

CHANGES IN SHRUB VEGETATION

THROUGH TIME AND SPACE

COSO – Changes Thru Time

- During the original Coso MGS study, we sampled shrub vegetation twice on all 4 sites
- In 1989 after a series of pretty good rainfall years
- Again in 1994, after a long drought and then 3 good winters
- Then in June 2016, after a really severe drought we sampled Site 2 and 3

COSO SHRUB SAMPLING

- Shrub sampling was done by line intercept method, using the 500 m N/S lines of trap stations. Ten of these lines were selected, beginning with Line B, then Line D, and so on. On each line, 10 alternating 25 m intervals between trap stations were sampled -- for example, Station B2 --> B3, then B4 --> B5. A total of 100 25 m intervals were sampled. Species and length of intercept (to nearest 10 cm) were recorded for each shrub intercepted, thus providing percent cover for each species, as well as the total number of individual plants per species. Plants with no live canopy were judged to be dead, but the number and intercept was recorded.

COSO SITE 2

CHANGES IN SHRUB COMMUNITY COMPOSITION

| | PERCENT COVER | | | NUMBER OF PLANTS | | | AVERAGE CONDITION | | |
|-------------|---------------|-------------|-------------|------------------|------------|------------|--|------|------------|
| | 1989 | 1994 | 2016 | 1989 | 1994 | 2016 | 1989 | 1994 | 2016 |
| ACSP | 3.53 | 4.73 | 1.87 | 322 | 350 | 142 | 2.5 | 3.4 | 1.9 |
| AMDU | 0.52 | 0.84 | 0.57 | 49 | 59 | 42 | 2.6 | 3.8 | 2.1 |
| AMSA | 2.1 | 3.24 | 1.54 | 97 | 127 | 72 | 2.1 | 3.5 | 2.2 |
| ATCO | 4.58 | 4.51 | 0.44 | 231 | 222 | 25 | 2.5 | 3.3 | 2.1 |
| ATPO | 1.87 | 1.06 | 1.62 | 63 | 30 | 44 | 1.2 | 3.8 | 3.2 |
| EPNE | 5.29 | 6.79 | 5.04 | 292 | 220 | 234 | 2.1 | 3.5 | 1.8 |
| GRSP | 0.18 | 0.28 | 0.33 | 11 | 11 | 12 | 2.1 | 3 | 2 |
| KRLA | 1.81 | 1.49 | 0.98 | 132 | 127 | 80 | 2.4 | 3.3 | 2.3 |
| LYAN | 2.1 | 2.31 | 1.28 | 118 | 117 | 88 | 2.4 | 2.6 | 1.7 |
| PSAR | 0.39 | 0.41 | 0.45 | 16 | 17 | 15 | 2.8 | 4 | 2.6 |
| Total Live | 22.37 | 25.66 | 14.12 | 1331 | 1280 | 754 | Condition based on % estimate of live canopy | | |
| Dead | 1.32 | 2.96 | 10.55 | 84 | 187 | 717 | 1 = 1-25% alive | | |
| | | | | | | | 2 = 25-50% alive | | |
| | | | | | | | 3 = 50-75% alive | | |
| Live + Dead | 23.69 | 28.62 | 24.67 | 1415 | 1467 | 1471 | 4=75-100% alive | | |

Numbers in **bold** = species with ≥10 individuals in sample every year

Data with green fill = notable changes over time in cover, numbers, or condition

COSO SITE 3

CHANGES IN SHRUB COMMUNITY COMPOSITION

| | PERCENT COVER | | | NUMBER OF PLANTS | | | AVERAGE CONDITION | | |
|-------------|---------------|-------|-------|------------------|------|------|-------------------------------------|------|------|
| | 1989 | 1994 | 2016 | 1989 | 1994 | 2016 | 1989 | 1994 | 2016 |
| ACSP | 0.41 | 0.60 | 0.48 | 33 | 44 | 30 | 2.2 | 3.5 | 2.1 |
| AMSA | 0.95 | 1.43 | 0.79 | 47 | 79 | 47 | 2.1 | 3.6 | 2.3 |
| ATCA | 4.96 | 3.52 | 2.22 | 147 | 120 | 84 | 2.1 | 3.6 | 2.5 |
| ATCO | 3.48 | 2.41 | 0.39 | 117 | 110 | 18 | 2.2 | 3.4 | 3.8 |
| EPNE | 0.19 | 0.32 | 0.26 | 11 | 16 | 16 | 2.5 | 3.8 | 1.9 |
| ERCO | 0.19 | 0.14 | 0.17 | 19 | 15 | 14 | 3.1 | 3.7 | 3 |
| GRSP | 7.27 | 3.66 | 3.21 | 264 | 150 | 133 | 2.3 | 3.3 | 2.8 |
| KRLA | 1.08 | 1.49 | 1.43 | 68 | 94 | 87 | 3.2 | 3.6 | 2.7 |
| LYAN | 0.42 | 0.58 | 0.17 | 21 | 31 | 14 | 2.7 | 3.1 | 1.9 |
| LYCO | 2.01 | 2.23 | 2.91 | 39 | 47 | 68 | 3.5 | 3.8 | 2.3 |
| Total Live | 21.09 | 16.48 | 12.07 | 766 | 706 | 511 | Condition % estimate of live canopy | | |
| Dead | 1.42 | 4.81 | 8.71 | 62 | 181 | 426 | 1 = 1-25% alive | | |
| | | | | | | | 2 = 25-50% alive | | |
| | | | | | | | 3 = 50-75% alive | | |
| Live + Dead | 22.51 | 21.29 | 20.78 | 828 | 887 | 937 | 4=75-100% alive | | |

Numbers in **bold** = species with ≥ 10 individuals in sample every year

Data with green fill = notable changes over time in cover, numbers, or condition





COSO SITE 2

May 29, 2011

U-21 -> U-01





ESR SITE 3
May 29, 2011
U-21 - A-26





COSO SITE 3
May 29, 2011
U-21 → U-01

Changes through Space N & E of Kramer Junction

- In 2011 and 2012, shrub sampling was done at camera sites
- Data from 13 sites N of KJ and from 23 sites E of KJ
- Shrubs were counted and measured in 2 x 25 m belt transects adjacent to arrays of 10 camera stations at each site
- Small sample area – only 5% of a hectare

Focus on Density of GRSP and KRLA

- Where were these 2 species found over this enormous area in the central part of the MGS range?
- How abundant were they?
- How does this fit with what we know about MGS diet?

8 Most Important Plants in MGS diet at Coso sites (1988-1996)

| Food item | Percent mean relative density | Percent frequency |
|---|----------------------------------|----------------------|
| <i>Krascheninnikovia lanata</i> leaves | 18.2 | 44.0 |
| <i>Astragalus lentiginosus</i> leaves | 12.6 | 35.2 |
| <i>Grayia spinosa</i> leaves | 11.9 | 28.0 |
| <i>Atriplex</i> spp. leaves | 7.4 | 47.1 |
| <i>Gilia</i> sp./ <i>Linanthus</i> sp. leaves and seeds | 7.4 | 34.3 |
| <i>Lupinus odoratus</i> leaves, pods, and seeds | 5.4 | 19.4 |
| Asteraceae leaves, flowers, and seeds | 4.5 | 20.7 |
| <i>Eriogonum</i> spp. leaves | 3.4 | 11.1 |
| Total | 70.8 | |

Conclusions?

- West Mojave shrub communities are in bad shape
- If GRSP and KRLA provide dietary support for MGS when annuals don't come up
- Then certain areas with more GRSP and KRLA should have more stable MGS populations
- Maybe the lack of GRSP/KRLA has something to do with instability of MGS populations in the hybrid zone