

**MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP
AT LAS CIENEGAS NATIONAL CONSERVATION AREA
1997-2009**



**Prepared by
Chris Hass, Ph.D.
Appleton-Whittell Research Ranch
National Audubon Society
HC 1 Box 44
Elgin, AZ 85611
<http://researchranch.audubon.org>
March 7, 2010**

**MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP
AT LAS CIENEGAS NATIONAL CONSERVATION AREA
1997-2009**

Executive Summary 3
Introduction and Methods 4
Results and Discussion 6
Results and Discussion 7
 PODA 7
 Capture Rates 7
 Impacts of habitat changes 8
 Productivity 8
 Capture Histories 9
 EMPI 9
 Capture Rates 9
 Productivity 10
 Capture Histories 10
Conclusions 11
Literature Cited 12
Appendix I. Species list of birds captured at PODA (1997-2009) 13
Appendix II. Species list of birds captured at EMPI (2002-2009). MAPS banding did not take place during 2007. Counts included newly banded and unbanded birds, but not recaptures 15
Appendix III. Breeding status (BRSTAT) information for PODA 17
Appendix IV. Breeding status information for EMPI 18
Appendix V. Habitat map for PODA banding station 19
Appendix VI. Habitat map for EMPI banding station 20

Executive Summary

- Bird banding stations were established at Post Dam (PODA) at the Appleton-Whittell Research Ranch of the National Audubon Society and at Empire Ranch (EMPI) within Las Cienegas National Conservation Area. Each station was run for at least 7 seasons between 1997 and 2009, according to a standardized protocol. Both sites are in riparian zones, but differ in plant species composition and habitat structure.
- Almost 2000 birds were banded during 5500 net-hours. Seventy-one species were captured at EMPI and 56 species were captured at PODA. Almost 3 times as many individuals were captured at EMPI as at PODA.
- Following an extensive wildfire during 2002 that burned through the PODA banding area, species diversity declined although capture rates did not.
- Productivity, as measured by the ratio of hatch-year birds to total captures, was higher at PODA than at EMPI.
- Multi-year recapture rates were higher at EMPI than at PODA. Some birds banded at EMPI during 2002 were recaptured in 2008.
- Capture rates and productivity appear to be increasing at PODA, whereas capture rates and species diversity appear to be declining at EMPI.

Introduction and Methods

The Monitoring Avian Productivity and Survivorship (MAPS) program was initiated in 1989 by the Institute for Bird Populations to collect data on North American land birds for conservation and management. The program uses constant-effort mist-netting and banding at monitoring stations across the continent. More than 500 stations are currently in operation. All birds captured are identified to species, sex and age according to standardized methodology (Pyle 1997; DeSante et al., 2007), and banded with uniquely numbered aluminum bands provided by the USGS/BRD Bird Banding Lab. Each station consists of about 10 permanent net sites, with one 12-m net per site, located uniformly within an approximate 8-ha area. Nets are operated for 3-6 hours during 1 day of each 10 day period, between May 1st and August 8th.

In addition to capturing and banding birds, data are collected on observed behaviors of all birds seen at the station to determine breeding activity, and periodically on habitat structure to correlate with banding and other breeding behavior. Birds observed at the banding station are recorded to species, and classified as probable or confirmed breeder based on behaviors observed such as courtship or nesting. Habitat structure at the MAPS station is classified using a federally accepted National Vegetation Classification Standard, to be conducted every 5 years or after a significant habitat-altering event, such as a fire.

MAPS data have been used to calculate regional productivity patterns of species groups (e.g., warblers), provide additional trend data to other measures such as the Breeding Bird Survey, and identify proximate causes of population declines (DeSante, 2000; DeSante et al., 2001).

Operation of a MAPS station began at Las Cienegas National Conservation Area (LCNCA) during 1997 with the establishment of a station at Post Dam (PODA) at the Appleton-Whittell Research Ranch of the National Audubon Society (AWRR). This station was operated annually by student volunteers until 2001. During April 2002, a large wildfire, the Ryan Fire, swept through the banding station resulting in the mortality of much of the vegetative overstory. The station was reestablished by Audubon personnel during 2007. During 2002, personnel from the Bureau of Land Management (BLM) established a station at Empire Gulch (EMPI), near the old Empire Ranch Headquarters (Fig. 1). This station has been operated annually by contract personnel and volunteers since then, except for 2007 when lack of volunteer coordination precluded operation of the station.

Both stations were operated 3-6 hours per station, with nets checked every 30 minutes. Birds were removed from the mist nets, placed in a small cloth bag, and taken to a central banding station for handling. Each individual was identified to species and gender using plumage patterns

and assessed for breeding condition. Age was estimated according to plumage patterns and wing feather criteria (Pyle, 1997), the wing cord was measured, and any injuries or disease noted.

Breeding status data were collected during 1997-2001, and 2009 at PODA, and 2002-2003 and 2008-2009 at EMPI (Appendices III and IV). Breeding status information is to be collected annually, but due to lack of volunteers proficient in bird identification and behavior, data have been collected intermittently. Habitat Structural Assessments were conducted at PODA during 1998 and 2007 and at EMPI during 2008 (Appendices V and VI).

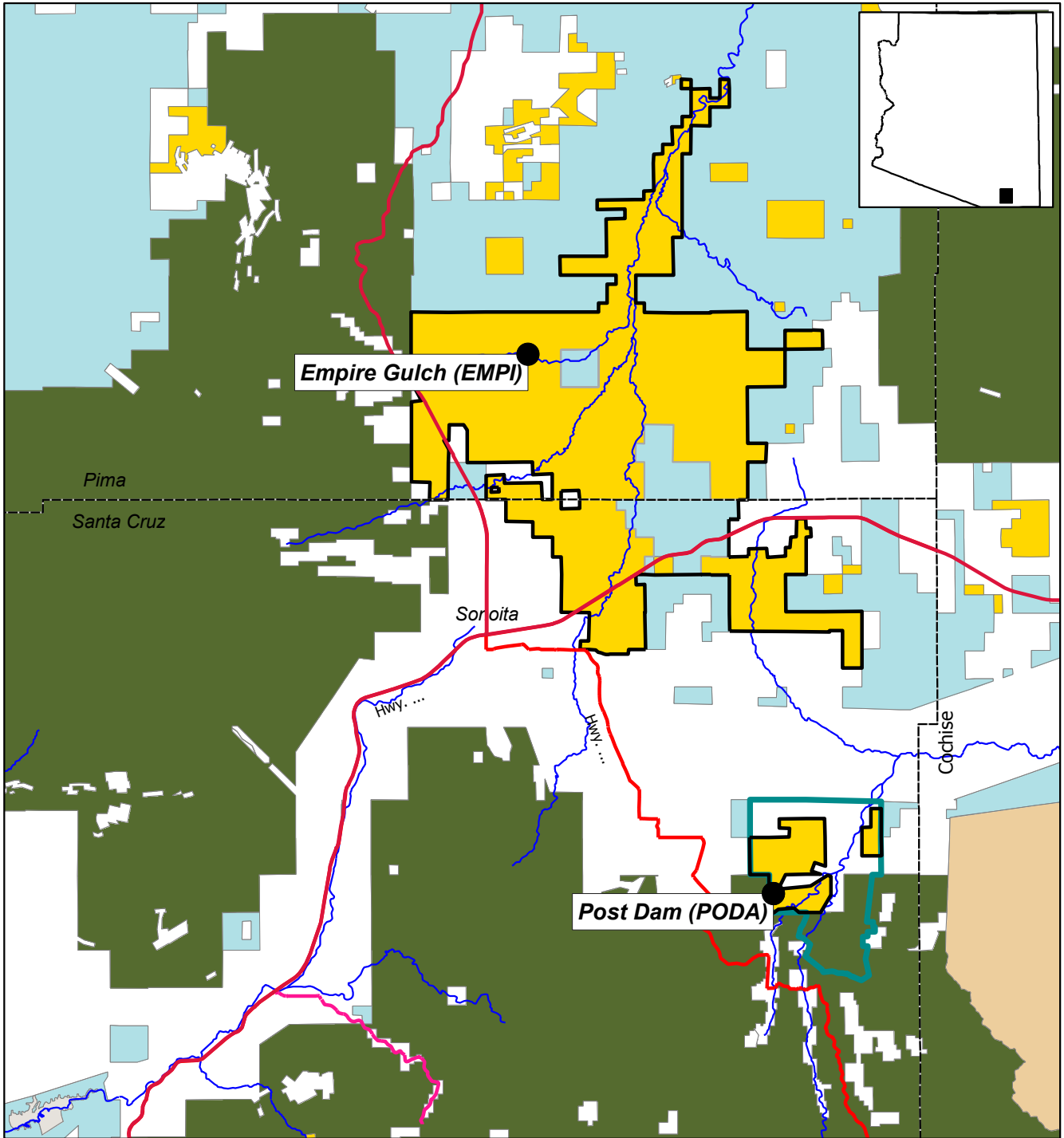
Both stations, PODA and EMPI, are located in riparian zones, surrounded by oak savannah (PODA) or grassland-mesquite (EMPI). Therefore, the stations were not located randomly in the landscape, but intentionally located in areas known to be species-rich. Both stations, including net placement, were reviewed by Peter Pyle, one of the establishers of the MAPS program, during a banding training in 2007 and found to be acceptable for the MAPS protocol. Dates of operation for each station are presented in Table 1. Because capture effort varied among years and between sites, results are presented as captures per 100 net-hours.

The objective of this report was to summarize the available capture data at each station, and compare capture rates, productivity, and capture history among years and between sites. No statistics were applied to the data, so conclusions regarding differences and trends should be viewed cautiously.

Table 1. Start and end dates of operation, total net hours and total captures (new, recaptures and unbanded birds) from MAPS bird banding stations at Las Cienegas National Conservation Area, 1997-2008. See Methods for descriptions of stations.

Station	Year	Start date	End date	Total net hours	Total captures	Bander
PODA	1997	May 23	July 27	410	71	J. Chace
	1998	May 27	July 26	440	91	J. Chace
	1999	May 27	July 21	370	50	J. Chace
	2000	June 8	August 5	385	78	Z. Jones
	2001	June 6	August 2	379.5	107	Z. Jones
	2007	May 16	August 3	351	95	C. Hass
	2008	May 15	July 31	271.5	71	C. Hass
	2009	May 18	July 30	220.5	38	C. Hass
	EMPI	2002	May 29	August 14	233.3	300
2003		May 7	August 13	487.2	435	L. Walraven
2004		May 18	August 17	385	442	J. Whetstone
2005		May 13	August 5	459.3	371	C. Hass
2006		May 12	August 4	420.2	328	C. Hass
2008		May 14	August 1	377.5	240	C. Hass
2009		May 19	July 31	316.5	242	C. Hass

Figure 1. Locations of MAPS stations at Las Cienegas National Conservation Area.



LEGEND	
Land Ownership	Lines and Points
BLM	County Boundaries
MILITARY RESERVATION	Major roads
PRIVATE	Major tributaries
STATE TRUST	LCNCA Boundary
USFS	AWRR Boundary
	Banding Station

Locations of MAPS bird banding stations.
 Map prepared by C. Hass, AWRR.
 12/17/2008
 Scale 1:23000

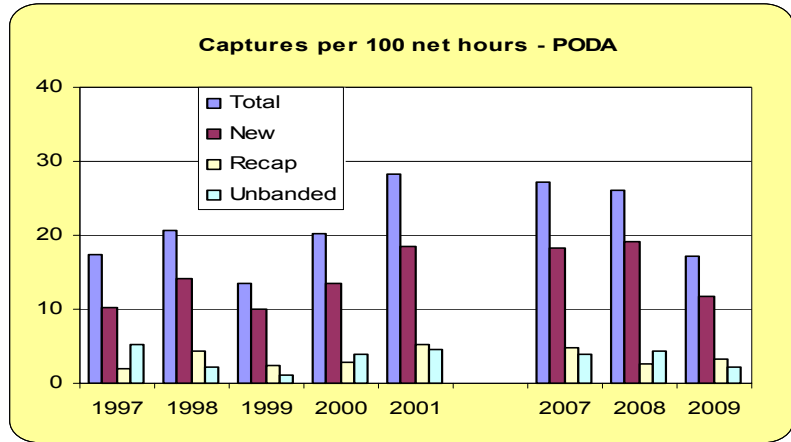
Results and Discussion

PODA

Capture Rates

During 1997-2009 at PODA, a total of 2827.5 net-hours were accrued, resulting in the capture of 601 birds, including 405 new captures, 98 recaptures and 98 unbanded birds. Unbanded birds included birds for which bands were not in stock at the station (hummingbirds, roadrunners) or birds that escaped before they could be banded. Overall average capture rate was 21 birds per 100 net hours. Capture rates fluctuated considerable over time (Fig. 2).

Figure 2. Captures per 100 net hours at the Post Dam (PODA) banding station, LCNCA. See text for methods.



At PODA, 56 different species of birds were captured, including 601 individuals. The number of species captured within a season ranged from 10 to 28 (Table 2, Appendix I). The five most commonly captured birds were Black-chinned Hummingbirds, Ash-throated Flycatchers, Rufous-crowned Sparrows, Black-headed Grosbeaks and Bewick’s Wrens.

Table 2. Total new captures and number of species captured each year at PODA and EMPI. New captures includes banded and unbanded birds, but not recaptures.

	Year							
PODA	1997	1998	1999	2000	2001	2007	2008	2009
Total New Individuals	63	72	41	67	87	78	64	31
Total Species	28	24	17	27	23	19	18	10
EMPI	2002	2003	2004	2005	2006		2008	2009
Total New Individuals	250	354	336	293	245		185	176
Total Species	30	40	44	36	38		34	31

Impacts of habitat changes

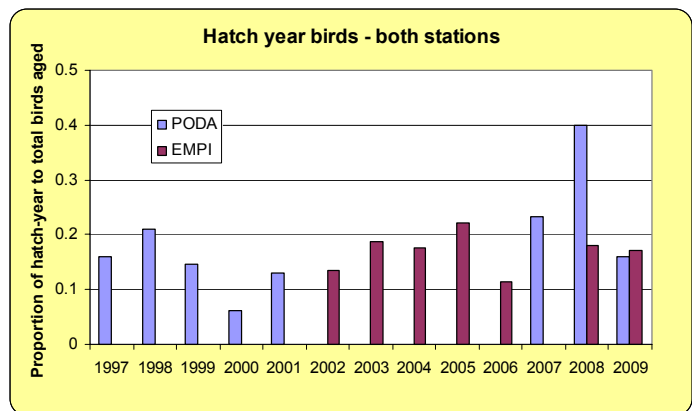
A wildfire burned through the PODA station in 2002, significantly altering the habitat by killing numerous trees and shrubs. Additional trees and shrubs were stressed by the fire and were more vulnerable to subsequent droughts which resulted in mortality 1-3 years after the fire. Prior to the Ryan Fire, 47 species were captured at PODA. In 2007-2009, more than 5 years after the Ryan Fire, only 26 species were captured, even though capture rates were higher than most years prior to the fire. Similar results were found in the San Pedro Riparian NCA, where capture rates remained at similar levels but overall species diversity declined following a burn within the riparian area (J. Whetstone, pers. comm.). The list of species captured, and counts, for periods before and after the fire are presented in Appendix I.

Beginning in 2007, it was noticed that Johnson grass (*Sorghum halepense*), a non-native species, was invading the streamside terraces along the PODA MAPS station. Mid-way through 2008, the infestation was thick enough to preclude the use of 3 net runs. By the end of the 2009 season, all 5 of the lower net runs were difficult to access. The impacts of the change in vegetation directly on the birds could not be determined, but it greatly impacted the spatial distribution of captures and overall sampling time.

Productivity

Productivity, as measured by the proportion of total new captures comprised of hatch-year birds, varied from year to year at both stations, but noticeably increased after the Ryan Fire of 2002 (Fig. 3). Overall average productivity at PODA for 1997-2008 was 19%. Average productivity 1997-2001 was 14%, whereas during 2007-2008 it averaged 26%, although productivity was notable lower in 2009 compared with the previous 2 years. Whether these increases were due to changes in climatic conditions, habitat changes related to the Ryan Fire, or perhaps competitive release could not be determined.

Figure 3. Proportion of newly banded and unbanded birds that were classified as hatch year each year at PODA.



Capture Histories

Although 50 different species were banded at PODA, only 10 were recaptured in years subsequent to the first time they were captured. Most birds were only captured the following year, and only 6 birds of 5 species were captured more than 1 year following capture (Table 3). No birds banded during the 1997-2001 period were recaptured during the 2007-2009 period. Those low recapture rates are in marked contrast to capture histories from EMPI (see below).

Table 3. Average capture histories for birds captured at least 1 year after their initial year of capture at PODA.

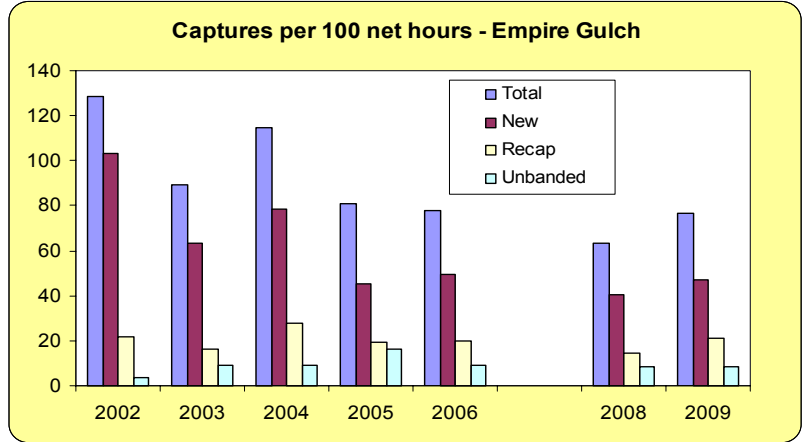
Species	Total banded (1997-2009)	Number recaptured	Average Years Between Captures	Maximum Years Between Captures	Multi-year Recapture Rate
Ash-throated Flycatcher	57	2	2	3	4%
Rufous-crowned Sparrow	46	4	2	3	9%
Blue Grosbeak	22	2	1	2	9%
Black Phoebe	20	1	1	1	5%
Bridled Titmouse	5	1	1	1	5%
Bewick's Wren	33	5	1	2	15%
Black-headed Grosbeak	36	2	1	1	6%
Bushtit	24	3	1	2	13%
Red-winged Blackbird	2	1	1	1	50%
Spotted Towhee	9	1	1	1	11%
Total	254	22	1	3	9%

EMPI

Capture Rates

During 2002-2009, 2679 net hours were accrued at EMPI, resulting in 2357 captures (including 1569 new captures, 526 recaptures, and 260 unbanded birds). Overall capture rate was 90 birds per 100 net hours. Capture rates fluctuated a bit, but were higher during 2002-2004 than during 2008-2009 (Fig. 4).

Figure 4. Captures per 100 net hours at the Empire Gulch (EMPI) banding station, LCNCA. Note differences in scale from Fig 2.



At EMPI, 71 different species were captured, for a total of 2357 individuals. The number of species captured each season ranged from 30-44 (Table 2). The 5 most commonly captured species were Lucy’s Warblers, Blue Grosbeaks, Common Yellowthroats, Yellow Warblers, and Black-chinned Hummingbirds (Appendix II).

Productivity

Productivity, as measured by the proportion of total new captures comprised of hatch-year birds, rose steadily until 2005, dropped markedly in 2006, and then rose again during 2008 and 2009 (Fig. 3). Overall productivity averaged 17%, slightly lower than PODA. It is possible that annual variations in productivity relate to precipitation (through its effects on primary productivity and insect populations) but that is beyond the scope of this report.

Capture Histories

Although 65 different species were banded at EMPI, only 19 species were recaptured in years subsequent to the first time they were captured. Seven of these species had individuals that were recaptured 5 or more years from their first captures (Table 4). In general, recapture rates were much higher than at PODA; whether this reflects differences in site fidelity or survivorship could not be determined. Interestingly, the species with the most captures, Lucy’s Warblers, had only 4 recaptures.

Table 4. Average capture histories for birds captured at least 1 year after their initial year of capture at EMPI.

Species	Total banded (2002-2009)	Number recaptured	Average years between recaptures	Maximum years between recaptures	Multi-year Recapture rate
Abert's Towhee	13	1	1	1	8%
Canyon Towhee	8	4	2	3	50%
Song Sparrow	38	11	3	5	29%
Black Phoebe	30	1	1	1	3%
Yellow-breasted Chat	93	19	3	6	20%
House Finch	86	2	1	1	2%
Blue Grosbeak	177	9	3	6	5%
Rufous-crowned Sparrow	23	4	3	4	17%
Bewick's Wren	42	8	1	1	19%
Bridled Titmouse	14	2	2	2	14%
Summer Tanager	60	17	2	5	28%
Northern Cardinal	7	3	2	3	43%
Brown-headed Cowbird	10	2	3	5	20%
White-breasted Nuthatch	11	1	1	1	9%
Lucy's Warbler	221	4	2	4	2%
Lesser Goldfinch	91	3	2	4	3%
Common Yellowthroat	160	28	2	5	18%
Yellow Warbler	134	7	2	5	5%
Bell's Vireo	21	2	2	3	10%
Total	1239	128	2	6	10%

Conclusions

There were substantial differences in capture rates, species diversity, productivity, and capture histories between sites. Although species diversity declined, capture rates and productivity

increased over time at PODA. However, although still substantially higher than PODA, capture rates and species diversity appear to be declining at EMPI. Bird banding following the MAPS protocol is labor intensive, and at times controversial, but it allows rigorous collection of data not readily available via other means. As most stations require volunteer time, they also provide a means for the general public to be involved in science.

The number of volunteers varied among years and between sites. In general, the low capture rate at PODA meant that the station could be operated with as few as 2 individuals (including 1 bander). Higher capture rates at EMPI meant that it took at least 4 people to operate the station and make sure birds were processed as quickly as possible. During 2009, up to 6 different volunteers contributed 136.5 volunteer hours at PODA, and up to 9 different volunteers contributed 272 volunteer hours at EMPI.

Literature Cited

- DeSante, D.F. 2000. Patterns of productivity and survivorship from the MAPS Program. Pp.166-177 In: Bonney, R. D.N. Pashley, R.J. Cooper, and L. Niles (eds.) *Strategies for Bird Conservation: the Partners in Flight Planning Process*. Proceedings of the Third Partners in Flight Workshop; 1995 October 1-5; Cape May, NJ. Proceedings RMRS-P-16. Ogden, UT: USDA, Forest Service, Rocky Mountain Research Station.
- DeSante, D.F., Burton, K.M., Velez, P., Froehlich, D., and Kaschube, D. MAPS manual, 2007 Protocol. Institute for Bird Populations, Point Reyes Station, Calif.
- DeSante, D.F., Nott, M.P., and O'Grady, D.R. 2001. Identifying the proximate demographic cause(s) of population change by modelling spatial variation in productivity, survivorship, and population trends. *Ardea* 89(special issue): 185-207.
- Pyle, P. 1997. *Identification Guide to North American Birds, Part I*. Slate Creek Press, Bolinas, Calif.

Appendix I. Species list of birds captured at PODA (1997-2009).

Species only captured before the Ryan fire (2002) are represented by green text, those only after the fire in red text, and those captured both pre- and post-fire are represented in black text. Counts included newly banded and unbanded birds, but not recaptures.

Species	1997	1998	1999	2000	2001	2007	2008	2009
Acorn Woodpecker		2						1
Ash-throated Flycatcher	7	8	6	3	4	11	15	5
Brown-crested Flycatcher						3	1	
Black-chinned Hummingbird	8	9	3	13	12	6	3	5
Bell's Vireo		1		1				
Bewick's Wren	2	4	1	4	6	7	5	5
Black-headed Grosbeak	2	6	1	6	6	5	5	3
Blue Grosbeak	2	6	1	2	2	2	1	4
Black Phoebe	4	3	4	2	4	4	1	
Botteri's Sparrow					1			
Bridled Titmouse	4		1	2	1	1		
Broad-tailed Hummingbird				2				
Bushtit		1	6	2	7	6	5	
Cassin's Kingbird					1	1	2	
Cassin's Sparrow							3	1
Canyon Towhee	3	2		4	3	1	3	1
Curve-billed Thrasher					1	3	4	
Common Yellowthroat	2	2	1	1	6			
Crissal Thrasher	1							
Dusky-capped Flycatcher	1							
Gambel's Quail				1				
Gray Flycatcher				1				
Green-tailed Towhee			1					
House Finch	1				1			1
Indigo Bunting		1	1					
Inca Dove		1						
Lark Sparrow	1							
Ladder-backed Woodpecker	2		2	2			1	
Lesser Goldfinch		2			1	4		
Lucy's Warbler	1	1		2			1	
Mexican Jay	4	2			1	1		
Mourning Dove	1	1						
Montezuma Quail					1			
Northern Mockingbird	1	3					4	
Orange-crowned Warbler					1			
Phainopepla					14		1	
Rufous-crowned Sparrow	5	10	3	4		16	5	5
Rock Wren							1	
Red-shafted Flicker	1	3		1				
Rufous Hummingbird	1					1		
Red-winged Blackbird	1	1						
Scott's Oriole	1			2				

Species	1997	1998	1999	2000	2001	2007	2008	2009
Spotted Towhee		1	4	3	2			
Summer Tanager	1		2	1	5			
Tropical Kingbird				1				
Varied Bunting						1		
Warbling Vireo				1				
White-breasted Nuthatch			2	1		2		
Western Flycatcher	1	1	2	4				
Western Kingbird	1							
Western Tanager	1	1						
Western Wood-pewee	1							
Willow Flycatcher				2				
White-winged Dove						1		
Yellow-billed Cuckoo					3			
Yellow Warbler				1	2			
Total Individuals	63	72	41	67	87	78	64	31
Total Species	28	24	17	27	23	19	18	10

Appendix II. Species list of birds captured at EMPI (2002-2009). MAPS banding did not take place during 2007. Counts included newly banded and unbanded birds, but not recaptures.

Species	2002	2003	2004	2005	2006	2008	2009
Abert's Towhee			5	4		4	2
American Redstart			1				
Ash-throated Flycatcher		2	4				
Audubon's Warbler			1				
Brown-crested Flycatcher		1					1
Black-chinned Hummingbird	6	32	20	18	15	19	7
Bell's Vireo	1	4	3	7	3	2	1
Bewick's Wren	2	7	9	13	6	5	6
Brown-headed Cowbird	2	2	3	2	1	1	
Black-headed Grosbeak	1	2	6	5	1		7
Blackburnian Warbler					1		
Blue Grosbeak	28	44	36	37	18	12	15
Black Phoebe	3	1	3	7	3	8	5
Botteri's Sparrow	1						
Bridled Titmouse		5	2	6			1
Black-throated Sparrow			1				1
Black-throated Gray Warbler		1	1				
Bullock's Oriole			1	1	1		
Canyon Towhee		6	3	1		1	
Canyon Wren			1				
Cassin's Sparrow						2	1
Chipping Sparrow	2						
Cordilleran Flycatcher	2						
Common Ground-dove	3	3	1	5	5	3	2
Common Yellowthroat	46	35	16	24	17	15	23
Dusky Flycatcher		3					
Eastern WoodPewee							1
Gila Woodpecker				1		1	3
Greater Roadrunner				1			
Hammond's Flycatcher		2					
House Finch	18	15	20	12	10	8	4
Hooded Oriole					1		
Hooded Warbler			1		2		1
Lark Sparrow		8			15		
Lazuli Bunting	2	4	5	2	2	1	1
Ladder-backed Woodpecker		1	2				
Lesser Goldfinch	16	5	33	11	15	11	3
Lucy's Warbler	41	48	56	58	27	18	14
Magnolia Warbler	1						
MacGillivray's Warbler		3	8	2	8	1	
Nashville Warbler			1				
Northern Cardinal		1	1	2	1		2
Northern Mockingbird					3	1	

Species	2002	2003	2004	2005	2006	2008	2009
Ovenbird			2		2		
Painted Bunting				2			
Painted Redstart			1				
Phainopepla			1				
Pine Siskin					1		
Rufous-crowned Sparrow	2	3	10	1	2		8
Red-shafted Flicker				1			
Song Sparrow	14	6	2	9	4	5	5
Summer Tanager	12	15	4	7	7	7	9
Swainson's Thrush		6		3	5	1	1
Townsend's Warbler		1					
Unknown Flycatcher							1
Unknown Hummingbird							1
Unknown Sparrow						1	
Unknown Thrush						4	
Varied Bunting		2	2			2	
Violet-crowned Hummingbird		1					
Vermillion Flycatcher			1	3	2	1	3
Verdin	2	1	2	2	5		
Warbling Vireo	2	4	4	1	6	1	
White-breasted Nuthatch	2	4		3		4	
Western Flycatcher	3	6	4	1	8	3	2
Western Screech Owl				2			
Western Tanager	2	5	5		2	4	
Western Wood-pewee	4	1			4		
Willow Flycatcher	1		2		1	1	
Wilson's Warbler	1	9	15	4	12	6	3
White-winged Dove						1	1
Yellow-breasted Chat	20	21	14	10	11	10	12
Yellow-billed Cuckoo						1	
Yellow Warbler	10	34	24	12	16	19	28
Total Individuals	250	354	336	293	245	185	176
Total Species*	30	40	44	36	38	34	31

*Not including unknown species.

Appendix III. Breeding status (BRSTAT) information for PODA.

Breeding status information for each species captured, seen, or heard at the MAPS station. Breeding status data collected 1997-2001, 2008-2009.

Species	BRSTAT	Species	BRSTAT	Species	BRSTAT
Great Blue Heron	T	Willow Flycatcher	M	Orange-crowned Warbler	M
Turkey Vulture	T	Gray Flycatcher	T	Lucy's Warbler	O
Mexican Duck	O	Western Flycatcher	T	Yellow Warbler	T
Red-tailed Hawk	O	Black Phoebe	U	Common Yellowthroat	U
Wild Turkey	O	Dusky-capped Flycatcher	T	Summer Tanager	U
Mountain Quail	T	Ash-throated Flycatcher	U	Western Tanager	O
Gambel's Quail	O	Brown-Crested Flycatcher	T	Green-tailed Towhee	M
Montezuma Quail	O	Tropical Kingbird	T	Spotted Towhee	O
Spotted Sandpiper	T	Cassin's Kingbird	O	Canyon Towhee	U
White-winged Dove	O	Western Kingbird	O	Cassin's Sparrow	T
Mourning Dove	U	Bell's Vireo	T	Botteri's Sparrow	O
Inca Dove	T	Plumbeous Vireo	T	Rufous-crowned Sparrow	U
Common Ground-dove	O	Warbling Vireo	T	Lark Sparrow	O
Yellow-billed Cuckoo	O	Mexican Jay	U	Grasshopper Sparrow	T
Greater Roadrunner	O	Common Raven	O	Black-headed Grosbeak	U
Great Horned Owl	T	Bridled Titmouse	U	Blue Grosbeak	B
Common Nighthawk	U	Bushtit	U	Indigo Bunting	T
Common Poorwill	T	White-breasted Nuthatch	O	Varied Bunting	-
Black-chinned Hummingbird	U	Rock Wren	T	Red-winged Blackbird	O
Broad-tailed Hummingbird	T	Bewick's Wren	B	Eastern Meadowlark	O
Rufous Hummingbird	M	Eastern Bluebird	M	Brown-headed Cowbird	U
Acorn Woodpecker	O	American Robin	T	Bullock's Oriole	T
Ladder-backed Woodpecker	U	Northern Mockingbird	U	Scott's Oriole	O
Red-shafted Flicker	O	Curve-billed Thrasher	O	House Finch	O
Western Wood-Pewee	O	Crissal Thrasher	T	Lesser Goldfinch	O
"Traill's" Flycatcher	T	Phainopepla	O		

Cumulative, composite breeding status determination. BRSTAT codes represent the summary status of each species' annual breeding status codes over the range of years during which the MAPS station was operated. The BRSTAT codes are defined as follows:

B - Regular breeder. Summer resident or suspected summer resident during all years the station was operated.

U - Usual breeder. Summer resident or suspected summer resident for more than 1/2 of the years the station was operated, but not all years.

O - Occasional breeder. Summer resident or suspected summer resident for 1/2 or fewer of the years the station was operated.

T - Transient. The station lies within the species' breeding range, but no individual of the species was a summer resident at that station during any year.

A - Altitudinal disperser. A species which breeds only at lower elevations than that of the station and which disperses to higher elevations after breeding.

M - Migrant. The station falls outside of the species' normal breeding range.

Appendix IV. Breeding status information for EMPI.

Breeding status information for each species captured, seen, or heard at the MAPS station. Breeding status data collected 2002-2009.

Species	BRSTAT	Species	BRSTAT	Species	BRSTAT
Great Blue Heron	T	Black Phoebe	B	Ovenbird	M
Turkey Vulture	O	Vermillion Flycatcher	O	MacGillivray's Warbler	M
Cooper's Hawk	O	Dusky-capped Flycatcher	T	Common Yellowthroat	B
Gray Hawk	T	Ash-throated Flycatcher	U	Hooded Warbler	M
Zone-tailed Hawk	T	Brown-crested Flycatcher	O	Wilson's Warbler	M
Red-Tailed Hawk	T	Cassin's Kingbird	U	Yellow-breasted Chat	B
American Kestrel	T	Western Kingbird	O	Summer Tanager	B
White-winged Dove	O	Bell's Vireo	U	Western Tanager	M
Mourning Dove	O	Warbling Vireo	O	Green-tailed Towhee	O
Common Ground-dove	U	Chihuahuan Raven	T	Canyon Towhee	U
Yellow-billed Cuckoo	U	Common Raven	T	Abert's Towhee	O
Greater Roadrunner	T	Violet-green Swallow	T	Cassin's Sparrow	O
Western Screech Owl	T	Bridled Titmouse	O	Botteri's Sparrow	T
Great Horned Owl	T	Verdin	O	Rufous-crowned Sparrow	U
Common Nighthawk	T	Bushtit	T	Lark Sparrow	O
Violet-crowned Hummingbird	T	White-breasted Nuthatch	U	Black-throated Sparrow	T
Black-chinned Hummingbird	B	Canyon Wren	T	Song Sparrow	B
Gila Woodpecker	O	Bewick's Wren	B	Northern Cardinal	U
Ladder-backed Woodpecker	O	Blue-gray Gnatcatcher	T	Black-headed Grosbeak	O
Red-shafted Flicker	U	Swainson's Thrush	M	Blue Grosbeak	B
Gilded Flicker	T	Northern Mockingbird	O	Lazuli Bunting	M
Western Wood-pewee	O	Phainopepla	O	Varied Bunting	T
Eastern Wood-pewee	T	Lucy's Warbler	B	Painted Bunting	M
"Traill's" Flycatcher	M	Yellow Warbler	B	Great-tailed Grackle	T
Willow Flycatcher	M	Magnolia Warbler	M	Brown-headed Cowbird	U
Hammond's Flycatcher	T	Audubon's Warbler	M	Hooded Oriole	T
Dusky Flycatcher	T	Black-throated Gray Warbler	T	Bullock's Oriole	T
Cordilleran Flycatcher	O	Townsend's Warbler	M	House Finch	B
"Western" Flycatcher	O	Black-throated Blue Warbler	M	Pine Siskin	M
		American Redstart	M	Lesser Goldfinch	B

Cumulative, composite breeding status determination. BRSTAT codes represent the summary status of each species' annual breeding status codes over the range of years during which the MAPS station was operated. The BRSTAT codes are defined as follows:

B - Regular breeder. Summer resident or suspected summer resident during all years the station was operated.

U - Usual breeder. Summer resident or suspected summer resident for more than 1/2 of the years the station was operated, but not all years.

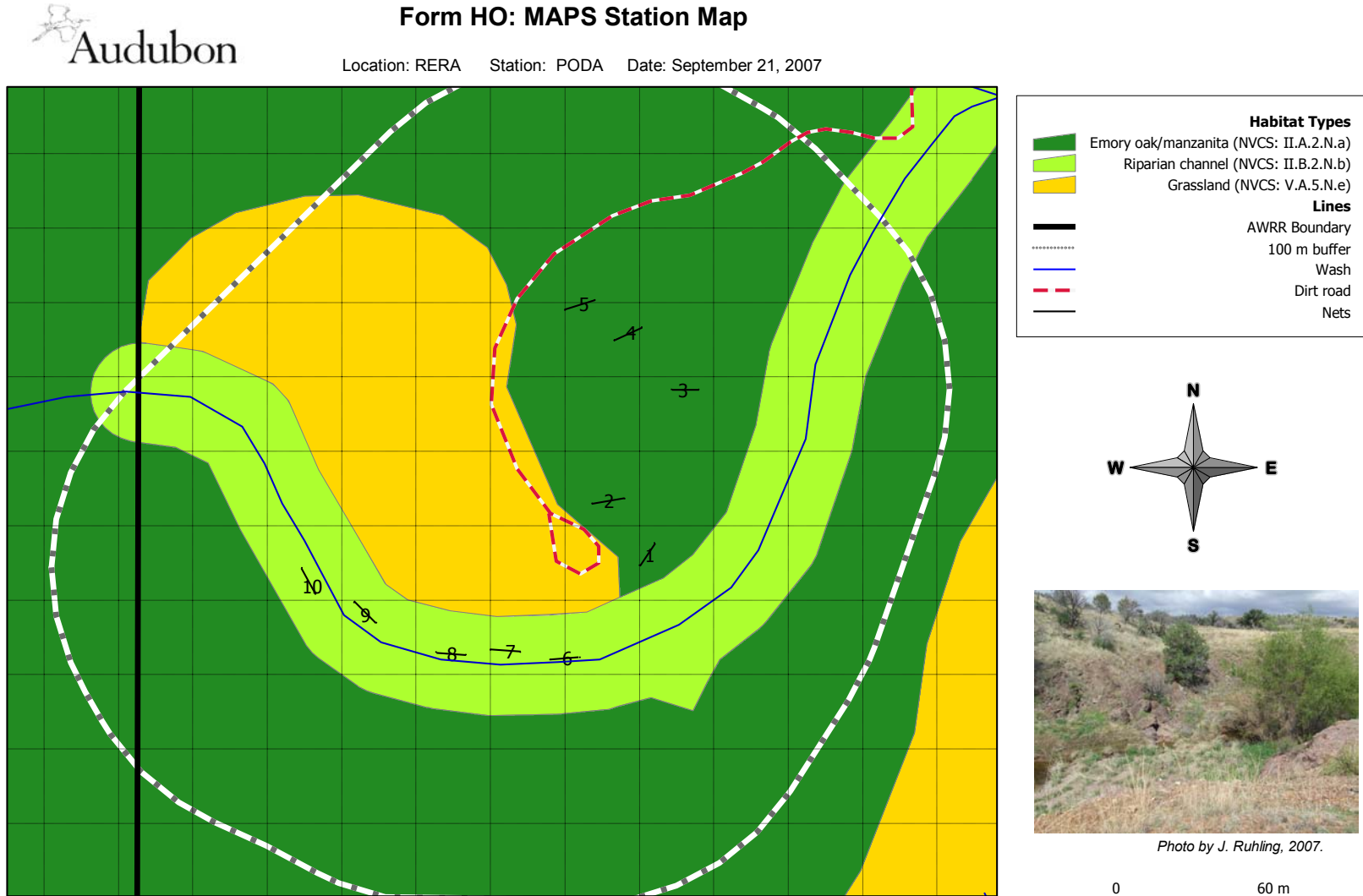
O - Occasional breeder. Summer resident or suspected summer resident for 1/2 or fewer of the years the station was operated.

T - Transient. The station lies within the species' breeding range, but no individual of the species was a summer resident at that station during any year.

A - Altitudinal disperser. A species which breeds only at lower elevations than that of the station and which disperses to higher elevations after breeding.

M - Migrant. The station falls outside of the species' normal breeding range.

Appendix V. Habitat map for PODA banding station. Data collected in 2007 by L. Kennedy.



Universal Transverse Mercator - Zone 12 (N)
North American 1927 (mean for CONUS)
Page Center: 544944.69 m E; 3493673.76 m N

Scale: 1:2100

12/17/2008

Appendix VI. Habitat map for EMPI banding station. Data collected in 2008 by L. Kennedy.

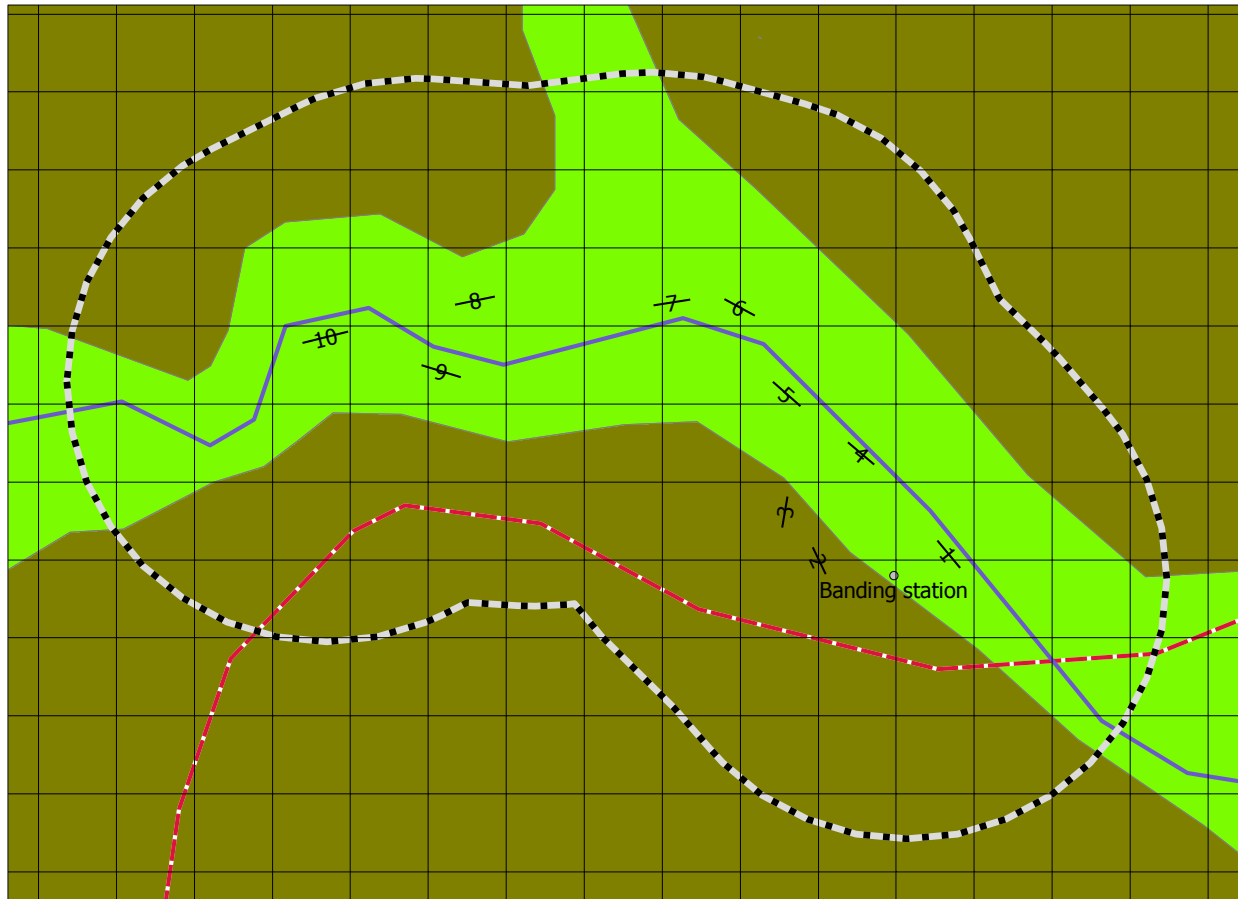


Form HO: MAPS Station Map

Location: RERA

Station: EMPI

Date: July 6, 2008



Habitat Types

- Mesquite (NVCS: III.B.3.N.a)
- Cottonwood (NVCS: III.B.2.N.c)

Lines

- 100 m buffer
- Empire Gulch
- EC910 (dirt road)
- Nets

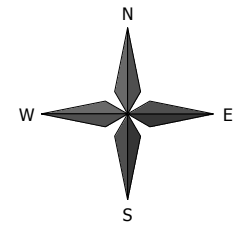


Photo by L. Kennedy, 2008.



Scale: 1:1600

12/17/2008

Universal Transverse Mercator - Zone 12 (N)
North American 1927 (mean for CONUS)
Page Center: 534466.36 m E; 3516783.56 m N