Technical Report No. 289

FIELD ECOLOGY INVESTIGATIONS OF THE EFFECTS OF SELECTED PESTICIDES ON WILDLIFE POPULATIONS[1/]

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ABSTRACT

In June 1972, two experimental areas on the Pawnee National Grassland in Colorado were aerially sprayed with toxaphene and malathion, two insecticides commonly used on rangelands. Intensive research is now underway on the sprayed areas and on an untreated area in cooperation with the International Biological Program (IBP), Grassland Biome. Data are collected on all major components of the shortgrass ecosystem: Birds, mammals, arthropods, vegetation biomass and species composition, and decomposer activity. Other data collected include food habits of Horned Larks and deer mice and chemical analyses for insecticide residues in plants, animals, and the environment.

From first-year results it was evident that the toxaphene application had greater direct effects than malathion. Populations of two of the major bird species, Horned Larks and McCown's Longspurs, were significantly reduced through emigration, nesting failures, and poisoning mortality. Small mammals probably died from toxaphene poisoning also. No carcasses were found, but only one of the marked animals on the toxaphene area was recaptured in postspray trapping, while 31% and 27% of the available marked animals were recaptured on the malathion and untreated areas, respectively.

Vegetation biomass was measured 2 weeks prior to the insecticide treatments and 8 to 9 weeks later (6 to 7 weeks postspray). During this period, the total vegetation biomass, other than prickly pear and six weeks fescue, increased 25% on the untreated area. During the same period, herbage biomass increased only 10% on the malathion area and 3% on the toxaphene area.

Continued observations in 1973 and 1974 will provide long-term data on response to the treatments by the shortgrass plant community and by vertebrate and invertebrate animal populations, as well as recovery rates to pretreatment status. These observations should also tell us how suppression of major components by pesticides affects the function and productivity of the whole ecosystem.

INTRODUCTION

Pesticides are applied to millions of acres of semiarid rangelands each year for arthropod and vertebrate pest control. Most field research on the impact of these chemicals on the ecology and productivity of rangelands has been short-term and oriented towards a few components rather than the whole ecosystem. Studies of insecticide effects on nontarget species have generally attempted only to identify immediate mortality of vertebrates (McEwen, Knittle, and Richmond 1972). In-depth research is needed so that the ecological costs and benefits of mass-spraying programs on rangeland can be more accurately identified.

Comprehensive field ecology studies are expensive and time-consuming because of the many parameters that must be sampled and the large amounts of data involved. Detailed research of this type is usually beyond the capabilities of small teams of investigators. In-depth ecosystem research becomes practical only with a large staff and budget or in cooperation with other research projects and agencies.

In 1971, we had the opportunity to initiate a field test of grasshopper insecticides in conjunction with the International Biological Program (IBP) Grassland Biome project on the Pawnee National Grassland. The IBP project had more than 40 separate studies underway or completed covering nearly all aspects of the shortgrass prairie ecosystem. More than 100 Technical Reports were available to us concerning the biotic and abiotic parameters and function of our study area. By participating in this cooperative research program we hoped to learn the overall impact on the shortgrass ecosystem from grasshopper insecticides and to identify the mechanisms and relationships by which effects are manifested.

OBJECTIVES

The primary objective is to determine the effects of 1 lb/acre toxaphene (in 3/4 pint fuel oil), or 8 oz/acre malathion (sprayed ULV), on species diversity and biomass of plant and animal life in a short-grass plains ecosystem. A secondary objective is to identify the mechanisms by which the effects, if any, occur.

METHODS

A study area was selected in 1971 on the Pawnee National Grassland, Weld County, Colorado (T. 8N., R. 64 W., S. 1 and the west 1/2, S. 12). Three contiguous treatment areas of 320 acres (129.5 ha) each were delineated. Approval to conduct the study was obtained from the U.S. Forest Service, administrators of land use on the area. The Forest Service also agreed to maintain the cattle-grazing season between August and October on the area. Clearance for the pesticide applications was given by the Federal Working Group on Pest Management, an interagency group in Washington, D.C.

Within each treatment, two replicate plots of 38.5 acres (15.6 ha) each were marked for intensive study (Fig. 1). These plots were located within the treatment areas at a minimum distance of 350 ft (106.7 m) from any edge to provide a wide buffer zone.

The study area is characterized by flat to rolling topography; blue grama (see Tables 1 and 2 for scientific names of birds and plants), buffalo grass, plains prickly pear cactus, and associated vegetation; shallow, sandy loam soils; average annual precipitation of 12.8 inches (324 mm); and an elevation of 5,070 ft (1,545 m) ± 100 ft (30.5 m).

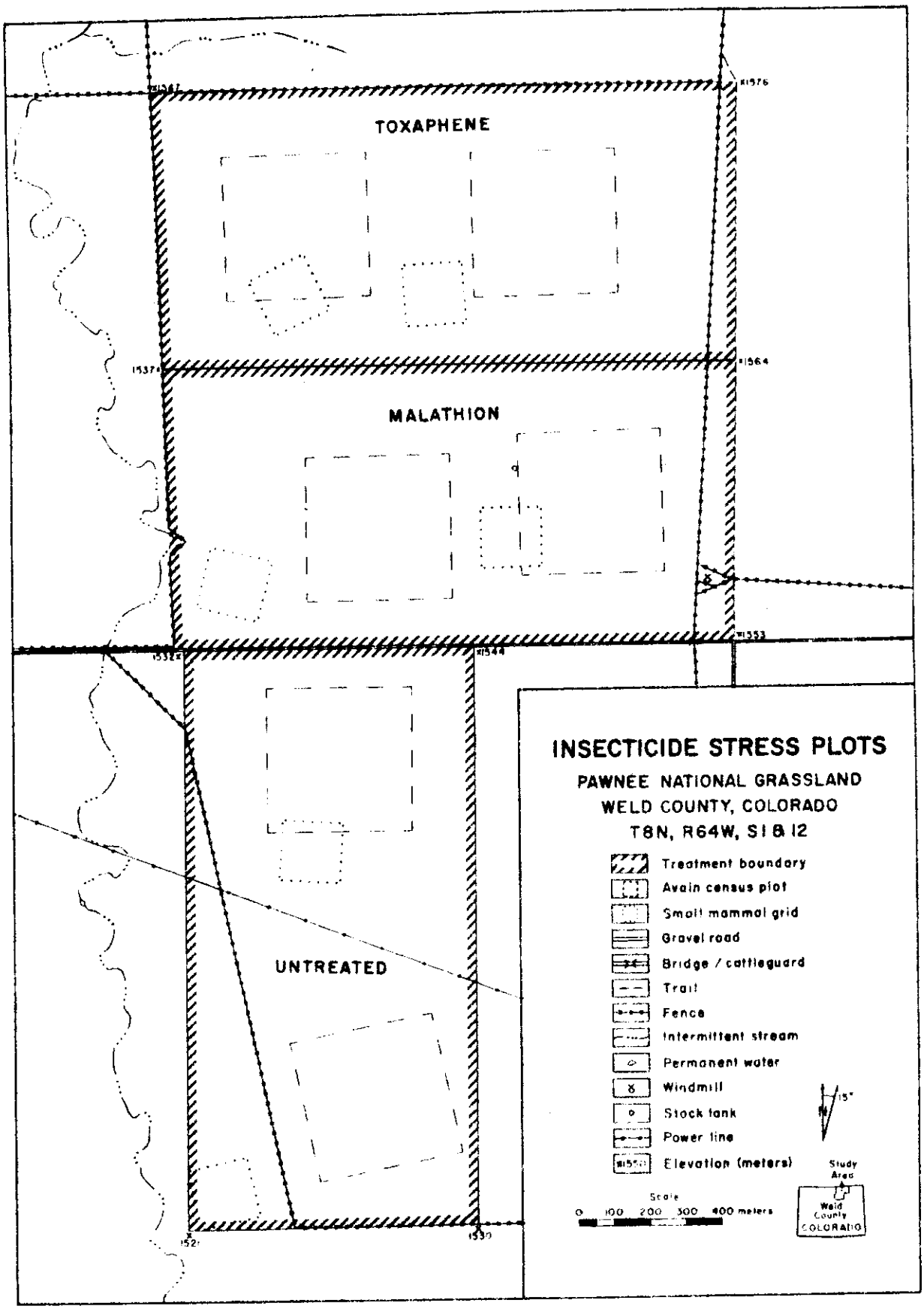

Fig. 1. Map showing insecticide stress plots on the Pawnee National Grassland.

Table 1. Bird species observed on study area in 1971-1972.

Scientific Name[1/]	Common Name
Ammodramus savannarum	Grasshopper Sparrow
Amphispiza belli	Sage Sparrow
Anas platyrhynchos	Mallard
Anthus spragueii	Sprague's Pipit
Aquila chrysaetos	Golden Eagle
Branta canadensis	Canada Goose
Buteo lagopus	Rough-legged Hawk
Buteo swainsoni	Swainson's Hawk
Calamospiza melanocorys	Lark Bunting
Calcarius lapponicus	Lapland Longspur
Calcarius mccownii	McCown's Longspur
Calcarius ornatus	Chestnut-collared Longspur
Charadrius montana	Mountain Plover
Charadrius vociferus	Killdeer
Chordeiles minor	Common Nighthawk
Circus cyaneus	Marsh Hawk
Columba livia	Rock Dove
Corvus brachyrhynchos	Common Crow
Eremophila alpestris	Horned Lark
Falco mexicanus	Prairie Falcon
Falco sparverius	Sparrow Hawk
Hirundo rustica	Barn Swallow
Lanius ludovicianus	Loggerhead Shrike

Table 1. Continued.

Scientific Name[1/]	Common Name
Mimus polyglottos	Mockingbird
Molothrus ater	Brown-headed Cowbird
Oporornis tolmiei	MacGillivray's Warbler
Oreoscoptes montanus	Sage Thrasher
Petrochelidon pyrrhonota	Cliff Swallow
Pooecetes gramineus	Vesper Sparrow
Salpinctes obsoletus	Rock Wren
Sayornis saya	Say's Phoebe
Speotyto cunicularia	Burrowing Owl
Spizella breweri	Brewer's Sparrow
Spizella passerina	Chipping Sparrow
Sturnella neglecta	Western Meadowlark
Sturnus vulgaris	Starling
Tyrannus verticalis	Western Kingbird
Zenaida macroura	Mourning Dove
Zonotrichia leucophrys	White-crowned Sparrow

[1/] Scientific names are taken from American Ornithologists' Union (1957) and Committee on Classification and Nomenclature (1973).

Table 2. Plant species present on vegetation biomass plots in 1972. A total of 624 half-square-meter circular plots were sampled (208 plots/treatment).

Scientific Name[1/]	Common Name[1/]	Toxaphene	Malathion	Untreated
	GRASS AND GRASSLIKE			
Agropyron smithii	Western wheatgrass		X	
Aristida longiseta	Red three-awn	X	X	X
Bouteloua gracilis	Blue grama	X	X	X
Buchloe dactyloides	Buffalo grass	X	X	X
Carex eleocharis	Needleleaf sedge	X	X	X
Carex filifolia	Threadleaf sedge	X		
Festuca octoflora	Six weeks fescue	X	X	X
Muhlenbergia torreyi	Ring muhly	X		X
Munroa squarrosa	False buffalo grass			X
Oryzopsis hymenoides	Indian ricegrass	X		
Schedonnardus paniculatus	Tumblegrass	X		X
Sitanion hystrix	Bottlebrush squirreltail	X	X	X
Sporobolus cryptandrus	Sand dropseed	X	X	X
Stipa comata	Needle and thread	X		X
	FORBS			
Allium textile	Textile onion	X	X	
Astragalus missouriensis	Missouri loco	X	X	
Astragalus mollissimus	Wooly loco	X		X
Astragalus spp.	Milkvetch	X	X	
Bahia oppositifolia	Plains bahia		X	
Chenopodium leptophyllum	Slimleaf goosefoot		X	

Table 2. Continued.

Scientific Name[1/]	Common Name[1/]	Toxaphene	Malathion	Untreated
Cirsium undulatum	Wavyleaf thistle	X	X	X
Conyza canadensis	Canadian horseweed			X
Cryptantha minima	Cryptantha	X	X	X
Cymopterus acaulis	Stemless spring parsley		X	
Erigeron bellidiastrum	Fleabane	X		X
Eriogonum effusum	Spreading wild buckwheat	X	X	X
Euphorbia glyptosperma	Ridgeseed euphorbia	X		X
Gaura coccinea	Scarlet gaura	X	X	X
Gilia laxifolia	Loose-flowered gilia	X	X	X
Haplopappus spinulosus	Ironplant goldenweed		X	
Helianthus petiolaris	Prairie sunflower			X
Heterotheca villosa	Hairy goldaster		X	X
Lappula redowskii	Bluebur stickseed	X	X	X
Lepidium densiflorum	Prairie pepperweed	X	X	X
Leucocrinum montanum	Common starlily	X		
Lithospermum incisum	Yellow gromwell	X		
Lomatium orientale	Biscuit-root			X
Lupinus pusillus	Rusty lupine		X	
Lygodesmia juncea	Rush skeletonplant	X	X	X
Machaeranthera tanacetifolia	Tansyleaf aster	X	X	X
Mirabilis linearis	Four-o-clock	X	X	X
Oenothera albicaulis	Prairie evening primrose	X		X
Oenothera spp.	Evening primrose	X	X	X

Table 2. Continued.

Scientific Name[1/]	Common Name[1/]	Toxaphene	Malathion	Untreated
Penstemon spp.	Penstemon	X	X	X
Plantago purshii	Wooly indianwheat	X	X	X
Psoralea tenuiflora	Slimflower scurfpea	X	X	X
Salsola kali tenuifolia	Tumbling Russian thistle	X		X
Senecio tridenticulatus	Plains groundsel			X
Sophora sericea	Silky sophora	X	X	
Sphaeralcea coccinea	Scarlet globemallow	X	X	X
Stephanomeria pauciflora	Wirelettuce	X	X	X
Talinum parviflorum	Prairie fameflower	X	X	X
Thelesperma filifolium	Greenthread	X	X	X
Tradescantia occidentalis	Prairie spiderwort	X		X
Unidentified forbs				X
	SHRUBS AND HALF-SHRUBS			
Artemisia frigida	Fringed sagewort			X
Atriplex canescens	Fourwing saltbush		X	
Chrysothamnus nauseosus	Rubber rabbitbrush			X
Gutierrezia sarothrae	Broom snakeweed	X	X	X
	CACTUS			
Mammillaria vivipara	Pincushion cactus		X	
Opuntia polyacantha	Plains prickly pear	X	X	X
	LICHEN			
Parmelia chlorochroa	Crustose lichen	X	X	X

[1/] Plant names follow Dickinson and Baker (1972).

able 2. Plant species present on vegetation biomass plots in 1972. A total of 624 half-square-meter circular plots were sampled (208 plots/treatment).

Scientific Name[1/]	Common Name[1/]	Toxaphene	Malathion	Untreated
	GRASS AND GRASSLIKE			
Agropyron smithii	Western wheatgrass		X	
Aristida longiseta	Red three-awn	X	X	X
Bouteloua gracilis	Blue grama	X	X	X
Buchloe dactyloides	Buffalo grass	X	X	X
Carex eleocharis	Needleleaf sedge	X	X	X
Carex filifolia	Threadleaf sedge	X		
Festuca octoflora	Six weeks fescue	X	X	X
Muhlenbergia torreyi	Ring muhly	X		X
Munroa squarrosa	False buffalo grass			X
Oryzopsis hymenoides	Indian ricegrass	X		
Schedonnardus paniculatus	Tumblegrass	X		X
Sitanion hystrix	Bottlebrush squirreltail	X	X	X
Sporobolus cryptandrus	Sand dropseed	X	X	X
Stipa comata	Needle and thread	X		X
	FORBS			
Allium textile	Textile onion	X	X	
Astragalus missouriensis	Missouri loco	X	X	
Astragalus mollissimus	Wooly loco	X		X
Astragalus spp.	Milkvetch	X	X	
Bahia oppositifolia	Plains bahia		X	
Chenopodium leptophyllum	Slimleaf goosefoot		X	

Table 2. Continued.

Scientific Name[1/]	Common Name[1/]	Toxaphene	Malathion	Untreated
Cirsium undulatum	Wavyleaf thistle	X	X	X
Conyza canadensis	Canadian horseweed			X
Cryptantha minima	Cryptantha	X	X	X
Cymopterus acaulis	Stemless spring parsley		X	
Erigeron bellidiastrum	Fleabane	X		X
Eriogonum effusum	Spreading wild buckwheat	X	X	X
Euphorbia glyptosperma	Ridgeseed euphorbia	X		X
Gaura coccinea	Scarlet gaura	X	X	X
Gilia laxifolia	Loose-flowered gilia	X	X	X
Haplopappus spinulosus	Ironplant goldenweed		X	
Helianthus petiolaris	Prairie sunflower			X
Heterotheca villosa	Hairy goldaster		X	X
Lappula redowskii	Bluebur stickseed	X	X	X
Lepidium densiflorum	Prairie pepperweed	X	X	X
Leucocrinum montanum	Common starlily	X		
Lithospermum incisum	Yellow gromwell	X		
Lomatium orientale	Biscuit-root			X
Lupinus pusillus	Rusty lupine		X	
Lygodesmia juncea	Rush skeletonplant	X	X	X
Machaeranthera tanacetifolia	Tansyleaf aster	X	X	X
Mirabilis linearis	Four-o-clock	X	X	X
Oenothera albicaulis	Prairie evening primrose	X		X
Oenothera spp.	Evening primrose	X	X	X

Table 2. Continued.

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Salsola kali tenuifolia	Tumbling Russian thistle	X		X
Senecio tridenticulatus	Plains groundsel			X
Sophora sericea	Silky sophora	X	X	
Sphaeralcea coccinea	Scarlet globemallow	X	X	X
Stephanomeria pauciflora	Wirelettuce	X	X	X
Talinum parviflorum	Prairie fameflower	X	X	X
Thelesperma filifolium	Greenthread	X	X	X
Tradescantia occidentalis	Prairie spiderwort	X		X
Unidentified forbs				X
	SHRUBS AND HALF-SHRUBS			
Artemisia frigida	Fringed sagewort			X
Atriplex canescens	Fourwing saltbush		X	
Chrysothamnus nauseosus	Rubber rabbitbrush			X
Gutierrezia sarothrae	Broom snakeweed	X	X	X
	CACTUS			
Mammillaria vivipara	Pincushion cactus		X	
Opuntia polyacantha	Plains prickly pear	X	X	X
	LICHEN			
Parmelia chlorochroa	Crustose lichen	X	X	X

[1/] Plant names follow Dickinson and Baker (1972).

These characteristics are similar to those of the IBP intensive study site and to many western rangeland areas where grasshoppers are a recurring problem.

The study area is grazed seasonally by privately-owned beef cattle under the administration of the U.S. Forest Service, headquartered at Greeley, Colorado. The three treatment areas are all within the same grazing unit and thus have been under the same land management for many years.

Sampling methods and experimental design followed the IBP format (French 1971) as closely as possible. Data were collected on the following ecosystem components and parameters: (1) vertebrate and invertebrate species composition and biomass, (2) plant species composition and biomass, (3) ground cover, (4) litter, (5) decomposer activity, (6) location and fate of insecticide residues in the biota and in the environment, and (7) food habits of one or two species of common vertebrates.

Birds were counted on strip transects (150 ft or 45.7 m on either side of the line of travel) in 1971, 1 year prespray, and chiefly by plot mapping in 1972 (with some supplementary strip transects). Bird census in 1973 would be done by a combination of these techniques. Territories of breeding Horned Larks (and possibly one or two additional species) will be determined by the flush method of Wiens (1969). All nests found were marked and checked periodically for success. Horned Larks were collected by gun on the study area, but off the replicate plots, for chemical residue and food habit analyses.

Small mammals were censused by live trap grids of 12 × 12 stations, 49.2 ft (15 m) between stations, with two grids on each treatment area.

The trap grids were located near, and in some cases partly on, the 38.5-acre replicate plots (Fig. 1). Traps were baited with dry rolled oats and hamster pellets and set 5 consecutive days per trapping period. Animals were marked with a toe-clipping system in 1971 and 1972. Numbered ear tags would also be attached to captured small mammals in 1973. Snap trap (museum special) lines were set on each treatment area, but off the live trap grids, to collect specimens for insecticide residue analyses and food habits studies. Analyses were made at the Denver Wildlife Research Center. Large mammals may range over more than one treatment area and only general observations are recorded.

Arthropods were sampled, beginning in 1972, by the IBP crew with a "quick trap" and vacuum collector on six 0.5-m^2 sample plots per replicate. One set of samples was collected 2 weeks prespray, and three sets of samples were collected in the postspray period in 1972. Three sets of samples were also to be taken in 1973, 1 year postspray. Arthropods were extracted with Berlese funnels at the IBP site headquarters, then sent to the Entomology Division, University of Wyoming, for species and biomass determinations.

Herbage samples were collected by an IBP crew using their standard procedure (clipping and estimating on circular half-square-meter plots). Collections were made 2 weeks prespray and 5 weeks postspray in 1972. On each sampling date, six plots were clipped and 46 estimated per replicate. One set of samples would also be collected in 1973, 1 year postspray, late in the growing season. Determinations made included percent bare ground, litter biomass, and vegetation biomass by species in the following categories: old dead, recent dead, perennial live,

and new live. Clipped samples are processed at the IBP site headquarters, and computer data printouts are provided by the IBP Natural Resource Ecology Laboratory, Fort Collins, Colorado.

Decomposer activity was studied by weighing filter-paper samples before and after varying periods of time under a light soil cover on each replicate. For 1973, in addition to this technique, equipment has been purchased to measure CO_2 evolution.

After the data have been acquired for the first year postspray (1973), species diversity and equitability indexes will be determined for plants and animals on the three treatments. Another potential use of these data is modeling studies of the shortgrass ecosystem in response to perturbation by insecticides under varying conditions, different treatment rates, etc. Energy flow through the different treatments may be approximated by extrapolating caloric values for the major ecosystem components from the IBP data bank.

The insecticide treatments were applied by a commercial spray plane (Easton Aerial Sprayers, Greeley, Colorado), on 14 June 1972. Toxaphene (chlorinated camphene (combined chlorine content 67% to 69%)) formulation was sprayed on the north half of Section 1 at the rate of 1-lb active toxaphene in 3/4 pint #2 diesel oil per acre. The formulation contained 90% toxaphene and 10% xylene prior to mixing in the fuel oil. The spray plane was a single-engine Grumman fixed wing ("Super Ag Cat") with a 260-gallon spray tank and fourteen 8003 nozzles. Flying speed was about 120 mph and swath coverage was about 100 ft wide. Swaths were marked by a flag truck along the east boundary and by automatically released paper markers on each swath.

The malathion (95% 0,0-dimethyl phosphorodithioate of diethyl mercaptosuccinate (liquid)) was sprayed on the south half of Section 1. Flying speed and swath marking were the same, but swath width was increased to 125 ft. A different set of nozzles was used--eight 8002 T-jet flat spray tip nozzles. Technical malathion, with no carrier, was sprayed at the rate of 8 fluid oz active ingredient per acre.

The toxaphene was sprayed between 8:06 and 8:40 a.m. (MDT), and the malathion between 9:35 and 10:05 a.m. (MDT). Weather conditions were clear during the applications except for cumulus clouds low on the west horizon. Temperatures at breast height ranged from 63° to 72°F (17.2° to 22.2°C) and wind speed at breast height varied from 2 to 8 mph (from the southeast) during the applications. Spray deposition was checked with spray (dye) cards by Dr. Blickenstaff of the Agricultural Research Service, USDA (Bozeman, Montana). Deposition appeared satisfactory for both insecticides with no evidence of "skips" between swaths. A small amount of malathion drift was detected on the south edge of the toxaphene plot, presumably because of the light wind blowing from the southeast during spraying. For toxaphene, 82.9% of the droplets on the spray cards were between 26 and 100 microns diameter and the largest droplets were 176 to 200 microns (1% of total). For malathion, 83.5% of the droplets were between 26 and 100 microns diameter and 1.7% were 200-350 microns, the largest found.

RESULTS

Birds

The most common species of breeding birds on the study area in order of abundance are Horned Larks, Lark Buntings, Western Meadowlarks,

and McCown's Longspurs. Forty species of birds have been seen on or near the study area (Table 1).

Transects through the treatment areas in 1971, 1 year prespray, indicated generally similar species composition on all treatments. However, total numbers of resident birds averaged somewhat higher on the area to receive the toxaphene treatment (Table 3) and lower on the area to remain untreated (control).

Territories of breeding males were not determined in 1971. The study areas were not finally selected until late June 1971, past the peak of nesting. Prior to final selection of treatment areas, we made strip counts of birds at several locations on the Pawnee Grassland rather than determining individual territories. We were searching for a study area with the least variability in topography, vegetation, and animal life, yet within one grazing unit.

Summer resident birds were censused in three periods in 1972: Pretreatment, 15 May to 12 June; 1-17 day postspray, 15 June to 1 July; and periodically from 15 July on through fall and winter. From five to ten plot counts and from two to eight transect counts per replicate were made in each period. All replicates had similar total bird densities in the 1972 prespray period. Horned Larks comprised about 67% of total birds on all plots. McCown's Longspurs were more abundant on the toxaphene and malathion plots than on the untreated, and Lark Buntings were more abundant on the untreated plots than on the treatment plots.

Approximate densities of the most common breeding species prior to the spray applications were: Horned Larks, 39 pairs per 100 acres

Table 3. Results of bird censuses, summer 1971, 1 year prior to insecticide treatments.

Species	Toxaphene Prespray	Malathion Prespray	Untreated Prespray
	Mean No. Birds	Mean No. Birds	Mean No. Birds
		9-18 June	
No. of censuses		8	11
Horned Lark	(no data)	14.0	11.4
Lark Bunting	(no data)	3.2	8.4
Western Meadowlark	(no data)	1.5	1.1
McCown's Longspur	(no data)	0.8	0.0
Other species	(no data)	3.5	1.2
Total birds		23.0[a/]	22.1[a/]
		15-30 June	
		(no data)	
		13 July-27 August	
No. of censuses	37	40	39
Horned Lark	20.7	15.9	13.8
Lark Bunting	5.6	3.0	3.9
Western Meadowlark	2.6	1.7	1.0
McCown's Longspur	0.7	2.2	0.5
Other species	1.1	1.5	0.9
Total birds	30.7[b/]	24.3[b/]	20.1[b/]

[a/] Data were transformed to a 38.5-acre (15.6 ha) area basis from counts of resident birds per 0.5 mile (0.8 km) transect, approximately 300 ft (91.4 m) wide (in 12 minutes).

[b/] Mean number of birds (excluding flocks of five or more birds) seen on a 38.5-acre (15.6 ha), nearly square, plot within a 25- to 35-minute early-morning census period. Two plots were established per treatment.

(or 40.5 ha in each case); Lark Buntings, 11 pairs per 100 acres; Western Meadowlarks, 3.6 pairs per 100 acres; and McCown's Longspurs, 3.2 pairs per 100 acres. In the first 17 days after the pesticide applications the numbers of Horned Larks and total birds decreased about 30% on the toxaphene plots while remaining stable on the malathion and untreated plots (Table 4).

Some of the disappearance of birds from the toxaphene plots was caused by direct poisoning. Meadowlarks and nestlings of Horned Larks and McCown's Longspurs seemed most susceptible. Adult Horned Larks were not observed to succumb to direct poisoning although Horned Lark mortality was seen in an earlier toxaphene study (McEwen et al. 1972).

In the second postspray period beginning 15 July, numbers of birds were still lower on the toxaphene than on the other plots, but the untreated plots also showed a marked decrease of bird use. Late summer bird activity is more variable than breeding season activity because of the movement of family groups and flocking preparatory to migration.

Maps of Horned Lark breeding territories are not presented in this report. The plot maps are complex and data are being very thoroughly examined to delineate territories of breeding birds and to avoid duplications.

Mammals

Small mammals were live-trapped on two replicate IBP-type square grids (12 × 12 or 144 stations) on each treatment. Traps were run for 5 consecutive days on each replicate prior to the treatments and again on each replicate after spraying. Prespray populations differed between treatments and, in some cases, between replicates within a treatment. The malathion grids had high densities of deer mice (*Peromyscus maniculatus*)

Table 4. Results of bird censuses, before and after insecticide applications made on 14 June 1972.

Species	Toxaphene	Malathion	Untreated
	Mean No. Birds	Mean No. Birds	Mean No. Birds
	Prespray, 15 May-12 June		
No. of censuses	19	19	17
Horned Lark	30.4	29.5	29.0
Lark Bunting	6.6	7.3	11.4
Western Meadowlark	3.8	4.2	4.5
McCown's Longspur	2.6	4.6	0.2
Other species	3.6	5.2	3.1
Total birds	47.0	50.8	48.2
	Postspray, 15 June-1 July		
No. of censuses	16	16	12
Horned Lark	19.9[a/]	26.8	28.2
Lark Bunting	6.9	7.8	13.7
Western Meadowlark	2.8	4.6	2.4
McCown's Longspur	2.6	3.8	0.6
Other species	1.4	3.1	2.1
Total birds	33.6[b/]	46.1	47.0

[a/] Differs from toxaphene prespray ($P < 0.001$) and from untreated postspray ($P < 0.005$).

[b/] Differs from toxaphene prespray ($P < 0.001$) and from untreated postspray ($P < 0.001$).

and few other species while all other grids had low deer mouse populations but higher numbers of other species. Other species captured (all grids) in order of abundance were grasshopper mice (*Onychomys leucogaster*), thirteen-lined ground squirrels (*Spermophilus tridecemlineatus*), Ord's kangaroo rats (*Dipodomys ordii*), hispid pocket mice (*Perognathus hispidus*), and juvenile desert cottontails (*Sylvilagus audubonii*). Species of larger mammals observed on the study area included black-tailed (*Lepus californicus*) and white-tailed jackrabbits (*L. townsendii*), pronghorns (*Antilocapra americana*), coyotes (*Canis latrans*), badgers (*Taxidea taxus*), spotted ground squirrels (*Spermophilus spilosoma*), and striped skunks (*Mephitis mephitis*). Scientific names follow Hall and Kelson (1959).

Population densities of small mammals have not yet been calculated. A comparison of new animals captured in each trapping period illustrates the differences between treatments in species composition (Table 5). The summary of trapping results in Table 5 shows the difference between the toxaphene grids and the other two treatments in the recapture of prespray-marked animals in the postspray period. Only one animal (deer mouse) was recaptured on the toxaphene treatment, and the validity of this one was questionable because the toe clip was either misread or was a natural amputation (the number recorded had not been applied in prespray marking). In contrast, 28% and 31% of prespray-marked animals were recaptured on the untreated and malathion grids, respectively. These results indicate that there probably was considerable mortality of small mammals on the toxaphene area, although we had no direct evidence of this. Undetected rodent mortality is possible because (1) small

Table 5. Summary of small mammal trapping results in 1972.

Captures	Deer Mouse	Grass-hopper Mouse	Thirteen-lined Ground Squirrel	Kangaroo Rat	Hispid Pocket Mouse	Desert Cotton-tail	Total
			Untreated				
Prespray new captures	10	7	--	5	--	--	22
Postspray recaptures[a/]	2	3	--	1	--	--	6 (27%)
Postspray new captures	2	10	5	6	3	--	26
All recaptures[b/]	14	14	5	9	4	--	46
			Malathion				
Prespray new captures	56	1	1	--	--	--	58
Postspray recaptures[a/]	18	--	--	--	--	--	18 (31%)
Postspray new captures	28	--	3	--	--	--	31
All recaptures[b/]	124	2	--	--	--	--	126
			Toxaphene				
Prespray new captures	21	2	2	1	--	1	27
Postspray recaptures[a/]	1[c/]	--	--	--	--	--	1 (4%)
Postspray new captures	9	5	12	2	5	--	33
All recaptures[b/]	24	4	14	--	3	--	45

[a/] Animals marked in the prespray period and recaptured in the postspray period.

[b/] Includes multiple recaptures of the same animal and recaptures within the period when the animal was marked.

[c/] This was a probable recapture from the prespray period, but there was a possible error in reading the toe clip number.

carcasses disappear quickly in the field and (2) animals that died in their burrows would not have been detected. Many of the new animals captured in the postspray period on the toxaphene grids may have been immigrants from surrounding areas. The rapid reinvasion of vacant habitat by small rodents is a well-known phenomenon. We recaptured one deer mouse on a toxaphene grid after it had been marked on a malathion grid 0.5 miles (0.8 km) distant.

In 1971, some preliminary trapping was done while searching for suitable locations for the trap grids. Several of the animals marked in 1971 were recaptured in 1972. These results also indicated a difference in survival between treatments. Although numbers marked in 1971 were not large, eight of these animals were recaptured on the untreated grids (six in postspray trapping) and three on the malathion grids (one in postspray trapping) in 1972. None were recaptured on the toxaphene grids.

Arthropods

The arthropod data have not yet been analyzed in detail. Summaries of total numbers and total biomass have been prepared. Four sets of samples were collected in 1972--one set of prespray and three sets of postspray (1 week, 2 weeks, and 5 weeks postspray). Malathion and toxaphene are "broad-spectrum" insecticides, and, as would be anticipated, there was a marked suppression of arthropods on the sprayed areas following treatment.

Arthropods are a major food source for many species of birds, mammals, reptiles, and amphibians. Even some omnivorous and herbivorous species may require a nearly 100% animal diet for a critical period

during early growth (Martin, Zim, and Nelson 1951, p. 279). For example, chicks of gallinaceous birds, such as pheasants and some grouse species, eat mostly invertebrates the first few days after hatching, but gradually convert to a diet of plant materials (Trippensee 1948, pp. 65 and 248). The high protein content of arthropods is one of the reasons for the high nutritional value and attractiveness to wildlife. The crude protein content of rangeland grasshoppers was found to average 67% to 75% (dry weight basis) (Ueckert, Yang, and Albin 1972).

The average number of individual arthropods found per 0.5 m^2 is shown in Fig. 2. Numbers on the insecticide treatment areas were similar to or higher than on the untreated area prior to spraying, but were much lower following spraying. One week after treatment, numbers of arthropods on the two sprayed areas averaged only 11% of the numbers on the unsprayed area. This percentage increased to 18% by the final 1973 sampling, 5 weeks postspray.

Total biomass of arthropods followed generally similar trends although pretreatment mean biomass was the highest on the malathion area (Fig. 3). Biomass is probably more meaningful, in terms of insect availability as food for wildlife, than numbers of individuals since 100 or more very small arthropods may not contain as much biomass as a single large grasshoppper or beetle. However, biomass may not necessarily equate completely with food availability for wildlife either. A given amount of biomass in the form of only 5 to 10 smaller insects (vs. one large insect) would offer more opportunity for capture by foraging birds, mammals, reptiles, and amphibians.

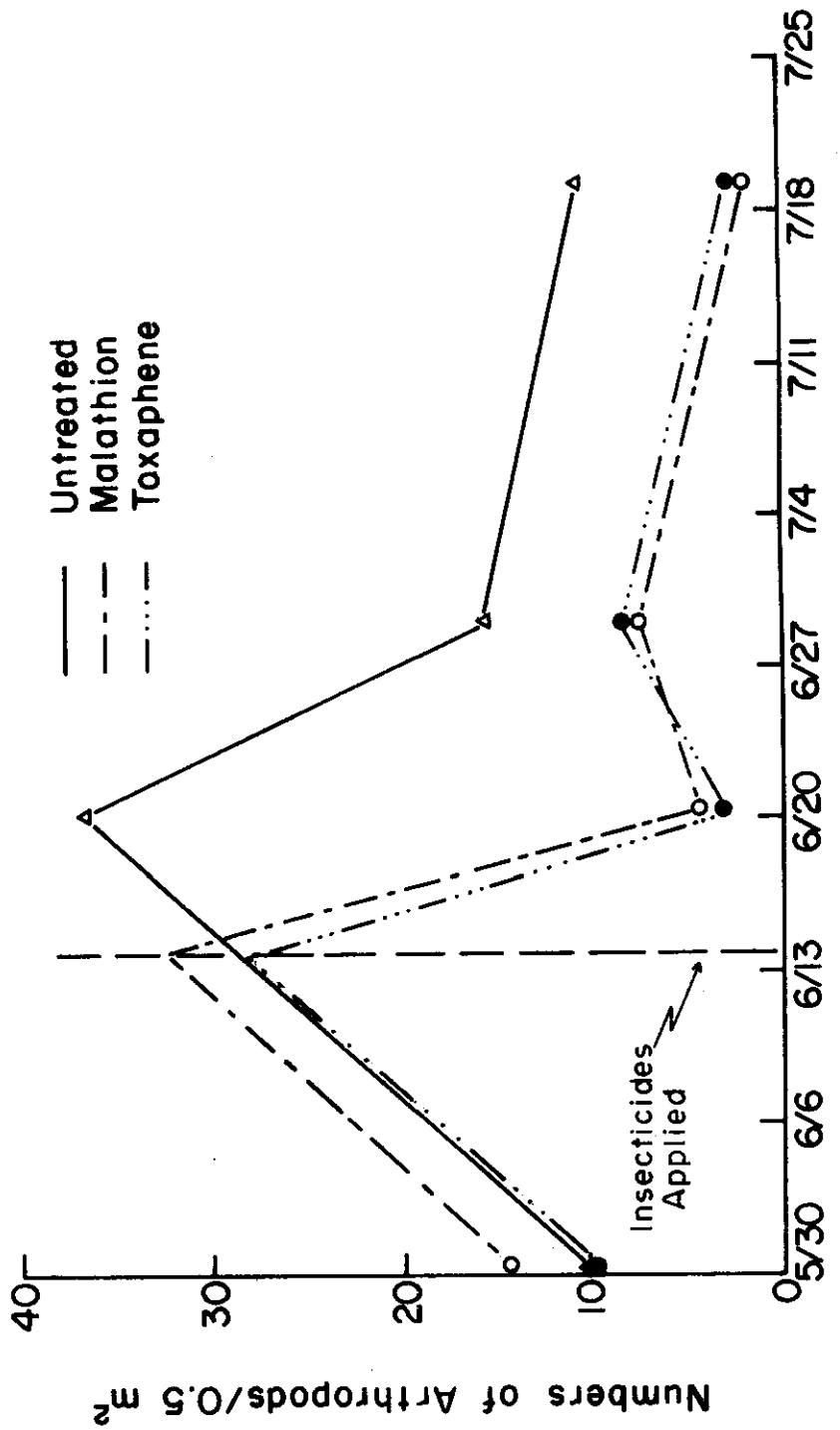

Fig. 2. Suppression of numbers of arthropods on insecticide-treated shortgrass prairie, 1972.

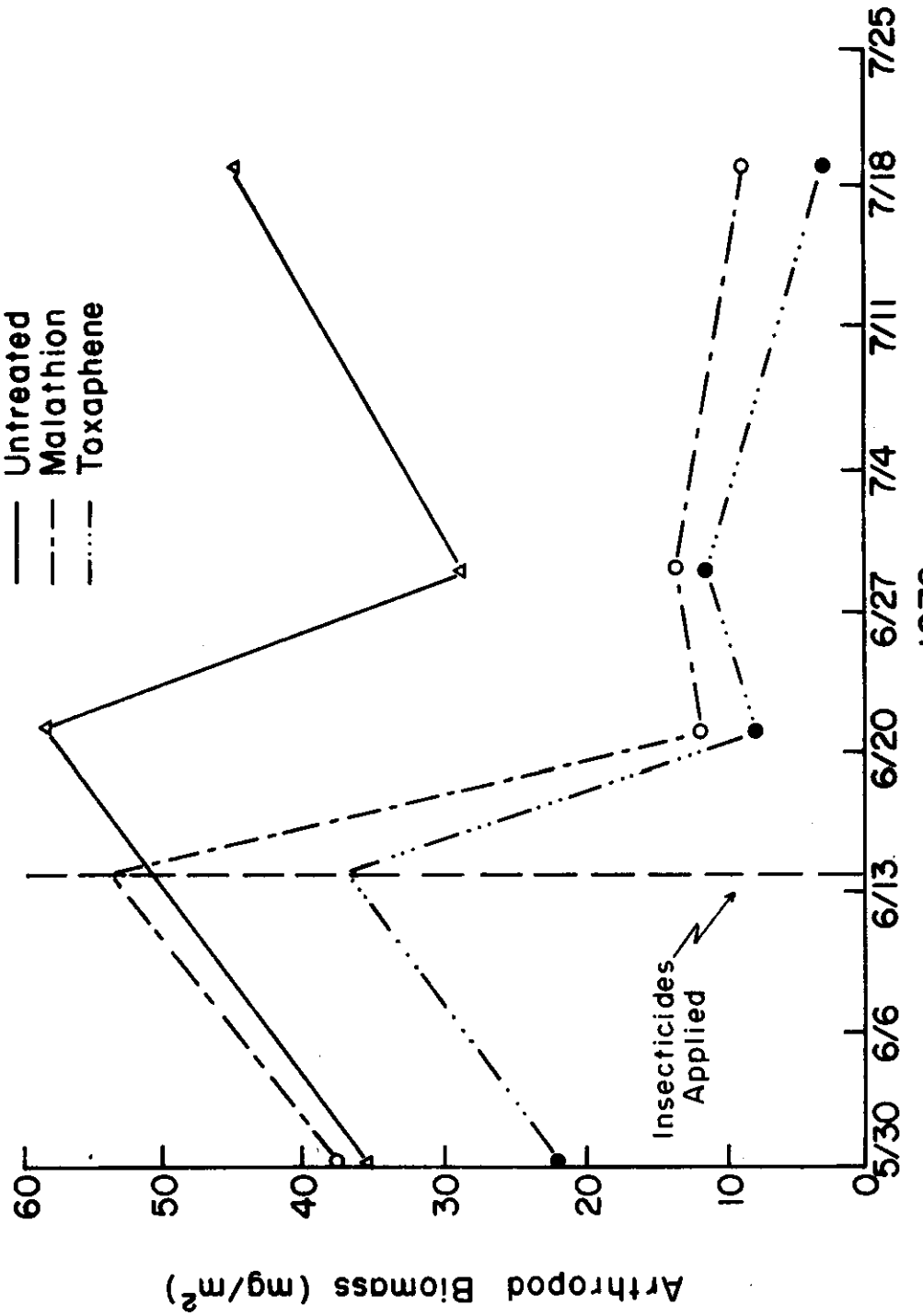

Fig. 3. Reduction in arthropod biomass on insecticide-treated shortgrass prairie, 1972.

The numbers of species of arthropods found followed the same trends as number of individuals and biomass per 0.5 m^2 (Fig. 4). Prior to treatment, the number of species averaged higher on the malathion plots than on the other two treatments. By the final collection in 1972, the number of species found on the two treated areas averaged little more than half the numbers found on the untreated area.

The suppression of arthropod populations following spraying was to be expected although a faster rate of recovery was anticipated in the weeks following treatment. Three sets of samples will be collected in 1973 to determine the degree of recovery 1 year postspray.

After collecting field data in 1973, we will attempt to relate abundance of important arthropods, food habits of the dominant birds on the treatment areas, and population density of the dominant birds. Nesting success will also be examined in relation to arthropod availability. Arthropods could have some bearing on small mammal populations as well. Live-trap data in 1973 will be examined for such relationships.

Vegetation

Plant species composition and aboveground biomass were measured by IBP workers 2 weeks before the insecticide treatments and 6 weeks after them. Samples were collected (6 clipped and 46 estimated plots per replicate) each date at one representative location on each replicate.

Plains prickly pear was the dominant species, averaging 46% (range 5.2 to 83.5) of total aboveground biomass overall on all replicates, pre- and post-treatment. Six weeks fescue, an annual grass, was also abundant on some plots in the prespray period and overall averaged 7.5% (range 0.1 to 29.2) of total biomass. Because of the variability of

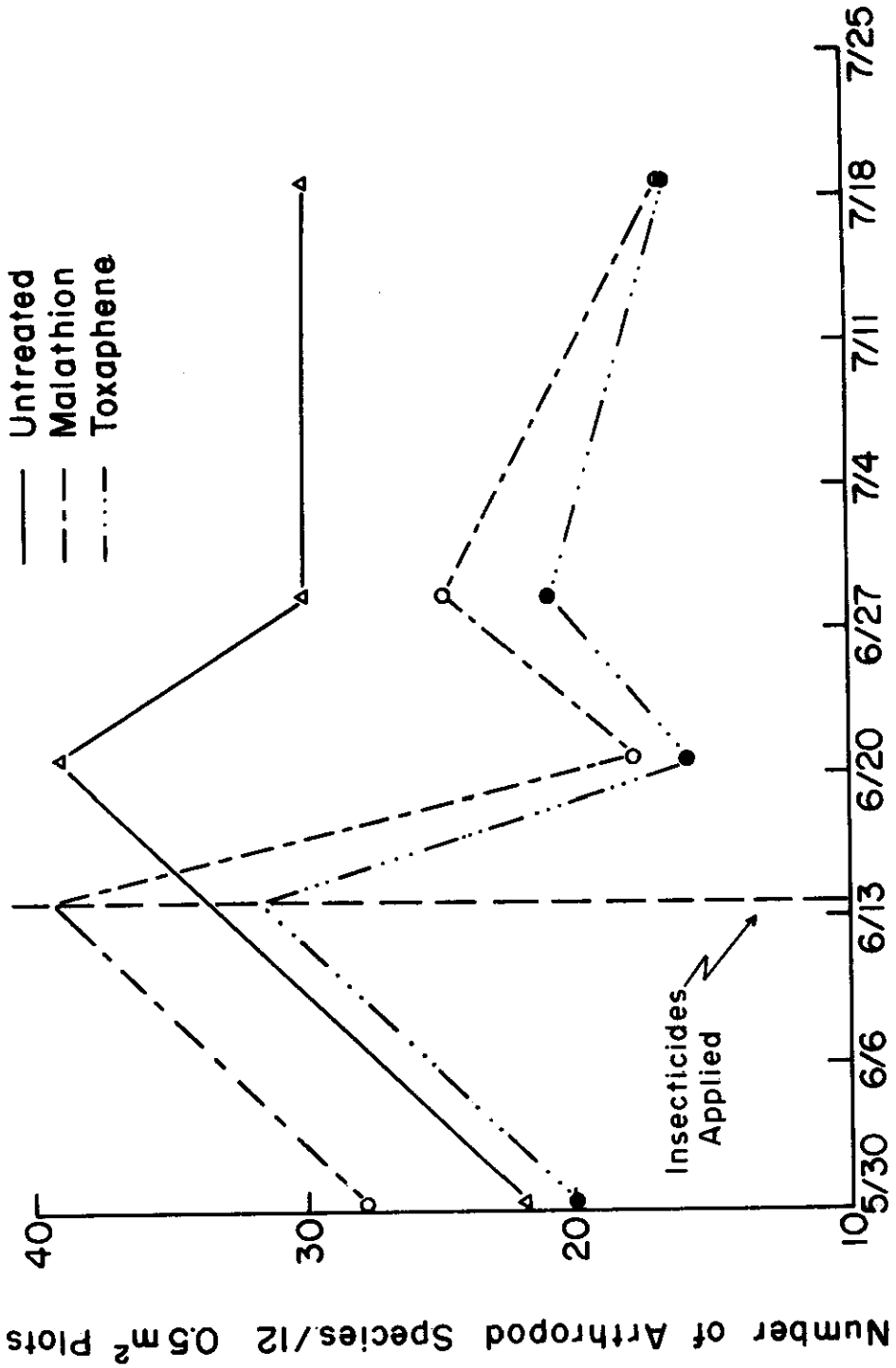

Fig. 4. Reduction of numbers of arthropod species on insecticide-treated shortgrass prairie, 1972.

the cactus and fescue data, these species are not included in the biomass comparisions. When included, the cactus and annual fescue data mask the treatment effects on the perennial grasses and forbs.

Grass and grasslike species comprised most of the vegetation other than cactus and annual (six weeks) fescue. Grass and grasslike species averaged 89.8% (range 86 to 95) of the remaining plant biomass; forbs averaged 8.2% (range 4.0 to 13.3); and shrubs averaged 2.0% (range 0.4 to 4.7). Plant species scientific names are listed in Table 2. Blue grama was the dominant grass, averaging 70.2% (range 61.1 to 78.9) of total herbage biomass (exclusive of cactus and annual fescue). Buffalo grass ranked next, averaging 12.2% (range 0.1 to 27.3).

Plant biomass data for the three treatments (toxaphene, malathion, control) are summarized in Table 6. The apparent differences in herbage biomass, and presumably plant growth, after the insecticide treatments are striking (data have not yet been statistically analyzed). From 30 May to 31 July, grasses and total herbage biomass on the control plots increased about 25%. During the same period, grasses and total biomass increased only 10% to 11% on the malathion plots. On the toxaphene plots, grasses and total biomass increased only 1.2% and 3.5%, respectively.

Because of the broad-spectrum insecticidal action of the two chemicals, it was anticipated that elimination of a large segment of plant-feeding insects by the chemicals could result in a relatively greater increase in herbage biomass on the sprayed areas. Although the insect populations were significantly decreased, there obviously was no positive response in the vegetation biomass and possibly there was some inhibitory effect.

Table 6. Aboveground vegetation[a/] biomass[b/] before and after insecticide treatments.

Vegetation	Prespray (g/m^2)	Postspray (g/m^2)	Change (%)
	Toxaphene		
Grass and grasslike	52.1	52.7	+ 1.2
Forbs	2.3	3.0	
Shrubs	0.5	1.1	
Total biomass	54.9	56.8	+ 3.5
	Malathion		
Grass and grasslike	46.4	51.7	+11.4
Forbs	2.3	4.1	
Shrubs	2.4	1.3	
Total biomass	51.1	57.1	+10.5
	Untreated		
Grass and grasslike	33.9	42.7	+26.0
Forbs	4.5	6.1	
Shrubs	0.7	0.2	
Total biomass	39.1	49.0	+25.3

[a/] Plant species are listed in Table 2.

[b/] Biomass includes current live, recent dead, and old dead vegetation. All species are included with the exceptions of six weeks fescue and plains prickly pear.

There is no ready explanation for the absence of a biomass increase on the insecticide-treated plots. If the apparent growth inhibition is real, there are two possible, but purely hypothetical causes: (1) direct phytotoxicity of the chemicals (we have found no indications of toxaphene or malathion phytotoxicity to grass species in the literature), or (2) elimination of growth-stimulating arthropods by the insecticides (as suggested by J. L. Dodd and M. I. Dyer, Natural Resource Ecology Laboratory staff). The possibility of such phenomena indicates the importance of maintaining all components for greatest productivity of natural ecosystems.

Litter and Decomposers

Litter was collected and weighed from six 0.5-m^2 plots per replicate per sampling date (from the same plots that were clipped for herbage biomass). In the prespray samples, mean litter weight was highest on the toxaphene area, next highest on the malathion area, and lowest on the untreated area (Table 7). As with vegetation biomass, these relationships were reversed in the postspray litter samples. Postspray litter weights were lowest on the toxaphene area and highest on the untreated area (Table 7). Again, as with the herbage biomass, there is no ready explanation for the treatment differences. The effects of the insecticides on litter production need further verification and more detailed study to understand the relationships.

Insecticide Residues

The following were periodically collected for chemical analysis after the pesticide applications: blue grama, insects, small rodents,

Table 7. Litter weights found on herbage biomass plots in 1972. Twelve censuses were taken for each treatment--toxaphene, malathion, and untreated--for both prespray and postspray.

Treatment	Litter Weight	
	Prespray (g/m^2)[a/]	Postspray (g/m^2)[a/]
Toxaphene	235.4[b/]	105.6[c/]
Malathion	189.5[d/]	151.3[e/]
Untreated	161.6	164.6

[a/] Weight of oven-dry, ash-free organic matter.

[b/] Differs from toxaphene, postspray, and from untreated, prespray, at 0.01 level (Snedecor and Cochran 1967, p. 102).

[c/] Differs from toxaphene, prespray, and from malathion and untreated, postspray, at 0.01 level (Snedecor and Cochran 1967, p. 102).

[d/] Differs from malathion, postspray, at 0.01 level (Snedecor and Cochran 1967, p. 102).

[e/] Differs from untreated, postspray, at 0.10 level (Snedecor and Cochran 1967, p. 102).

and Horned Larks. Specimens were collected from all treatments (toxaphene, malathion, and untreated), but samples were taken over a longer period of time from the toxaphene area because of the greater stability and persistence of this chemical.

As would be expected, residues of both chemicals were initially high on the vegetation and gradually decreased. Disappearance of the chemicals in blue grama and associated grasses is shown through 85 days post-treatment for toxaphene and through 10 days for malathion (Fig. 5 and 6). Results of later collections will be discussed in a later report.

Dead and dying insects, mostly ground beetles and grasshoppers, contained pesticide residues. Eight samples of 5 to 20 insects each were collected between 5 hours and 6 days postspray on the toxaphene area. Residues in the eight composite samples ranged from 5.1 to 40.7 ppm toxaphene with a mean of 20.1 ppm. A wolf spider (*Lycosa* spp.) found dead 6 days postspray contained 13.8 ppm toxaphene.

Six composites of insects were collected on the malathion area between 3 and 47 hours postspray. Residues ranged from 6.4 to 21.7 ppm malathion with a mean of 12.9 ppm. No further samples were collected because of the difficulty in finding arthropods on the sprayed areas.

A few small mammals were collected for residue analysis. One hispid pocket mouse and one deer mouse had 8.4 and 2.4 ppm toxaphene, respectively, at 2 days postspray (whole-body, fresh-weight basis). At 7 days, three deer mice had 1.1 ppm (composite sample). A thirteen-lined ground squirrel found dead in a box trap at 28 days had 6.2 ppm. A deer mouse collected at 58 days had 7.3 ppm toxaphene and a hispid pocket mouse on the same date showed no detectable toxaphene about the 0.4 ppm level.

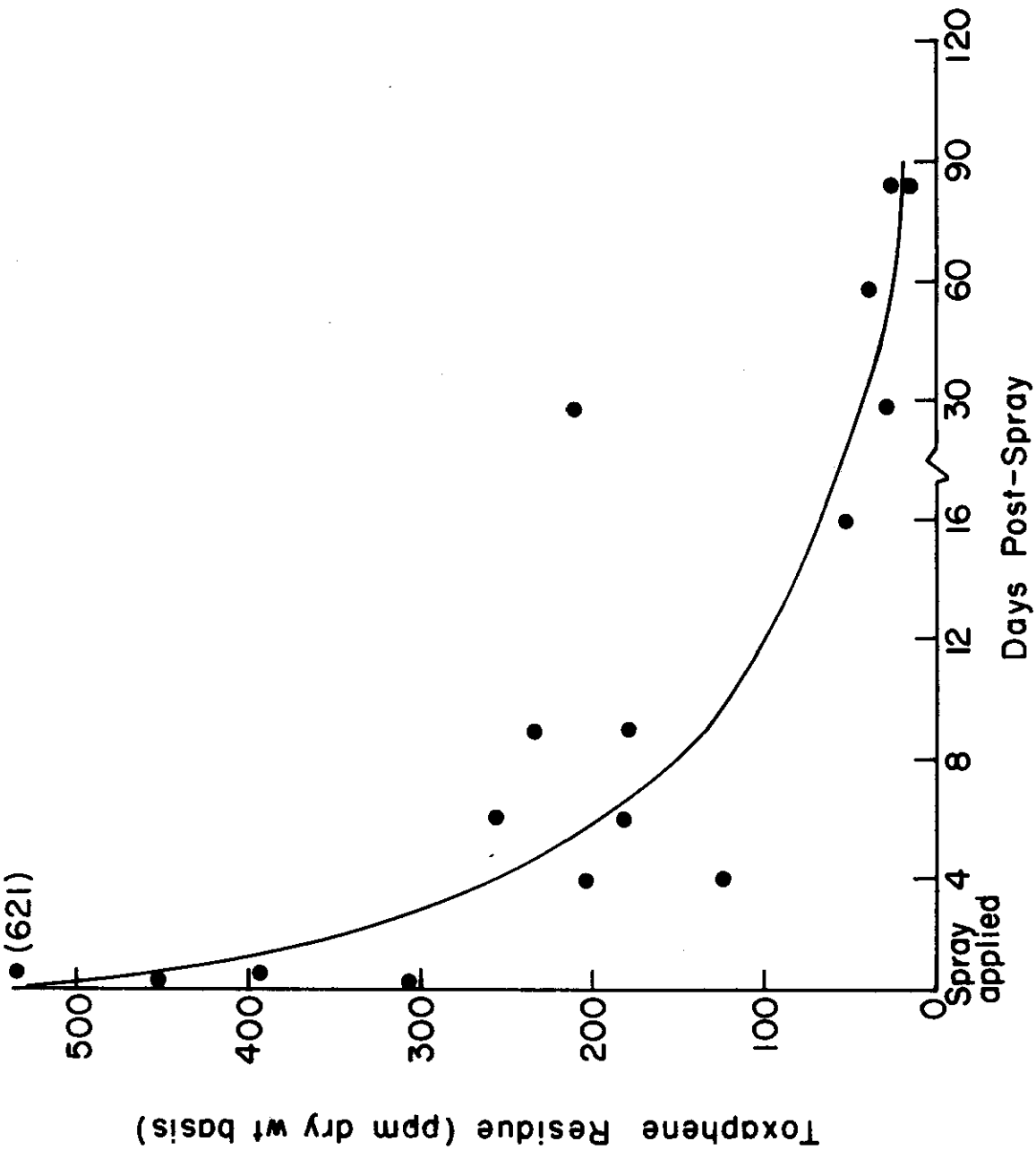

Fig. 5. Toxaphene residues on blue grama and associated plants.

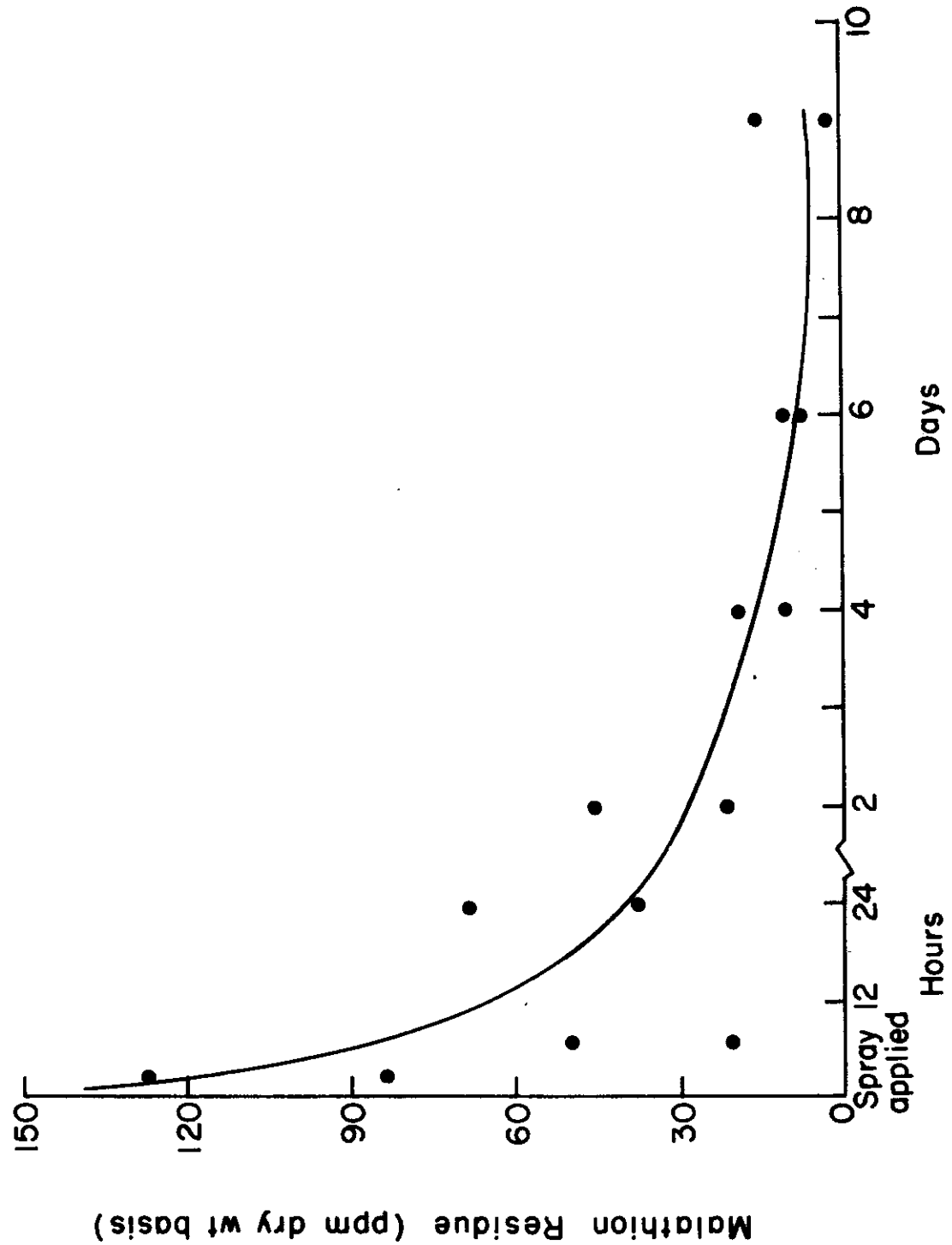

Fig. 6. Malathion residues on blue grama and associated plants.

On the malathion area, six deer mice and one thirteen-lined ground squirrel were collected between 2 and 7 days postspray and analyzed individually. None of these animals contained malathion above the detection limits of 0.4 ppm in whole-body samples.

Horned Larks were collected periodically from all treatments for analysis. Birds collected through 85 days postspray all showed substantial toxaphene residues. Thirteen Horned Larks analyzed individually for whole-body residues between 1 and 28 days postspray had a mean of 5.4 ppm toxaphene (range 1.8 to 9.6). Two birds collected at 58 days had 4.6 and 4.1 ppm toxaphene and two at 85 days had 2.3 and 2.9 ppm. Results of later collections will be recorded in a later report. Two meadowlarks found dead on the toxaphene area contained 4.5 and 2.7 ppm toxaphene, respectively. Three McCown's Longspur nestlings found dead had toxaphene, but less than 0.4 ppm on a whole-body basis. Three Barn Swallow nestlings found dead showed toxaphene at less than 0.4 ppm also. These limited residue data indicate that Horned Larks were more resistant to direct poisoning by toxaphene than some of the other species present on the area. However, one juvenile Horned Lark found dead impaled on a bush (as though killed by a shrike) contained toxaphene at a level lower than 0.4 ppm. Heavier mortality of Horned Larks was observed on rangeland sprayed with toxaphene at the same rate, but over a much larger area of 177,000 acres (McEwen et al. 1972).

Residues in Horned Larks from the malathion area were much lower than in those on the toxaphene area. Only birds collected through 31 hours post-treatment contained measurable malathion in whole-body samples. One Horned Lark contained 0.8 ppm and a second had 0.4 ppm

malathion. Two Horned Larks in this period had no malathion above 0.4 ppm. Ten more Horned Larks taken between 2 and 28 days all showed no malathion above 0.4 ppm. A Say's Phoebe nestling found dead near the malathion area also had no measurable residue.

Samples of all types were also collected prespray and from the untreated area postspray for residue analysis. In the prespray period, four grass samples, five Horned Larks, and two rodents had no detectable malathion or toxaphene residues.

Samples collected from the untreated plots after the spray applications showed indication of some slight drift or migration of both pesticides to the untreated area. Four grass samples taken through 9 days had 0.9 to 1.9 ppm malathion. Six grass samples taken through 58 days had 0.4 to 1.6 ppm toxaphene (mean = 0.8 ppm). One taken at 85 days had no toxaphen. Two Horned Larks from the untreated area had no detectable malathion residue, but four Horned Larks had 0.5 to 2.0 ppm toxaphene. A Horned Lark collected from the untreated area at 85 days postspray had no measurable toxaphene.

The residues in grass and animals on the untreated area undoubtedly occurred because of the close proximity of the sprayed areas. This contamination was undesirable, but necessary in order to have three similar treatment areas within one grazing unit. When selecting the the study areas, we realized some contamination probably would occur, but we felt that utilizing areas at two or three different locations would have been a greater disadvantage because of dissimilarities in soils, vegetation, animal life, or grazing seasons and land-use history.

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APPENDIX I

FIELD DATA

Aboveground invertebrate data

Aboveground invertebrate data collected on insecticide plots at the Pawnee Site were recorded on form NREL-30. These data are stored as a part of Grassland Biome Data set A2U30EB. A sample data form and a listing of the data are attached.

IBP

GRASSLAND BIOME

U.S. INTERNATIONAL BIOLOGICAL PROGRAM

FIELD DATA SHEET - INVERTEBRATE

DATA TYPE	SITE	INITIALS	DATE			TREATMENT	REPLICATE	PLOT SIZE	QUADRAT	TROPHIC	HOST	ORDER	FAMILY	GENUS	SPECIES	SUBSPECIES	LIFE STAGE	TOTAL NO.	DRY WT.	NO. WEIGH
			Day	Mo	Yr															

DATA TYPE

01 Aboveground Biomass
02 Litter
03 Belowground Biomass
10 Vertebrate - Live Trapping
11 Vertebrate - Snap Trapping
12 Vertebrate - Collection
20 Avian Flush Census
21 Avian Road Count
22 Avian Road Count Summary
23 Avian Collection - Internal
24 Avian Collection - External
25 Avian Collection - Plumage
30 Invertebrate
40 Microbiology - Decomposition
41 Microbiology - Nitrogen
42 Microbiology - Biomass
3 Microbiology - Root Decomposition
44 Microbiology - Respiration

SITE

01 Ale
02 Bison
03 Bridger
04 Cottonwood
05 Dickinson
06 Hays
07 Hopland
08 Jornada
09 Osage
10 Pantex
11 Pawnee

TREATMENT

1 Ungrazed
2 Lightly grazed
3 Moderately grazed
4 Heavily grazed
5 Grazed 1969, ungrazed 1970
6
7
8
9

TROPHIC

0 Unknown
1 Plant feeding (tissue)
2 Plant feeding (sap)
3 Plant feeding (pollen and nectar)
4 Plant feeding (seed)
5 Predator
6 Parasitoid
7 Parasite
8 Scavenger
9 Non-feeding stage

LIFE STAGE

00 Undetermined
10 Adult
20 Pupae
30 Egg
40 Nymph or Larva
41 Nymph or Larva, early
42 Nymph or Larva, middle
43 Nymph or Larva, late
50 Instar
51 Instar, 1st
52 Instar, 2nd
53 Instar, 3rd

+++ EXAMPLE OF DATA +++

```
         1         2         3         4         5         6         7
1234567890123456789012345678901234567890123456789012345678901234567890123456789012
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3111RJL300572X10.5011 2        HOMOCIC1FL FL    40       08 .00011  01
3111RJL300572X10.5011 2        HOMOCIC1FL FL    10       01 .00051  01
3111RJL300572X10.5011 2        HEMILYGABL LE    40       03 .00015  01
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3111RJL300572X10.5015 7        HYMEFORMMO MI    10       13 .00038  01
3111RJL300572X10.5015 0        COLECURCHY GR    10       01 .00353  01
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3111RJL300572X20.5011 1        COLECHRYCH SP    10       01 .00071  01
3111RJL300572X20.5011 0        COLETENEBL SP    10       01 .00385  01
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3111RJL300572X20.5015	1	COLECHRYCH	SP	10	01	.00071 01
3111RJL300572X20.5015	2	HOMOCIC1FL	FL	40	03	.00011 01
3111RJL300572X20.5015	1	COLECHRYCH	SP	10	01	.00071 01
3111RJL300572X20.5016	1	COLECHRYCH	SP	10	01	.00071 01
3111RJL300572X20.5016	2	HOMOCIC1FL	FL	10	03	.00051 01
3111RJL300572Y10.5011	7	HYMEFORMMY	SA	10	01	.00158 01
3111RJL300572Y10.5011	7	HYMEFORMMO	MI	10	02	.00038 01
3111RJL300572Y10.5011	7	HYMEFORMLE	TR	10	01	.00045 01
3111RJL300572Y10.5011	2	HOMOISSIBR	SU	10	01	.00046 01
3111RJL300572Y10.5011	2	HOMOCIC1AT	SP	40	01	.00051 01
3111RJL300572Y10.5011	2	HOMOCIC1AC	HU	10	01	.00028 01
3111RJL300572Y10.5011	5	ARANTHOMXY	LA	10	01	.00375 01
3111RJL300572Y10.5011	0	COLETENEED	SP	10	01	.00672 01
3111RJL300572Y10.5012	2	HOMOCIC1GI	AT	40	01	.00023 01
3111RJL300572Y10.5012	2	HOMOCIC1FL	FL	10	01	.00051 01
3111RJL300572Y10.5012	0	LEPIARCTAP	SP	42	01	.00052 01
3111RJL300572Y10.5012	2	HEMILYGABL	LE	10	01	.00015 01
3111RJL300572Y10.5012	7	HYMEFORMLE	TR	10	02	.00045 01
3111RJL300572Y10.5012	0	COLECURCOP	SU	10	01	.00122 01
3111RJL300572Y10.5012	2	HEMILYGACR	DI	10	01	.00046 01
3111RJL300572Y10.5013	2	HOMOCIC1AT	SP	40	01	.00051 01
3111RJL300572Y10.5013	2	HOMOCIC1GI	AT	40	01	.00023 01
3111RJL300572Y10.5013	2	HOMOCIC1AC	HU	10	02	.00028 01
3111RJL300572Y10.5013	0	COLECOCCPA	VI	10	01	.00022 01
3111RJL300572Y10.5013	0	COLETENEBL	SP	10	03	.00385 01
3111RJL300572Y10.5013	1	COLECARAHA	DE	10	01	.01424 01
3111RJL300572Y10.5015	2	HOMOCIC1GI	AT	40	01	.00023 01
3111RJL300572Y10.5015	7	HYMEFORMMO	MI	10	08	.00038 01
3111RJL300572Y10.5015	2	HOMOCIC1FL	FL	40	01	.00011 01
3111RJL300572Y10.5015	2	HOMOPSEUCR	AR	40	04	.00038 01
3111RJL300572Y10.5015	0	COLECOCCHY	SP	10	02	.00040 01
3111RJL300572Y10.5016	2	HOMOCIC1FL	FL	40	01	.00011 01
3111RJL300572Y10.5016	0	COLECOCCHY	SP	10	01	.00040 01
3111RJL300572Y10.5016	7	HYMEFORMLE	TR	10	07	.00045 01
3111RJL300572Y10.5016	0	COLECURCGE	BA	10	01	.01318 01
3111RJL300572Y10.5016	0	COLECURCEP	SP	40	01	.00042 01
3111RJL300572Y20.5011	2	HOMOCIC1FL	FL	40	05	.00011 01
3111RJL300572Y20.5011	2	HOMOCIC1FL	FL	10	01	.00051 01
3111RJL300572Y20.5011	7	HYMEFORMMO	MI	10	02	.00038 01
3111RJL300572Y20.5011	7	HYMEFORMLE	TR	10	01	.00045 01
3111RJL300572Y20.5011	0	COLECOCCHY	SP	10	01	.00040 01
3111RJL300572Y20.5012	7	HYMEFORMFO	NE	10	07	.00070 01
3111RJL300572Y20.5012	2	HOMOCIC1FL	FL	10	01	.00051 01
3111RJL300572Y20.5012	0	LEPIARCTAP	SP	42	01	.00052 01
3111RJL300572Y20.5012	0	COLECURCGE	BA	10	01	.01318 01
3111RJL300572Y20.5012	0	COLECURCSM	SP	10	01	.00062 01
3111RJL300572Y20.5012	0	COLECOCCHY	SP	10	01	.00040 01
3111RJL300572Y20.5012	1	COLECARAAM	QU	10	01	.00240 01
3111RJL300572Y20.5013	1	ORTHACRIPS	DE	10	01	.04758 01
3111RJL300572Y20.5013	2	HOMOCIC1FL	FL	10	02	.00051 01
3111RJL300572Y20.5013	2	HOMOCIC1FL	FL	40	07	.00011 01
3111RJL300572Y20.5013	7	HYMEFORMMO	MI	10	02	.00038 01
3111RJL300572Y20.5013	0	COLECOCCPA	VI	10	01	.00022 01
3111RJL300572Y20.5013	1	COLECARAAM	QU	10	01	.00240 01
3111RJL300572Y20.5013	0	COLECURCGE	BA	10	01	.01318 01
3111RJL300572Y20.5013	0	COLECURCSM	SP	10	04	.00062 01
3111RJL300572Y20.5013	0	DIPTSCENSC	SP	40	01	.00088 01
3111RJL300572Y20.5014	2	HOMOCIC1GI	AT	40	01	.00023 01
3111RJL300572Y20.5014	2	HOMOCIC1FL	FL	40	02	.00011 01

3111RJL300572Y20.5014	0	COLECURCOP	SU	10	01	.00122 01
3111RJL300572Y20.5014	0	COLETENEBL	SP	10	01	.00385 01
3111RJL300572Y20.5014	2	HEMILYGABL	LE	40	01	.00015 01
3111RJL300572Y20.5015	2	HOMOCIC1FL	FL	40	03	.00011 01
3111RJL300572Y20.5015	7	HYMEFORMMO	MI	10	01	.00038 01
3111RJL300572Y20.5015	0	COLETENEBL	SP	10	01	.00385 01
3111RJL300572Y20.5015	0	COLECURCHY	GR	10	01	.00353 01
3111RJL300572Y20.5015	0	COLECURCSM	SP	10	06	.00062 01
3111RJL300572Y20.5015	2	HEMILYGABL	LE	10	07	.00015 01
3111RJL300572Y20.5015	7	HYMEFORMMY	SA	10	06	.00158 01
3111RJL300572Y20.5015	2	HOMOPSEUCR	AR	40	02	.00038 01
3111RJL300572Y20.5015	0	COLECARAMI	LI	10	01	.00036 01
3111RJL300572Y20.5016	2	HOMOCIC1FL	FL	40	01	.00011 01
3111RJL300572Y20.5016	7	HYMEFORMMO	MI	10	07	.00038 01
3111RJL300572Y20.5016	5	ARANTHOMXY	LA	10	01	.00375 01
3111RJL300572Y20.5016	7	HYMEFORMMO	MI	10	23	.00038 01
3111RJL300572Z10.5012	7	HYMEFORMMY	SA	10	01	.00158 01
3111RJL300572Z10.5012	0	COLETENEBL	SP	10	01	.00385 01
3111RJL300572Z10.5012	0	COLECURCHY	GR	10	01	.00353 01
3111RJL300572Z10.5013	2	HEMILYGANE	BI	10	06	.00448 01
3111RJL300572Z10.5013	0	COLECURCCA	IN	10	01	.00141 01
3111RJL300572Z10.5014	2	HOMOCIC1FL	FL	40	01	.00011 01
3111RJL300572Z10.5014	2	HOMOCIC1GI	AT	40	03	.00023 01
3111RJL300572Z10.5014	2	HOMOCIC1AC	HU	10	01	.00028 01
3111RJL300572Z10.5014	7	HYMEFORMMO	MI	10	18	.00038 01
3111RJL300572Z10.5014	0	COLECUCCHY	SP	10	01	.00040 01
3111RJL300572Z10.5015	2	HOMOCIC1FL	FL	10	01	.00051 01
3111RJL300572Z10.5015	0	COLECOCCPA	VI	10	01	.00022 01
3111RJL300572Z10.5015	0	COLETENEBL	SP	10	02	.00385 01
3111RJL300572Z10.5015	0	COLECURCHY	GR	10	01	.00353 01
3111RJL300572Z10.5016	2	HOMOISSIBR	SU	10	01	.00046 01
3111RJL300572Z10.5016	7	HYMEFORMFO	OR	10	01	.00180 01
3111RJL300572Z10.5016	0	COLECURCHY	VI	10	01	.00231 01
3111RJL300572Z20.5011	2	HOMOCIC1GI	AT	40	09	.00023 01
3111RJL300572Z20.5011	7	HYMEFORMMO	MI	10	03	.00038 01
3111RJL300572Z20.5011	0	COLETENEBL	SP	10	01	.00385 01
3111RJL300572Z20.5011	0	COLECURCHY	GR	10	01	.00353 01
3111RJL300572Z20.5011	1	COLECARASE	PL	10	01	.00193 01
3111RJL300572Z20.5011	0	LEPINOCT	05	40	01	.02318 01
3111RJL300572Z20.5012	2	HOMOCIC1GI	AT	40	01	.00023 01
3111RJL300572Z20.5012	2	HOMOCIC1AT	SP	40	01	.00051 01
3111RJL300572Z20.5012	2	HOMOCIC1AC	HU	10	01	.00028 01
3111RJL300572Z20.5012	1	COLECARASE	PL	10	01	.00193 01
3111RJL300572Z20.5012	0	COLESCARRH	SP	10	01	.00072 01
3111RJL300572Z20.5012	0	COLECURCCA	IN	10	01	.00141 01
3111RJL300572Z20.5012	0	COLECURCHY	GR	10	07	.00353 01
3111RJL300572Z20.5012	1	COLECARAHA	DE	10	01	.01424 01
3111RJL300572Z20.5013	2	HOMOCIC1FL	FL	40	04	.00011 01
3111RJL300572Z20.5013	7	HYMEFORMFO	NE	10	01	.00070 01
3111RJL300572Z20.5013	1	COLECARASE	PL	10	03	.00193 01
3111RJL300572Z20.5013	0	COLECURCHY	GR	10	04	.00353 01
3111RJL300572Z20.5013	0	COLESCARRH	SP	10	05	.00072 01
3111RJL300572Z20.5013	2	HEMILYGABL	LE	10	02	.00015 01
3111RJL300572Z20.5014	2	HOMOCIC1GI	AT	10	03	.00023 01
3111RJL300572Z20.5014	7	HYMEFORMFO	OR	10	01	.00180 01
3111RJL300572Z20.5014	0	COLETENEBL	SP	10	01	.00385 01
3111RJL300572Z20.5015	2	HOMOCIC1GI	AT	40	01	.00023 01

3111RJL300572Z20.5015	2	HOMOCICIFL	FL		40	02	.00011	01
3111RJL300572Z20.5015	0	COLETENEBL	SP		10	01	.00385	01
3111RJL300572Z20.5015	0	COLETENEAN	MO		10	01	.00078	01
3111RJL300572Z20.5015	7	HYMEFORMMO	MI		10	01	.00038	01
3111RJL210672X10.5021	0	COLECOCCHY	QU		10	01	.00048	01
3111RJL210672X10.5021	7	HYMEFORMMO	MI		10	01	.00038	01
3111RJL210672X10.5022	2	HOMOCICIFL	FL		40	01	.00011	01
3111RJL210672X10.5022	2	HOMOCICIFL	FL		10	02	.00051	01
3111RJL210672X10.5022	0	COLECURCCA	IN		10	01	.00141	01
3111RJL210672X10.5023	2	HOMOCICIFL	FL		10	01	.00051	01
3111RJL210672X10.5024	7	HYMEFORMMO	MI		10	01	.00038	01
3111RJL210672X10.5024	0	COLEHISTXE	FI		10	01	.00358	01
3111RJL210672X10.5024	0	COLETENEBL	SP		10	01	.00358	01
3111RJL210672X10.5024	1	COLECHRYCH	SP		10	01	.00071	01
3111RJL210672X10.5024	1	LEPIARCTAP	SP		42	01	.00052	01
3111RJL210672X10.5025	2	HOMOCICIGI	AT		40	01	.00023	01
3111RJL210672X10.5025	0	HYMEHALIDI	PR		10	01	.00208	01
3111RJL210672X10.5025	1	LEPIARCTAP	SP		42	01	.00052	01
3111RJL210672X10.5026	0	HYMEHALIDI	PR		10	01	.00208	01
3111RJL210672X10.5026	1	COLETENEBL	SP		10	01	.00385	01
3111RJL210672X20.5021	1	COLECHRYPH	SP		10	01	.00016	01
3111RJL210672X20.5021	0	HYMEHALIDI	PR		10	02	.00208	01
3111RJL210672X20.5021	0	COLETENEEL	SP	7	10	01	.00169	01
3111RJL210672X20.5021	1	LEPIARCTAP	SP		42	01	.00052	01
3111RJL210672X20.5021	1	COLECARASE	PL		10	01	.00193	01
3111RJL210672X20.5021	0	COLESCARRH	SP		10	01	.00072	01
3111RJL210672X20.5022	2	HOMOCICIGI	AT		40	01	.00023	01
3111RJL210672X20.5022	1	LEPIARCTAP	SP		41	02	.00008	01
3111RJL210672X20.5023	0	COLECOCCHY	QU		10	01	.00048	01
3111RJL210672X20.5023	2	HOMOCICIFL	FL		10	02	.00051	01
3111RJL210672X20.5024	2	HOMOCICIGI	AT		40	01	.00023	01
3111RJL210672X20.5024	7	HYMEFORMMO	MI		10	01	.00038	01
3111RJL210672X20.5025	0	HYMEFORMMO	MI		10	01	.00038	01
3111RJL210672X20.5025	0	HYMEHALIDI	PR		10	01	.00208	01
3111RJL210672X20.5025	1	COLECARAHA	DE		10	01	.01424	01
3111RJL210672X20.5025	1	LEPIARCTAP	SP		41	01	.00008	01
3111RJL210672X20.5026	2	HOMOCICIGI	AT		10	01	.00023	01
3111RJL210672X20.5026	1	LEPIARCTAP	SP		42	04	.00052	01
3111RJL210672X20.5026	1	COLECHRYBR	SP		10	01	.00046	01
3111RJL210672Y10.5021	2	HOMOCICIFL	FL		10	01	.00051	01
3111RJL210672Y10.5021	1	LEPIARCTAP	SP		42	04	.00052	01
3111RJL210672Y10.5022	7	HYMEFORMMO	MI		10	01	.00038	01
3111RJL210672Y10.5022	5	ARANTHOMXY	LA		10	01	.00375	01
3111RJL210672Y10.5022	0	COLECURCCA	IN		10	01	.00141	01
3111RJL210672Y10.5022	2	HEMILYGABL	LE		10	03	.00015	01
3111RJL210672Y10.5022	5	DIPTSCENSC	SP		40	01	.00088	01
3111RJL210672Y10.5023	7	HYMEFORMLE	TR		10	01	.00045	01
3111RJL210672Y10.5023	7	HYMEFORMMO	MI		10	01	.00038	01
3111RJL210672Y10.5024	7	HYMEFORMMO	MI		10	01	.00038	01
3111RJL210672Y10.5024	2	HEMILYGABL	LE		10	02	.00015	01
3111RJL210672Y10.5024	0	COLETENEBL	SP		10	01	.00385	01
3111RJL210672Y10.5025	7	HYMEFORMMO	MI		10	01	.00038	01
3111RJL210672Y10.5025	0	COLETENEBL	SP		10	01	.00385	01
3111RJL210672Y10.5025	0	COLECURCCA	IN		10	01	.00141	01
3111RJL210672Y10.5025	5	ARANTHOMXY	SP	2	10	01	.00054	01
3111RJL210672Y10.5026	7	HYMEFORMLE	TR		10	02	.00045	01
3111RJL210672Y10.5026	0	COLESCARRH	SP		10	02	.00072	01
3111RJL210672Y20.5021	7	HYMEFORMLE	TR		10	04	.00045	01
3111RJL210672Y20.5021	1	LEPIARCTAP	SP		42	01	.00052	01
3111RJL210672Y20.5022	7	HYMEFORMMO	MI		10	01	.00038	01

3111RJL21067ZY20.5022	1	LEPIARCTAP	SP		42	02	.00052 01
3111RJL21067ZY20.5022	7	HYMEFORMSO	MO		10	05	.00142 01
3111RJL21067ZY20.5022	2	HEMILYGABL	LE		10	02	.00015 01
3111RJL21067ZY20.5022	0	DIPTCECI	09		40	01	.00018 01
3111RJL21067ZY20.5023	0	HYMEHALIDI	PR		10	01	.00208 01
3111RJL21067ZY20.5023	2	HEMILYGABL	LE		10	02	.00015 01
3111RJL21067ZY20.5023	1	COLETENEBL	SP		10	01	.00385 01
3111RJL21067ZY20.5024	2	HEMILYGABL	LE		10	01	.00015 01
3111RJL21067ZY20.5024	2	HOMOCIC1FL	FL		40	02	.00011 01
3111RJL21067ZY20.5024	5	ARANTHOMXY	SP	2	40	01	.00054 01
3111RJL21067ZY20.5025	0	COLECURCHY	GR		10	01	.00353 01
3111RJL21067ZY20.5026	0	HYMEHALIDI	PR		10	01	.00208 01
3111RJL21067ZY20.5026	0	COLECURCCL	SP		10	01	.02122 01
3111RJL21067ZY20.5026	1	LEPIARCTAP	SP		42	02	.00052 01
3111RJL21067ZY20.5026	1	COLECURCAP	SP		10	01	.00032 01
3111RJL21067ZY20.5026	1	COLEANTHAN	SP		10	01	.00066 01
3111RJL21067ZZ10.5021	0	HYMEAPIDNE	VE		10	01	.00126 01
3111RJL21067ZZ10.5021	0	HYMEHALIDI	PR		10	01	.00208 01
3111RJL21067ZZ10.5021	2	HOMOCIC1GI	AT		40	01	.00023 01
3111RJL21067ZZ10.5021	2	HOMOCIC1GI	AT		10	02	.00023 01
3111RJL21067ZZ10.5022	0	HYMEHALIDI	PR		10	01	.00208 01
3111RJL21067ZZ10.5022	1	LEPIARCTAP	SP		41	01	.00008 01
3111RJL21067ZZ10.5022	1	LEPIARCTAP	SP		42	02	.00052 01
3111RJL21067ZZ10.5022	0	COLECURCCA	IN		10	03	.00141 01
3111RJL21067ZZ10.5022	0	COLECURCHY	GR		10	01	.00353 01
3111RJL21067ZZ10.5022	1	COLECHRYCH	SP		10	02	.00071 01
3111RJL21067ZZ10.5022	0	COLECOCCHY	SP		10	01	.00040 01
3111RJL21067ZZ10.5022	0	DIPTCECI	09		40	01	.00018 01
3111RJL21067ZZ10.5022	5	ACARTROM	01		10	02	.00004 01
3111RJL21067ZZ10.5023	5	ARANTHOMXY	SP	3	40	02	.02518 01
3111RJL21067ZZ10.5023	0	HYMEAPIDNE	VE		10	01	.00126 01
3111RJL21067ZZ10.5023	0	HYMEHALIDI	PR		10	01	.00208 01
3111RJL21067ZZ10.5023	7	HYMEFORMMO	MI		10	07	.00038 01
3111RJL21067ZZ10.5023	2	HOMOCIC1CU	SP		40	01	.00148 01
3111RJL21067ZZ10.5023	2	HOMOCIC1AC	SP		10	02	.00028 01
3111RJL21067ZZ10.5023	2	HOMOCIC1FL	FL		40	02	.00011 01
3111RJL21067ZZ10.5023	0	COLETENEBL	SP		10	01	.00385 01
3111RJL21067ZZ10.5023	0	COLECURCHY	GR		10	02	.00353 01
3111RJL21067ZZ10.5023	0	COLETENEEL	SP	5	40	02	.00026 01
3111RJL21067ZZ10.5023	1	COLECHRYCH	SP		10	02	.00071 01
3111RJL21067ZZ10.5023	2	HEMILYGABL	LE		40	116	.00015 01
3111RJL21067ZZ10.5024	0	HYMEHALIDI	PR		10	02	.00208 01
3111RJL21067ZZ10.5024	2	HOMOCIC1FL	FL		10	07	.00051 01
3111RJL21067ZZ10.5024	2	HOMOCIC1FL	FL		40	13	.00011 01
3111RJL21067ZZ10.5024	7	HYMEFORMMO	MI		10	11	.00038 01
3111RJL21067ZZ10.5024	2	HEMILYGALY	SP		10	01	.00563 01
3111RJL21067ZZ10.5024	0	COLETENEEL	EX		10	01	.03284 01
3111RJL21067ZZ10.5024	0	COLECURCGE	HA		10	01	.01318 01
3111RJL21067ZZ10.5024	0	COLECURCHY	GR		10	02	.00353 01
3111RJL21067ZZ10.5024	0	COLETENEBL	SP		10	01	.00385 01
3111RJL21067ZZ10.5024	1	LEPIARCTAP	SP		42	01	.00052 01
3111RJL21067ZZ10.5024	2	HEMILYGABL	LE		10	03	.00015 01
3111RJL21067ZZ10.5025	2	HEMILYGABL	LE		10	18	.00015 01
3111RJL21067ZZ10.5025	2	HOMOCIC1GI	AT		40	01	.00023 01
3111RJL21067ZZ10.5025	1	COLECHRY	01		40	01	.00120 01
3111RJL21067ZZ10.5025	0	COLETENEBL	SP		10	01	.00385 01
3111RJL21067ZZ10.5025	0	COLECOCCHY	SP		10	01	.00040 01
3111RJL21067ZZ10.5025	0	COLECOCCHY	QU		10	01	.00048 01
3111RJL21067ZZ10.5025	0	COLECURCCA	IN		10	01	.00141 01
3111RJL21067ZZ10.5025	2	HEMILYGANY	SP		10	01	.00042 01

3111RJL210672Z10.5025	2	HEMILYGABL	SP	10	02 .00015 01
3111RJL210672Z10.5025	7	HYMEFORMMO	MI	10	06 .00038 01
3111RJL210672Z10.5025	7	HYMEFORMMY	SA	10	02 .00158 01
3111RJL210672Z10.5025	7	HYMEFORMSO	MO	10	18 .00142 01
3111RJL210672Z10.5026	2	HOMOCIC1AC	SP	10	06 .00028 01
3111RJL210672Z10.5026	2	HOMOCIC1GI	AT	40	01 .00023 01
3111RJL210672Z10.5026	2	HEMILYGABL	LE	10	03 .00015 01
3111RJL210672Z10.5026	2	HOMOCIC1FL	FL	40	03 .00011 01
3111RJL210672Z10.5026	1	COLETENEBL	SP	10	01 .00385 01
3111RJL210672Z10.5026	2	HEMILYGANY	SP	10	06 .00042 01
3111RJL210672Z10.5026	7	HYMEFORMMY	SA	10	03 .00158 01
3111RJL210672Z20.5021	0	HYMEHALIDI	PR	10	01 .00174 01
3111RJL210672Z20.5021	7	HYMEFORMFO	NE	10	01 .00070 01
3111RJL210672Z20.5021	7	HYMEFORMLE	TR	10	03 .00045 01
3111RJL210672Z20.5021	7	HYMEFORMMO	MI	10	17 .00038 01
3111RJL210672Z20.5021	2	HEMILYGABL	LE	10	04 .00015 01
3111RJL210672Z20.5021	0	COLETENEBL	SP	10	01 .00385 01
3111RJL210672Z20.5021	0	COLESCARRH	SP	10	01 .00072 01
3111RJL210672Z20.5022	7	HYMEFORMLE	TR	10	01 .00045 01
3111RJL210672Z20.5022	2	HOMOCIC1AC	SP	10	04 .00028 01
3111RJL210672Z20.5022	2	HOMOCIC1GI	AT	40	01 .00023 01
3111RJL210672Z20.5022	2	HEMILYGAGE	BU	10	01 .00085 01
3111RJL210672Z20.5022	0	COLECURCCA	IN	10	01 .00141 01
3111RJL210672Z20.5022	0	COLETENEBL	SP	10	01 .00385 01
3111RJL210672Z20.5022	0	COLECURCHY	GR	10	04 .00353 01
3111RJL210672Z20.5022	0	COLEPHALPH	SP	10	01 .00022 01
3111RJL210672Z20.5022	2	HEMILYGABL	LE	10	03 .00015 01
3111RJL210672Z20.5022	0	DIPTCECI	09	40	02 .00018 01
3111RJL210672Z20.5023	2	HOMOCIC1GI	AT	40	04 .00023 01
3111RJL210672Z20.5023	2	HOMOCIC1GI	AT	10	05 .00023 01
3111RJL210672Z20.5023	2	HOMOCIC1FL	FL	40	02 .00011 01
3111RJL210672Z20.5023	2	HOMOCIC1AC	SP	10	03 .00028 01
3111RJL210672Z20.5023	1	COLETENEBL	SP	10	01 .00385 01
3111RJL210672Z20.5023	1	COLECHRYCH	SP	10	03 .00071 01
3111RJL210672Z20.5023	0	COLECURCCA	IN	10	01 .00141 01
3111RJL210672Z20.5023	0	COLETENEBL	SP	10	01 .00385 01
3111RJL210672Z20.5023	1	LEPIARCTAP	SP	42	03 .00052 01
3111RJL210672Z20.5023	2	HEMILYGAGE	BU	10	01 .00085 01
3111RJL210672Z20.5023	2	HEMILYGABL	LE	10	03 .00015 01
3111RJL210672Z20.5023	0	DIPTCECI	09	40	02 .00018 01
3111RJL210672Z20.5024	0	HYME	69	10	01 .00008 01
3111RJL210672Z20.5024	2	HOMOCIC1GI	AT	10	03 .00023 01
3111RJL210672Z20.5024	2	HOMOCIC1GI	AT	40	01 .00023 01
3111RJL210672Z20.5024	2	HOMOCIC1AC	SP	10	03 .00028 01
3111RJL210672Z20.5024	1	COLECHRY	01	40	01 .00120 01
3111RJL210672Z20.5024	0	COLECURCGE	RA	10	01 .01318 01
3111RJL210672Z20.5024	2	HEMILYGABL	LE	10	02 .00015 01
3111RJL210672Z20.5024	0	COLECURCCA	CR	10	01 .00063 01
3111RJL210672Z20.5024	0	COLECURCCA	IN	10	01 .00141 01
3111RJL210672Z20.5024	0	COLECURCHY	GR	10	01 .00353 01
3111RJL210672Z20.5024	1	COLECHRYCH	SP	10	02 .00071 01
3111RJL210672Z20.5024	0	COLEHISTXE	FI	10	01 .00358 01
3111RJL210672Z20.5024	2	HEMILYGANY	SP	10	06 .00042 01
3111RJL210672Z20.5024	2	HEMILYGABL	LE	10	01 .00015 01
3111RJL210672Z20.5024	2	HOMOCIC1FL	FL	10	07 .00051 01
3111RJL210672Z20.5025	0	HYMEHALIDI	PR	10	01 .00208 01
3111RJL210672Z20.5025	1	COLECHRYCH	SP	10	02 .00071 01
3111RJL210672Z20.5025	2	HOMOCIC1GI	AT	40	02 .00023 01
3111RJL210672Z20.5025	2	HOMOCIC1GI	AT	10	05 .00023 01

3111RJL210672Z20.5025	0	COLETENEAN	MO	10	01	.00078 01
3111RJL210672Z20.5025	1	COLECARASE	PL	10	01	.00193 01
3111RJL210672Z20.5025	0	COLECURCCA	IN	10	01	.00141 01
3111RJL210672Z20.5025	0	COLECURCCA	CR	10	02	.00063 01
3111RJL210672Z20.5025	2	HOMOCIC1GI	AT	40	02	.00023 01
3111RJL210672Z20.5025	2	HEMILYGABL	LE	10	03	.00015 01
3111RJL210672Z20.5025	2	HEMILYGANY	SP	10	01	.00042 01
3111RJL210672Z20.5025	2	THYS	09	10	02	.00004 01
3111RJL210672Z20.5025	2	THYS	07	10	01	.00006 01
3111RJL210672Z20.5026	7	HYMEFORMMO	MI	10	03	.00038 01
3111RJL210672Z20.5026	0	HYMEHALIDI	PR	10	01	.00208 01
3111RJL210672Z20.5026	2	HEMILYGAGE	BU	10	01	.00085 01
3111RJL210672Z20.5026	7	HYMEFORMFO	NE	10	04	.00070 01
3111RJL210672Z20.5026	2	HOMOCIC1FL	FL	40	12	.00011 01
3111RJL210672Z20.5026	1	COLECARASE	PL	10	01	.00193 01
3111RJL210672Z20.5026	2	HEMILYGANY	SP	10	01	.00042 01
3111RJL210672Z20.5026	2	HOMOCIC1GI	AT	10	02	.00023 01
3111RJL210672Z20.5026	2	HOMOCIC1GI	AT	40	01	.00023 01
3111RJL210672Z20.5026	2	HOMOCIC1FL	FL	40	06	.00011 01
3111RJL210672Z20.5026	1	LEPIARCTAP	SP	42	03	.00052 01
3111RJL290672X10.5031	2	HOMOCIC1GI	AT	40	01	.00023 01
3111RJL290672X10.5031	2	HOMOCIC1GI	AT	10	04	.00023 01
3111RJL290672X10.5031	2	HOMOCIC1FL	FL	40	01	.00011 01
3111RJL290672X10.5031	2	HOMOCIC1FL	FL	10	02	.00051 01
3111RJL290672X10.5032	0	COLECURCAP	SP	10	03	.00032 01
3111RJL290672X10.5032	2	HOMOCIC1GI	AT	10	02	.00023 01
3111RJL290672X10.5032	2	HOMOCIC1GI	AT	40	02	.00023 01
3111RJL290672X10.5032	2	HOMOCIC1FL	FL	40	01	.00011 01
3111RJL290672X10.5032	7	HYMEFORMMO	MI	10	01	.00038 01
3111RJL290672X10.5033	2	HOMOCIC1GI	AT	10	01	.00023 01
3111RJL290672X10.5033	2	HOMOCIC1FL	FL	10	02	.00051 01
3111RJL290672X10.5033	2	HOMOCIC1FL	FL	40	01	.00011 01
3111RJL290672X10.5033	0	HYME	71	10	03	.00005 01
3111RJL290672X10.5033	2	HOMOAPHIIZ	SP	40	01	.00009 01
3111RJL290672X10.5034	7	HYMEFORMFO	OE	10	06	.00180 01
3111RJL290672X10.5034	0	HYME	71	10	02	.00005 01
3111RJL290672X10.5034	2	HOMOCIC1FL	FL	10	01	.00051 01
3111RJL290672X10.5034	2	HOMOCIC1FL	FL	40	01	.00011 01
3111RJL290672X10.5035	0	COLECURCAP	SP	10	01	.00032 01
3111RJL290672X10.5035	2	HOMOCIC1GI	AT	10	02	.00023 01
3111RJL290672X10.5035	2	HOMOCIC1FL	FL	10	02	.00051 01
3111RJL290672X10.5035	2	COLECHRYCH	SP	10	01	.00071 01
3111RJL290672X10.5036	2	HOMOCIC1GI	AT	10	01	.00023 01
3111RJL290672X10.5036	2	HOMOCIC1FL	FL	40	01	.00011 01
3111RJL290672X10.5036	0	COLECOCCPA	VI	10	01	.00022 01
3111RJL290672X20.5031	1	COLECHRYPH	SP	10	01	.00016 01
3111RJL290672X20.5031	2	HOMOCIC1GI	AT	40	01	.00023 01
3111RJL290672X20.5031	2	HOMOCIC1GI	AT	10	02	.00023 01
3111RJL290672X20.5032	0	COLECOCCHY	SP	10	01	.00040 01
3111RJL290672X20.5032	1	COLECHRYPH	SP	10	01	.00016 01
3111RJL290672X20.5032	2	HEMILYGABL	LE	10	01	.00015 01
3111RJL290672X20.5032	2	HOMOCIC1GI	AT	40	02	.00023 01
3111RJL290672X20.5032	2	HOMOCIC1FL	FL	10	08	.00051 01
3111RJL290672X20.5032	1	COLECHRYCH	SP	10	01	.00071 01
3111RJL290672X20.5033	0	HYME	71	10	01	.00005 01
3111RJL290672X20.5033	2	HEMILYGABL	LE	10	01	.00015 01
3111RJL290672X20.5033	2	HOMOCIC1FL	FL	40	07	.00011 01
3111RJL290672X20.5033	2	HOMOCIC1FL	FL	10	02	.00051 01
3111RJL290672X20.5033	2	HOMOCIC1AT	SP	10	03	.00051 01

3111RJL290672X20.5034	2	HEMILYGABL	LE		10	01	.00015	01
3111RJL290672X20.5034	2	HOMOCIC1FL	FL		40	02	.00011	01
3111RJL290672X20.5034	2	HOMOCIC1FL	FL		40	01	.00011	01
3111RJL290672X20.5035	1	COLEANTIAN	LU		10	01	.00012	01
3111RJL290672X20.5035	2	HOMOCIC1AT	SP		10	06	.00051	01
3111RJL290672X20.5035	2	HOMOCIC1BA	SP		10	01	.00188	01
3111RJL290672X20.5035	2	HOMOCIC1FL	FL		40	02	.00011	01
3111RJL290672X20.5035	2	HOMOCIC1	SO		40	04	.00005	01
3111RJL290672X20.5035	5	ARANLYCOLY	SP	3	10	01	.02102	01
3111RJL290672X20.5035	0	COLETENEBL	SP		10	01	.00385	01
3111RJL290672X20.5035	1	LEPIARCTAP	SP		42	02	.00052	01
3111RJL290672X20.5035	0	COLECURCHY	GR		10	01	.00353	01
3111RJL290672X20.5035	2	HEMILYGABL	LE		10	01	.00015	01
3111RJL290672X20.5036	2	HOMOCIC1AT	SP		10	02	.00051	01
3111RJL290672X20.5036	2	HOMOCIC1FL	FL		10	03	.00051	01
3111RJL290672X20.5036	5	ACARERYTER	SP		10	01	.00008	01
3111RJL290672Y10.5031	1	ORTHACRIOP	OR		40	01	.00212	01
3111RJL290672Y10.5031	1	COLECUCCHY	QU		10	01	.00048	01
3111RJL290672Y10.5031	2	HEMILYGABL	LE		10	01	.00015	01
3111RJL290672Y10.5031	7	HYMEFORMMO	MI		10	02	.00038	01
3111RJL290672Y10.5031	0	COLECURCCA	IN		10	01	.00141	01
3111RJL290672Y10.5032	1	COLEANTILA	VI		10	01	.00019	01
3111RJL290672Y10.5032	0	HYMEFIGIXY	QU		10	01	.00052	01
3111RJL290672Y10.5032	0	HYME	71		10	03	.00005	01
3111RJL290672Y10.5032	0	COLECURCCA	CR		10	01	.00063	01
3111RJL290672Y10.5032	0	COLETENEBL	SP		10	01	.00385	01
3111RJL290672Y10.5032	2	HEMILYGABL	LE		10	01	.00015	01
3111RJL290672Y10.5034	0	HYME	71		10	71	.00005	01
3111RJL290672Y10.5034	1	COLETENEBL	SP		10	01	.00385	01
3111RJL290672Y10.5034	2	HOMOCIC1FL	FL		10	01	.00051	01
3111RJL290672Y10.5034	7	HYMEFORMMO	MI		10	02	.00038	01
3111RJL290672Y10.5035	0	HYME	71		10	60	.00005	01
3111RJL290672Y10.5035	2	HEMILYGAGE	BU		10	01	.00085	01
3111RJL290672Y10.5035	0	HYME	71		10	02	.00005	01
3111RJL290672Y10.5035	1	COLEANTIAN	LU		10	01	.00012	01
3111RJL290672Y10.5035	0	TENEBL	SP		10	01	.00385	01
3111RJL290672Y20.5031	1	ORTHACRIOP	OR		40	01	.00312	01
3111RJL290672Y20.5031	2	HOMOCIC1FL	FL		10	03	.00051	01
3111RJL290672Y20.5031	2	HEMILYGABL	LE		10	01	.00015	01
3111RJL290672Y20.5031	0	COLETENEBL	SP		10	01	.00385	01
3111RJL290672Y20.5031	0	COLECURCCA	IN		10	01	.00141	01
3111RJL290672Y20.5032	0	HYME	71		10	02	.00005	01
3111RJL290672Y20.5032	5	ARAN	70		10	01	.00088	01
3111RJL290672Y20.5033	7	HYMEFORMMO	MI		10	14	.00038	01
3111RJL290672Y20.5033	5	ACARERYT	04		10	01	.00001	01
3111RJL290672Y20.5033	0	COLECURCHY	GR		10	01	.00353	01
3111RJL290672Y20.5034	0	HYME	71		10	05	.00005	01
3111RJL290672Y20.5034	1	LEPIARCTAP	SP		41	01	.00008	01
3111RJL290672Y20.5035	1	ORTHACRIOP	OR		40	02	.00322	01
3111RJL290672Y20.5035	2	HOMOCIC1AT	SP		10	03	.00051	01
3111RJL290672Y20.5035	2	HOMOCIC1AC	SP		10	02	.00028	01
3111RJL290672Y20.5035	0	COLEPHALPH	SP		10	01	.00022	01
3111RJL290672Y20.5035	7	HYMEFORMMO	MI		10	07	.00038	01
3111RJL290672Y20.5035	0	COLETENEBL	SP		10	01	.00385	01
3111RJL290672Y20.5035	2	HEMILYGABL	LE		10	08	.00015	01
3111RJL290672Y20.5035	0	COLECURCAN	SP		10	01	.00048	01
3111RJL290672Y20.5035	7	HYMEFORMFO	NE		10	01	.00070	01
3111RJL290672Y20.5035	1	LEPIARCTAP	SP		42	03	.00052	01

3111RJL290672Y20.5036	2	HEMIMIRIHA	SP	10	01	.00080	01
3111RJL290672Y20.5036	0	HEMITINGCO	AC	10	01	.00080	01
3111RJL290672Y20.5036	7	HYMEFORMMO	MI	10	01	.00038	01
3111RJL290672Y20.5036	1	COLECHRYCH	SP	10	01	.00071	01
3111RJL290672Z10.5032	2	HOMOCIC1FL	FL	10	03	.00051	01
3111RJL290672Z10.5032	0	HYME	71	10	08	.00005	01
3111RJL290672Z10.5032	0	COLETENEBL	SP	10	02	.00385	01
3111RJL290672Z10.5032	5	ACARERYT	04	10	01	.00001	01
3111RJL290672Z10.5032	0	COLESCARRH	SP	10	01	.00072	01
3111RJL290672Z10.5033	2	HOMOCIC1FL	FL	10	01	.00051	01
3111RJL290672Z10.5033	2	HOMOCIC1AC	SP	10	01	.00028	01
3111RJL290672Z10.5033	2	HOMOCIC1CU	SP	10	02	.00356	01
3111RJL290672Z10.5033	7	HYMEFORMMO	MI	10	01	.00038	01
3111RJL290672Z10.5033	5	ARANTHOMXY	SP	2 40	02	.00054	01
3111RJL290672Z10.5033	0	COLETENEBL	SP	10	01	.00385	01
3111RJL290672Z10.5033	2	HEMILYGANE	BI	10	01	.00448	01
3111RJL290672Z10.5033	2	HEMILYGABL	LE	10	02	.00015	01
3111RJL290672Z10.5033	2	HEMILYGAGE	BU	10	01	.00085	01
3111RJL290672Z10.5033	2	HEMILYGACR	DI	10	01	.00046	01
3111RJL290672Z10.5036	2	HOMOCIC1FL	FL	40	05	.00011	01
3111RJL290672Z10.5034	2	HOMOCIC1FL	FL	10	02	.00051	01
3111RJL290672Z10.5034	2	HOMOCIC1GI	AT	40	03	.00023	01
3111RJL290672Z10.5034	0	COLETENEBL	SP	10	01	.00385	01
3111RJL290672Z10.5034	0	COLEPHALPH	SP	10	01	.00022	01
3111RJL290672Z10.5034	0	COLECURCCA	CR	10	01	.00063	01
3111RJL290672Z10.5034	7	HYMEFORMMO	MI	10	08	.00038	01
3111RJL290672Z10.5034	7	HYMEFORMMY	SA	10	01	.00158	01
3111RJL290672Z10.5035	2	HOMOCIC1GI	AT	40	01	.00023	01
3111RJL290672Z10.5035	0	HYME	71	10	04	.00005	01
3111RJL290672Z10.5035	2	HOMOCIC1FL	FL	40	03	.00011	01
3111RJL290672Z10.5035	0	COLETENEBL	SP	10	01	.00385	01
3111RJL290672Z10.5035	2	HEMILYGABL	LE	10	03	.00015	01
3111RJL290672Z10.5035	2	HEMILYGANY	SP	10	02	.00042	01
3111RJL290672Z10.5035	7	HYMEFORMMO	MI	10	07	.00038	01
3111RJL290672Z10.5036	1	ORTHACRIPS	DE	10	01	.04758	01
3111RJL290672Z10.5036	2	HEMILYGABL	LE	10	01	.00015	01
3111RJL290672Z10.5036	2	HOMOCIC1FL	FL	10	02	.00051	01
3111RJL290672Z10.5036	2	HOMOCIC1FL	FL	40	15	.00011	01
3111RJL290672Z10.5036	2	HOMOCIC1CU	SP	40	01	.00148	01
3111RJL290672Z10.5036	2	HOMOCIC1GI	AT	10	01	.00023	01
3111RJL290672Z10.5036	2	HOMOCIC1AT	SP	10	02	.00051	01
3111RJL290672Z10.5036	0	HYME	71	10	08	.00005	01
3111RJL290672Z10.5036	0	COLECOCCHY	QU	10	01	.00048	01
3111RJL290672Z10.5036	0	COLECURCCA	IN	10	02	.00141	01
3111RJL290672Z10.5036	5	COLECOCCHI	CO	40	01	.00016	01
3111RJL290672Z10.5036	7	HYMEFORMMO	MI	10	06	.00038	01
3111RJL290672Z20.5031	2	HOMOCIC1GI	AT	40	02	.00023	01
3111RJL290672Z20.5031	2	HOMOCIC1AT	SP	10	01	.00051	01
3111RJL290672Z20.5031	2	HOMOCIC1FL	FL	40	09	.00011	01
3111RJL290672Z20.5031	0	COLETENEBL	SP	10	01	.00385	01
3111RJL290672Z20.5032	0	HYME	71	10	02	.00005	01
3111RJL290672Z20.5032	2	HOMOCIC1FL	FL	10	02	.00051	01
3111RJL290672Z20.5032	7	HYMEFORMMO	MI	10	01	.00038	01
3111RJL290672Z20.5033	0	COLECUCCPA	VI	10	01	.00022	01
3111RJL290672Z20.5033	0	HYME	71	10	18	.00005	01
3111RJL290672Z20.5033	2	HOMOCIC1GI	AT	40	01	.00023	01
3111RJL290672Z20.5033	2	HOMOCIC1FL	FL	40	06	.00011	01
3111RJL290672Z20.5033	7	HYMEFORMMO	MI	10	02	.00038	01
3111RJL290672Z20.5034	0	COLECURCCA	IN	10	01	.00141	01

3111RJL290672Z20.5034	2	HOMOCIC1FL	FL	40	13	.00011 01
3111RJL290672Z20.5034	2	HOMOCIC1FL	FL	10	01	.00051 01
3111RJL290672Z20.5034	2	HOMOCIC1CU	SP	40	01	.00148 01
3111RJL290672Z20.5034	0	HOMOCIC1PR	SU	40	01	.00097 01
3111RJL290672Z20.5034	0	COLECURCCA	IN	10	01	.00141 01
3111RJL290672Z20.5034	1	COLECHRYCH	SP	10	04	.00071 01
3111RJL290672Z20.5034	0	COLETENEBL	SP	10	01	.00385 01
3111RJL290672Z20.5034	0	COLECUCCHY	GU	10	01	.00048 01
3111RJL290672Z20.5034	2	HEMILYGABL	LE	10	04	.00015 01
3111RJL290672Z20.5035	5	HYMEICHNAN	RE	10	01	.00053 01
3111RJL290672Z20.5035	2	HOMOCIC1GI	AT	10	01	.00023 01
3111RJL290672Z20.5035	2	HOMOCIC1FL	FL	10	02	.00051 01
3111RJL290672Z20.5035	2	HEMILYGAGE	RU	10	01	.00085 01
3111RJL290672Z20.5035	1	COLECHRYCH	SP	10	01	.00071 01
3111RJL290672Z20.5035	0	COLECURCHY	GR	10	01	.00353 01
3111RJL290672Z20.5035	0	COLETENEBL	SP	10	01	.00385 01
3111RJL290672Z20.5035	2	HEMILYGANY	SP	10	03	.00042 01
3111RJL290672Z20.5036	1	COLECHRYCH	SP	10	01	.00071 01
3111RJL290672Z20.5036	1	COLECHRYAL	SP	10	01	.00044 01
3111RJL290672Z20.5036	0	COLEPHALPH	SP	10	01	.00022 01
3111RJL290672Z20.5036	0	COLECURCCA	IN	10	01	.00141 01
3111RJL290672Z20.5036	2	HEMILYGABL	LE	10	01	.00015 01
3111RJL290672Z20.5036	2	HOMOCIC1CU	SP	40	01	.00148 01
3111RJL290672Z20.5036	2	HOMOCIC1FL	FL	40	09	.00011 01
3111RJL290672Z20.5036	2	HOMOCIC1FL	FL	10	01	.00051 01
3111RJL290672Z20.5036	0	HYME	71	10	03	.00005 01
3111RJL290672Z20.5036	7	HYMEFORMFO	NE	10	03	.00070 01
3111RJL190772X10.5031	1	ORTHACRIPS	DE	40	01	.00134 01
3111RJL190772X10.5032	0	HYMEHALIDI	PR	10	01	.00208 01
3111RJL190772X10.5033	2	HOMOCIC1DR	GA	10	01	.00024 01
3111RJL190772X10.5033	5	ARANTHOMXY	LA	10	01	.00375 01
3111RJL190772X10.5035	0	DIPTSARCSA	SP	10	01	.00244 01
3111RJL190772X10.5036	0	COLECUCCHY	SP	10	01	.00040 01
3111RJL190772X20.5031	2	HOMOCIC1GI	AT	40	01	.00023 01
3111RJL190772X20.5031	0	COLECUCCHY	SP	10	01	.00040 01
3111RJL190772X20.5031	7	HYMEFORMMY	SA	10	03	.00158 01
3111RJL190772X20.5032	1	ORTHACRIAR	CO	40	01	.01020 01
3111RJL190772X20.5032	5	NEURMYRM	01	40	01	.00082 01
3111RJL190772X20.5034	1	COLECHRYCH	SP	10	01	.00071 01
3111RJL190772X20.5034	1	COLECHRYPH	SP	10	03	.00016 01
3111RJL190772X20.5034	1	HEMILYGAGE	RU	10	01	.00085 01
3111RJL190772X20.5034	2	HOMOCIC1AC	SP	10	01	.00028 01
3111RJL190772X20.5034	1	COLECHRYCH	SP	10	01	.00071 01
3111RJL190772X20.5034	2	HEMILYGABL	LE	10	01	.00015 01
3111RJL190772X20.5035	5	ARANLYCOLY	SP 1	10	01	.00840 01
3111RJL190772X20.5036	2	HOMOCIC1BA	SP 1	10	02	.00022 01
3111RJL190772Y10.5031	7	HYMEFORMMO	MI	10	01	.00038 01
3111RJL190772Y10.5031		ORTHACRIAR	CO	40	01	.00218 01
3111RJL190772Y10.5032	7	HYMEFORMMY	SA	10	01	.00158 01
3111RJL190772Y10.5032	0	COLECURCGE	BA	10	01	.00085 01
3111RJL190772Y10.5033	7	HYMEFORMMO	MI	10	01	.00038 01
3111RJL190772Y10.5033	0	COLECUCCHY	SP	10	01	.00040 01
3111RJL190772Y10.5033	2	HEMILYGABL	LE	10	01	.00015 01
3111RJL190772Y10.5034	1	ORTHACRIOP	OR	40	01	.00992 01
3111RJL190772Y10.5034	7	HYMEFORMFO	OR	10	01	.00180 01
3111RJL190772Y10.5034	7	HYMEFORMMO	MI	10	01	.00038 01
3111RJL190772Y10.5035	7	HYMEFORMMY	SA	10	01	.00158 01
3111RJL190772Y10.5035	0	COLECURCCA	IN	10	01	.00141 01

3111RJL190772Y10.5035	0	COLECOCCHY	SP	10	01	.00040 01
3111RJL190772Y10.5035	0	HYMEBRACRO	SP	10	01	.00214 01
3111RJL190772Y10.5036	7	HYMEFORMMO	MI	10	01	.00038 01
3111RJL190772Y10.5036	1	ORTHACRITR	AS	40	01	.02136 01
3111RJL190772Y20.5031	1	ORTHACRIME	GL	40	01	.00788 01
3111RJL190772Y20.5032	0	COLECOCCHY	QU	10	01	.00048 01
3111RJL190772Y20.5033	1	COLECHRYPH	SP	10	02	.00016 01
3111RJL190772Y20.5035	2	HOMOCIC1FL	FL	10	01	.00051 01
3111RJL190772Y20.5035	1	COLECHRYCH	SP	10	01	.00071 01
3111RJL190772Y20.5035	2	HOMOPSEUCR	AR	40	01	.00038 01
3111RJL190772Z10.5031	2	HOMOCIC1GI	AT	40	01	.00023 01
3111RJL190772Z10.5031	2	HOMOCIC1AC	SP	10	01	.00028 01
3111RJL190772Z10.5031	2	HOMOCIC1AT	SP	40	01	.00051 01
3111RJL190772Z10.5031	0	COLEANOBTR	EL	10	01	.00088 01
3111RJL190772Z10.5031	0	COLECURCCA	IN	10	03	.00141 01
3111RJL190772Z10.5032	0	HYMEHALIDI	PR	10	05	.00208 01
3111RJL190772Z10.5032	2	HOMOCIC1AT	SP	40	01	.00051 01
3111RJL190772Z10.5032	2	HOMOCIC1FL	FL	10	01	.00051 01
3111RJL190772Z10.5032	2	HEMILYGANY	SP	10	01	.00042 01
3111RJL190772Z10.5032	0	COLECURCCA	IN	10	01	.00141 01
3111RJL190772Z10.5032	0	COLECURCHY	GR	10	01	.00353 01
3111RJL190772Z10.5032	1	COLECARASE	PL	10	01	.00193 01
3111RJL190772Z10.5032	0	COLEELATCT	SP	40	01	.00038 01
3111RJL190772Z10.5032	1	LEPIARCTAP	SP	41	01	.00008 01
3111RJL190772Z10.5033	0	HYMERETHEP	SP	10	01	.00022 01
3111RJL190772Z10.5033	1	COLECHRYBR	SP	10	01	.00046 01
3111RJL190772Z10.5033	2	HOMOCIC1FL	FL	10	01	.00051 01
3111RJL190772Z10.5033	2	HOMOCIC1AC	SP	10	02	.00028 01
3111RJL190772Z10.5033	2	HEMILYGANY	SP	10	01	.00042 01
3111RJL190772Z10.5033	2	HEMILYGALY	SP	10	01	.00563 01
3111RJL190772Z10.5033	0	COLECURCCA	IN	10	01	.00141 01
3111RJL190772Z10.5033	0	COLECURCHY	GR	10	02	.00353 01
3111RJL190772Z10.5033	0	COLETENEBL	SP	10	01	.00385 01
3111RJL190772Z10.5033	2	HEMILYGABL	LE	40	01	.00015 01
3111RJL190772Z10.5034	0	HYMEHALIDI	PR	10	01	.00208 01
3111RJL190772Z10.5034	0	HYMERETHEP	SP	10	02	.00022 01
3111RJL190772Z10.5034	2	HOMOCIC1GI	AT	10	02	.00023 01
3111RJL190772Z10.5034	2	HOMOCIC1FL	FL	10	01	.00051 01
3111RJL190772Z10.5034	2	HOMOCIC1AT	SP	40	01	.00051 01
3111RJL190772Z10.5034	0	COLECURCHY	GR	10	01	.00353 01
3111RJL190772Z10.5034	0	COLECURCGE	BA	10	01	.00085 01
3111RJL190772Z10.5034	7	HYMEFORMSO	MO	10	01	.00142 01
3111RJL190772Z10.5035	1	ORTHACRIPS	DE	40	01	.00126 01
3111RJL190772Z10.5035	0	HYMERETHEP	SP	10	01	.00022 01
3111RJL190772Z10.5035	0	HYMEHALIDI	PR	10	01	.00208 01
3111RJL190772Z10.5035	2	HOMOCIC1FL	FL	40	01	.00011 01
3111RJL190772Z10.5035	2	HOMOCIC1FL	FL	10	03	.00051 01
3111RJL190772Z10.5035	0	COLECURCGE	BA	10	01	.00085 01
3111RJL190772Z10.5036	2	HOMOCIC1FL	FL	10	03	.00051 01
3111RJL190772Z10.5036	2	HOMOCIC1AC	SP	10	01	.00028 01
3111RJL190772Z10.5036	7	HYMEFORMFO	OB	10	02	.00180 01
3111RJL190772Z10.5036	5	ACARERYT	02	10	01	.00025 01
3111RJL190772Z10.5036	1	COLECHRYCH	SP	10	01	.00071 01
3111RJL190772Z10.5036	0	COLECURCGE	BA	10	01	.00085 01
3111RJL190772Z10.5036	1	LEPIARCTAP	SP	41	01	.00008 01
3111RJL190772Z20.5031	7	HYMEFORMMO	MI	10	01	.00038 01
3111RJL190772Z20.5031	1	COLECHRYBR	SP	10	01	.00046 01
3111RJL190772Z20.5031	2	HOMOCIC1FL	FL	10	01	.00051 01

3111RJL190772Z20.5031	2	HOMOCICIAT	SP	40	01	.00051 01
3111RJL190772Z20.5031	0	COLETENEBL	SP	10	07	.00385 01
3111RJL190772Z20.5031	0	COLETENEEL	EX	10	02	.03284 01
3111RJL190772Z20.5031	0	COLECURCCA	IN	10	01	.00141 01
3111RJL190772Z20.5031	5	ACARERYT	02	10	01	.00025 01
3111RJL190772Z20.5031	1	LEPIARCTAP	SP	41	01	.00008 01
3111RJL190772Z20.5032	2	HOMOCICIFL	FL	10	03	.00051 01
3111RJL190772Z20.5032	0	COLETENEAN	MO	10	01	.00078 01
3111RJL190772Z20.5032	0	COLETENEBL	SP	10	02	.00385 01
3111RJL190772Z20.5032	2	HEMILYGANY	SP	10	01	.00042 01
3111RJL190772Z20.5033	1	ORTHACRITR	KI	40	01	.01176 01
3111RJL190772Z20.5033	0	COLECURCCA	IN	10	02	.00141 01
3111RJL190772Z20.5034	0	HYMEHALIDI	PR	10	02	.00208 01
3111RJL190772Z20.5034	2	HOMOCICIAT	SP	40	03	.00051 01
3111RJL190772Z20.5034	0	COLECURCHY	GR	10	02	.00353 01
3111RJL190772Z20.5034	0	COLECURCCA	IN	10	05	.00141 01
3111RJL190772Z20.5034	0	COLETENEBL	SP	10	03	.00385 01
3111RJL190772Z20.5034	7	HYMEFORMMY	SA	10	01	.00158 01
3111RJL190772Z20.5034	1	LEPIARCTAP	SP	41	01	.00008 01
3111RJL190772Z20.5035	0	HYMEHALIDI	PR	10	05	.00208 01
3111RJL190772Z20.5035	1	ORTHACRIPS	DE	40	01	.00130 01
3111RJL190772Z20.5035	0	COLETENEBL	SP	10	02	.00385 01
3111RJL190772Z20.5035	0	COLETENEAN	MO	10	01	.00078 01
3111RJL190772Z20.5036	0	HYMEHALIDI	PR	10	03	.00208 01
3111RJL190772Z20.5036	2	HOMOCICIFL	FL	10	05	.00051 01
3111RJL190772Z20.5036	0	COLECOCCHY	QU	10	01	.00048 01
3111RJL190772Z20.5036	0	COLECURCGE	BA	10	01	.00085 01
3111RJL190772Z20.5036	0	COLETENEBL	SP	10	03	.00385 01
3111RJL190772Z20.5036	1	ORTHACRIME	GL	40	01	.00612 01

Aboveground herbage data

The aboveground herbage data for the 1972 Pawnee insecticide treatments are part of Grassland Biome data set number A2U00AB. The data are recorded on form NREL-01. A sample form and a sample listing follow.

IBP

GRASSLAND BIOME

U.S. INTERNATIONAL BIOLOGICAL PROGRAM

FIELD DATA SHEET – ABOVEGROUND BIOMASS

DATA TYPE	SITE	INITIALS	DATE			TREATMENT	REPLICATE	PLOT SIZE	QUADRAT	CLIP-EST.	GROWTH FM.	GENUS	SPECIES	SUBSPECIES	CATEGORY	WEIGHT ESTIMATE	SACK NO.	DRY WEIGHT	CROWN PLOT SIZE	CROWN WEIGHT
			DAY	MO.	YR.															
1-2	3-4	5-7	8-9	10-11	12-13	14	15	16-19	21-23	25	27	29-30	31-32	34	35	36-40	42-45	47-52	54-57	59-64
01																				

DATA TYPE
- 01 Aboveground Biomass
- 02 Litter
- 03 Belowground Biomass
- 10 Vertebrate - Live Trapping
- 11 Vertebrate - Snap Trapping
- 12 Vertebrate - Collection
- 20 Avian Flush Census
- 21 Avian Road Count
- 22 Avian Road Count Summary
- 23 Avian Collection - Internal
- 24 Avian Collection - External
- 25 Avian Collection - Plumage
- 30 Invertebrate
- 40 Microbiology - Decomposition
- 41 Microbiology - Nitrogen
- 42 Microbiology - Biomass
- 43 Microbiology - Root Decomposition
- 44 Microbiology - Respiration

SITE
- 01 Ale
- 02 Bison
- 03 Bridger
- 04 Cottonwood
- 05 Dickinson
- 06 Hays
- 07 Hopland
- 08 Jornada
- 09 Osage
- 10 Pantex
- 11 Pawnee

TREATMENT
- 1 Ungrazed
- 2 Lightly grazed
- 3 Moderately grazed
- 4 Heavily grazed
- 5 Grazed 1969, ungrazed 1970
- 6 Grazed 1970, ungrazed 1971
- 7
- 8
- 9

CLIP-ESTIMATE
- 1 Harvested
- 2 Harvest and Est.
- 3 Estimated
- 4 Est. for Insect
- 5 Est. for Reference
- 6 Est. for Future Clip

GROWTH FORM
- 1 Perennial grass
- 2 Annual grass
- 3 Sedge, rush, etc.
- 4 Annual forb
- 5 Biennial forb
- 6 Perennial forb
- 7 Half-shrub
- 8 Shrub
- 9 Tree
- 0 Miscellaneous

CATEGORY
- 1 Live
- 2 Old dead
- 3 Recent dead

+++ EXAMPLE OF DATA +++

```
         1         2         3         4         5
12345678901234567890123456789012345678901234567890123456789
0111HMJ300572X1   .5 011 2   SPCO  1     1 3200     .44
0111HMJ300572X1   .5 011 2   SPCO  2     1 3201     .10
0111HMJ300572X1   .5 011 2   PACH        3202     .19
0111HMJ300572X1   .5 011 2   BOGR 21    21 3203    9.10
0111HMJ300572X1   .5 011 2   PLPA G1     1 3204     .01
0111HMJ300572X1   .5 011 2   BOGR 22    15 3203   10.30
0111HMJ300572X1.125 011 2   BOGR 25       3206   41.31
0111HMJ300572X1   .5 012 2   PACH        3231    8.00
0111HMJ300572X1   .5 012 2   BUDA  1     8 3232    2.76
0111HMJ300572X1   .5 012 2   BUDA  2     3 3232    2.39
0111HMJ300572X1   .5 012 2   BOGR 21    21 3234    5.61
0111HMJ300572X1   .5 012 2   BOGR 22    13 3234    8.71
0111HMJ300572X1   .5 012 2   ASTR A1     1 3237     .15
0111HMJ300572X1.125 012 2   BUDA  5       3230     .86
0111HMJ300572X1.125 012 2   BOGR 25       3238   26.18
0111HMJ300572X1   .5 013 2   PENS T1     1 3913     .27
0111HMJ300572X1   .5 013 2   OPPO  4    28 3912    6.72
0111HMJ300572X1   .5 013 2   OPPO  3    12 3916   33.10
0111HMJ300572X1   .5 013 2   OPPO  2    18 3914     .00
0111HMJ300572X1   .5 013 2   PACH        3915    2.25
0111HMJ300572X1   .5 013 2   BOGR 21    22 3918    9.21
0111HMJ300572X1   .5 013 2   BOGR 22    12 3918   12.23
0111HMJ300572X1   .5 013 2   BUDA  1     4 3920     .16
0111HMJ300572X1   .5 013 2   BUDA  2     2 3920     .66
0111HMJ300572X1   .5 013 2   CAEL 21     1 3917     .06
0111HMJ300572X1   .5 013 2   CAEL 22     1 3917     .06
0111HMJ300572X1.125 013 2   BOGR 25       3918   32.51
0111HMJ300572X1   .5 014 2   FEOC 21     2 3927    2.81
0111HMJ300572X1   .5 014 2   FEOC 22     3 3928    7.22
0111HMJ300572X1   .5 014 2   SPCO  1     1 3931     .16
0111HMJ300572X1   .5 014 2   SPCO  2     1 3932     .07
0111HMJ300572X1   .5 014 2   PLPA G1     1 3923     .04
0111HMJ300572X1   .5 014 2   LYJU  1     1 3924     .16
0111HMJ300572X1   .5 014 2   LEMO 41     1 3925     .02
0111HMJ300572X1   .5 014 2   PACH        3926     .34
0111HMJ300572X1   .5 014 2   BOGR 21    16 3929    6.08
0111HMJ300572X1   .5 014 2   BOGR 22     7 3929   11.80
0111HMJ300572X1   .5 014 2   ASMI101     1 3935     .05
0111HMJ300572X1   .5 014 2   LEDE  2     1 3934     .04
0111HMJ300572X1.125 014 2   BOGR 25       3933   22.03
0111HMJ300572X1   .5 014 2   BUDA  1     4 3936    1.73
0111HMJ300572X1   .5 014 2   BUDA  2     2 3936    2.54
0111HMJ300572X1.125 014 2   BUDA  5       3937    5.24
0111HMJ300572X1   .5 015 2   OPPO  4    95 4239  130.36
0111HMJ300572X1   .5 015 2   OPPO  3    45 4240   99.42
0111HMJ300572X1   .5 015 2   OPPO  2    25 4241   27.92
0111HMJ300572X1   .5 015 2   FEOC 21     2 4242    2.26
0111HMJ300572X1   .5 015 2   FEOC 22     2 4242    6.19
0111HMJ300572X1   .5 015 2   PACH        4243    2.63
0111HMJ300572X1   .5 015 2   PLPA G1     1 4244     .05
0111HMJ300572X1   .5 015 2   SPCO  1     1 4245     .20
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0111HMJ300572X1	.5	015	2	BOGR	22	15	4247	28.07
0111HMJ300572X1	.125	015	2	BOGR	25		2191	111.06
0111HMJ300572X1	.5	015	2	GILA	31	1	2823	.01
0111HMJ300572X1	.5	015	2	BUDA	1	3	2827	1.07
0111HMJ300572X1	.5	015	2	BUDA	2	1	2827	2.67
0111HMJ300572X1	.5	016	2	GUSA	22	10	3207	4.48
0111HMJ300572X1	.5	016	2	GUSA	24	4	3208	1.35
0111HMJ300572X1	.5	016	2	OPPO	4	85	3209	56.40
0111HMJ300572X1	.5	016	2	OPPO	3	25	3210	21.04
0111HMJ300572X1	.5	016	2	OPPO	2	20	3211	45.56
0111HMJ300572X1	.5	016	2	SPCO	1	1	3212	.35
0111HMJ300572X1	.5	016	2	SPCO	2	1	3213	.13
0111HMJ300572X1	.5	016	2	PLPA	61	1	3214	.16
0111HMJ300572X1	.5	016	2	FACH			3215	4.20
0111HMJ300572X1	.5	016	2	FEOC	21	2	3216	.78
0111HMJ300572X1	.5	016	2	FEOC	22	1	3217	.62
0111HMJ300572X1	.5	016	2	THFI	1	1	3218	.03
0111HMJ300572X1	.5	016	2	BOGR	21	22	3219	9.25
0111HMJ300572X1	.5	016	2	BOGR	22	15	3219	15.80
0111HMJ300572X1	.5	016	2	GILA	31	1	3220	.03
0111HMJ300572X1	.125	016	2	BOGR	25		3221	1.68
0111HMJ300572X1	.125	016	2	BUDA	5		3223	1.54
0111HMJ300572X1	.5	016	2	BUDA	1	1	3224	.11
0111HMJ300572X1	.5	016	2	BUDA	2	1	3225	.54
0111HMJ300572X1	.5	016	2	GUSA	21		4500	2.28
0111HMJ300572X1	.5	001	5	PSTE	31	2		
0111HMJ300572X1	.5	001	5	CAEL	21	2		
0111HMJ300572X1	.5	001	5	CAEL	22	2		
0111HMJ300572X1	.5	001	5	PENS	11	1		
0111HMJ300572X1	.5	001	5	GACO	51	1		
0111HMJ300572X1	.5	001	5	PLPA	61	1		
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0111HMJ300572X1	.5	001	5	BOGR	22	15		
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0111HMJ300572X1	.5	002	5	BOGR	21	22		
0111HMJ300572X1	.5	002	5	BOGR	22	10		
0111HMJ300572X1	.5	003	5	GUSA	22	5		
0111HMJ300572X1	.5	003	5	GUSA	24	10		
0111HMJ300572X1	.5	003	5	SPCO	1	1		
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0111HMJ300572X1	.5	003	5	ASMI	101	2		
0111HMJ300572X1	.5	003	5	BOGR	21	25		
0111HMJ300572X1	.5	003	5	BOGR	22	11		
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0111HMJ300572X1	.5	004	5	SPCO	2	1		
0111HMJ300572X1	.5	004	5	BOGR	21	20		
0111HMJ300572X1	.5	004	5	BOGR	22	10		
0111HMJ300572X1	.5	004	5	BUDA	1	7		
0111HMJ300572X1	.5	004	5	BUDA	2	4		

0111HMJ300572X1	.5	005	5	PSTE 31 2
0111HMJ300572X1	.5	005	5	ASMI101 2
0111HMJ300572X1	.5	005	5	CAFI 1 3
0111HMJ300572X1	.5	005	5	CAFI 2 3
0111HMJ300572X1	.5	005	5	SPCO 1 1
0111HMJ300572X1	.5	005	5	BUDA 1 8
0111HMJ300572X1	.5	005	5	BUDA 2 2
0111HMJ300572X1	.5	005	5	GUSA 24 3
0111HMJ300572X1	.5	005	5	BOGR 21 15
0111HMJ300572X1	.5	005	5	BOGR 22 10
0111HMJ300572X1	.5	006	5	PENS T1 2
0111HMJ300572X1	.5	006	5	PSTE 31 1
0111HMJ300572X1	.5	006	5	CAFI 1 5
0111HMJ300572X1	.5	006	5	CAFI 2 5
0111HMJ300572X1	.5	006	5	BOGR 21 20
0111HMJ300572X1	.5	006	5	BOGR 22 10
0111HMJ300572X1	.5	007	5	GUSA 24 3
0111HMJ300572X1	.5	007	5	CAFI 1 3
0111HMJ300572X1	.5	007	5	CAFI 2 3
0111HMJ300572X1	.5	007	5	ARLO 31 1
0111HMJ300572X1	.5	007	5	ARLO 32 2
0111HMJ300572X1	.5	007	5	GACO 51 1
0111HMJ300572X1	.5	007	5	BUDA 1 9
0111HMJ300572X1	.5	007	5	BUDA 2 4
0111HMJ300572X1	.5	007	5	BOGR 21 5
0111HMJ300572X1	.5	007	5	BOGR 22 3
0111HMJ300572X1	.5	008	5	PENS T1 1
0111HMJ300572X1	.5	008	5	PSTE 31 1
0111HMJ300572X1	.5	008	5	CAFI 1 2
0111HMJ300572X1	.5	008	5	CAFI 2 2
0111HMJ300572X1	.5	008	5	ASMI101 2
0111HMJ300572X1	.5	008	5	BUDA 1 10
0111HMJ300572X1	.5	008	5	BUDA 2 4
0111HMJ300572X1	.5	008	5	BOGR 21 7
0111HMJ300572X1	.5	008	5	BOGR 22 7
0111HMJ300572X1	.5	008	5	TROC 1 1
0111HMJ300572X1	.5	008	5	LIIN 21 1
0111HMJ300572X1	.5	008	5	ARLO 31 1
0111HMJ300572X1	.5	008	5	ARLO 2 3
0111HMJ300572X1	.5	009	5	GUSA 24 3
0111HMJ300572X1	.5	009	5	PSTE 31 1
0111HMJ300572X1	.5	009	5	BUDA 1 5
0111HMJ300572X1	.5	009	5	BUDA 2 4
0111HMJ300572X1	.5	009	5	PENS T1 1
0111HMJ300572X1	.5	009	5	ASMI101 1
0111HMJ300572X1	.5	009	5	BOGR 21 12
0111HMJ300572X1	.5	009	5	BOGR 22 8
0111HMJ300572X1	.5	009	5	CAFI 1 1
0111HMJ300572X1	.5	009	5	CAFI 2 1
0111HMJ300572X1	.5	010	5	PSTE 31 1
0111HMJ300572X1	.5	010	5	CAEL 21 1
0111HMJ300572X1	.5	010	5	CAEL 22 1
0111HMJ300572X1	.5	010	5	MUTO 21 1
0111HMJ300572X1	.5	010	5	MUTO 22 4
0111HMJ300572X1	.5	010	5	BOGR 21 20
0111HMJ300572X1	.5	010	5	BOGR 22 10
0111HMJ300572X1	.5	010	5	BUDA 1 4
0111HMJ300572X1	.5	010	5	BUDA 2 3

0111HMJ300572X1	.5 011 5	PSTE 31	2
0111HMJ300572X1	.5 011 5	CAEL 21	1
0111HMJ300572X1	.5 011 5	CAEL 22	1
0111HMJ300572X1	.5 011 5	BOGR 21	22
0111HMJ300572X1	.5 011 5	BOGR 22	10
0111HMJ300572X1	.5 012 5	OPPO 4	35
0111HMJ300572X1	.5 012 5	OPPO 2	30
0111HMJ300572X1	.5 012 5	PSTE 31	1
0111HMJ300572X1	.5 012 5	CAEL 21	1
0111HMJ300572X1	.5 012 5	CAEL 22	1
0111HMJ300572X1	.5 012 5	GACO 51	1
0111HMJ300572X1	.5 012 5	CAFI 1	1
0111HMJ300572X1	.5 012 5	CAFI 2	1
0111HMJ300572X1	.5 012 5	BOGR 21	21
0111HMJ300572X1	.5 012 5	BOGR 22	12
0111HMJ300572X1	.5 013 5	EREF 4	1
0111HMJ300572X1	.5 013 5	BUDA 1	4
0111HMJ300572X1	.5 013 5	BUDA 2	3
0111HMJ300572X1	.5 013 5	BOGR 21	20
0111HMJ300572X1	.5 013 5	BOGR 22	10
0111HMJ300572X1	.5 013 5	ASMI101	1
0111HMJ300572X1	.5 013 5	CAEL 21	1
0111HMJ300572X1	.5 013 5	CAEL 22	1
0111HMJ300572X1	.5 014 5	SPCO 1	1
0111HMJ300572X1	.5 014 5	SPCO 2	1
0111HMJ300572X1	.5 014 5	CAEL 21	1
0111HMJ300572X1	.5 014 5	CAEL 22	1
0111HMJ300572X1	.5 014 5	BOGR 21	22
0111HMJ300572X1	.5 014 5	BOGR 22	12
0111HMJ300572X1	.5 014 5	LEMO 41	1
0111HMJ300572X1	.5 015 5	CAEL 21	2
0111HMJ300572X1	.5 015 5	CAEL 22	1
0111HMJ300572X1	.5 015 5	BOGR 21	21
0111HMJ300572X1	.5 015 5	BOGR 22	9
0111HMJ300572X1	.5 015 5	PSTE 31	2
0111HMJ300572X1	.5 015 5	SPCO 1	1
0111HMJ300572X1	.5 015 5	SPCO 2	1
0111HMJ300572X1	.5 016 5	GUSA 22	2
0111HMJ300572X1	.5 016 5	GUSA 24	2
0111HMJ300572X1	.5 016 5	PENS T1	1
0111HMJ300572X1	.5 016 5	CAEL 21	2
0111HMJ300572X1	.5 016 5	CAEL 22	1
0111HMJ300572X1	.5 016 5	BOGR 21	20
0111HMJ300572X1	.5 016 5	BOGR 22	12
0111HMJ300572X1	.5 017 5	PSTE 31	2
0111HMJ300572X1	.5 017 5	GUSA 22	2
0111HMJ300572X1	.5 017 5	GUSA 24	2
0111HMJ300572X1	.5 017 5	BUDA 1	5
0111HMJ300572X1	.5 017 5	BUDA 2	4
0111HMJ300572X1	.5 017 5	BOGR 21	20
0111HMJ300572X1	.5 017 5	BOGR 22	10
0111HMJ300572X1	.5 018 5	PENS T1	4
0111HMJ300572X1	.5 018 5	EREF 4	1
0111HMJ300572X1	.5 018 5	FEOC 21	1
0111HMJ300572X1	.5 018 5	ASMI101	1
0111HMJ300572X1	.5 018 5	TROC 1	1
0111HMJ300572X1	.5 018 5	BOGR 21	22
0111HMJ300572X1	.5 018 5	BOGR 22	10
0111HMJ300572X1	.5 018 5	BUDA 1	2

0111HMJ300572X1	.5 018 5	BUDA 2	2
0111HMJ300572X1	.5 019 5	SPCO 1	1
0111HMJ300572X1	.5 019 5	SPCO 2	1
0111HMJ300572X1	.5 019 5	ASMI101	1
0111HMJ300572X1	.5 019 5	GUSA 22	6
0111HMJ300572X1	.5 019 5	GUSA 24	6
0111HMJ300572X1	.5 019 5	CAEL 21	1
0111HMJ300572X1	.5 019 5	CAEL 22	1
0111HMJ300572X1	.5 019 5	BUDA 1	8
0111HMJ300572X1	.5 019 5	BUDA 2	4
0111HMJ300572X1	.5 019 5	BOGR 21	20
0111HMJ300572X1	.5 019 5	BOGR 22	12
0111HMJ300572X1	.5 020 5	GACO 51	1
0111HMJ300572X1	.5 020 5	GACO 52	1
0111HMJ300572X1	.5 020 5	CAEL 21	1
0111HMJ300572X1	.5 020 5	CAEL 22	1
0111HMJ300572X1	.5 020 5	SPCO 1	1
0111HMJ300572X1	.5 020 5	SPCO 2	1
0111HMJ300572X1	.5 020 5	BUDA 1	4
0111HMJ300572X1	.5 020 5	BUDA 2	4
0111HMJ300572X1	.5 020 5	BOGR 21	22
0111HMJ300572X1	.5 020 5	BOGR 22	10
0111HMJ300572X1	.5 020 5	GUSA 22	3