Taylor's Checkerspot Diapause Phase Habitat Pilot Investigation

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Objective: to test methods for gaining information on characteristics of habitat used by Taylor's checkerspot caterpillars while in their diapause phase (~ mid-July to mid-February) to better inform habitat restoration to aid species' recovery.

Methods: The Butterfly Lab at the Oregon Zoo provided 22 Taylor's checkerspot caterpillars from their captive rearing program on 11 July, 2008 for this diapauses habitat investigation. Larvae were nearing entry into diapause, and were in either their 4th or 5th instar phase. Larvae were placed as groups (10 and 12 individuals) on a *Plantago lanceolata* host plant under two 0.5 m^2 (71 cm x 71 cm) enclosures (Figures 1 and 2) at Glacial Heritage Preserve in Thurston County, WA on 11 July. *P. lanceolata* plants were beginning to show signs of desiccation, but were still generally erect and robust and medium green. No rocks or stones naturally occurred in the plots, so several of these items were added to approximate conditions more typically found on prairies elsewhere in the South Sound.

Figure 1. Example of caterpillar enclosure on Glacial Heritage Preserve, WA, July, 2008.

Data Collection - Vegetation and other cover variables were recorded for each of the two release plots. Enclosures were removed to collect data on caterpillar activity on 13, 15, 18, and 24 July 2008 (Table 1). Caterpillars were initially observed under a rock or at the base of a plant (figures 3 and 4), or in a small tunnel in the soil. No webbing was observed in association with the caterpillars at any of the visits. By 24 July, I could no longer locate caterpillars within the plots, and assumed they were either buried in the soil, had escaped the enclosure, or died. On 17 – 19 September, I carefully excavated both plots to a depth of 6", screening all material to search for caterpillars. I found one live caterpillar among thatch debris in the east plot.

Figure 2. One of two plots containing caterpillars with mesh cover removed, at Glacial Heritage Preserve, WA, July 2008.


a 
b

Figure 3. Single caterpillar resting in depression under rock (a), shown in place in figure 3b, Glacial Heritage preserve, WA, July 2008.

Figure 4. Single caterpillar in center of photo at base of *Leucanthemum* plant, leaf litter removed for visibility, Glacial Heritage Preserve, WA, 13 July 2008.

Table 1. Observations of Taylor's checkerspot caterpillars after release into enclosures at Glacial Heritage Preserve, WA, July 2008.

Date	**Plot**	**Qty. larvae**	**Behavior**	**Substrate**	**Comments**
13 July	W	1	moving	vertical P. lanceolata leaf	small amnt evid. of feeding & frass
13 July	W	2	resting	2 together in small hollow at base of release P. lanc.	
13 July	E	1	resting	Under large rock	
13 July	E	1	burrowing	Narrow hole in soil under litter	Larva slowly disappeared into vertical hole in soil. Molted skin next to hole.
13 July	E	2	crawling	Ground surface	Final, diapause (5^{th}?) instar
13 July	E	1	resting	On ground surface under litter at base of Leucanthemum	
15 July	W	1	Resting	Small hollow at base of release P. lanc.	Not in diapause condition (instar prior to), crawled out after disturbance and crawled through plot
15 July	E	1	resting	Small hollow at base of very small P. lanc.	
15 July					No larva under rock in W plot, and no larva at base of Leucanthemum in E plot. Did considerable excavations in areas with small holes to search, but no larvae.
18 July	W	1	resting	Small hollow at base of Balsam/grass clump	Larva in diapause condition
18 July	E	1	resting	On top of leaf of release P. lanc. plant	Fell off plant when disturbed and crawled around plot during investigation.
18 July	W & E				Locations containing larvae during previous visit no longer contain larvae.
24 July	W & E				Locations containing larvae during previous visit no longer contain larvae.

Discussion

It is likely that my searching actions influenced the behavior and movements of the caterpillars I was studying, and thus my results. Observations by Gordon Pratt on Quino checkerspot caterpillars, however, also revealed that these caterpillars moved between sites several weeks into diapause. Taken together, these observations reveal that the diapause state is not entirely static, but may be somewhat dynamic. In addition, although some caterpillars likely escaped from the enclosures, and I may have missed some individuals during the September plot excavation, it is also possible that some caterpillars died, as this life stage is highly susceptible to mortality. Observations from this trial suggest use of duff layer, especially at the base of plants, and small soil tunnels as diapause habitat for Taylor's checkerpot caterpillars. More research is warranted, and future efforts to document diapause habitat should center on creating a more tightly enclosed prairie habitat unit that would prevent escape by the caterpillars.