

Taylor's Checkerspot Butterfly Annual Working Group Meeting
Meeting Minutes and Updated Action Plan | Vancouver, WA | November 20-21, 2014

Day 1 – November 20th | Partner Updates

In Attendance

(Alphabetic by Entity)

Adam Stebbins, *Benton County Natural Areas*; Jenny Heron, *British Columbia Ministry of the Environment*; Hannah Anderson, Elspeth Kim, Bill Kronland, *Center for Natural Lands Management (CNLM)*; Matt Blakely Smith, *Greenbelt Land Trust*; Carolyn Menke, *Institute for Applied Ecology (IAE)*; Zoe Froyland, Jeff Foster, Rod Gilbert, Dan Grosboll, Christa LaGrande, Todd Zuchowski, *Joint Base Lewis-McChord (JBLM)*; Karen Lewis, Julia Low, Kim McEuen, *Oregon Zoo*; Claudia Copley, *Royal British Columbia Museum*; Lindsay Hamilton, *Sustainability in Prisons Project*; Dave Hays, Mary Linders, *Washington Dept. of Fish and Wildlife (WDFW)*; Dave Wilderman, *Washington Dept. of Natural Resources (WDNR)*; Cheryl Schultz, Cameron Thomas, Jessica Zemietis, *Washington State University (WSU)*; Nate Haan, *University of Washington (UW)*; Judy Lantor, Rich Szlemp, Ted Thomas, *US Fish and Wildlife Service (USFWS)*; Karen Holtrop, *US Forest Service (USFS)*; Ivan Stocker; Dana Ross.

Recovery Planning

Ted Thomas, USFWS

USFWS will pull together a small group to begin recovery planning for Taylor's checkerspot butterfly (TCB) in early 2015. The interim recovery plan created by Washington State will be utilized as a base for recovery planning.

Population and Habitat Updates (by region)

British Columbia – Jenny Heron, BC Ministry of the Environment

Survey Results

TCB are found in two locations on Denman Island, and were historically known to occur on nearby Hornby Island until the mid to late 1990's. In 2014 surveys, conducted by volunteers and one hired professional, only 36 checkerspots were observed within the two locations on Denman. One area is a swampy wetland with very slow natural succession. The other area, located a few km away, is a butterfly reserve area set aside within a new provincial park. As habitat succession has proceeded quickly in the second location, population decline has been observed.

Thanks to a carbon crediting program on the island, some vegetative data has been collected, and the creation of the new provincial park actual ecosystem mapping has been partially done. An ongoing management conflict is the effort to maintain checkerspot habitat and the need to fulfill the agreement of the carbon covenant, which requires the growth of trees. This has been partially resolved by creating a 10 hectare set-aside butterfly reserve where no tree removal occurs. The next step to further resolve this conflict is to create a master plan that integrates conservation and recreation goals, although recreation will be low on this site.

Habitat Enhancement

At Denman Provincial Park, volunteers removed brush and a professional crew will come in to continue brush removal in mid-January. Volunteers undertook a project to create a butterfly garden with an information kiosk, and volunteers are also growing native and nectar plants in their personal greenhouses to be transplanted to the provincial park.

On a Denman Conservancy Association Property, 2-3 hectares will receive vegetation removal for TCB habitat enhancement, and ongoing monitoring is occurring at private properties.

At Helliwell Provincial Park, conifer removal occurred in 2014 and it is the hope that once the Douglas-fir and shore pine are removed that a draw of water will last longer throughout the season. The site would then be supplemented with host plants. The overall goal is to push the fir back in order to open the meadows between the forest edge and the bluffs.

Upcoming Work

Plans for 2015 are to maintain and expand monitoring and plan for translocation. This includes monitoring populations and habitat on Denman Island; reassessing a Vancouver Island site (private ownership) as a possible future translocation site; planning translocation at one or more sites; and, conducting further inventory within the historic range.

Clallam County – Dave Hays, WDFW and Karen Holtrop, USFS

Survey Results – Dave Hays, WDFW (on behalf of Ann Potter, WDFW)

Overall challenges to monitoring Clallam County sites include unfavorable and unpredictable weather conditions, and lack of sufficient staffing and data analysis.

Adult Surveys: At the Sequim site, a stabilized dune area, there was a good high count (614) and long flight period (57 days). At Dan Kelly Ridge, where the steep ridges make surveying challenging and there are a lot of small areas to survey, less than 10 TCB were observed at each small area. The highest count in any one visit was 10. The areas surveyed had larger numbers a few years back, though the low counts this year could be due to weather conditions. At Eden Valley, six complete surveys were conducted with a high count of 155, which is similar to counts from previous years. Ingrown trees and shrubs, a problem at some sites, is less of a problem here. A reported observation of a checkerspot in the Dungeness area could suggest a new or previously

unidentified population (though this could not be relocated) – there likely are a few areas that haven't been surveyed yet that are near a historic site.

Surveys for Oviposition Sites: These surveys are conducted in order to plan for and increase effectiveness of restoration actions. The searches look for pre-diapause larvae, webbing, eggs, frass, etc. Pre-treatment larval searches are done on the sites receiving restoration work, and the goal is to look closely at the small site where trees and shrubs have been removed, in order to gauge impact of restoration.

Survey Results – Karen Holtrop, Olympic National Forest/USFS

Adult Surveys: At Bear Mountain and Gray Wolf, the high adult counts (18, 11 respectively) were lower than usual, but that may be an artifact of weather conditions this year (as noted for the other Clallam sites as well). Bear Mountain is receiving habitat enhancement activities and with improved conditions hope to see higher numbers next year. At 3 O'clock Ridge and Upper Dungeness, high counts this year were up (242 and 784, respectively). Both of these sites are made up of a series of openings in balds, roadsides, clearcuts and camp areas. The increased high count came from the balds at 3 O'clock Ridge, and from the road, two clearcuts and a habitat enhancement site at Upper Dungeness.

Larval Searches & Surveys for Oviposition Sites: Larval searches were conducted at Upper Dungeness, 3 O'clock Ridge, and Bear Mountain, and informed habitat enhancement at those sites. Plot surveys were conducted in 2014, and 6 oviposition sites were found in the enhancement plot.

Additional surveys of unoccupied suitable habitat were conducted. Although no TCB were observed flying, there were areas of suitable habitat identified and surveys will continue. Some TCB's were observed flying in small openings in close proximity to Upper Dungeness and 3 O'clock Ridge.

Habitat Enhancement – Dave Hays, WDFW and Karen Holtrop, ONF/USFS

As noted in the survey section, many of the Clallam County sites are challenging to survey and restore due to their steep slopes. Due to these challenges, only a few acres of restoration occur at some sites, but these enhancements are still significant. Work is being conducted annually at most sites and plans are to continue annual work. In 2015, prescribed fire will potentially occur on some sites, and some commercial clearing/thinning may occur on some sites as well.

Preliminary observations regarding responses to habitat restoration include that an increase in Castilleja plants appears to result in an increase in egg laying. It has also been observed that in some of the areas where tree and shrub removal occurred in order to remove shading, checkerspot weren't seen using sites that lacked sufficient host plants. One additional observation was that host plants seem to be emerging post-treatment.

In terms of acquisition, last spring WDNR acquired a piece of habitat from a timber company. This land, part of the DNR Trust Land and under management for checkerspots, provides a gentler slope area for work and also facilitates the ability to do larger landscape actions such as burning.

South Sound – Dave Hays, WDFW, Mary Linders, WDFW, Bill Kronland, CNLM

Survey Results – Mary Linders, WDFW

Survey objectives at JBLM's Range 76, the remaining source site in South Puget Sound, are to determine relative abundance as an indicator of background conditions for reintroductions. These last few years have shown higher numbers that are similar to those of 2006 and 2007.

Survey objectives at reintroduction sites are to monitor as a measure of occupancy and to estimate relative abundance and distribution as indicators of population persistence or expansion. The survey area is being expanded with larger transects to better understand distribution. At JBLM's Range 50 reintroduction site, good numbers are being maintained, though with the smaller population size has a smaller distribution. At Pacemaker, a single release was conducted in 2012 and the 2014 survey reported very few and widespread sightings, although the survey conducted at Pacemaker was not as thorough as the other sites as it is logistically difficult to monitor. At Scatter Creek South, the highest population yet to be recorded was in 2013, though at first glance (not yet analyzed) the 2014 numbers appear to be similarly positive. Distribution is very contained around release sites, which was the goal for the site.

In an effort to look beyond standard monitoring areas, surveys looked for new colonization sites, mapped potential and suitable sites, and tried to better understand the potential outside of release areas. Surveys were conducted in the Artillery Impact Area (AIA), and around the edge of and south of Range 76. Butterflies were observed in scattered locations, increasingly each year. Nectar resources were also recorded during these surveys and it was observed that there are nice clusters of resources which could be built upon to improve and delineate habitat. Future more thorough surveys aim to get a better understanding of the numbers and locations of these edge populations. These surveys conducted in 2012, 2013, and 2014 picked up work that hadn't been conducted since 2006, and plans are to continue the surveys in future years due to the beneficial information gained from them.

Habitat Enhancement – Dave Hays, WDFW

At Scatter Creek North prescribed fire and herbicide prepared the site for native plants, including 12K plugs planted over 11 acres. This treatment has resulted in a large reduction in scotch broom and improved habitat quality for prairie species such as the Oregon branded skipper, Mardon skipper, Western bluebird and purple martin, all of which were observed in 2014 after being absent in 2013. This site is less than a mile from Scatter Creek South (there is forest in between) and one checkerspot has been observed in the enhancement unit.

At Scatter Creek South, issues with burn permits meant only a ¼ acre prescribed burn occurred in 2013, much smaller than planned. Checkerspots did move into that small burn area, and in 2014 burns were conducted around that area and are already showing positive responses in the habitat.

Habitat Enhancement – Bill Kronland, CNLM

Restoration is being conducted at the 3 occupied sites on JBLM plus on TA-15 to prepare for potential future reintroduction. At TA-7S there was a timber harvest to get sunlight into the south end and move restoration forward. At TA-15 they are taking a more informative approach to enhancement actions. Two major areas were burned and treated and they used four units to do combos of low vs high density and low vs high diversity with buffers in between to look at different outcomes.

Benton County – Carolyn Menke, IAE and Dana Ross

Survey Results – Dana Ross

At Fitton Green, which is made up of three loosely connected meadows/prairies, the flight period was 36 days (April 10-May 15) with a sharp increase in abundance over the first 11-12 days. Peak flight was around April 20 (high count of 312) and using these numbers, the population is estimated to be around 581, which is up 68% from last year. If you look across survey data from 2003-2014, there are big fluctuations in the population with booms and busts, and this year's survey data shows an uptick which is positive.

At Beazell, which is made up of five separate areas in two distinct regions (north/middle and south), the south meadow population winked out a few years ago, but TCB remain in the long-term naturally occurring balds to the north and those populations appear to have increased. The flight period at Beazell appears similar to that of Fitton Green with a 39-day flight period and a high count of 274. If you look across survey data from 2003-2014, there is a similar pattern of population fluctuations, with this year showing a sharp increase over the last three years of poor numbers.

Dana also surveyed several historic sites that still have reasonable habitat. At South Fitton Green, which is 1 mile south of the occupied north meadows, IAE has brought the meadow up to higher quality but although the occasional butterfly is observed there nothing has taken hold. This could be a potential reintroduction site as it is within reach of an existing population which would allow for some gene flow. At Fort Hoskins Historical Park, which is several miles to the northwest of Beazell, the occasional checkerspot has been observed there so there may be or may have been another population closer to Fort Hoskins that was unknown. Chip Ross Park, which is owned by Timberhill Corporation, is a big oak savannah with a fair amount of checkerspot resources. Development is slowly coming towards the area and there is lots of recreation from people and dogs. Checkerspots were observed here in the 1980's, so the site could be a potential

site for reintroduction. Finally, Sulphur Springs, a big meadow with good quality habitat on private land across the street from the small opening in the park, had checkerspots observed regularly in the 1980's. Dana noted it is important to make visits to peripheral sites when there is good weather, and that there is a clear need for more capacity for surveying – especially smaller perhaps unoccupied areas that have not been previously considered.

Habitat Enhancement – Carolyn Menke, IAE

At Fitton Green Natural Area, the Cardwell Hill-BPA corridor north meadows are occupied and IAE is working to create stepping stones between those areas to the previously occupied south meadow. They are expanding flyways on the current road to draw checkerspots down to the south meadow, which is about 28 acres in size, the flyaway expansion includes tree and shrub removal and treatment of false brome and Canada thistle. IAE has seeded Roemer's fescue throughout the flyaways and stepping stones, and are doing intensive forb and plug planting in the stepping stones. This work is supported through the bi-state SWG grant.

Habitat Conservation Planning for TCB – Carolyn Menke, IAE

The Benton County Habitat Conservation Plan (HCP), which IAE has worked on, includes Taylor's as a covered species. The biggest issue on private lands is management, not development. TCB was considered for coverage in the Yamhill SWCD HCP but since no TCB have been observed in Yamhill it wasn't included. IAE is now working on the Thurston County (WA) HCP, which is due for completion in early 2015. The Thurston HCP utilizes a habitat-based approach – oak woodland habitat (focus on Western gray squirrel, slender-billed white-breasted nuthatch); spotted frog habitat; and prairie/grassland habitat (focus on streaked horned lark, Mazama pocket gopher, vesper sparrow, multiple butterflies including TCB, and golden paintbrush). The goal is to balance impacts with conservation strategy – want to minimize impacts, especially in reserve priority areas, and protect the base of land to support prairie-oak or riparian ecosystems and manage and enhance reserves.

Research and Other Updates

Taylor's checkerspot host plant suitability study – Nate Haan, UW

Nate's research is based on research with other Edith's subspecies – it is clear that pre-diapause larvae are in a 'race against time' against host plant senescence in which most larvae (up to 90%) starve. The study question the research aims to answer: "is this what happens with TCB?" with the goal of measuring variability in senescence phenology for *P. lanceolata*, *Castilleja hispida*, and *Castilleja levisecta* by releasing TCB larvae/eggs onto all three species and monitoring effects on larvae, and determining how soil and physical site factors influence senescence phenology and larval performance.

This research project has three phases (I: Observational Study; II: Release larvae on plots from IB and monitor survival/performance, and III: Release larvae on seeded plots), and is currently in

Phase 1B – monitoring 82 plots distributed across 3 sites (Glacial Heritage, Tenalquot, and West Rocky) and the 3 plant species. At each plot, environmental measurements were taken (such as multiple soil measures, slope, light interception, etc.). Five plants in each plot were marked with a paper clip and visited weekly from May 12-July 9 in order to make visual estimates of plant color, size, chlorophyll content and iridoid glycosides.

Preliminary results show that even in July, the average *P. lanceolata* plant was consistently green (i.e. food source remains late into season), whereas for *C. hispida* there was a big variance and for *C. levisecta* there was some variance but a big drop off. Future work will include seeding so that the age of the plant will be known and that data can be incorporated into the analysis.

In addition to further data analysis and leaf nitrogen and iridoid glycoside contents, future work includes replication of Phase I and initiation of Phases II and II.

Checkerspot demography: Baltimore checkerspots use of native and non-native host plants – Cheryl Schultz, WSU

Cheryl's research asks how we can understand the biology of species and predict how they will respond to different kinds of disturbances, and use that to understand how we should do our management. It is also based on the assumption that habitat use does not equal habitat quality.

The research looks at the whole lifecycle and analyzes how it varies in relation to host plant. Early findings show that survival is higher on the native host plant for post-diapause survival, and that overwinter survival is much better from the non-native host plant. Together, growth rates show that both hosts are good, but that Plantago (non-native) is better. The management applications of this is that plantago is not a sink and thus it is suitable for use in restoration, with a two-species mix recommended.

Edith's checkerspot workshop overview – Elspeth Kim, CNLM

In January 2014, with funding from USFWS, CNLM coordinated with Creekside Science, WDFW, and the Xerces Society to put on a workshop that brought together 30 key members of the three listed western Edith's checkerspot species (bay, quino, and Taylor's) conservation communities. The three day workshop allowed for the exchange of ideas and information across formal and informal settings and built relationships and knowledge networks, with a goal to strengthen collective recovery efforts by providing a forum for information sharing and catalyzing priority actions between practitioners working on recovery of each sub-species.

Presentations and discussions included the following topics: species overviews; habitat restoration and management; institutional and regulatory landscape; advocacy, media, and education; reintroductions; and managing for species in the 21st century. The workshop allowed for self-reflection within each group, lessons learned from other groups, increased knowledge networks, increased communication among the Quino community, and a list of tasks and

research for the whole community. Conversations among attendees are ongoing since the workshop. Full proceedings from the workshop can be [found here](#).

Rapid Habitat Assessment – Mary Linders, WDFW

The project goal of the rapid habitat assessment (RHA) project is to quantify known habitat characteristics to increase the scientific basis of habitat enhancement planning and the determination of site readiness for checkerspot reintroduction.

To date, the project has surveyed over 500 acres of habitat in a two year time period. Surveys looked at host and nectar plant abundance and diversity, exotic invasive cover, native grass cover, shrub cover and open ground. The next step after surveys is to map sets of those variables, and assess subunits on a 5-acre scale to identify areas with habitat characteristics important for reintroduction. Reintroduction-ready habitat criteria are based on a variety of variables pertaining to Taylor's checkerspot resources. JBLM's Range 76 and Range 50 were used to help identify target thresholds. ***Action Item*** Mary is requesting that folks review the targets and provide feedback.

Captive Rearing & Reintroduction Updates

Captive Rearing at the Oregon Zoo – Karen Lewis, Oregon Zoo

In response to the captive rearing program at the Zoo seeing very high pre-diapause mortality, affected cups were marked and segregated. Of the survivors, entrance to diapause was delayed. Just prior to the 2013 cold diapause, the decision was made to cull all affected larvae. Larvae not culled had good survival initially, but after a few weeks after they were woken up, they began to die off again. The increased mortality was not limited to any particular matriline – it was widespread. Specimens were sent to multiple labs, no diseases were identified, leaving concern about the unknown. The full colony was culled except for some post-diapause larvae that were reared to adulthood to allow for further pathogen testing, which still did not reveal a source of the problem. Some toxicity analyses will be conducted. Since this issue, the zoo decided to move the butterfly lab to a different location on site. The new butterfly rearing facility is in full use and the zoo has had a great season so far this year, with very little pre-diapause mortality – a good sign for the new facility.

Captive Rearing & Reintroduction Goals – Mary Linders, WDFW

The goal of the captive rearing program is to produce 10,000 eggs across both facilities, resulting in 3,000 post-diapause larvae for release while retaining 600 to rear to adult stage in order to maintain a captive colony should it be necessary. This final step is a safety net not a primary goal.

The goal of the reintroduction program is to establish at least 3 new populations at 3 Puget lowland sites in the next decade (by 2022). The objectives are to release at least 1,500 post-

diapause larvae at each of the two sites (3,000 in all) annually, and to continue releases at each site for 5 consecutive years.

British Columbia Captive Rearing & Reintroduction Updates – Jenny Heron, BC Ministry of the Environment

There is currently a collaborative translocation plan underway with a schedule of actions for the next three years. This also includes proposed translocation sites and other considerations. The proposed translocation sites include Helliwell Provincial Park, Tribune Bay Provincial Park, and a private cooperative next to Helliwell Provincial Park.

Day 2 – November 21st | Action Planning

In Attendance

Adam Stebbins, *Benton County Natural Areas*; Elspeth Kim, Bill Kronland, *Center for Natural Lands Management (CNLM)*; Tom Kaye, *Institute for Applied Ecology (IAE)*; Rod Gilbert, Dan Grosboll, *Joint Base Lewis-McChord (JBLM)*; David Shepardson, *Oregon Zoo*; Dave Hays, Mary Linders, *Washington Dept. of Fish and Wildlife (WDFW)*; Cheryl Schultz, Jessica Zemietis, *Washington State University (WSU)*; Nate Haan, *University of Washington (UW)*; Rich Szlemp, Ted Thomas, *US Fish and Wildlife Service (USFWS)*; Ivan Stocker.

Increasing sizes and numbers of populations in Oregon

Discussion Goals – Elspeth Kim, CNLM

The purpose of this discussion is to identify opportunities and identify task actions to implement efforts to increase the sizes and numbers of populations in Oregon, especially in Benton County where the two extant populations occur. With the ongoing captive rearing and reintroduction efforts in South Sound, the need to discuss the vulnerability of the two Oregon TCB populations has increased.

Benton County Status – Tom Kaye, IAE

There are only two remaining populations of TCB in Oregon. Both are not particularly large and face major threats from invasive species. It is imperative we take action before these populations reduce in size to a point where it's too late.

There are numerous sites in Benton County that could be appropriate for reintroduction – these are sites with combinations of plantago, Castilleja, and nectar plants. The obvious question in regards to these sites with suitable habitat characteristics is ‘then why aren’t TCB there already?’ Keep this question in mind, we will need to use these basic characteristics as a guide as to what sites and in which order we carefully evaluate at a higher level for reintroduction suitability. This would include identifying plant resources and limiting factors.

Full Group Discussion

There was consensus that these populations are vulnerable, but opinions differ on what is most appropriate, most likely to succeed, and what capacity exists to increase the number of populations. Some feel we need to increase the size of existing populations in both Washington and Oregon before we move TCB around in Oregon. Tom Kaye noted that there is a stepping stone project being conducted at Fitton Green to connect the privately-owned occupied site with a larger, publicly-owned meadow that is being managed for TCB.

The biggest discussion at hand was in regards to the best and most feasible method – translocation or captive rearing? One option is to establish a captive rearing facility at a prison in Oregon through the Sustainability in Prisons Project. IAE has met with a prison that is eager to start a program but lacks the funding to initiate the program. In this method, the Oregon Zoo would provide expertise and design while IAE would serve as the liaison (the role Evergreen does in WA) and work weekly with inmates, while inmates would work daily. The estimated cost to set up a new prison facility is \$30-\$40K. This discussion led to the question “would the money that would go towards creating a new facility take away habitat enhancement funding that is needed? If so, would a better option be to move adults? On the subject of captive rearing, another possible option discussed was adding Oregon TCB rearing to the Oregon Zoo program. It is noted that adding Oregon TCB to the program at the zoo certainly wouldn’t double the costs, as it wouldn’t be a whole new system, but would be more consistent with the ongoing costs for the Washington TCB rearing.

In discussing the funding constraints and time necessary to set up a captive rearing and reintroduction program, paired with the urgency felt in Oregon, the option of translocating adults was raised. Mary Linders noted that based on field observations, translocated adults are likely to stay where you put them, especially if you move them on a day that is partly sunny.

Regardless of if the method selected is translocation or captive rearing, there are lessons to be learned and expertise to be shared from the efforts in Washington, as well as steps to be taken to improve ongoing and future work range wide. The group noted that habitat at potential receiving sites need to be quantified. Perhaps utilizing the Rapid Habitat Assessment, a group needs to discuss the criteria of what is needed on a checkerspot site to deem it suitable for receiving captive-reared or traslocated TCB.

Action Item Identify what suitable habitat would look like and create a team to assess sites in in WA and OR in regards to if they meet suitable habitat criteria.

Action Item Create a report on the South Puget Sound captive rearing and reintroduction process, including the decision making process for each step.

Action Planning

The full group reviewed the Action Plan and updated it to reflect project progress, newly identified tasks, and remove completed tasks. Following this, the group re-prioritized the actions to reflect current needs and priorities. A smaller sub group was tasked with reviewing and revising the Research category at a later date. Please see the list of ranked priorities and the full updated Action Plan on the following pages.

Review of Action Items from Days 1 and 2

- Mary is requesting that folks review the targets and provide feedback.
- Identify what suitable habitat would look like and create a team to assess sites in WA and OR in regards to if they meet suitable habitat criteria.
- Create a report on the South Puget Sound captive rearing and reintroduction process, including the decision making process for each step.

Ranked Priority Actions

1. Enhance habitat by controlling/removing invasive species and structural modifiers, and enhancing larval food and nectar plants as appropriate.
2. Determine and implement best approach for increasing numbers of populations within each region (e.g. habitat enhancement, habitat manipulations, translocation, captive rearing and reintroduction).
3. Define habitat restoration targets through research with a focus on evaluating the quality of various host species in relation to butterfly performance in all life stages.
4. Improve connectivity between occupied areas and/or suitable habitat.
5. Develop suitable survey and monitoring protocols to determine occupancy, trends, distribution, and abundance.
6. Prioritize and survey suitable habitat to identify additional populations and/or expansions.
7. Determine if host *Castilleja* species produce fertile hybrids to resolved conflict between planting both species at same sites.
8. Minimize direct impacts to occupied sites.
9. Where appropriate, initiate efforts to increase the number of populations through captive rearing and reintroduction (by region).
10. Continue to implement captive rearing and reintroduction programs, including monitoring source and release sites in South Sound and ensuring release sites are in suitable condition.
11. Develop management/restoration plans including fire at occupied and unoccupied sites.
12. Research and develop best management practices for using fire in relation to butterfly recovery.
13. Review data from genetic and meta-population studies to direct population management.
14. Refine criteria and establish standardized habitat assessment regimen to evaluate habitat suitability.
15. Utilize existing knowledge to create white paper that documents both known habitat characteristics and known habitat management practices and identifies information gaps.
16. Create and implement opportunities to evaluate effects of habitat management on *Eet* populations.
17. Prioritize and survey suitable habitat to identify additional population and/or expansions.
18. Pursue conservation easements, acquisitions, and management agreements.
19. Share information between entities, establish partnerships, and maintain a working group.
20. Identify opportunities to conduct public outreach and education, including opportunities to share information about listing and conservation to landowners that do or may have occupied or suitable habitat.

Please Note: Changes made to the Action Plan between Nov. 20 (time of update) and March 30 (finalization) were organizational and had no major impact on content. Items from the 'Research' section were absorbed into the other categories and the 'Enhance and Increase Sizes and Numbers of Populations' category was split into two categories (now 2. Enhance Habitat and 3. Captive Rearing and Reintroduction'). Due to these changes, reference numbers may have changed. Priority rankings may have changed +/- 1 but no change in rank order was made.

Taylor's Checkerspot Butterfly Action Plan - Updated 21 Nov 2014

The purpose of this action plan is to identify the next-best conservation actions that can be conducted over the next 3-5 years to support TCB recovery.

Category	Ref.	Task	Rank	Status & Implementing Party
1. Protect Occupied and Other Key Sites	1.1	1. Pursue conservation easements, acquisitions, and management agreements.	18	
	1.1.a	a. Work w/BPA to develop and implement management agreements at Scatter Creek & Cardwell Hill.		Ongoing (@ SC)
	1.1.b	b. Pursue acquisition or conservation easement with willing sellers. [e.g. South Puget Sound, Bald Hill (WA), Denman Island Private Land and Cardwell Hill properties (OR)].		
	1.1.c	c. Finalize voluntary management plans on private land (e.g. Denman Island, Bald Hill (WA)) under the guidance of WDFW & DNR Forest Practices Board).		Completed in Clallam County
	1.2	2. Minimize direct impacts to occupied sites.	8	
	1.2.a	a. Minimize incompatible recreation especially at Scatter Creek, Dan Kelly Ridge (ATV use), Denman Island Provincial Park.		In progress (WDFW, ONF)
	1.2.b	b. Minimize training impacts & manage wildfire (in concert w/consultation), esp. at R74/76, R51.		Ongoing (JBLM)
	1.3	3. Develop management/restoration plans including fire at occupied and unoccupied sites.	11	In progress
2. Enhance Habitat	2.1	1. Enhance habitat by controlling/removing invasive species and structural modifiers, and enhancing larval food and nectar plants as appropriate.	1	Ongoing
	2.1.a	a. Improve production of larval and nectar plant materials throughout the range, esp. in Clallam Co. & BC.		In Progress
	2.1.b	b. Determine if host Castilleja species produce fertile hybrids to resolve conflict between planting both species at same sites.	7	
	2.1.c	c. Collect information on plantago pathogen in order to identify and calculate the level of risk to Eet. (relate to larger picture of host plant population change)		
	2.1.d	d. Develop techniques to restore and enhance deep soil sites as a tool for recovery.		
	2.1.e	e. Research and develop best management practices for using fire in relation to butterfly recovery.	12	Initiated at JBLM
	2.2	2. Improve connectivity between occupied areas and/or suitable habitat.	4	
	2.3	3. Define habitat restoration targets through research.		
	2.3.a	a. Evaluate quality of various host species in relation to butterfly performance in all life stages (e.g. phenology, chemical content, abundance, environmental, etc.).	3	In Progress for pre-diapause larvae (UW)
	2.3.b	b. Evaluate dispersal in the context of landscape and local factors.		
	2.3.c	c. Define butterfly habitat selection through research (e.g. oviposition & adult habitat, nectar and larval food plant density, phenology, soil type/structure, and spatial arrangement).		In progress. Ovipos. Complete in Clallam Co., AIA, OR.
	2.3.d	d. Determine the characteristics of occupied habitat, with respect to nectar plants, host plants, and vegetation structure. Build upon previous work.		Ongoing (UW, WDFW); coarse review completed (IAE)
	2.3.e	e. Identify pre and post diapause food plants, particularly in the Olympia Peninsula.		Ongoing (ONF)
	2.4	4. Utilize existing knowledge to create white paper that documents both known habitat characteristics and known habitat management practices and identifies information gaps.	15	
2.5	5. Create and implement opportunities to evaluate effects of habitat management on Eet populations.	16	Ongoing	
2.6	6. Increase understanding of impact of external factors			
2.6.a	a. Evaluate impact of predators.			
2.6.b	b. Evaluate the impact of vehicle off-road traffic on plantago population.		Planned (JBLM)	
3. Captive Rearing and Reintroduction	3.1	1. Continue to implement captive rearing and reintroduction programs, including monitoring source and release sites in South Sound and ensuring release sites are in suitable condition.	10	Ongoing (WDFW, OR Zoo, TESC)
	3.1.a	a. Evaluate release techniques on larval survivorship.		
		b. Improve understanding of the influence of weather and climate on population dynamics and reintroductions.		
	3.2	2. Where appropriate, initiate efforts to increase the number of populations through captive rearing and reintroduction (by region).	9	
	3.2.a	a. Identify and prioritize potential future release sites in coordination with recovery planning efforts and entities (esp. in OR).		
3.2.b	b. Develop new facilities or additional capacity for captive rearing, as needed (e.g. Benton Co., Denman Is.).			
3.3	3. Document decision making and state of knowledge for population increase efforts.			
4. Survey / Monitor	4.1	1. Develop suitable survey/monitoring protocols to determine occupancy, trends, distribution, and abundance.	5	
	4.1.a	a. Develop methodologies for calculating an estimate of population size.		
	4.2	2. Annually monitor all known populations.	6	Ongoing
	4.3	3. Prioritize and survey suitable habitat to identify additional populations and/or expansions.	17	
	4.4	4. Refine criteria and establish standardized habitat assessment regimen to evaluate habitat suitability.	14	Ongoing
4.4.a	a. Assess status of occupied and key sites.			
5. Coordination & Education	5.1	1. Determine and implement best approach for increasing numbers of populations within each region (e.g. habitat enhancement, habitat manipulations, translocation, captive rearing and reintroduction).	2	Planned (FWS)
	5.2	2. Develop Recovery Plan.		Completed in B.C.
	5.3	3. Review data from genetic and meta-population studies to direct population management.	13	
	5.3.a	a. Determine the appropriate taxonomy for populations identified as E. e. taylori using genetic analyses.		
	5.3.b	b. Determine the degree of genetic structuring within and between populations of E. e. taylori.		
	5.4	4. Inform and discuss effects of ESA status and cooperatively develop solutions. (e.g. monitoring & project survey requirements, recovery planning, conservation measures).		
	5.5	5. Share information between entities, establish partnerships, and maintain a working group.	19	Ongoing
5.5.a	a. Utilize synergistic restoration efforts (e.g. funding, communications, messaging, political/public support) with complementary species-at-risk to support a larger distribution of healthy functioning ecosystem (e.g. SWG project, CALE).			
5.6	6. Identify opportunities to conduct public outreach and education, including opportunities to share information about listing and conservation to landowners that do or may have occupied or suitable habitat.	20		