

LOOKING BACKWARD Dec. 31—Jan.1, 2017

This is the year the drought was at least put on “pause.” In northern and central California most stations received record or near-record high precipitation. Recall that the drought years were consistently good for most Valley butterflies, many of which recovered to levels seen before the systematic decline that began in the late 90s. But the butterfly seasons at higher elevations varied from mediocre to awful, with species failing to be recorded in entire years at most sites. Hypothesizing that the mountain problems were due to lack of snow cover and the insulation it affords, I might have been expected to predict a bumper crop of butterflies in the Sierra after one of the snowiest winters ever. But I didn’t. I reasoned that population levels were so depressed after 4-5 successive drought years that even greatly-enhanced overwinter survival could scarcely make a dent in the deficit. Nearly all high-elevation species are single-brooded, so even phenomenal breeding success during the warm months (and there was no reason to think that had been the case in summer 2016, with the vegetation still under drought stress) would require more than one year to pump up numbers going into overwintering. So I expected only very modest improvement—if any. And I expected at least some deterioration in the Valley as overwinter mortality surged in response to flooding and a very moist, pathogen-friendly environment even where there was no flooding. Unfortunately, I was right on both.

The number of site visits was down, due mostly to the late melt-out in the mountains. But the season was also truncated at the end. Unlike the similar snow pack of winter 1982-83, which took 3 seasons to melt off completely, the 2016-17 pack disappeared very rapidly in the face of a record or near-record warm Sierran summer; there was hardly any thunderstorm activity, and by autumn everything was very dry and shutting down. Site visit data:

Site:	Year:	2013	2014	2015	2016	2017
Suisun Marsh		31	32	32	31	32
Gates Canyon		32	30	33	31	31
West Sacramento		34	33	35	33	32
North Sacramento		32	33	33	33	33
Rancho Cordova		31	33	31	34	35
Washington		21	21	21	21	20
Lang Crossing		18	18	18	17	15
Donner Pass		18	21	22	15	16
Castle Peak		7	9	7	5	5
Sierra Valley		18	20	20	19	19

Totals: 233 250 252 239 238

Suisun and North Sacramento had persistent flooding in the most flood-prone areas. The west half of West Sacramento, west of the levee, lies in the Yolo Bypass flood basin and was under water until early summer. Usually there is a huge post-flood butterfly “boom” when the Bypass is recolonized, but it was somewhat muted this year. *Lycaena helloides* was eradicated in the Bypass and did not reappear until ix.11, but it built up good numbers in autumn. It had a bad year at all low-elevation sites. *Brephidium exile* was eradicated at Suisun and did not reappear until ix.1. It did not recover, and had its worst year ever at Suisun, peaking at only 124 animals on x.31. It was first recorded in West Sacramento on viii.15 but actually built up quite a dense population in autumn, peaking at 203 on x.29. All its breeding there was on *Atriplex triangularis* (= *A. patula* var. *hastata*) with none at all observed on *Salsola*. *Polites sabuleti*, which had nearly blinked out in 2016, apparently went extinct in West Sacramento in 2017—not due to flooding. *Lerodea eufala* was very low everywhere.

Both *Everes comyntas* and *Plebejus acmon* had poor years at all low-elevation sites. *Pieris rapae* had a robust but hardly record-setting year. *Colias eurytheme* – after very poor performance during the drought years and a recovery in summer 2016 – had an old-fashioned “outbreak” in alfalfa in late viii-early ix, but the expected repeat in x never happened.

As usual after wet years, emergence dates were a bit later than during the drought. In the Sierra, however, the rapid melt-out made them less late than in previous very heavy snow years. In the Valley we initially had 23 index phenology species. Two of those became extinct at our sites, and a third was not seen in the Valley this year. That leaves 20 species for comparison. Of these, 6 were earlier in 2017 than in 2016, an average of 15 days earlier, while 13 were later, an average of 16 days later, and one was unchanged. For the entire set, an average species was 6.1 days later in 2017 than in 2016. *Lycaena helloides* distorted the late calculation, having been 75 days later than last year (vii.18.17 vs. v.4.16) due to flooding. If it is not counted, the average late species was only 11 days later in 2017, and the average species overall was only 3.6 days later.

*Phyciodes campestris* and *Euchloe ausonides* remain apparently extinct from my low-elevation transect sites. They had been index species.

MIGRATORS: *Nymphalis californica* had returned from limbo last year, and the trend continued. Mass migrations were observed at Mt. Shasta and Lassen at the usual time in early-midsummer, but only moderate numbers were seen this far south. Day-positives were quite similar to last year:

Year	LC	DP	WA	SV	CP	Total
2012	3	3	4	1	4	15
2013	2	4	9	0	5	20

2014	3	3	8	0	5	19
2015	4	3	8	0	1	16
2016	3	7	7	3	3	23
2017	5	5	7	1	5	23

The autumn downslope migration was noted, with observations in Rancho Cordova on x.4 and (apparently a hibernator) xi.17 and xii.8. None was seen at GC in fall.

The Painted Lady, *Vanessa cardui*, had a moderate northward migration that began late – March into April – and consisted of very mixed phenotypes, suggesting a blend of desert-born individuals and ones born farther north due to earlier movements. The southward migration in autumn was nearly absent at rabbitbrush in the Sierra and on the east side, but very strong near the coast (observe Gates and Suisun data):

For each site the first number is the total counted before viii.1 and the second, after.

Site:	2012	2013	2014	2015	2016	2017
RC	37, 10	25,45	106,4	269,1	25,6	72,10
GC	15,19	9,35	121,4	236,2	22,3	63,67
WS	44,18	27,37	116,7	360,3	22,11	72,26
NS	55,22	32,38	140,2	431,3	31,6	86,26
SM	35,42	20,77	159,16	388,12	32,17	22,68
Totals	186,111	113,232	642,33	1664,21	132,43	315,197

Numbers were poor in the mountains all season. On the other hand, it was an excellent year for *V. virginiensis* – at all elevations.

The Buckeye, *Junonia coenia*, continued its pattern of peaking in summer and dropping off in autumn (when it used to peak). In the Sierra it was recorded at Lang from v.20 to ix.14; Donner, viii.8 only; Castle, ix.10 only; and Sierra Valley, v.18-x.15. The suggestion is that it overwintered successfully at 5000' on both slopes. Low-elevation counts:

Site	2012	2013	2014	2015	2016	2017
RC	93	143	173	350	249	193
GC	69	63	196	269	254	184
WS	74	188	247	634	876	857
NS	153	395	483	1274	776	941

SM	101	95	132	391	244	175
Totals	490	884	1231	3818	2399	2350

The excellent numbers at WS and NS came despite a late start due to flooding.

Numbers of Monarchs (*Danaus plexippus*) were surprisingly close to last year's:

Site	2016	2017
RC	7	9
GC	14	16
WS	19	14
NS	11	3
SM	29	27
Totals	80	69

Breeding was, as usual, very sporadic and less conspicuous at all my sites than last year. The first Valley record was ii.22.17, 4 days earlier than last year. Monarchs were seen in the Sierra thus: WA viii.21; LC vi.18 and vii.1; none at DP; CP, ix.10 and SV, vi.17, viii.24 and ix.5.

I have paid special attention to the Fiery Skipper (*Hylephila phyleus*) because it is a preferred prey of the naturalized European Paper Wasp (*Polistes dominula*). Wasp populations, which had been very low, rose slightly early in the season but then crashed to the threshold of detectability in late summer-early autumn (peak Fiery Skipper season). There was no trend apparent in any case:

Site	2012	2013	2014	2015	2016	2017
RC	202	273	196	171	144	181
GC	26	34	22	69	30	23
WS	325	229	185	328	339	309
NS	351	444	325	454	308	517
SM	400	392	628	534	438	283
Totals:	1304	1472	1356	1556	1259	1313

Now for the things in trouble regionally!

*Satyrium* species all count as in trouble at low elevations.

*S. sylvinus*: WS 2012:0 2013:7 2014:0 2015:4 2016:4 2017:11

NS 2012:20 2013:22 2014:44 2015:10 2016:83 2017:107

GC 2012:8 2013:5 2014:4 2015:10 2016:2 2017:16

*S. californica*: GC 2012:13 2013:16 2014:40 2015:61 2016:102 2017:88

RC 2012:2 2013:6 2014:4 2015:4 2016:34 2017:27

*S. tetra*: GC 2012:2 2013:1 2014:0 2015:3 2016:1 2017:2

*S. auretteorum*: GC 2012:3 2013:9 2014:17 2015:7 2016:25 2017:15

*S. saepium*: GC 2012:3 2013:3 2014:2 2015:3 2016:6 2017:5

All *Satyrium* had a terrible year again in the Sierra, as shown by these day-positive totals:

*sylvinus*, 1 each at WA and LC, 3 at DP

*californica*, 1 each at WA and SV, 2 at LC; *auretteorum*, 1 at LC; *saepium*, 1 at DP, 2 each at WA, LC and SV; *behrii*, 1 at DP, 2 at SV;

*fuliginosum*, 1 at DP, 2 at CP; *tetra*, 2 at SV. These are comparable to 2016.

*Ochlodes yuma* remained stable at 4 seen each in 2016 and 2017 at SM.

*Lycaena xanthoides*:

NS 2012:5 2013:12 2014:31 2015:22 2016:12 2017:11

WS (none since 1 in 2014)

SM 2012:4 2013:4 2014:1 2015:2 2016:0 2017:2

*Glaucopsyche lygdamus*:

NS 2012:0 2013:12 2014:3 2015:8 2016:49 2017:5

RC 2012:15 2013:4 2014:6 2015:125 2016:137 2017:40

*Pyrgus scriptura*:

NS 2012:0 2013:1 2014:0 2015:1 2016:1 2017:0

WS 2012:38 2013:29 2014:35 2015:55 2016:189 2017:48

SM 2012:2 2013:3 2014:8 2015:13 2016:41 2017:21

*Pholisora catullus*:

WS 2012:37 2013:23 2014:17 2015:71 2016:29 2017:39

NS 2012:4 2013:5 2014:0 2015:1 2016:0 2017:1

The records in Davis and SM last year were not repeated.

Here are the skippers that have been on the upswing lately:

*Erynnis tristis:*

RC 2012:10 2013:24 2014:25 2015:32 2016:37 2017:45

SM 2012:1 2013:9 2014:20 2015:50 2016:42 2017:18

WS 2012:9 2013:42 2014:31 2015:76 2016:126 2017:97

NS 2012:59 2013:42 2014:31 2015:88 2016:125 2017:76

GC 2012:27 2013:31 2014:12 2015:66 2016:62 2017:44

*Ochlodes sylvanoides:*

Site	2012	2013	2014	2015	2016	2017
GC	161	229	81	99	108	224
WS	18	13	4	1	1	0
NS	59	69	20	20	25	18
RC	89	83	191	116	173	77
SM	40	11	50	30	34	13
Totals:	367	405	346	266	341	332

At RC, this species was exterminated on the gravel bars by flooding and only survived in the uplands.

*Poanes melane:*

GC	85	79	47	54	52	12
WS	20	7	1	3	7	3
NS	20	29	16	13	14	12
RC	2	4	4	5	6	9
SM	3	6	1	5	3	8
Totals;	130	125	69	80	82	44

Lorquin's Admiral, *Limenitis lorquini*, had been on a roll but was exterminated at RC and possibly at NS by flooding, only reappearing late in the season; it appears

Overwintering larvae took a bad hit everywhere:

RC	2012:8	2013:34	2014:14	2015:29	2016:36	2017:2
GC	2012:38	2013:67	2014:38	2015:47	2016:69	2017:17
WS	2012:37	2013:61	2014:21	2015:31	2016:54	2017:15
NS	2012:6	2013:11	2014:29	2015:26	2016:23	2017:14
Totals:	90	173	102	133	182	48

The Variable Checkerspot, *Euphydryas chalcedona*, had 6 sightings at GC in 2017, down 1 from 2016.

The Mourning Cloak, *Nymphalis antiopa*, virtually disappeared from the Valley in 2017 but was incredibly abundant at GC in late winter:

RC	2012:22	2013:4	2014:12	2015:6	2016:3	2017:0
SM	2012:2	2013:1	2014:1	2015:0	2016:0	2017:0
WS	2012:5	2013:10	2014:12	2015:2	2016:1	2017:1
NS	2012:15	2013:10	2014:3	2015:4	2016:1	2017:3
GC	2012:49	2013:40	2014:27	2015:20	2016:32	2017:71 (includes 2 in summer and 1 in xii)
Totals:	99	68	55	32	37	75

The Pygmy Blue, *Brephidium exile*, had a second straight terrible year. At Suisun it was extirpated by persistent flooding, reappeared very late and never recovered,

peaking on x.31 at only 124 individuals. However, at WS, where it also started late, it had a very good late "bloom" on *Atriplex triangularis*, peaking x.29 at 203 individuals.

The Western Tiger Swallowtail, *Papilio rutulus*, was down slightly:

SM	2012:12	2013:21	2014:22	2015:19	2016:28	2017:12
GC	2012:40	2013:90	2014:47	2015:94	2016:71	2017:79
WS	2012:44	2013:63	2014:27	2015:47	2016:75	2017:40
NS	2012:28	2013:25	2014:31	2015:38	2016:54	2017:57
RC	2012:42	2013:57	2014:46	2015:40	2016:75	2017:47
Totals:	166	256	173	238	303	235

The Pale Swallowtail, *Papilio eurymedon*:

GC	2012:70	2013:53	2014:8	2015:32	2016:51	2017:30
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And the Anise Swallowtail, *Papilio zelicaon*:

RC	2012:5	2013:4	2014:2	2015:2	2016:3	2017:7
SM	2012:58	2013:13	2014:27	2015:16	2016:50	2017:20
WS	2012:3	2013:4	2014:1	2015:3	2016:2	2017:3
NS	2012:20	2013:31	2014:18	2015:36	2016:44	2017:36
GC	2012:8	2013:3	2014:1	2015:2	2016:5	2017:2
Totals:	94	55	49	59	104	68

And the Gulf Fritillary, *Agraulis vanillae*, despite the lack of killer freezes, had a rather poor year:

RC	2012:5	2013:18	2014:38	2015:12	2016:15	2017:10
WS	2012:0	2013:4	2014:12	2015:18	2016:16	2017:7
NS	2012:11	2013:16	2014:31	2015:38	2016:24	2017:18
SM	2012:0	2013:12	2014:18	2015:47	2016:47	2017:18
Totals:	16	50	99	115	102	53

Willow Slough (vii.4 as always) had 21 species and 571 bugs, vs. 23 and 913 last year. *Pieris rapae* had 324 individuals, down only 11 from 335 in 2016, while *Colias eurytheme* fell drastically from 326 to only 50. There was only 1 Pygmy Blue.

Overall: Not a catastrophic decline at low elevations, but indications of regressing toward the pre-drought condition of decline.

The recent tendency of holding numbers of species nearly flat all summer (as back in the 70s-80s) in the Valley held again this year, but species diversity was down somewhat. Here are the low-elevation species maxima by date for all sites in 2015, 2016 and 2017:

SM 20,x.8 and x.3.15;24, ix.3.16; 17.ix.13.17.

GC 30,v.1.15; 29, v.13.16; 26, vi.15.17.

WS 26, ix.25.15; 22, v.4 and ix.5.16; 19, ix.11.17.

NS 27, v.26.15; 24, vi.6.16; 21, vi.25.17.

RC 17, iii.25,x.7 and x.16.15; 21,vi.7.16;18, x.4.17.

Species diversity was horrid at the mountain sites, with few animals and quite a few species abnormally rare or just absent. Here are the maximum-diversity days for 2015, 16 and 17:



WA 24, v.2.15;25, v.11.16;25, vii.2.17.

LC 28, vii.1.15; 26, vi.24.16; 29, vi.3.17.

DP 37, vi.18.15;41, vi.30.16; 32, vii.19.17.

CP 37, vi.25.15; 34, vii.7.16; 24, viii.1.17.

The two most phenologically-bizarre records were *Plebejus saepiolus* at SV ix.26.17 and *Callophrys lemberti* on Castle Peak, viii.26.17. Nearly everything that was rare in 2016 was as rare—or rarer—in 2017. There was a very slight improvement in *Speyeria*. As noted earlier, flight seasons were short—it was not clear whether that was due to scarcity or compression of the season at both ends (late snowmelt at the beginning, early drying late—a bizarre and deadly combination!) or both. Nectar sources behaved erratically, with poor or poorly-synchronized blooms by *Eriogonum*, *Monardella*, *Aster*, *Apocynum* and *Chrysothamnus*.

A formal treatment of all of this is in the works for publication. Stay tuned. Meanwhile, it's hard to see any real bounceback in the Sierra in the next couple of seasons, whatever the weather does.