

LOOKING BACKWARD Dec. 31—Jan. 1, 2019

2018 was the single worst butterfly year since this project began. It was the only year when butterflies were at a low ebb both in numbers and diversity at BOTH high (SV,CP,DP,LC,WA) and low (RC,NS,WS,GC,SM) sites. Usually wet years are good in the mountains and bad in the Valley, and vice versa for dry years. In 2018 it was bad everywhere. So it should not be surprising if 2019 was a better year. The number of site visits held nearly constant, but the number at high elevations fell due to a late spring and meltout—partially compensated by more intense scrutiny at low elevations, especially late in the season:

Site	2016	2017	2018	2019
Suisun Marsh	31	32	31	33
Gates Canyon	31	31	32	31
West Sacramento	33	32	31	33
North Sacramento	33	33	30	33
Rancho Cordova	34	35	30	35
Washington	21	20	17	18
Lang Crossing	17	15	17	13
Donner Pass	15	16	20	15
Castle Peak	5	5	8	8
Sierra Valley	19	19	19	16
Totals:	239	238	235	235

The season can be tied to the strange rhythm of precipitation. The rains and snows started very late, so that in the high country there had already been freeze and desiccation damage due to the lack of snow cover before it finally materialized. But then snowfall was very heavy and persistent, yielding one of the top 5 to 10 seasonal snowfalls of record at Donner (depending on what sources one uses) and a late meltout. The early dryness would presage a poor butterfly year; the late snowiness a good one. The overwintering inocula were small due to cumulative negative population impacts still carrying over from the drought. But the two halves of the season traded off against each other, such that overall the high-elevation faunas showed improvement (with some notable exceptions, documented below). At low elevations some species showed dramatic increases while others either remained low or got worse. An interesting comparison not previously made here is the maximum number of species observed in any one sample during the year:

Site	2016	2017	2018	2019
Suisun Marsh	24	17	19	20
Gates Canyon	29	26	25	22

West Sacramento	22	18	18	21
North Sacramento	24	21	19	21
Rancho Cordova	21	16	15	17
Washington	25	25	26	20
Lang Crossing	26	29	30	26
Donner Pass	41	32	36	41
Castle Peak	34	24	30	29
Sierra Valley	26	22	19	24

(A longer-term compilation of this datum is available on request. Since 2002 the maxima are: SM 24 (2016); GC 37 (2004,2005); WS 22 (2005, 2016); NS 27 (2015); RC 21 (2016); WA 35 (2003); LC 42 (2013); DP 52 (2008); CP 48 (2003); SV 35 (2004). The interpretation of these data is complicated, because high numbers might reflect compression of the season due to a late/cold spring—but could also reflect larger numbers of species at or beyond the abundance threshold to be detected.)

In the Valley, the Yolo Bypass (WS) and the NS flood basins filled by midwinter and remained flooded into May. *Brephidium exile* and *Lycaena helloides* were extirpated and had very bad seasons; only one individual of *L. helloides* was recorded at WS in the entire year (vii.20)! Nearly all the low-elevation records of this species were at *Baccharis* in autumn. *B. exile*, wiped out at SM by flooding, was not recorded until vi.12. It peaked at a respectable 1016 on x.23 and then plummeted to 212 on xi.2, rose to 441 on xi.11, and then petered out to 2 on xii.23. Usually a Yolo Bypass flood is followed by a major midsummer rebound of the fauna, but that did not happen this year; though the number of species reached a typical high of 21, the maximum number of individuals peaked early—477 on vi.28—and was in the 200s during most of what is usually peak abundance season in autumn. NS was similar, peaking at 502 bugs on vii.7 and never exceeding 300 after viii.8. Two regionally-extinct or near-extinct species put in unexpected appearances: a *Euchloe ausonides* at SM on iv.22 and singletons of *Pholisora catullus* at NS on viii.19, ix.5 and x.18. It is known to be breeding in backyard gardens directly across the American River in Boulevard Park (a neighborhood).

For the indicator species in the Valley, phenologically it was a very late year. Of 21 species, 16 were later than in 2018 (range 1-124 days; mean 32.0 days) and 5 were earlier (range 2 to 60 days; mean 18.4 days). I included *Lycaena helloides* this time since it was extirpated in the Bypass both years. This again reflected the very wet late winter and delayed spring.

MIGRATORS: It was a major migration year for both the Painted Lady and the CA Tortoiseshell.

2018 had been (for whatever reason) the worst *Vanessa cardui* year on record in the Valley. 2019 was one of the best. We had advance warning of mass emergences and movements in late winter in southern California. The spring N-ward migration was protracted, in multiple waves. As a result breeding in the Valley was also protracted, and we had some animals all through the summer. The fall S-ward migration was sparse on both sides of the Sierra, however, and stragglers continued right through December.

The first number is the total counted up to viii.1 and the second is the number thereafter.

Site	2017	2018	2019
Rancho Cordova	72,10	3,0	3833, 8
Gates Canyon	63,67	2,1	544,8
West Sacramento	72,26	4,1	3301,29
North Sacramento	86,26	3,0	1765,12
Suisun Marsh	22,68	13,0	1807,17
Totals for year:	315,197	25,2	11250,74

Numbers were also good in the Sierra. *V. virginiensis* was less common than last year.

Nymphalis californica was strong all year. Both the early-summer migration to the N and NE and the end-of-summer migration to the S and SW were in the 100s of thousands if not millions. As is often the case, we do not know where they bred in the summer—only that clouds of them passed over the summit of Mt. Lassen heading S. Only day-positives are recorded here:

Site	2017	2018	2019
Lang Crossing	5	6	3
Donner Pass	5	11	13
Washington	7	10	6
Sierra Valley	1	2	3
Castle Peak	5	8	8
Totals:	23	37	33

One of the more striking tortie phenomena was the abundance of the species in the Valley during the downslope autumn migration, especially at NS where it set a site record. Singletons were recorded on vii.19 , viii.18 and viii.27; then 36 on ix.25 (puddling!), 3 on x.7 and 2 on x.18. there were 6 at Gates Canyon on ix.27 but none thereafter on into winter.

The Buckeye, *Junonia coenia*, had a better year than last but has not regained its numbers of prior years, especially during the drought. Once again it peaked in early summer, failing to produce its traditionally large autumn brood.

Site	2017	2018	2019
Rancho Cordova	193	55	141
Gates Canyon	184	58	83
West Sacramento	857	106	239
North Sacramento	941	109	98

Suisun Marsh	175	51	145
Totals:	2350	379	706

Last year was the worst Monarch (*Danaus plexippus*) year in the history of my transect—until this year.

Site	2017	2018	2019
Rancho Cordova	9	4	2
Gates Canyon	16	4	2
West Sacramento	14	3	1
North Sacramento	3	2	1
Suisun Marsh	27	12	3
Valley totals:	69	25	9

And in the Sierra (counts, not day-positives):

Washington	1	3	1
Lang Crossing	2	0	1
Donner Pass	0	5	0
Castle Peak	1	1	0
Sierra Valley:	2	2	1
Sierran totals:	6	11	3
Totals (all 10 sites):	75	36	12

For the second consecutive year, I never saw even a single wild larva! Not for not looking.

(Based on reports of breeding elsewhere, mostly S, I estimated in fall that the statewide population would increase by 2-4X. That was obviously not an extrapolation from these transect data!)

Desert immigrants were slightly more frequent than last year. *Phoebis sennae*: WS, V.23; SV, vi.16; *Leptotes marina*, SM,viii.30; NS, ix.5. A Queen was reported in Butte County (not by us!).

Other things in trouble regionally:

Satyrium sylvinus: West Sac 2017-11, 2018-2, 2019-1.

North Sac 2017-107, 2018-22, 2019-35.

Gates Canyon 2017-16, 2018-3, 2019-8.

Not usually recorded in Rancho—occasionally a singleton—but in 2019, 21!

Satyrium californica: Gates Canyon 2017-88, 2018-7, 2019-11.

Rancho Cordova 2017-27, 2018-6, 2019-11.

Satyrium tetra: Gates 2017-7, not seen since!

Satyrium auretorum: Gates 2017-15, 2018-1, 2019-1.

Satyrium saepium: Gates 2017-5, 2018-4, 2019-5.

In the Sierra the *Satyrium* remained very scarce, with slight improvements at LC and SV. At SV, *S. behrii* recorded vi.29,vii.11 and vii.22; *S. fuliginosum* not seen in 2019. *Euphilotes battoides*, not recorded at SV in 2018, was back (v.12). *E. enoptes* recovered at Donner (vii.25-viii.7).

No change in status of *Ochlodes yuma* at Suisun. *Lycaena xanthoides*: North Sac 2017-11, 2018-3, 2019-0. Suisun 2017-2, 2018-4, 2019-2.

Glaucopsyche lygdamus: North Sac 2017-5, 2018-33, 2019-3. Rancho Cordova 2017-40, 2018-18, 2019-29.

Pyrgus scriptura: West Sac 2017-48, 2018-31, 2018-15. Suisun 2017-21, 2018-8, 2019-4.

Pholisora catullus: West Sac 2017-39, 2018-12, 2019-30. North Sac 2017-1, 2018-1, 2019-3.

And now for stuff recently on the upswing!

Hylephila phyleus:

Site	2017	2018	2019
Rancho Cordova	181	127	198
Gates Canyon	23	7	4
West Sacramento	309	273	314
North Sacramento	517	369	354
Suisun Marsh	283	288	215
Totals:	1313	1064	1085

Erynnis tristis:

Rancho Cordova	45	46	160
Suisun Marsh	18	9	25
West Sacramento	97	50	73
North Sacramento	76	104	171
Gates Canyon	44	38	40
Totals:	280	247	479

Ochlodes sylvanoides:

Gates Canyon	224	163	172
West Sacramento	0	1	5
North Sacramento	18	11	81
Rancho Cordova	77	84	202
Suisun Marsh	13	11	46
Totals:	332	269	506

Poanes melane:

Gates Canyon	12	39	33
West Sacramento	3	3	13
North Sacramento	12	36	11
Rancho Cordova	9	15	11
Suisun Marsh	8	4	12
Totals:	44	58	80

Limenitis lorquini:

Rancho Cordova	2	10	13
Gates Canyon	17	29	44
West Sacramento	15	26	50
North Sacramento	14	4	18
Totals:	48	60	125

Euphydryas chalcedona:

Gates Canyon	6	21	20
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Nymphalis antiopa:

Rancho Cordova	0	4	6
Suisun Marsh	0	7	1
West Sacramento	2	7	1
North Sacramento	3	9	6
Gates Canyon	71	58	21
Totals:	76	85	35

Papilio rutulus:

Suisun Marsh	12	6	30
Gates Canyon	79	73	64
West Sacramento	40	28	36
North Sacramento	57	24	68
Rancho Cordova	47	60	55
Totals:	235	190	253

Papilio eurymedon:

Gates Canyon	30	15	8
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Papilio zelicaon:

Rancho Cordova	7	2	1
Suisun Marsh	20	22	16
West Sacramento	3	2	0
North Sacramento	36	9	18
Gates Canyon	2	3	5
Totals:	68	38	40

Agraulis vanillae:

Rancho Cordova	10	5	9
West Sacramento	7	3	15
North Sacramento	18	11	13
Suisun Marsh	18	8	22
Totals:	53	27	59

In the Sierra, *Oeneis ivallda* returned on Castle Peak (one seen on vii.22); *Neophasia menapia* returned at LC and DP; *Satyrium behrii* and *Euphilotes battoides* returned at SV; and *Cercyonis oetus* again was not seen at CP, despite late-season forays for it. Overall, numbers of most things were up in the Sierra compared to last year, but the prognosis for next year is guarded because of the near-total failure of the summer monsoon. In the first half of summer, soil moisture was good thanks to the late snowmelt. But by late summer much of the Sierran vegetation was drought-stressed—albeit nowhere near the way it was during the drought, or in 2002. That is, the overwinter inoculum is likely to be moderate, and its survivorship will depend on the snow season. The Sierran sites that showed declines beyond 2018 were Washington and Sierra Valley. SV was disappointing nearly all season, and very droughty after July.

Onward...

