, while the CW-N site characterized lower density native shrubs (Fig. 9 and Appendix C). Tree cover was very high at both bosque sites, but differed in composition, with the native site comprised almost exclusively of native species and the exotic site split between native and exotic species (Fig. 4). At the exotic bosque site, the native cover came from the overstory mature cottonwoods, while the understory trees were almost exclusively exotic species such as tree of heaven (*Ailanthus altissima*), Russian olive, and Siberian elm (*Ulmus pumila*) (Appendix C). Species richness on both the site and per-meter basis was lowest at the mature bosque sites, but particularly so at the exotic-dominated site, which had half the number of total species of the native-dominated site (Figs. 5 & 6).

Arthropod Abundance and Biomass

Overall, there was a high diversity of arthropods captured in our sampling. Between 2003 and 2005, a total of 49,515 individual arthropods were collected on the sticky cards representing 18 different insect orders and two types of arachnids (Appendix D). In addition, 70 families and 10 other sub-order taxonomic groups were identified. Ninety-four percent of the individuals collected were from the Diptera (flies), Hymenoptera (bees and wasps), Thysanoptera (thrips), Homoptera (leaf hoppers), and Coleoptera (beetles) orders. Only these orders occurred in high enough densities to be used in the subsequent analyses.

There was a large variation in biomass and numbers of insects collected across sites and between sample periods (Figs. 11 & 12). Number of insects did not correlate well to total biomass, due to the large size difference between different taxa. Thus a site may have had a very

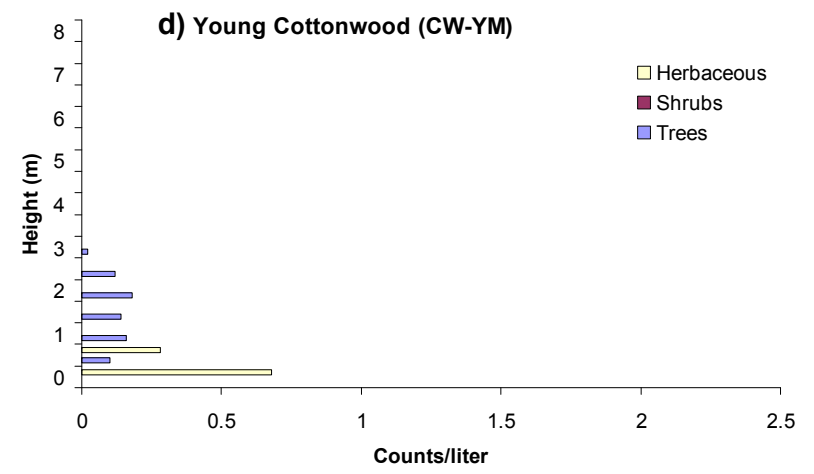
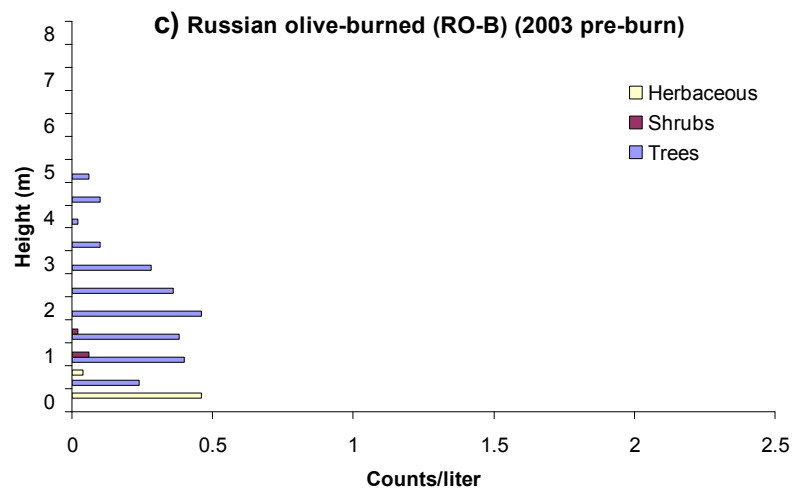
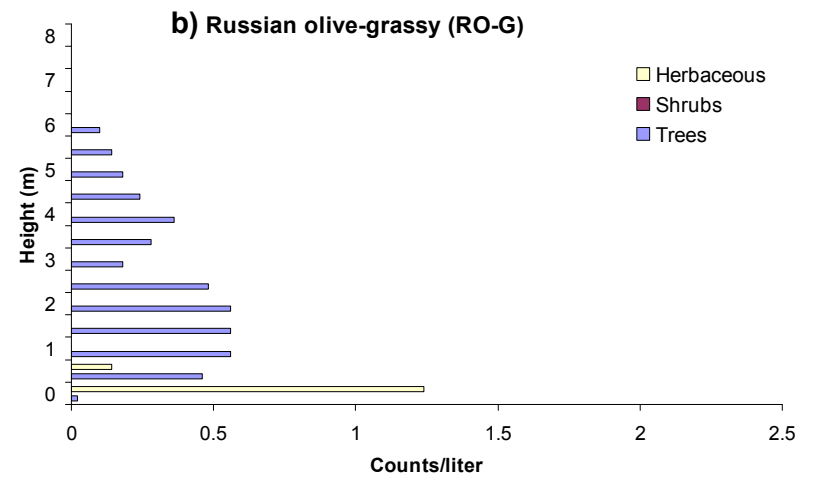
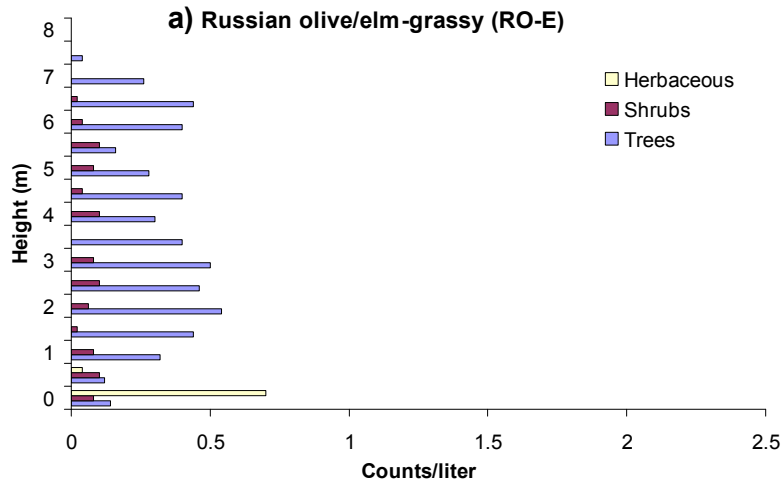


Figure 8 Vertical vegetation for the Russian olive and young cottonwood sites showing average count of species per liter by half-meter and lifeform.

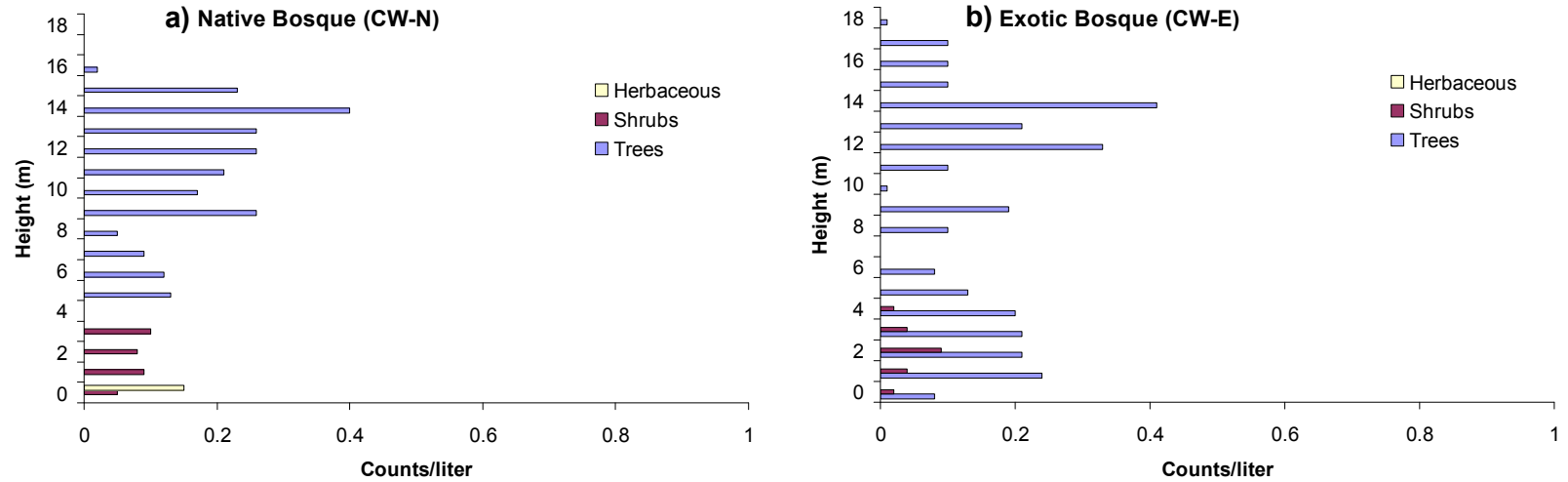


Figure 9. Vertical vegetation for the mature bosque sites showing average count of species per liter by meter and lifeform.

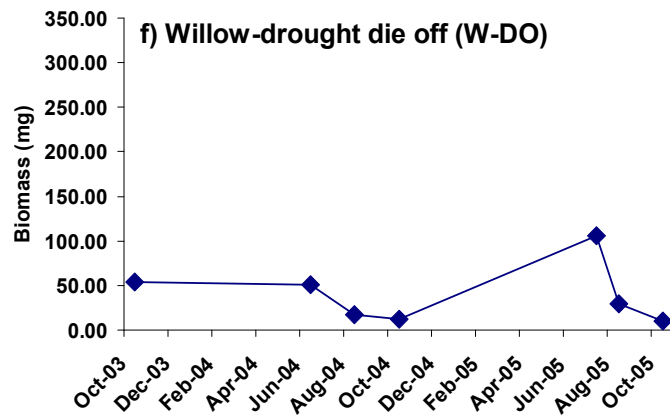
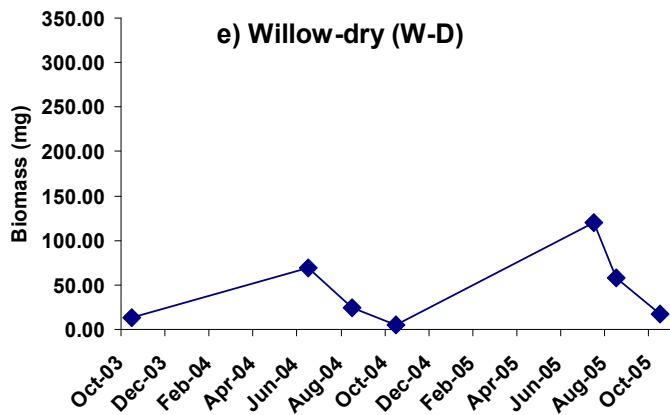
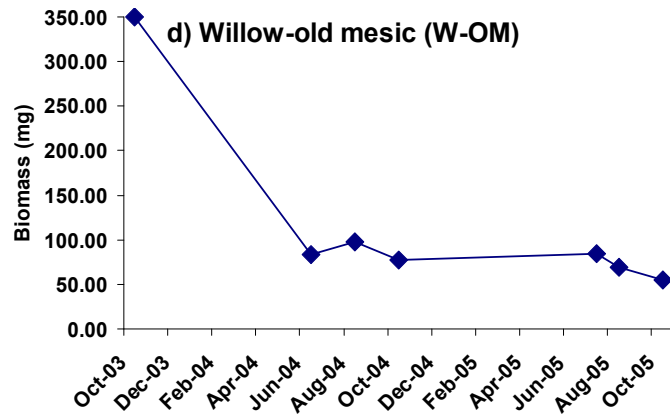
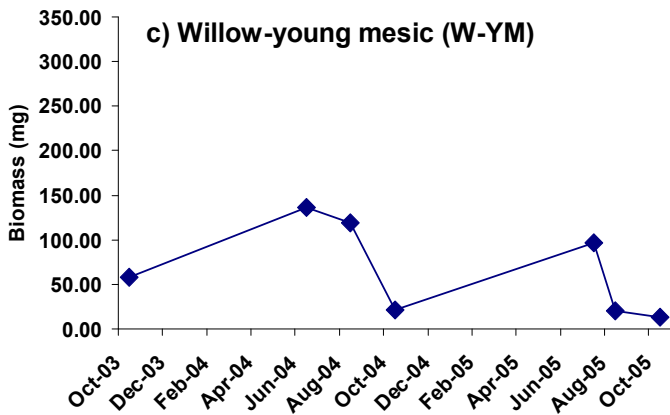
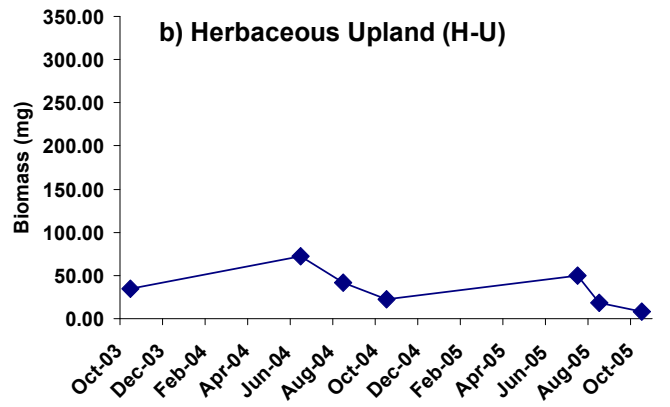
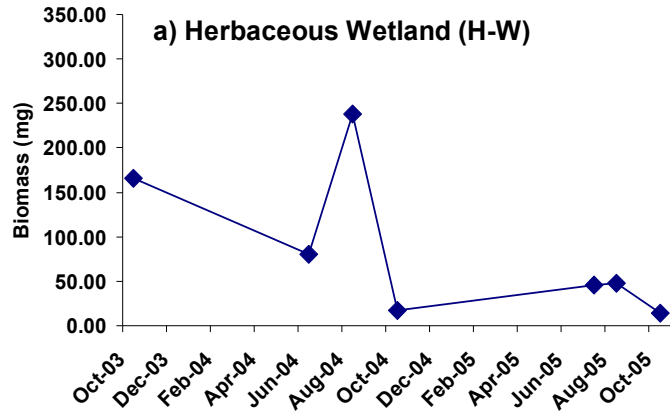


Figure 10. Average total biomass of insects per sticky card by month and year for herbaceous and willow sites.

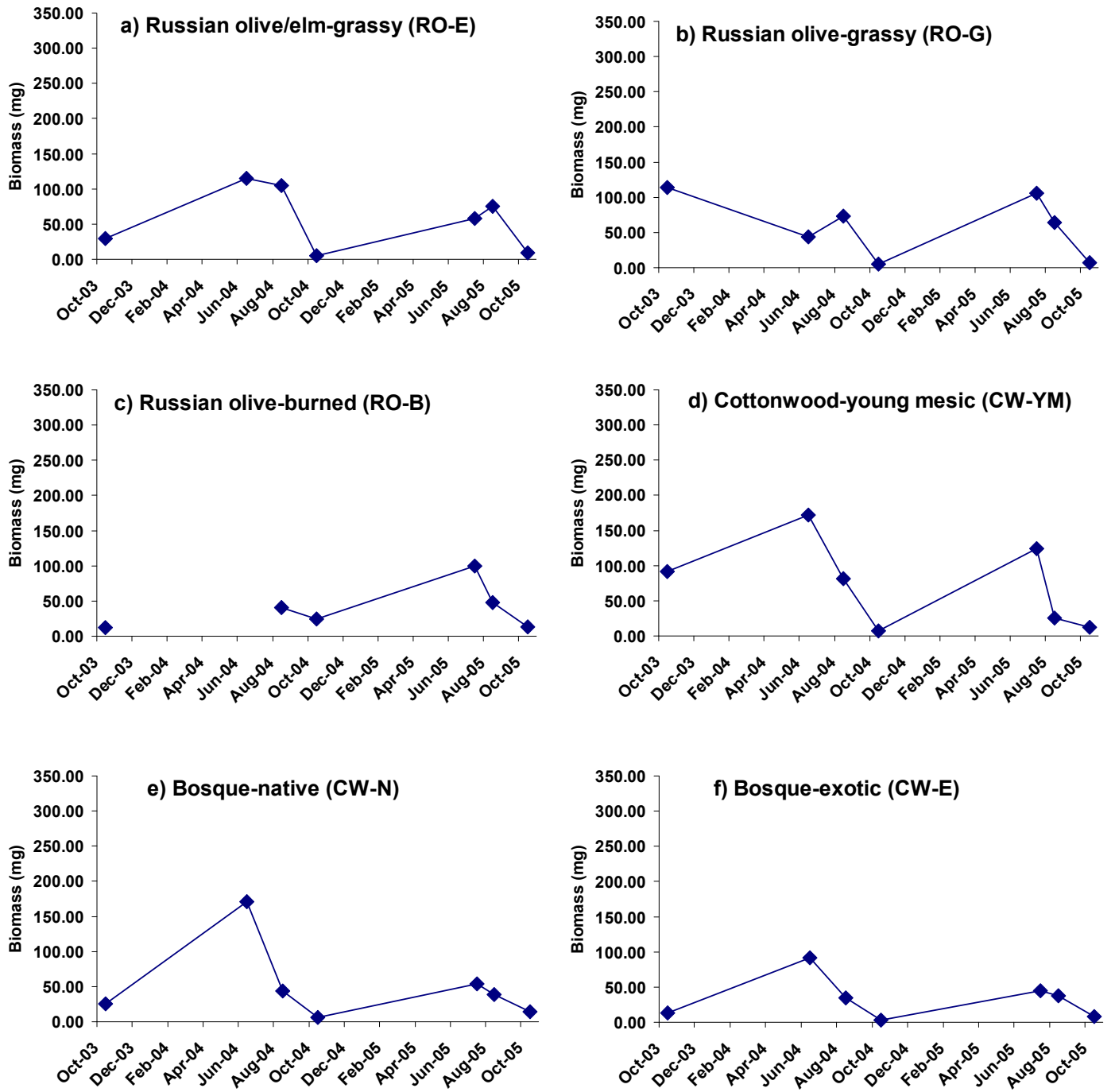


Figure 11. Average total biomass of insects per sticky card by month and year for Russian olive and cottonwood sites.

high number of thrips or chalcid wasps, but still have had a very small total biomass of insects. Dominant taxa groups also shifted between sample periods within and across sites (Fig. 13).

The herbaceous wet and dry sites differed greatly in total insect biomass in 2003 and the summer of 2004 (Figs. 11a & b). This difference was due to the prominence of large brachypterid flies and wasps at the herbaceous wetland site during those sample periods (Figs. 13b & c). The high biomass corresponds to high plant diversity at the herbaceous wetland site (Fig. 10). The difference in total insect biomass between the two herbaceous sites was much smaller in 2005, which corresponds with the wetland site's loss of herbaceous cover in transition to a young shrubland.

The willow sites had a similar pattern in overall insect biomass, with one major exception (Figs. 11c, d, e, & f). The W-OM site had the largest total biomass of any site in the study during the October 2003 sample. It also had a slightly lower total biomass in June of 2004 compared to August 2004. Other than these exceptions the willow sites all followed a pattern of peak biomass in the early summer, decreasing across the later sample periods. The early summer peak was particularly pronounced following the spring floods of 2005, with the exception of W-OM. In general the mesic willow sites (W-YM & W-OM) had higher biomass than the drier sites (W-D & W-DO), which might have been due to the greater herbaceous density and diversity at the mesic sites.

The very high biomass at the old mesic willow site in October 2003 was due to a very high number of leaf hoppers (Cicadellidae), which, being relatively large members of the aerial fauna, also created a large biomass. The spike in the biomass of leaf hoppers, due to very high numbers of individuals, was observed only at the W-OM and RO-G sites in October 2003 (Fig. 13a). Although the W-OM site continued to have the highest biomass of leaf hoppers across all sample years, the average biomass per card dropped to less than a sixth of that seen in 2003 (Fig. 13a). In 2004, leaf hoppers were common at all the willow sites as well as the two mesic Russian olive sites (RO-E & RO-G), and accounted for a smaller but potentially significant part of the insect biomass at these sites (Fig. 13a).

The Russian olive sites had a total biomass similar to the mesic willow sites (W-YM & W-OM) (Figs. 12a, b, & c). The exception was the burned Russian olive site (burned during the June 2004 sample) which had lower total biomass than the other Russian olive sites in August 2004, two months after the fire (Fig. 12c). In general the Russian olive sites followed the pattern of biomass peaking in the early summer and declining into the fall. However, the pattern was not as consistent at the beginning of the summer among the Russian olive sites as it was among the willow dominated sites (Fig. 12). Brachypterid flies were the most consistent contributors to total biomass at the Russian olive sites (Fig. 13b).

Total biomass at the cottonwood-dominated sites followed the pattern of a peak in early summer followed by a steep decline to the fall (Figs. 12d, e, & f). The young mesic cottonwood site generally had the highest biomass totals of all sites and was dominated by Brachypterid flies, non-chalcid wasps and beetles (Figs. 13b, c & d). The mature bosque sites (CW-N & CW-E) had total biomass similar to the dry willow sites (W-D & W-DO), but differed in composition. While Brachypterid flies and beetles were large contributors to biomass at both types of sites, leaf

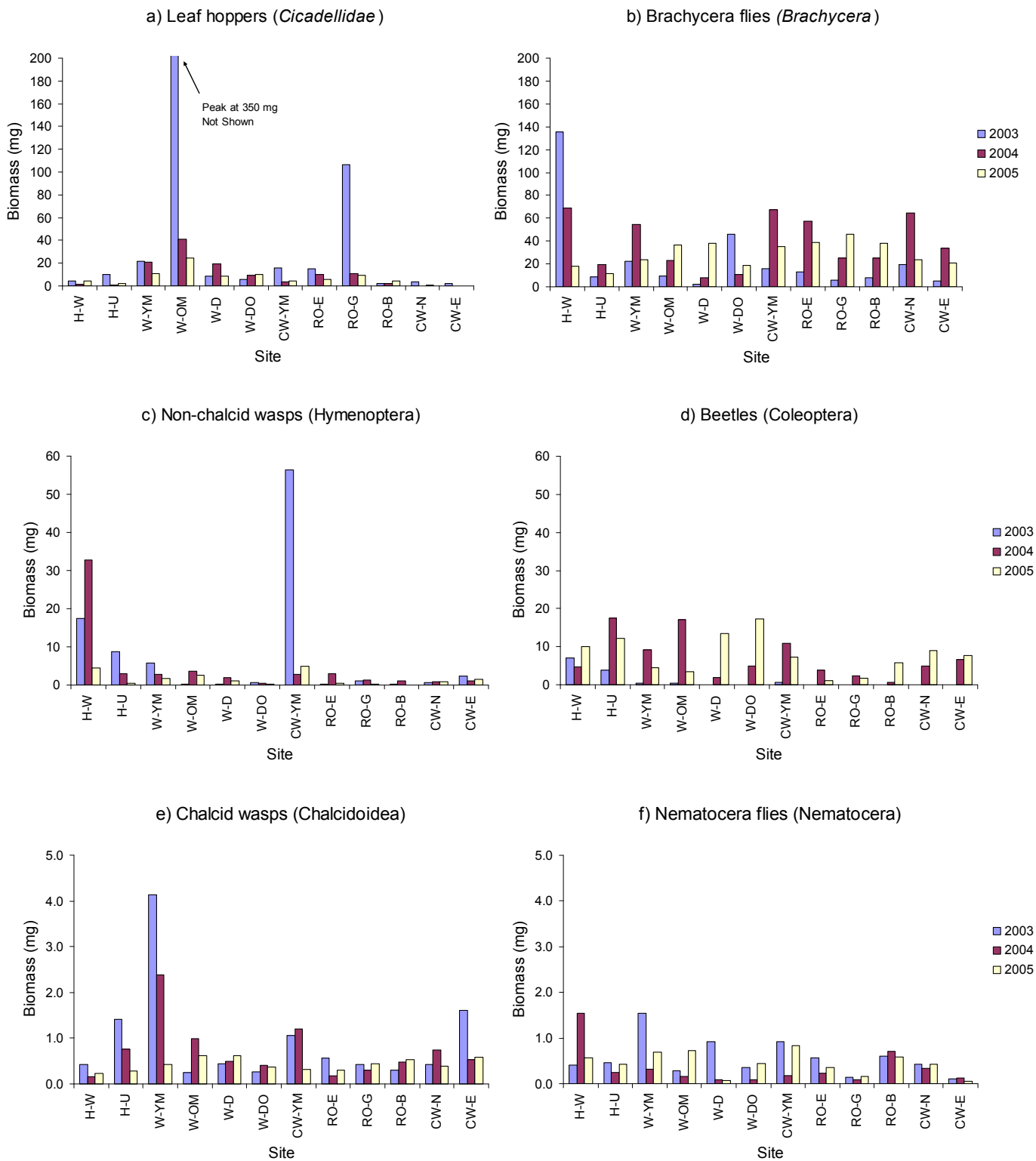


Figure 12. Average biomass per card for six most common insects groups by site and year.

hoppers were almost absent at the mature bosque sites (Figs. 13a, b & d). In addition the bosque sites peaked in total biomass in June 2004, while the dry willow sites peaked in July 2005 following the 2005 floods (Figs. 11e, & f, & 12e, & f). These inter-annual differences in peak total biomass were related to the abundance of brachycerid flies and beetles (Figs. 13b & d).

In general chalcid wasps and Nematocera flies were so small that their contribution to overall biomass rarely averaged more than one mg per card (Figs. 13e & f.) However, there were a few sites and years where chalcids did contribute measurably to overall biomass, particularly at the young mesic willow site in 2003 and 2004 (Fig. 13e). Thrips (Thysanoptera), although present in large numbers, accounted for very little biomass. At no site did they contribute an average biomass of more than 0.5 mg.

Discussion

Generally, earlier successional sites with mesic vegetation were those that had the highest insect biomass. These sites also tended to be those with the greatest plant species diversity, although they did not necessarily have the highest total vegetative cover. Native-dominated sites also tended to have higher total insect biomass. These preliminary results seem to indicate that not only are the dominant tree and shrub species important to the aerial insect fauna, but overall moisture regime, and diversity across plant life form strata may be equally important in determining the diversity, density and biomass of aerial insects at various sites within the Rio Grande Bosque.

Some insect groups are more important than others. The majority of the biomass at most sites came from leaf hoppers, brachycerid flies, non-chalcid wasps, and beetles, which are among the largest of the aerial insects collected on the sticky cards. They are also all taxa that are known to be food sources for birds. Members of all four groups have also been shown to be significant components in the diet of Southwestern Willow Flycatchers (Durst 2004). He suggests that smaller taxa may be a resource too small to be exploited by birds, and for this reason did not include thrips (Thysanoptera) in analysis of bird habitat. In our case thrips were present in large numbers at many of our sites, but their contribution to overall biomass was small and they may not be important energetically. Although chalcid wasps and nematocerid flies are also small in size, they did occur in large enough numbers at some sites to possibly be a viable food resource for small bird species like hummingbirds.

The first two years of this study have shown a lot of variation between different types of sites within the Middle Rio Grande Bosque as well as across years. Insect number and biomass were particularly variable across years. However, there did appear to be a seasonal pattern that was consistent across most sites. This pattern of peak biomass in the spring/early summer, followed by decreasing biomass into the fall, correlates with expected bird breeding periods and possibly with spring migration. In 2006 more intensive sampling of insects in the spring/early summer was conducted, and should provide a clearer picture of the dynamics of insect biomass during this key period for the bosque summer resident species.

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Appendix A Site locations and directions.

I-V

| PlotID | Site Name | Site Code | Site Description | Easting | Northing |
|---------|--------------------------|-----------|---|---------|----------|
| 03AP001 | Herbaceous wetland | H-W | Transient sandbar islands off the end of the AOP manipulated bar site. Dominated by herbaceous vegetation in 2003, with many seedling trees and shrubs. By spring of 2006 most herbaceous vegetation was dying, and small native shrubs were dominant. | 347903 | 3878900 |
| 03AP002 | Willow-young mesic | W-YM | Five year old stand of coyote willow with many young cottonwoods at the center of the AOP manipulated bar. | 348053 | 3879052 |
| 03AP003 | Cottonwood-young mesic | CW-YM | Five year old regeneration cottonwood stand in the center of the AOP manipulated bar site. Includes patches of very dense young cottonwoods and more open areas of young cottonwoods and herbaceous vegetation. | 348088 | 3879104 |
| 03AP004 | Herbaceous upland | H-U | Weedy herbaceous and regeneration Russian olive and Siberian elm upper terrace on AOP manipulated bar site. | 348158 | 3879187 |
| 98RB002 | Willow-dry | W-D | Dry sandy sidebar dominated by large stands of coyote willow with some scattered exotic trees (saltcedar and Siberian elm) one cottonwood, and very little herbaceous understory. | 354708 | 3904507 |
| 98RB008 | Russian olive-grassy | RO-G | High sidebar dominated by dense Russian olive, with thick grassy understory in open patches between trees. | 348343 | 3879381 |
| 98RB009 | Willow-old mesic | W-OM | Willow dominated swale in higher Russian olive and Siberian elm dominated sidebar. | 348310 | 3879342 |
| 98RB010 | Russian olive/elm-grassy | RO-E | Sidebar dominated by large Russian olives and moderately large elms with dense grassy understory | 347528 | 3877451 |
| 98RB011 | Willow-drought die off | W-DO | Willow dominated high sandy bar (most willow dead in 2003) at south end of very large sandy sidebar that is mostly native dominated, though sparse in parts. Willows resprouting after 2005 flood. | 346128 | 3874555 |
| 98RB012 | Russian olive-burned | RO-B | High back bar dominated by Russian olive, with mixed dry grasses and few willows. Site burned in June 2004, removing all standing herbaceous and killing most of the Russian olives above the root crown. Russian olives re-sprouting at root crown by July 2 | 345978 | 3872418 |
| 99RB013 | Bosque-native | CW-N | Mature cottonwood Bosque with mixed understory of NM olive, Gooddings willow, and alkali muhly within a large terrace dominated by old cottonwoods and a mixture of NM olive, Russian olive and saltcedar. | 354619 | 3904880 |
| 99RB017 | Bosque-exotic | CW-E | Mature cottonwood Bosque with overstory composed of older cottonwoods and dense understory of Russian olive, Siberian elms, and Tree of Heaven. | 348257 | 3879499 |

Appendix B – Plant Species List

| Scientific Name | Common Name | NHNM- ACRO1 | Kartez Symbol | Origin |
|--|------------------------|----------------|------------------|------------|
| Trees | | | | |
| <i>Ailanthus altissima</i> | tree of heaven | AILALT | AIAL | Introduced |
| <i>Elaeagnus angustifolia</i> | Russian olive | ELAANG | ELAN | Introduced |
| <i>Morus alba</i> | white mulberry | MORALB | MOAL | Introduced |
| <i>Populus deltoides</i> ssp. <i>wislizeni</i> | Rio Grande cottonwood | POPDELW | PODEW | Native |
| <i>Salix amygdaloides</i> | peachleaf willow | SALAMY | SAAM2 | Native |
| <i>Salix gooddingii</i> | Goodding's willow | SALGOO | SAGO | Native |
| <i>Ulmus pumila</i> | Siberian elm | ULMPUM | ULPU | Introduced |
| Shrubs | | | | |
| <i>Amorpha fruticosa</i> | desert indigobush | AMOFRU | AMFR | Native |
| <i>Baccharis salicina</i> | false willow | BACSAL | BASA | Native |
| <i>Clematis ligusticifolia</i> | western white clematis | CLELIG | CLLI2 | Native |
| <i>Forestiera pubescens</i> var. <i>pubescens</i> | New Mexico olive | FORPUBP | FOPUP | Native |
| <i>Opuntia imbricata</i> | tree cholla | OPUIMB | OPIM | Native |
| <i>Parthenocissus vitacea</i> | thicket creeper | PARVIT | PAVI5 | Native |
| <i>Salix exigua</i> | coyote willow | SALEXI | SAEX | Native |
| <i>Tamarix ramosissima</i> | saltcedar | TAMRAM | TARA | Introduced |
| Sub-Shrubs | | | | |
| <i>Desmanthus illinoensis</i> | prairie bundleflower | DESILL | DEIL | Native |
| <i>Gutierrezia sarothrae</i> | broom snakeweed | GUTSAR | GUSA2 | Native |
| <i>Opuntia phaeacantha</i> | tulip pricklypear | OPUPHA | OPPH | Native |
| Graminoids | | | | |
| <i>Agrostis gigantea</i> | redtop | AGRGIG | AGGI2 | Introduced |
| <i>Agrostis</i> spp. | bentgrass | AGROST | AGROS2 | |
| <i>Bolboschoenus maritimus</i> ssp. <i>paludosus</i> | saltmarsh bulrush | BOLMARP | BOMAP | Native |
| <i>Bothriochloa laguroides</i> ssp. <i>torreyana</i> | silver beardgrass | BOTLAGT | BOLAT | Native |
| <i>Bouteloua curtipendula</i> | sideoats grama | BOUCUR | BOCU | Native |
| <i>Bromus carinatus</i> | California brome | BROCAR | BRCA5 | Native |
| <i>Bromus japonicus</i> | Japanese brome | BROJAP | BRJA | Introduced |
| <i>Bromus</i> spp. | brome | BROMUS | BROMU | |
| <i>Bromus tectorum</i> | cheatgrass | BROTEC | BRTE | Introduced |
| <i>Carex emoryi</i> | Emory's sedge | CAREMO | CAEM2 | Native |
| <i>Carex praegracilis</i> | clustered field sedge | CARPRA | CAPR5 | Native |
| <i>Carex</i> spp. | sedge | CAREX | CAREX | Native |
| <i>Cenchrus spinifex</i> | sandbur | CENSPI | CESP4 | Native |
| <i>Cynodon dactylon</i> | bermudagrass | CYNDAC | CYDA | Introduced |
| Cyperaceae | | CYPERA | | |
| <i>Cyperus niger</i> | black flatsedge | CYPNIG | CYNI2 | Native |
| <i>Cyperus odoratus</i> | fragrant flatsedge | CYPODO | CYOD | Native |
| <i>Cyperus</i> spp. | flatsedge | CYPERU | CYPER | |

| Scientific Name | Common Name | NHNM- ACRO1 | Kartez Symbol | Origin |
|---|--------------------------|----------------|------------------|------------|
| Graminiods cont. | | | | |
| <i>Cyperus squarrosus</i> | bearded flatsedge | CYPSQU | CYSQ | Native |
| <i>Digitaria sanguinalis</i> | hairy crabgrass | DIGSAN | DISA | Native |
| <i>Distichlis spicata</i> | inland saltgrass | DISSPI | DISP | Native |
| <i>Echinochloa crus-galli</i> | barnyardgrass | ECHCRU | ECCR | Introduced |
| <i>Eleocharis palustris</i> | common spikerush | ELEPAL | ELPA3 | Native |
| <i>Elymus canadensis</i> | Canada wildrye | ELYCAN | ELCA4 | Native |
| <i>Elymus elymoides</i> | bottlebrush squirreltail | ELYELY | ELEL5 | Native |
| <i>Elymus x pseudorepens</i> | false quackgrass | ELYPSE | ELPS | Native |
| <i>Eragrostis pectinacea</i> | tufted lovegrass | ERAPEC | ERPE | Native |
| <i>Festuca arundinaceae</i> | tall fescue or K-31 | FESARU | FEAR3 | Introduced |
| <i>Hordeum jubatum</i> | foxtail barley | HORJUB | HOJU | Native |
| <i>Hordeum murinum</i> ssp. <i>glaucum</i> | smooth barley | HORMURG | HOMUG | Introduced |
| <i>Hordeum</i> spp. | barley | HORDEU | HORDE | |
| <i>Juncus arcticus</i> var. <i>balticus</i> | Baltic rush | JUNARCB | JUARB5 | Native |
| <i>Juncus torreyi</i> | Torrey's rush | JUNTOR | JUTO | Native |
| <i>Leersia oryzoides</i> | rice cutgrass | LEEORY | LEOR | Native |
| <i>Leptochloa fusca</i> ssp. <i>fascicularis</i> | bearded sprangletop | LEPFUSF | LEFUF | Native |
| <i>Muhlenbergia asperifolia</i> | alkali muhly | MUHASP | MUAS | Native |
| <i>Panicum capillare</i> | witchgrass | PANCAP | PACA6 | Native |
| <i>Panicum obtusum</i> | vine mesquite | PANOBT | PAOB | Native |
| <i>Panicum</i> spp. | panicgrass | PANICU | PANIC | Native |
| <i>Pascopyrum smithii</i> | western wheatgrass | PASSMI | PASM | Native |
| <i>Paspalum distichum</i> | knotgrass | PASDIS | PADI6 | Native |
| <i>Poa pratensis</i> | Kentucky bluegrass | POAPRA | POPR | Native |
| <i>Poa</i> spp. | bluegrass | POA | POA | |
| <i>Polypogon monspeliensis</i> | annual rabbitsfoot grass | POLMON | POMO5 | Introduced |
| <i>Saccharum ravennae</i> | ravennagrass | SACRAV | SARA3 | Introduced |
| <i>Schoenoplectus pungens</i> | common threesquare | SCHPUN | SCPU10 | Native |
| <i>Schoenoplectus tabernaemontani</i> | softstem bulrush | SCHTAB | SCTA2 | Native |
| <i>Sorghastrum nutans</i> | Indiangrass | SORNUT | SONU2 | Native |
| <i>Sorghum halepense</i> | johnsongrass | SORHAL | SOHA | Introduced |
| <i>Sporobolus airoides</i> | alkali sacaton | SPOAIR | SPAI | Native |
| <i>Sporobolus compositus</i> var. <i>compositus</i> | tall dropseed | SPOCOMC | SPCOC2 | Native |
| <i>Sporobolus cryptandrus</i> | sand dropseed | SPOCRY | SPCR | Native |
| Forbs | | | | |
| <i>Ambrosia acanthicarpa</i> | flatspine burr ragweed | AMBACA | AMAC2 | Native |
| <i>Ambrosia psilostachya</i> | Cuman ragweed | AMBPSI | AMPS | Native |
| <i>Apocynum cannabinum</i> | Indianhemp | APOCAN | APCA | Native |
| <i>Asclepias speciosa</i> | showy milkweed | ASCSPE | ASSP | Native |
| <i>Asclepias subverticillata</i> | whorled milkweed | ASCSUB | ASSU2 | Native |
| <i>Asparagus officinalis</i> | garden asparagus | ASPOFF | ASOF | Introduced |
| <i>Bidens cernua</i> | nodding beggarstick | BIDCER | BICE | Introduced |
| <i>Bidens frondosa</i> | devil's beggartick | BIDFRO | BIFR | Native |
| <i>Chamaesyce serpyllifolia</i> | thymeleaf sandmat | CHASER2 | CHSE6 | Native |
| <i>Chenopodium incanum</i> | mealy goosefoot | CHEINC | CHIN2 | Native |
| <i>Chenopodium leptophyllum</i> | narrowleaf goosefoot | CHELEP | CHLE4 | Native |

| Scientific Name | Common Name | NHNM- ACRO1 | Kartez Symbol | Origin |
|--------------------------------------|--------------------------|----------------|------------------|------------|
| Forbs cont. | | | | |
| Chenopodium spp. | goosefoot | CHENOP | CHENO | |
| Convolvulus arvensis | field bindweed | CONARV | COAR4 | Introduced |
| Conyza canadensis | Canadian horseweed | CONCAN | COCA5 | Native |
| Dalea leporina | foxtail prairieclover | DALLEP | DALE3 | Native |
| Descurainia spp. | tansymustard | DESCUR | DESCU | |
| Dimorphocarpa wislizeni | spectacle pod | DIMWIS | DIWI2 | Native |
| Epilobium spp. | willowherb | EPILOB | EPILO | Native |
| Equisetum laevigatum | smooth horsetail | EQULAE | EQLA | Native |
| Erigeron divergens | spreading fleabane | ERIDIV | ERDI4 | Native |
| Erigeron flagellaris | trailing fleabane | ERIFLA | ERFL | Native |
| Erigeron spp. | fleabane | ERIGER | ERIGE2 | Native |
| Euthamia occidentalis | western goldenrod | EUTOCC | EUOC4 | Native |
| Gaura parviflora | velvetweed | GAUPAR | GAPA6 | Native |
| Glycyrrhiza lepidota | American licorice | GLYLEP | GLLE3 | Native |
| Grindelia nuda var. nuda | curlytop gumweed | GRINUDN | GRNUN | Native |
| Helianthus annuus | common sunflower | HELANN | HEAN3 | Native |
| Helianthus petiolaris | prairie sunflower | HELPET | HEPE | Native |
| Heterotheca villosa | hairy goldenaster | HETVIL | HEVI4 | Native |
| Kochia scoparia | common kochia | KOCSCO | KOSC | Introduced |
| Lactuca serriola | prickly lettuce | LACSER | LASE | Introduced |
| Lactuca tatarica var. pulchella | blue lettuce | LACTATP | LATAP | Native |
| Lycopus americanus | American bugleweed | LYCAME | LYAM | Native |
| Machaeranthera canescens ssp. glabra | hoary tansyaster | MACCANG | | Native |
| Medicago sativa | alfalfa | MEDSAT | MESA | Introduced |
| Melilotus officinalis | yellow sweetclover | MELOFF | MEOF | Introduced |
| Mentha arvensis | wild mint | MENARV | MEAR4 | Native |
| Oenothera elata ssp. hirsutissima | Hooker's eveningprimrose | OENELAH | OEELH | Native |
| Physalis spp. | groundcherry | PHYSAL | PHYSA | |
| Plantago major | common plantain | PLAMAJ | PLMA2 | Introduced |
| Polygonum lapathifolium | curlytop knotweed | POLLAP | POLA4 | Native |
| Polygonum persicaria | Lady's thumb | POLPER | POPE3 | Introduced |
| Polygonum ramosissimum | knotweed | POLRAM | PORA3 | Native |
| Polygonum spp. | knotweed | POLYGO | POLYG4 | |
| Portulaca spp. | hogweed | PORTUL | PORTU | |
| Pseudognaphalium stramineum | cottonbatting cudweed | PSESTR | PSST7 | Native |
| Ranunculus cymbalaria | alkali buttercup | RANCYM | RACY | Native |
| Ratibida tagetes | green prairie coneflower | RATTAG | RATA | Native |
| Rumex crispus | curly dock | RUMCRI | RUCR | Introduced |
| Rumex pulcher | fiddle dock | RUMPUL | RUPU3 | Introduced |
| Rumex spp. | dock | RUMEX | RUMEX | |
| Salsola tragus | prickly Russian thistle | SALTRA | SATR12 | Introduced |
| Senecio flaccidus var. flaccidus | threadleaf ragwort | SENFLAF | SEFLF | Native |
| Senecio riddellii | Riddell's ragwort | SENRID | SERI2 | Native |
| Sisymbrium altissimum | tall tumbled mustard | SISALT | SIAL2 | Introduced |
| Solanum elaeagnifolium | silverleaf nightshade | SOLELA | SOEL | Native |
| Solanum spp. | nightshade | SOLANU | SOLAN | Native |

| Scientific Name | Common Name | NHNM- ACRO1 | Kartez Symbol | Origin |
|--|----------------------|----------------|------------------|------------|
| Forbs cont. | | | | |
| <i>Solidago canadensis</i> | Canada goldenrod | SOLCAN | SOCA6 | Native |
| <i>Sonchus asper</i> | spiny sowthistle | SONASP | SOAS | Introduced |
| <i>Sphaeralcea incana</i> | gray globemallow | SPHINC | SPIN2 | Native |
| <i>Symphotrichum ericoides</i> | heath aster | SYMERI | SYER | Native |
| <i>Symphotrichum lanceolatum</i> ssp. <i>hesperium</i> | white panicle aster | SYMLANH | SYLAH | Native |
| <i>Taraxacum officinale</i> | common dandelion | TAROFF | TAOF | Introduced |
| <i>Teucrium canadense</i> var. <i>occidentale</i> | western germander | TEUCANO | TECAO | Native |
| <i>Thelesperma megapotamicum</i> | Hopi tea greenthread | THEMEG | THME | Native |
| <i>Typha angustifolia</i> | narrowleaf cattail | TYPANG | TYAN | Native |
| <i>Typha domingensis</i> | southern cattail | TYPDOM | TYDO | Native |
| <i>Typha latifolia</i> | broadleaf cattail | TYPLAT | TYLA | Native |
| <i>Verbascum thapsus</i> | common mullein | VERTHA | VETH | Introduced |
| <i>Verbena bracteata</i> | bigbract verbena | VERBRA | VEBR | Native |
| <i>Veronica anagallis-aquatica</i> | water speedwell | VERANA | VEAN2 | Native |
| <i>Xanthium strumarium</i> | rough cocklebur | XANSTR | XAST | Native |

Appendix C

Individual site floristic summary tables, ordered by PlotId within vegetation types
(Herbaceous, Willow, Russian olive, then Cottonwood).

03AP001 Herbaceous Wetland (H-W)

| Scientific Name | Common Name | Origin | 2003 | 2004 | 2005 |
|--|--------------------------|------------|-------|-------|-------|
| Trees | | | | | |
| Ailanthus altissima | tree of heaven | Introduced | | 0.01 | |
| Populus deltoides ssp. wislizeni | Rio Grande cottonwood | Native | 7.90 | 3.64 | 7.04 |
| Salix amygdaloides | peachleaf willow | Native | | | 2.88 |
| Salix gooddingii | Goodding's willow | Native | 2.30 | 0.83 | 2.96 |
| Ulmus pumila | Siberian elm | Introduced | 0.05 | | |
| Shrubs | | | | | |
| Salix exigua | coyote willow | Native | 0.40 | 1.98 | 14.65 |
| Salix spp. | willow | Native | | 1.08 | |
| Tamarix ramosissima | saltcedar | Introduced | 0.01 | 0.38 | 0.05 |
| Graminoids | | | | | |
| Agrostis gigantea | redtop | Introduced | 9.30 | 0.38 | |
| Agrostis spp. | bentgrass | | | 0.01 | |
| Bolboschoenus maritimus ssp. paludosus | saltmarsh bulrush | Native | | | 0.69 |
| Carex emoryi | Emory's sedge | Native | 0.10 | | 0.88 |
| Carex spp. | sedge | Native | | 0.68 | |
| Cynodon dactylon | bermudagrass | Introduced | | | 0.09 |
| Cyperaceae | | | 0.30 | 0.15 | |
| Cyperus niger | black flatsedge | Native | | 0.00 | |
| Cyperus odoratus | fragrant flatsedge | Native | | 3.38 | 0.03 |
| Cyperus spp. | flatsedge | | | 0.32 | |
| Cyperus squarrosus | bearded flatsedge | Native | | 0.05 | |
| Echinochloa crus-galli | barnyardgrass | Introduced | 1.20 | 17.88 | 1.61 |
| Eleocharis palustris | common spikerush | Native | 39.00 | 4.28 | |
| Eragrostis pectinacea | tufted lovegrass | Native | | 6.56 | 4.66 |
| Hordeum jubatum | foxtail barley | Native | 0.05 | | |
| Hordeum murinum ssp. glaucum | smooth barley | Introduced | 0.60 | 0.00 | |
| Juncus torreyi | Torrey's rush | Native | 1.32 | 0.00 | |
| Leersia oryzoides | rice cutgrass | Native | 38.30 | 37.21 | 4.72 |
| Leptochloa fusca ssp. fascicularis | bearded sprangletop | Native | | 1.83 | 0.06 |
| Muhlenbergia asperifolia | alkali muhly | Native | 0.90 | 0.03 | |
| Panicum capillare | witchgrass | Native | | 4.03 | 0.90 |
| Panicum obtusum | vine mesquite | Native | | 0.01 | 0.03 |
| Panicum spp. | panicgrass | Native | | 0.41 | |
| Paspalum distichum | knotgrass | Native | 1.80 | 2.74 | 1.03 |
| Polypogon monspeliensis | annual rabbitsfoot grass | Introduced | 4.65 | | |
| Schoenoplectus pungens | common threesquare | Native | 1.15 | 2.59 | 0.58 |
| Schoenoplectus tabernaemontani | softstem bulrush | Native | 0.60 | 0.44 | |
| Sporobolus cryptandrus | sand dropseed | Native | | 0.04 | 0.06 |
| Forbs | | | | | |
| Ambrosia psilostachya | Cuman ragweed | Native | | 0.03 | |
| Bidens cernua | nodding beggarstick | Introduced | 1.30 | 0.06 | 0.09 |
| Bidens frondosa | devil's beggartick | Native | 42.70 | 2.31 | 0.51 |
| Chamaesyce serpyllifolia | thymeleaf sandmat | Native | | 0.62 | 0.24 |
| Chenopodiaceae | goosefoot family | | | 0.01 | |

03AP001 Herbaceous Wetland (H-W) cont.

| Scientific Name | Common Name | Origin | 2003 | 2004 | 2005 |
|--|----------------------|------------|------|-------|-------|
| Forbs cont. | | | | | |
| Convolvulus arvensis | field bindweed | Introduced | | 0.03 | |
| Conyza canadensis | Canadian horseweed | Native | 0.40 | 0.01 | |
| Epilobium spp. | willowherb | Native | 0.01 | | |
| Euthamia occidentalis | western goldenrod | Native | 8.10 | 10.71 | 1.05 |
| Kochia scoparia | common kochia | Introduced | | | 0.00 |
| Lactuca tatarica var. pulchella | blue lettuce | Native | 0.05 | | |
| Lycopus americanus | American bugleweed | Native | 0.01 | 0.02 | |
| Medicago sativa | alfalfa | Introduced | | 0.06 | |
| Melilotus officinalis | yellow sweetclover | Introduced | 5.55 | 0.06 | |
| Mentha arvensis | wild mint | Native | | | 0.01 |
| Plantago major | common plantain | Introduced | | 0.04 | |
| Polygonum persicaria | Lady's thumb | Introduced | | 0.43 | 0.06 |
| Polygonum spp. | knotweed | | 0.40 | | |
| Pseudognaphalium stramineum | cottonbattng cudweed | Native | | 0.01 | 0.07 |
| Ranunculus cymbalaria | alkali buttercup | Native | 0.40 | | |
| Rumex pulcher | fiddle dock | Introduced | 0.30 | | |
| Rumex spp. | dock | | | 0.03 | |
| Sonchus asper | spiny sowthistle | Introduced | | | 0.01 |
| Symphotrichum lanceolatum ssp. hesperium | white panicle aster | Native | | 0.38 | 0.03 |
| Typha angustifolia | narrowleaf cattail | Native | | | 3.52 |
| Typha domingensis | southern cattail | Native | 4.10 | 4.06 | |
| Typha latifolia | broadleaf cattail | Native | | | 0.29 |
| unidentified forb | | | 0.55 | 0.02 | 0.06 |
| Veronica anagallis-aquatica | water speedwell | Native | 3.10 | | |
| Xanthium strumarium | rough cocklebur | Native | 2.20 | 4.85 | 11.03 |

03AP004 Herbaceous Upland (H-U)

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|---|-----------------------|------------|-------|-------|
| Trees | | | | |
| <i>Elaeagnus angustifolia</i> | Russian olive | Introduced | 5.14 | 6.71 |
| <i>Populus deltoides</i> ssp. <i>wislizeni</i> | Rio Grande cottonwood | Native | 0.03 | 1.63 |
| <i>Salix gooddingii</i> | Goodding's willow | Native | | 0.14 |
| <i>Ulmus pumila</i> | Siberian elm | Introduced | 2.80 | 2.43 |
| Shrubs | | | | |
| <i>Baccharis salicina</i> | false willow | Native | | 0.03 |
| <i>Salix exigua</i> | coyote willow | Native | 7.00 | 7.09 |
| Graminoids | | | | |
| <i>Agrostis gigantea</i> | redtop | Introduced | 0.29 | |
| <i>Bromus japonicus</i> | Japanese brome | Introduced | 0.03 | 0.06 |
| <i>Bromus tectorum</i> | cheatgrass | Introduced | | 0.06 |
| <i>Carex emoryi</i> | Emory's sedge | Native | 0.60 | 0.20 |
| <i>Cynodon dactylon</i> | bermudagrass | Introduced | 3.66 | 4.86 |
| <i>Cyperus odoratus</i> | fragrant flatsedge | Native | | 0.43 |
| <i>Distichlis spicata</i> | inland saltgrass | Native | 17.23 | 25.74 |
| <i>Echinochloa crus-galli</i> | barnyardgrass | Introduced | | 0.20 |
| <i>Elymus canadensis</i> | Canada wildrye | Native | 0.49 | 0.43 |
| <i>Elymus x pseudorepens</i> | false quackgrass | Native | 0.51 | 0.09 |
| <i>Eragrostis pectinacea</i> | tufted lovegrass | Native | | 0.11 |
| <i>Muhlenbergia asperifolia</i> | alkali muhly | Native | 15.77 | 23.97 |
| <i>Panicum capillare</i> | witchgrass | Native | | 0.06 |
| <i>Panicum obtusum</i> | vine mesquite | Native | 5.09 | 7.43 |
| <i>Pascopyrum smithii</i> | western wheatgrass | Native | | 1.17 |
| <i>Paspalum distichum</i> | knotgrass | Native | | 0.04 |
| <i>Schoenoplectus pungens</i> | common threesquare | Native | 0.17 | 0.27 |
| <i>Sorghastrum nutans</i> | Indiangrass | Native | 1.00 | |
| <i>Sorghum halepense</i> | johnsongrass | Introduced | 9.03 | 4.00 |
| <i>Sporobolus airoides</i> | alkali sacaton | Native | 0.29 | |
| <i>Sporobolus compositus</i> var. <i>compositus</i> | tall dropseed | Native | 2.31 | 0.01 |
| <i>Sporobolus cryptandrus</i> | sand dropseed | Native | 0.69 | 0.09 |
| Unidentified grass | Unidentified grass | | 0.14 | |
| Forbs | | | | |
| <i>Ambrosia psilostachya</i> | Cuman ragweed | Native | 2.74 | 0.57 |
| <i>Asclepias speciosa</i> | showy milkweed | Native | 0.10 | |
| <i>Asclepias subverticillata</i> | whorled milkweed | Native | | 0.00 |
| <i>Bidens frondosa</i> | devil's beggartick | Native | | 0.29 |
| <i>Convolvulus arvensis</i> | field bindweed | Introduced | 4.77 | 0.21 |
| <i>Conyza canadensis</i> | Canadian horseweed | Native | 0.00 | 0.16 |
| <i>Equisetum laevigatum</i> | smooth horsetail | Native | 0.03 | 0.05 |
| <i>Euthamia occidentalis</i> | western goldenrod | Native | 0.80 | 0.97 |
| <i>Gaura parviflora</i> | velvetweed | Native | 0.03 | 0.53 |
| <i>Glycyrrhiza lepidota</i> | American licorice | Native | 1.14 | 2.57 |
| <i>Helianthus annuus</i> | common sunflower | Native | 6.89 | 2.29 |
| <i>Helianthus petiolaris</i> | prairie sunflower | Native | 0.05 | |
| <i>Kochia scoparia</i> | common kochia | Introduced | 8.01 | 1.74 |
| <i>Lactuca serriola</i> | prickly lettuce | Introduced | | 0.03 |
| <i>Lactuca tatarica</i> var. <i>pulchella</i> | blue lettuce | Native | 0.06 | |
| <i>Machaeranthera canescens</i> ssp. <i>glabra</i> | hoary tansyaster | Native | 1.14 | 0.29 |
| <i>Melilotus officinalis</i> | yellow sweetclover | Introduced | 1.63 | |

03AP004 Herbaceous Upland (H-U) cont.

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|--|--------------------------|---------------|-------------|-------------|
| Forbs cont. | | | | |
| Polygonum persicaria | Lady's thumb | Introduced | | 0.14 |
| Ratibida tagetes | green prairie coneflower | Native | 0.09 | 0.01 |
| Salsola tragus | prickly Russian thistle | Introduced | 17.60 | 0.20 |
| Symphotrichum ericoides | heath aster | Native | 1.83 | |
| Symphotrichum lanceolatum ssp. hesperium | white panicle aster | Native | 0.14 | 0.23 |
| Teucrium canadense var. occidentale | western germander | Native | 0.06 | 0.03 |

03AP002 Willow-young mesic (W-YM)

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|--|--------------------------|------------|-------|-------|
| Trees | | | | |
| <i>Morus alba</i> | white mulberry | Introduced | 0.06 | 0.09 |
| <i>Populus deltoides</i> ssp. <i>wislizeni</i> | Rio Grande cottonwood | Native | 9.60 | 14.69 |
| <i>Salix gooddingii</i> | Goodding's willow | Native | 0.29 | 0.14 |
| <i>Ulmus pumila</i> | Siberian elm | Introduced | 0.43 | 0.23 |
| Shrubs | | | | |
| <i>Salix exigua</i> | coyote willow | Native | 24.86 | 48.09 |
| <i>Tamarix ramosissima</i> | saltcedar | Introduced | 0.31 | 0.13 |
| Graminoids | | | | |
| <i>Bolboschoenus maritimus</i> ssp. <i>paludosus</i> | saltmarsh bulrush | Native | | 0.12 |
| <i>Bromus carinatus</i> | California brome | Native | 0.23 | |
| <i>Carex emoryi</i> | Emory's sedge | Native | 3.00 | 4.97 |
| <i>Cynodon dactylon</i> | bermudagrass | Introduced | 4.46 | 2.20 |
| <i>Cyperus odoratus</i> | fragrant flatsedge | Native | | 0.12 |
| <i>Distichlis spicata</i> | inland saltgrass | Native | 6.17 | 4.46 |
| <i>Echinochloa crus-galli</i> | barnyardgrass | Introduced | 0.20 | 2.01 |
| <i>Eleocharis palustris</i> | common spikerush | Native | | 0.03 |
| <i>Elymus canadensis</i> | Canada wildrye | Native | 0.51 | 0.57 |
| <i>Elymus elymoides</i> | bottlebrush squirreltail | Native | 0.77 | |
| <i>Festuca arundinaceae</i> | tall fescue or K-31 | Introduced | | 0.17 |
| <i>Hordeum murinum</i> ssp. <i>glaucum</i> | smooth barley | Introduced | 1.43 | 0.06 |
| <i>Leptochloa fusca</i> ssp. <i>fascicularis</i> | bearded sprangletop | Native | | 1.29 |
| <i>Muhlenbergia asperifolia</i> | alkali muhly | Native | 0.69 | |
| <i>Panicum capillare</i> | witchgrass | Native | 0.09 | 0.50 |
| <i>Panicum obtusum</i> | vine mesquite | Native | 2.09 | 0.37 |
| <i>Paspalum distichum</i> | knotgrass | Native | 0.03 | 1.63 |
| <i>Schoenoplectus pungens</i> | common threesquare | Native | 0.03 | 0.06 |
| <i>Sorghastrum nutans</i> | Indiangrass | Native | 0.51 | |
| <i>Sorghum halepense</i> | johnsongrass | Introduced | 1.14 | 0.67 |
| <i>Sporobolus compositus</i> var. <i>compositus</i> | tall dropseed | Native | 0.79 | |
| <i>Sporobolus cryptandrus</i> | sand dropseed | Native | | 0.00 |
| Forbs | | | | |
| <i>Ambrosia psilostachya</i> | Cuman ragweed | Native | 3.74 | 0.02 |
| <i>Apocynum cannabinum</i> | Indianhemp | Native | 2.80 | 7.06 |
| <i>Bidens frondosa</i> | devil's beggartick | Native | | 0.21 |
| <i>Chamaesyce serpyllifolia</i> | thymeleaf sandmat | Native | 0.05 | 0.21 |
| <i>Convolvulus arvensis</i> | field bindweed | Introduced | 0.01 | 0.01 |
| <i>Conyza canadensis</i> | Canadian horseweed | Native | 4.37 | 0.39 |
| <i>Equisetum laevigatum</i> | smooth horsetail | Native | 0.12 | 0.28 |
| <i>Euthamia occidentalis</i> | western goldenrod | Native | 2.29 | 5.97 |
| <i>Gaura parviflora</i> | velvetweed | Native | | 0.06 |
| <i>Grindelia nuda</i> var. <i>nuda</i> | curlytop gumweed | Native | 0.86 | |
| <i>Helianthus annuus</i> | common sunflower | Native | 7.46 | 0.01 |
| <i>Helianthus petiolaris</i> | prairie sunflower | Native | 1.72 | 0.00 |
| <i>Lactuca serriola</i> | prickly lettuce | Introduced | 2.41 | |
| <i>Melilotus officinalis</i> | yellow sweetclover | Introduced | 23.14 | 0.30 |
| <i>Polygonum persicaria</i> | Lady's thumb | Introduced | | 0.03 |
| <i>Salsola tragus</i> | prickly Russian thistle | Introduced | 3.90 | 0.06 |
| <i>Solanum elaeagnifolium</i> | silverleaf nightshade | Native | 0.89 | 0.02 |

03AP002 Willow-young mesic (W-YM) cont.

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|--|---------------------|---------------|-------------|-------------|
| Forbs cont. | | | | |
| Symphotrichum ericoides | heath aster | Native | 0.29 | |
| Symphotrichum lanceolatum ssp. hesperium | white panicle aster | Native | 0.31 | 0.23 |
| Teucrium canadense var. occidentale | western germander | Native | | 2.16 |
| unidentified forb | | | 3.89 | |
| Xanthium strumarium | rough cocklebur | Native | 1.29 | 4.49 |

98RB002 Willow-dry (W-D)

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|--|-----------------------|------------|-------|-------|
| Trees | | | | |
| <i>Populus deltoides</i> ssp. <i>wislizeni</i> | Rio Grande cottonwood | Native | 0.00 | 0.00 |
| <i>Ulmus pumila</i> | Siberian elm | Introduced | 3.72 | 5.17 |
| Shrubs | | | | |
| <i>Opuntia imbricata</i> | tree cholla | Native | 0.03 | 0.03 |
| <i>Salix exigua</i> | coyote willow | Native | 44.03 | 48.31 |
| <i>Tamarix ramosissima</i> | saltcedar | Introduced | 6.23 | 5.30 |
| Sub-Shrubs | | | | |
| <i>Gutierrezia sarothrae</i> | broom snakeweed | Native | 0.01 | 0.03 |
| <i>Opuntia phaeacantha</i> | tulip pricklypear | Native | | 0.00 |
| Graminoids | | | | |
| <i>Bromus japonicus</i> | Japanese brome | Introduced | | 0.00 |
| <i>Elymus canadensis</i> | Canada wildrye | Native | 0.03 | 0.01 |
| <i>Elymus x pseudorepens</i> | false quackgrass | Native | 0.00 | |
| <i>Muhlenbergia asperifolia</i> | alkali muhly | Native | 0.00 | |
| <i>Panicum obtusum</i> | vine mesquite | Native | 0.27 | 0.07 |
| <i>Sporobolus airoides</i> | alkali sacaton | Native | 0.30 | 0.11 |
| <i>Sporobolus cryptandrus</i> | sand dropseed | Native | 0.07 | 0.06 |
| Unidentified grass | Unidentified grass | | 0.00 | |
| Forbs | | | | |
| <i>Ambrosia psilostachya</i> | Cuman ragweed | Native | 0.49 | 0.29 |
| <i>Chamaesyce serpyllifolia</i> | thymeleaf sandmat | Native | 1.57 | 0.02 |
| <i>Chenopodium incanum</i> | mealy goosefoot | Native | | 0.00 |
| <i>Chenopodium leptophyllum</i> | narrowleaf goosefoot | Native | | 0.00 |
| <i>Conyza canadensis</i> | Canadian horseweed | Native | 0.64 | 6.46 |
| <i>Dimorphocarpa wislizeni</i> | spectacle pod | Native | 0.03 | |
| <i>Erigeron divergens</i> | spreading fleabane | Native | | 0.67 |
| <i>Erigeron</i> spp. | fleabane | Native | 0.01 | |
| <i>Euthamia occidentalis</i> | western goldenrod | Native | 0.09 | |
| <i>Lactuca serriola</i> | prickly lettuce | Introduced | | 0.03 |
| <i>Machaeranthera canescens</i> ssp. <i>glabra</i> | hoary tansyaster | Native | | 0.01 |
| <i>Melilotus officinalis</i> | yellow sweetclover | Introduced | 7.22 | 20.06 |
| <i>Portulaca</i> spp. | hogweed | | 0.00 | |
| <i>Senecio flaccidus</i> var. <i>flaccidus</i> | threadleaf ragwort | Native | | 0.03 |
| <i>Senecio riddellii</i> | Riddell's ragwort | Native | 0.14 | |
| <i>Solanum</i> spp. | nightshade | Native | 0.06 | |
| <i>Thelesperma megapotamicum</i> | Hopi tea greenthread | Native | 0.03 | |
| unidentified forb | | | 0.03 | 0.03 |
| <i>Xanthium strumarium</i> | rough cocklebur | Native | 0.11 | |

98RB009 Willow-old mesic (W-OM)

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|--|--------------------------|------------|-------|-------|
| Trees | | | | |
| <i>Elaeagnus angustifolia</i> | Russian olive | Introduced | 9.29 | 10.43 |
| <i>Morus alba</i> | white mulberry | Introduced | 0.40 | 1.60 |
| <i>Populus deltoides</i> ssp. <i>wislizeni</i> | Rio Grande cottonwood | Native | 6.37 | 9.61 |
| <i>Salix gooddingii</i> | Goodding's willow | Native | 0.44 | 0.40 |
| <i>Ulmus pumila</i> | Siberian elm | Introduced | 1.43 | 1.57 |
| Shrubs | | | | |
| <i>Salix exigua</i> | coyote willow | Native | 32.31 | 47.61 |
| Graminoids | | | | |
| <i>Agrostis gigantea</i> | redtop | Introduced | 1.34 | 0.29 |
| <i>Agrostis</i> spp. | bentgrass | | 0.04 | |
| <i>Carex emoryi</i> | Emory's sedge | Native | 11.63 | 25.66 |
| <i>Carex praegracilis</i> | clustered field sedge | Native | 3.26 | |
| <i>Cynodon dactylon</i> | bermudagrass | Introduced | | 0.16 |
| <i>Distichlis spicata</i> | inland saltgrass | Native | | 0.01 |
| <i>Elymus canadensis</i> | Canada wildrye | Native | 2.09 | 0.09 |
| <i>Elymus elymoides</i> | bottlebrush squirreltail | Native | 0.29 | |
| <i>Elymus x pseudorepens</i> | false quackgrass | Native | 0.20 | |
| <i>Hordeum</i> spp. | barley | | 0.03 | |
| <i>Juncus arcticus</i> var. <i>balticus</i> | Baltic rush | Native | 0.13 | 0.14 |
| <i>Leptochloa fusca</i> ssp. <i>fascicularis</i> | bearded sprangletop | Native | | 0.91 |
| <i>Muhlenbergia asperifolia</i> | alkali muhly | Native | 1.14 | 0.06 |
| <i>Panicum capillare</i> | witchgrass | Native | | 0.03 |
| <i>Schoenoplectus pungens</i> | common threesquare | Native | | 0.00 |
| <i>Sorghastrum nutans</i> | Indiangrass | Native | 44.71 | 2.17 |
| Unidentified grass | Unidentified grass | | 3.09 | |
| Forbs | | | | |
| <i>Ambrosia psilostachya</i> | Cuman ragweed | Native | 7.50 | 0.46 |
| <i>Apocynum cannabinum</i> | Indianhemp | Native | 1.81 | 3.59 |
| <i>Asclepias speciosa</i> | showy milkweed | Native | 0.79 | 2.53 |
| <i>Asclepias subverticillata</i> | whorled milkweed | Native | 0.09 | 0.11 |
| <i>Convolvulus arvensis</i> | field bindweed | Introduced | 0.90 | 1.56 |
| <i>Dalea leporina</i> | foxtail prairieclover | Native | | 0.04 |
| <i>Equisetum laevigatum</i> | smooth horsetail | Native | 0.12 | 0.57 |
| <i>Euthamia occidentalis</i> | western goldenrod | Native | 1.93 | 1.37 |
| <i>Gaura parviflora</i> | velvetweed | Native | | 0.06 |
| <i>Helianthus annuus</i> | common sunflower | Native | | 0.07 |
| <i>Helianthus petiolaris</i> | prairie sunflower | Native | 0.20 | |
| <i>Lactuca tatarica</i> var. <i>pulchella</i> | blue lettuce | Native | 0.77 | 0.09 |
| <i>Lycopus americanus</i> | American bugleweed | Native | 0.07 | 0.03 |
| <i>Melilotus officinalis</i> | yellow sweetclover | Introduced | 2.69 | |
| <i>Mentha arvensis</i> | wild mint | Native | 0.00 | |
| <i>Rumex crispus</i> | curly dock | Introduced | | 0.04 |
| <i>Senecio riddellii</i> | Riddell's ragwort | Native | 0.09 | |
| <i>Symphotrichum ericoides</i> | heath aster | Native | 0.92 | |
| <i>Symphotrichum lanceolatum</i> ssp. <i>hesperium</i> | white panicle aster | Native | 5.51 | 2.36 |
| <i>Taraxacum officinale</i> | common dandelion | Introduced | 0.21 | |
| unidentified forb | | | 0.14 | |
| <i>Xanthium strumarium</i> | rough cocklebur | Native | | 0.11 |

98RB011 Willow-drought die off (W-DO)

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|---|--------------------------|------------|-------|-------|
| Trees | | | | |
| <i>Elaeagnus angustifolia</i> | Russian olive | Introduced | 2.57 | 2.29 |
| <i>Morus alba</i> | white mulberry | Introduced | 0.06 | 0.43 |
| <i>Populus deltoides</i> ssp. <i>wislizeni</i> | Rio Grande cottonwood | Native | 0.46 | 0.26 |
| <i>Ulmus pumila</i> | Siberian elm | Introduced | 11.13 | 13.71 |
| Shrubs | | | | |
| <i>Baccharis salicina</i> | false willow | Native | 2.66 | 3.03 |
| <i>Parthenocissus vitacea</i> | thicket creeper | Native | 0.03 | |
| <i>Salix exigua</i> | coyote willow | Native | 22.26 | 37.71 |
| <i>Tamarix ramosissima</i> | saltcedar | Introduced | 1.57 | 3.71 |
| Sub-Shrubs | | | | |
| <i>Desmanthus illinoensis</i> | prairie bundleflower | Native | 0.00 | |
| Graminoids | | | | |
| <i>Agrostis gigantea</i> | redtop | Introduced | 0.06 | 0.06 |
| <i>Bromus japonicus</i> | Japanese brome | Introduced | 2.26 | 8.50 |
| <i>Bromus tectorum</i> | cheatgrass | Introduced | | 0.74 |
| <i>Cyperus odoratus</i> | fragrant flatsedge | Native | | 0.74 |
| <i>Cyperus</i> spp. | flatsedge | | | 0.03 |
| <i>Distichlis spicata</i> | inland saltgrass | Native | 0.09 | |
| <i>Echinochloa crus-galli</i> | barnyardgrass | Introduced | | 0.07 |
| <i>Elymus canadensis</i> | Canada wildrye | Native | 0.23 | 0.54 |
| <i>Elymus elymoides</i> | bottlebrush squirreltail | Native | 0.66 | |
| <i>Eragrostis pectinacea</i> | tufted lovegrass | Native | | 0.04 |
| <i>Festuca arundinacea</i> | tall fescue or K-31 | Introduced | 1.14 | 1.14 |
| <i>Hordeum jubatum</i> | foxtail barley | Native | | 0.13 |
| <i>Muhlenbergia asperifolia</i> | alkali muhly | Native | 2.91 | 4.55 |
| <i>Panicum capillare</i> | witchgrass | Native | 0.07 | 0.22 |
| <i>Panicum obtusum</i> | vine mesquite | Native | 1.17 | 1.17 |
| <i>Paspalum distichum</i> | knotgrass | Native | | 0.23 |
| <i>Polygonum monspeliensis</i> | annual rabbitsfoot grass | Introduced | | 0.00 |
| <i>Saccharum ravennae</i> | ravennagrass | Introduced | 0.59 | 0.80 |
| <i>Sorghastrum nutans</i> | Indiangrass | Native | 0.49 | 0.71 |
| <i>Sorghum halepense</i> | johnsongrass | Introduced | 0.20 | 0.71 |
| <i>Sporobolus airoides</i> | alkali sacaton | Native | 0.01 | 0.03 |
| <i>Sporobolus compositus</i> var. <i>compositus</i> | tall dropseed | Native | 0.43 | 0.69 |
| <i>Sporobolus cryptandrus</i> | sand dropseed | Native | 2.57 | 0.63 |
| Forbs | | | | |
| <i>Ambrosia psilostachya</i> | Cuman ragweed | Native | 5.45 | 7.98 |
| <i>Asclepias subverticillata</i> | whorled milkweed | Native | | 0.03 |
| <i>Bidens frondosa</i> | devil's beggartick | Native | | 0.03 |
| <i>Chamaesyce serpyllifolia</i> | thymeleaf sandmat | Native | 0.07 | 0.16 |
| <i>Conyza canadensis</i> | Canadian horseweed | Native | 0.83 | 4.79 |
| <i>Descurainia</i> spp. | tansymustard | | | 0.14 |
| <i>Equisetum laevigatum</i> | smooth horsetail | Native | 0.17 | 0.16 |
| <i>Euthamia occidentalis</i> | western goldenrod | Native | 0.03 | 1.00 |
| <i>Gaura parviflora</i> | velvetweed | Native | | 0.25 |
| <i>Helianthus annuus</i> | common sunflower | Native | | 0.07 |
| <i>Melilotus officinalis</i> | yellow sweetclover | Introduced | 1.91 | 3.09 |

98RB011 Willow-drought die off (W-DO) cont.

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|--|--------------------------|---------------|-------------|-------------|
| Forbs cont. | | | | |
| Oenothera elata ssp. hirsutissima | Hooker's eveningprimrose | Native | 0.10 | 0.03 |
| Solidago canadensis | Canada goldenrod | Native | 0.03 | 0.16 |
| Symphotrichum ericoides | heath aster | Native | 2.26 | 0.26 |
| Symphotrichum lanceolatum ssp. hesperium | white panicle aster | Native | 0.23 | 0.06 |
| Xanthium strumarium | rough cocklebur | Native | 0.00 | |

98RB008 Russian olive-grassy (RO-G)

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|--|-------------------------|------------|-------|-------|
| Trees | | | | |
| <i>Elaeagnus angustifolia</i> | Russian olive | Introduced | 59.97 | 57.57 |
| <i>Morus alba</i> | white mulberry | Introduced | 4.57 | 2.86 |
| <i>Populus deltoides</i> ssp. <i>wislizeni</i> | Rio Grande cottonwood | Native | | 0.57 |
| <i>Ulmus pumila</i> | Siberian elm | Introduced | 1.57 | 6.00 |
| Shrubs | | | | |
| <i>Salix exigua</i> | coyote willow | Native | 8.17 | 9.89 |
| Graminoids | | | | |
| <i>Cynodon dactylon</i> | bermudagrass | Introduced | 46.91 | 65.54 |
| <i>Distichlis spicata</i> | inland saltgrass | Native | 1.57 | |
| <i>Elymus canadensis</i> | Canada wildrye | Native | 2.20 | 6.50 |
| <i>Leptochloa fusca</i> ssp. <i>fascicularis</i> | bearded sprangletop | Native | | 0.01 |
| <i>Muhlenbergia asperifolia</i> | alkali muhly | Native | 11.40 | 5.34 |
| <i>Sporobolus airoides</i> | alkali sacaton | Native | 1.59 | 0.57 |
| <i>Sporobolus compositus</i> var. <i>compositus</i> | tall dropseed | Native | 5.14 | 2.37 |
| Unidentified grass | Unidentified grass | | 0.09 | |
| Forbs | | | | |
| <i>Ambrosia psilostachya</i> | Cuman ragweed | Native | 8.91 | 5.77 |
| <i>Apocynum cannabinum</i> | Indianhemp | Native | 0.37 | 0.09 |
| <i>Convolvulus arvensis</i> | field bindweed | Introduced | 0.17 | 0.06 |
| <i>Conyza canadensis</i> | Canadian horseweed | Native | 0.06 | 0.42 |
| <i>Equisetum laevigatum</i> | smooth horsetail | Native | 0.24 | 0.12 |
| <i>Helianthus annuus</i> | common sunflower | Native | 0.77 | 3.30 |
| <i>Helianthus petiolaris</i> | prairie sunflower | Native | 0.01 | |
| <i>Lactuca serriola</i> | prickly lettuce | Introduced | 0.03 | 0.91 |
| <i>Lactuca tatarica</i> var. <i>pulchella</i> | blue lettuce | Native | 0.26 | 1.79 |
| <i>Machaeranthera canescens</i> ssp. <i>glabra</i> | hoary tansyaster | Native | | 0.14 |
| <i>Melilotus officinalis</i> | yellow sweetclover | Introduced | 0.15 | 1.02 |
| <i>Salsola tragus</i> | prickly Russian thistle | Introduced | 0.24 | 0.14 |
| <i>Symphotrichum ericoides</i> | heath aster | Native | 8.17 | 17.23 |
| <i>Symphotrichum lanceolatum</i> ssp. <i>hesperium</i> | white panicle aster | Native | 0.03 | |

98RB010 Russian olive/elm-grassy (RO-E)

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|--|--------------------------|------------|-------|-------|
| Trees | | | | |
| <i>Elaeagnus angustifolia</i> | Russian olive | Introduced | 80.03 | 79.66 |
| <i>Populus deltoides</i> ssp. <i>wislizeni</i> | Rio Grande cottonwood | Native | 0.71 | 0.57 |
| <i>Ulmus pumila</i> | Siberian elm | Introduced | 16.19 | 27.86 |
| <i>Ulmus pumila</i> - seedling | Siberian elm | Introduced | | 0.01 |
| Shrubs | | | | |
| <i>Tamarix ramosissima</i> | saltcedar | Introduced | 2.43 | 2.00 |
| Graminoids | | | | |
| <i>Bothriochloa laguroides</i> ssp. <i>torreyana</i> | silver beardgrass | Native | 0.07 | |
| <i>Bromus japonicus</i> | Japanese brome | Introduced | 35.26 | 66.32 |
| <i>Bromus tectorum</i> | cheatgrass | Introduced | | 0.03 |
| <i>Carex emoryi</i> | Emory's sedge | Native | 2.23 | 2.23 |
| <i>Carex occidentalis</i> | western sedge | Native | | 0.59 |
| <i>Carex praegracilis</i> | clustered field sedge | Native | 1.29 | |
| <i>Cynodon dactylon</i> | bermudagrass | Introduced | 12.80 | 2.84 |
| <i>Elymus canadensis</i> | Canada wildrye | Native | 8.94 | 8.48 |
| <i>Elymus elymoides</i> | bottlebrush squirreltail | Native | 0.29 | |
| <i>Hordeum jubatum</i> | foxtail barley | Native | | 0.03 |
| <i>Hordeum murinum</i> ssp. <i>glaucum</i> | smooth barley | Introduced | 0.01 | |
| <i>Juncus arcticus</i> var. <i>balticus</i> | Baltic rush | Native | 0.03 | 0.00 |
| <i>Muhlenbergia asperifolia</i> | alkali muhly | Native | 0.11 | 0.49 |
| <i>Panicum obtusum</i> | vine mesquite | Native | 3.94 | 0.84 |
| <i>Pascopyrum smithii</i> | western wheatgrass | Native | 0.29 | |
| <i>Sorghastrum nutans</i> | Indiangrass | Native | 0.17 | |
| <i>Sporobolus airoides</i> | alkali sacaton | Native | 0.14 | |
| <i>Sporobolus compositus</i> var. <i>compositus</i> | tall dropseed | Native | 1.60 | 0.57 |
| Forbs | | | | |
| <i>Ambrosia psilostachya</i> | Cuman ragweed | Native | 2.86 | 0.87 |
| <i>Asclepias subverticillata</i> | whorled milkweed | Native | 0.07 | 0.26 |
| <i>Chenopodium</i> spp. | goosefoot | | 0.16 | |
| <i>Convolvulus arvensis</i> | field bindweed | Introduced | 2.03 | 0.93 |
| <i>Conyza canadensis</i> | Canadian horseweed | Native | 6.44 | 2.49 |
| <i>Equisetum laevigatum</i> | smooth horsetail | Native | 0.14 | 0.26 |
| <i>Gaura parviflora</i> | velvetweed | Native | 0.76 | 0.25 |
| <i>Helianthus petiolaris</i> | prairie sunflower | Native | 0.29 | |
| <i>Lactuca serriola</i> | prickly lettuce | Introduced | 5.17 | 2.49 |
| <i>Symphotrichum ericoides</i> | heath aster | Native | 4.90 | 0.42 |
| <i>Taraxacum officinale</i> | common dandelion | Introduced | | 0.01 |

98RB012 Russian olive-burned (RO-B)

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|---|--------------------------|------------|------|-------|
| Trees | | | | |
| <i>Elaeagnus angustifolia</i> | Russian olive | Introduced | 4.14 | 6.14 |
| <i>Ulmus pumila</i> | Siberian elm | Introduced | 0.15 | 0.74 |
| Shrubs | | | | |
| <i>Salix exigua</i> | coyote willow | Native | 1.52 | 3.31 |
| Sub-Shrubs | | | | |
| <i>Desmanthus illinoensis</i> | prairie bundleflower | Native | 0.43 | 0.92 |
| Graminoids | | | | |
| <i>Cyperus odoratus</i> | fragrant flatsedge | Native | 0.52 | 1.43 |
| <i>Distichlis spicata</i> | inland saltgrass | Native | 0.52 | 6.23 |
| <i>Elymus canadensis</i> | Canada wildrye | Native | | 0.03 |
| <i>Elymus x pseudorepens</i> | false quackgrass | Native | 0.01 | 1.43 |
| <i>Muhlenbergia asperifolia</i> | alkali muhly | Native | 0.14 | 2.57 |
| <i>Panicum obtusum</i> | vine mesquite | Native | | 0.11 |
| <i>Sorghastrum nutans</i> | Indiangrass | Native | 0.01 | 0.00 |
| <i>Sorghum halepense</i> | johnsongrass | Introduced | 1.15 | 3.20 |
| <i>Sporobolus airoides</i> | alkali sacaton | Native | 3.57 | 10.40 |
| <i>Sporobolus compositus</i> var. <i>compositus</i> | tall dropseed | Native | 0.89 | 2.71 |
| <i>Sporobolus cryptandrus</i> | sand dropseed | Native | 0.37 | 1.61 |
| Forbs | | | | |
| <i>Ambrosia psilostachya</i> | Cuman ragweed | Native | 0.71 | 1.52 |
| <i>Asclepias speciosa</i> | showy milkweed | Native | 0.01 | 0.03 |
| <i>Asclepias subverticillata</i> | whorled milkweed | Native | 0.02 | 0.01 |
| <i>Chamaesyce serpyllifolia</i> | thymeleaf sandmat | Native | 0.09 | 0.14 |
| <i>Convolvulus arvensis</i> | field bindweed | Introduced | 1.99 | 0.60 |
| <i>Conyza canadensis</i> | Canadian horseweed | Native | 0.20 | 13.06 |
| <i>Descurainia</i> spp. | tansymustard | | | 0.17 |
| <i>Equisetum laevigatum</i> | smooth horsetail | Native | 0.15 | 2.24 |
| <i>Gaura parviflora</i> | velvetweed | Native | 0.01 | 5.21 |
| <i>Helianthus annuus</i> | common sunflower | Native | 0.89 | 12.71 |
| <i>Kochia scoparia</i> | common kochia | Introduced | | 0.20 |
| <i>Lactuca serriola</i> | prickly lettuce | Introduced | | 0.31 |
| <i>Machaeranthera canescens</i> ssp. <i>glabra</i> | hoary tansyaster | Native | 0.01 | 0.26 |
| <i>Melilotus officinalis</i> | yellow sweetclover | Introduced | | 1.83 |
| <i>Oenothera elata</i> ssp. <i>hirsutissima</i> | Hooker's eveningprimrose | Native | | 0.65 |
| <i>Physalis</i> spp. | groundcherry | | | 0.06 |
| <i>Polygonum ramosissimum</i> | knotweed | Native | | 0.06 |
| <i>Rumex crispus</i> | curly dock | Introduced | | 0.29 |
| <i>Salsola tragus</i> | prickly Russian thistle | Introduced | | 0.71 |
| <i>Sisymbrium altissimum</i> | tall tumbled mustard | Introduced | | 0.49 |
| <i>Sonchus asper</i> | spiny sowthistle | Introduced | | 0.43 |
| <i>Sphaeralcea incana</i> | gray globemallow | Native | | 0.03 |
| <i>Symphotrichum ericoides</i> | heath aster | Native | 1.63 | 3.66 |
| unidentified forb | | | 0.00 | |

03AP003 Cottonwood-young mesic (CW-YM)

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|--|--------------------------|------------|-------|-------|
| Trees | | | | |
| <i>Elaeagnus angustifolia</i> | Russian olive | Introduced | 2.29 | 7.43 |
| <i>Populus deltoides</i> ssp. <i>wislizeni</i> | Rio Grande cottonwood | Native | 21.83 | 31.71 |
| <i>Salix gooddingii</i> | Goodding's willow | Native | 0.14 | |
| <i>Ulmus pumila</i> | Siberian elm | Introduced | 0.01 | 0.60 |
| Shrubs | | | | |
| <i>Baccharis salicina</i> | false willow | Native | 6.75 | 8.20 |
| <i>Salix exigua</i> | coyote willow | Native | 2.05 | 5.13 |
| <i>Tamarix ramosissima</i> | saltcedar | Introduced | 0.43 | 0.43 |
| <i>Tamarix ramosissima</i> - seedling | saltcedar | Introduced | 0.03 | |
| Sub-Shrubs | | | | |
| <i>Gutierrezia sarothrae</i> | broom snakeweed | Native | 0.20 | |
| Graminoids | | | | |
| <i>Agrostis gigantea</i> | redtop | Introduced | 0.14 | 0.80 |
| <i>Bolboschoenus maritimus</i> ssp. <i>paludosus</i> | saltmarsh bulrush | Native | | 1.95 |
| <i>Bouteloua curtipendula</i> | sideoats grama | Native | 0.03 | |
| <i>Bromus japonicus</i> | Japanese brome | Introduced | 4.37 | |
| <i>Bromus</i> spp. | brome | | 0.01 | |
| <i>Carex emoryi</i> | Emory's sedge | Native | 0.21 | 0.76 |
| <i>Cenchrus spinifex</i> | sandbur | Native | | 0.03 |
| <i>Cynodon dactylon</i> | bermudagrass | Introduced | 0.09 | 0.47 |
| <i>Cyperus odoratus</i> | fragrant flatsedge | Native | 0.01 | 1.25 |
| <i>Cyperus squarrosus</i> | bearded flatsedge | Native | | 2.83 |
| <i>Digitaria sanguinalis</i> | hairy crabgrass | Native | 0.15 | 0.00 |
| <i>Distichlis spicata</i> | inland saltgrass | Native | 0.59 | 2.49 |
| <i>Echinochloa crus-galli</i> | barnyardgrass | Introduced | 0.06 | 0.68 |
| <i>Elymus canadensis</i> | Canada wildrye | Native | 2.86 | 0.50 |
| <i>Elymus elymoides</i> | bottlebrush squirreltail | Native | 0.04 | |
| <i>Elymus x pseudorepens</i> | false quackgrass | Native | 0.07 | 0.06 |
| <i>Eragrostis pectinacea</i> | tufted lovegrass | Native | | 0.42 |
| <i>Festuca arundinaceae</i> | tall fescue or K-31 | Introduced | 1.83 | 1.46 |
| <i>Hordeum jubatum</i> | foxtail barley | Native | | 0.09 |
| <i>Hordeum murinum</i> ssp. <i>glaucum</i> | smooth barley | Introduced | 0.46 | |
| <i>Hordeum</i> spp. | barley | | | 0.03 |
| <i>Juncus torreyi</i> | Torrey's rush | Native | | 0.00 |
| <i>Leptochloa fusca</i> ssp. <i>fascicularis</i> | bearded sprangletop | Native | 0.11 | |
| <i>Muhlenbergia asperifolia</i> | alkali muhly | Native | 17.89 | 5.42 |
| <i>Panicum capillare</i> | witchgrass | Native | 0.10 | 2.23 |
| <i>Panicum obtusum</i> | vine mesquite | Native | 0.13 | 0.57 |
| <i>Paspalum distichum</i> | knotgrass | Native | | 0.31 |
| <i>Poa pratensis</i> | Kentucky bluegrass | Native | | 0.01 |
| <i>Poa</i> spp. | bluegrass | | 0.26 | |
| <i>Saccharum ravennae</i> | ravennagrass | Introduced | 0.03 | 0.11 |
| <i>Schoenoplectus pungens</i> | common threesquare | Native | 0.03 | 0.77 |
| <i>Sorghastrum nutans</i> | Indiangrass | Native | 1.97 | 0.35 |
| <i>Sorghum halepense</i> | johnsongrass | Introduced | 0.57 | 2.54 |
| <i>Sporobolus airoides</i> | alkali sacaton | Native | 0.57 | 0.51 |
| <i>Sporobolus compositus</i> var. <i>compositus</i> | tall dropseed | Native | 3.11 | 0.29 |
| <i>Sporobolus cryptandrus</i> | sand dropseed | Native | 3.23 | 0.46 |
| Unidentified grass | Unidentified grass | | 0.09 | |

03AP003 Cottonwood-young mesic (CW-YM) cont.

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|---|--------------------------|------------|------|-------|
| Forbs | | | | |
| <i>Ambrosia acanthicarpa</i> | flatspine burr ragweed | Native | 0.01 | |
| <i>Ambrosia psilostachya</i> | Cuman ragweed | Native | 2.64 | 0.11 |
| <i>Apocynum cannabinum</i> | Indianhemp | Native | 0.06 | 0.19 |
| <i>Asclepias speciosa</i> | showy milkweed | Native | 0.11 | 0.63 |
| <i>Asparagus officinalis</i> | garden asparagus | Introduced | 0.03 | 0.06 |
| <i>Bidens frondosa</i> | devil's beggartick | Native | | 0.03 |
| <i>Chamaesyce serpyllifolia</i> | thymeleaf sandmat | Native | 0.69 | 1.34 |
| <i>Convolvulus arvensis</i> | field bindweed | Introduced | 0.06 | |
| <i>Conyza canadensis</i> | Canadian horseweed | Native | 0.99 | 0.05 |
| <i>Equisetum laevigatum</i> | smooth horsetail | Native | 0.93 | 3.59 |
| <i>Erigeron flagellaris</i> | trailing fleabane | Native | 0.07 | |
| <i>Euthamia occidentalis</i> | western goldenrod | Native | 5.36 | 11.57 |
| <i>Gaura parviflora</i> | velvetweed | Native | | 0.12 |
| <i>Grindelia nuda</i> var. <i>nuda</i> | curlytop gumweed | Native | 0.43 | |
| <i>Helianthus annuus</i> | common sunflower | Native | 0.71 | 0.14 |
| <i>Helianthus petiolaris</i> | prairie sunflower | Native | 0.02 | |
| <i>Heterotheca villosa</i> | hairy goldenaster | Native | 0.03 | |
| <i>Lactuca serriola</i> | prickly lettuce | Introduced | 0.04 | |
| <i>Lactuca tatarica</i> var. <i>pulchella</i> | blue lettuce | Native | 0.00 | |
| <i>Machaeranthera canescens</i> ssp. <i>glabra</i> | hoary tansyaster | Native | 0.14 | |
| <i>Melilotus officinalis</i> | yellow sweetclover | Introduced | 4.17 | 0.11 |
| <i>Oenothera elata</i> ssp. <i>hirsutissima</i> | Hooker's eveningprimrose | Native | 0.19 | |
| <i>Polygonum lapathifolium</i> | curlytop knotweed | Native | | 0.00 |
| <i>Polygonum</i> spp. | knotweed | | 0.09 | |
| <i>Salsola tragus</i> | prickly Russian thistle | Introduced | 0.00 | |
| <i>Solidago canadensis</i> | Canada goldenrod | Native | 2.26 | 0.03 |
| <i>Symphyotrichum ericoides</i> | heath aster | Native | 0.51 | |
| <i>Symphyotrichum lanceolatum</i> ssp. <i>hesperium</i> | white panicle aster | Native | 0.09 | 0.40 |
| <i>Thelesperma megapotamicum</i> | Hopi tea greenthread | Native | 0.06 | |
| <i>Verbascum thapsus</i> | common mullein | Introduced | 0.00 | |
| <i>Verbena bracteata</i> | bigbract verbena | Native | | 0.01 |
| <i>Xanthium strumarium</i> | rough cocklebur | Native | 2.36 | 4.19 |

99RB013 Bosque-native (CW-N)

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|--|-------------------------|------------|-------|-------|
| Trees | | | | |
| <i>Elaeagnus angustifolia</i> | Russian olive | Introduced | 0.15 | 0.15 |
| <i>Populus deltoides</i> ssp. <i>wislizeni</i> | Rio Grande cottonwood | Native | 72.69 | 73.14 |
| <i>Salix gooddingii</i> | Goodding's willow | Native | 8.77 | 8.86 |
| <i>Ulmus pumila</i> | Siberian elm | Introduced | 0.02 | 0.01 |
| <i>Ulmus pumila</i> - seedling | Siberian elm | Introduced | 0.01 | |
| Shrubs | | | | |
| <i>Amorpha fruticosa</i> | desert indigobush | Native | 0.29 | 0.43 |
| <i>Baccharis salicina</i> | false willow | Native | 0.06 | |
| <i>Clematis ligusticifolia</i> | western white clematis | Native | 3.69 | 4.34 |
| <i>Forestiera pubescens</i> | New Mexico olive | Native | | 1.14 |
| <i>Forestiera pubescens</i> var. <i>pubescens</i> | New Mexico olive | Native | 17.16 | 17.14 |
| <i>Tamarix ramosissima</i> | saltcedar | Introduced | 4.00 | 3.87 |
| Graminoids | | | | |
| <i>Distichlis spicata</i> | inland saltgrass | Native | 3.97 | 1.52 |
| <i>Elymus canadensis</i> | Canada wildrye | Native | 0.29 | 1.03 |
| <i>Elymus x pseudorepens</i> | false quackgrass | Native | 0.00 | 0.04 |
| <i>Hordeum jubatum</i> | foxtail barley | Native | | 0.03 |
| <i>Muhlenbergia asperifolia</i> | alkali muhly | Native | 16.99 | 21.49 |
| <i>Sporobolus airoides</i> | alkali sacaton | Native | 1.20 | 1.71 |
| <i>Sporobolus cryptandrus</i> | sand dropseed | Native | | 0.03 |
| Forbs | | | | |
| <i>Ambrosia psilostachya</i> | Cuman ragweed | Native | 1.14 | 4.02 |
| <i>Conyza canadensis</i> | Canadian horseweed | Native | 0.03 | 1.00 |
| <i>Helianthus annuus</i> | common sunflower | Native | | 0.03 |
| <i>Lactuca serriola</i> | prickly lettuce | Introduced | | 0.03 |
| <i>Machaeranthera canescens</i> ssp. <i>glabra</i> | hoary tansyaster | Native | 0.80 | 3.37 |
| <i>Melilotus officinalis</i> | yellow sweetclover | Introduced | 0.00 | |
| <i>Salsola tragus</i> | prickly Russian thistle | Introduced | 0.15 | |
| <i>Symphotrichum ericoides</i> | heath aster | Native | 0.03 | |

99RB017 Bosque-exotic (CW-E)

| Scientific Name | Common Name | Origin | 2004 | 2005 |
|--------------------------------------|-----------------------|---------------|-------------|-------------|
| Trees | | | | |
| Ailanthus altissima | tree of heaven | Introduced | 10.29 | 15.20 |
| Elaeagnus angustifolia | Russian olive | Introduced | 32.71 | 35.54 |
| Morus alba | white mulberry | Introduced | | 3.43 |
| Populus deltoides ssp. wislizeni | Rio Grande cottonwood | Native | 64.00 | 70.29 |
| Salix amygdaloides | peachleaf willow | Native | | 2.29 |
| Ulmus pumila | Siberian elm | Introduced | 15.77 | 18.97 |
| Ulmus pumila - seedling | Siberian elm | Introduced | 0.00 | |
| Shrubs | | | | |
| Amorpha fruticosa | desert indigobush | Native | 0.71 | 0.09 |
| Parthenocissus vitacea | thicket creeper | Native | 12.17 | 10.43 |
| Tamarix ramosissima | saltcedar | Introduced | 2.37 | 2.37 |
| Forbs | | | | |
| Convolvulus arvensis | field bindweed | Introduced | 1.44 | 1.36 |
| Conyza canadensis | Canadian horseweed | Native | 0.01 | |
| Machaeranthera canescens ssp. glabra | hoary tansyaster | Native | | 0.03 |
| Melilotus officinalis | yellow sweetclover | Introduced | 0.34 | 0.80 |

Appendix D

List of all arthropod taxa identified with total number of individuals counted by taxa. Listed by Order and Family, with Sub-Order, Infraorder, Section, and Superfamily included, where relevant.

| | Family | 2003 | 2004 | 2005 |
|------------------|-------------------------|-------------|-------------|-------------|
| Arachnida | | | | |
| | Acari | 24 | 26 | 2 |
| | Araneae | 48 | 68 | 143 |
| | Pseudoscorpiones | 2 | | |
| Insecta | | | | |
| | Coleoptera | 47 | 1061 | 964 |
| | Anthicidae | | | 3 |
| | Carabidae | | 4 | 3 |
| | Chrysomelidae | 19 | 11 | 24 |
| | Cleridae | | 234 | 415 |
| | Coccinellidae | 6 | 37 | 27 |
| | Cryptophagidae | | 5 | |
| | Curculionidae | 2 | 17 | 7 |
| | Elateridae | | 1 | 4 |
| | Staphylinidae | 2 | 69 | 30 |
| | Tenebrionidae | 4 | | |
| | Melandryidae | 1 | 271 | 261 |
| | Chrysomelidae | | 2 | |
| | Lampyridae | | 3 | |
| | Scirtidae | | 1 | |
| | Mordellidae | | 222 | 73 |
| | Unidentified Coleoptera | 13 | 184 | 117 |
| | Collembola | 7 | 741 | 170 |
| | Diptera | 2684 | 6925 | 5453 |
| | Brachycera | 15 | 1908 | 1804 |
| | Asilomorpha | | | |
| | Asiloidea | | | |
| | Asilidae | | | 5 |
| | Therevidae | | 6 | |
| | Bombylioidea | | | |
| | Acroceridae | | 4 | |
| | Empidoidea | | | |
| | Dolichopodidae | | 10 | 3 |
| | Empididae | | 32 | 25 |

| | Family | 2003 | 2004 | 2005 |
|----------------------|----------------|------|------|------|
| Diptera cont. | | | | |
| Brachycera cont. | | | | |
| | Muscomorpha | | 13 | |
| | Acalypratae | | 41 | |
| | Conopoidea | | | |
| | Conopidae | | 13 | 62 |
| | Ephydroidea | | | |
| | Chloropidae | | 15 | 50 |
| | Lauxanioidea | | | |
| | Chamaemyiidae | | | 5 |
| | Lauxaniidae | | 2995 | 904 |
| | Neriodea | | | |
| | Micropezidae | | | 2 |
| | Sciomyzoidea | | | |
| | Sepsidae | | | 1 |
| | Tephritoidea | | | |
| | Otitidae | 2 | 16 | 6 |
| | Tephritidae | | 64 | 80 |
| | Aschiza | | | |
| | Platypezoidea | | | |
| | Phoridae | | 194 | 398 |
| | Syrphoidea | | | |
| | Pipunculidae | | 8 | 13 |
| | Syrphidae | | | 28 |
| | Calypratae | | 54 | 1 |
| | Oestroidea | | | |
| | Calliphoridae | | 5 | 8 |
| | Sarcophagidae | | | 305 |
| | Tachinidae | 479 | 389 | 436 |
| | Tabanomorpha | | | |
| | Stratiomyoidea | | | |
| | Xylomyidae | | 4 | |
| | Tabanoidea | | | |
| | Tabanidae | | 3 | 10 |
| | Nematocera | 1924 | 975 | 582 |
| | Bibionomorpha | | | |
| | Bibionoidea | | | |
| | Bibionidae | | | 57 |
| | Sciaroidea | | | |
| | Cecidomyiidae | | 3 | 10 |
| | Mycetophilidae | | 5 | |
| | Sciaridae | | 118 | 425 |
| | Culicomorpha | | | |
| | Chironomoidea | | | |
| | Chironomidae | | | 4 |
| | Culicomorpha | | | |
| | Culicidae | | | 2 |
| | Psychodomorpha | | | |
| | Psychodomorpha | | | |
| | Psychodidae | | | 222 |

| Family | 2003 | 2004 | 2005 |
|--------------------------|-------------|-------------|-------------|
| Diptera cont. | | | |
| Nematocera cont. | | | |
| Psychodomorpha cont. | | | |
| Scatopsoidea | | | |
| Scatopsidae | | 16 | |
| Tipulomorpha | | | |
| Tipuloidea | | | |
| Tipulidae | 1 | | |
| Unidentified Diptera | 263 | 34 | 5 |
| Ephemeroptera | 1 | 1 | 11 |
| Hemiptera | 107 | 191 | 339 |
| Cimicomorpha | | | |
| Reduviidae | | 1 | |
| Tingidae | | 2 | |
| Pentatomomorpha | | | |
| Lygaeidae | | 1 | 60 |
| Pentatomidae | | | 1 |
| Unidentified Hemiptera | 107 | 187 | 278 |
| Homoptera | 3851 | 2538 | 2418 |
| Auchenorrhyncha | | | |
| Cicadoidea | | | |
| Cicadellidae | 3417 | 1893 | 1767 |
| Fulgoroidea | | 7 | |
| Sternorrhyncha | | | |
| Aleyrodidae | | 72 | 409 |
| Aphididae | 434 | 490 | 168 |
| Psyllidae | | 69 | 73 |
| Unidentified Homoptera | | 7 | 1 |
| Hymenoptera | 3566 | 4447 | 2883 |
| Apocrita | | | |
| Formicidae | 53 | 105 | 37 |
| Chalcidoidea | 3266 | 3732 | 2492 |
| Cynipoidea | 1 | | |
| Figitidae | | 100 | 4 |
| Ichneumonoidea | 30 | 36 | 11 |
| Braconidae | | 2 | |
| Pompiloidea | | | |
| Pompilidae | | 1 | |
| Sphecoidea | 43 | 8 | 8 |
| Sphecidae | 2 | 30 | 1 |
| Tiphioidea | | | |
| Tiphidae | | 46 | |
| Vespoidea | 4 | 10 | |
| Unidentified Hymenoptera | 167 | 377 | 330 |

| | Family | 2003 | 2004 | 2005 |
|-----------------------------|--------------------------|-------------|-------------|-------------|
| Isoptera | | | | 1 |
| Lepidoptera | | 37 | 12 | 17 |
| | Noctuoidea | | | |
| | Noctuidae | 31 | | 1 |
| | Papilionoidea | | | |
| | Nymphalidae | | 1 | |
| | Pieridae | 1 | 3 | 3 |
| | Unidentified Lepidoptera | 5 | 8 | 13 |
| Neuroptera | | 2 | 6 | 25 |
| | Chrysopidae | | | 23 |
| | Unidentified Neuroptera | 2 | 6 | 2 |
| Orthoptera | | | 3 | 3 |
| Plecoptera | | 1 | | |
| Polyxenida | | | | 1 |
| | Polyxenidae | | | 1 |
| Psocoptera | | 1 | 15 | |
| | Psocidae | | 1 | |
| | Unidentified Psocoptera | 1 | 14 | |
| Thysanoptera | | 1000 | 5915 | 2674 |
| Trichoptera | | | 61 | 76 |
| | Hydroptilidae | | | 65 |
| | Unidentified Trichoptera | | 61 | 11 |
| Unidentified Insecta | | 708 | 95 | 144 |