

Upper Columbia Basin Network Camas Lily Protocol Development Summary (August 2007)



Protocol: Camas Lily

Parks Where Protocol will be Implemented: NEPE and BIHO

Justification/Issues being addressed:

Camas lily was historically one of the most widely utilized plant foods of the Nez Perce people, and remains so for many tribal members today (Harbinger 1964; Hunn 1981; Turner and Kuhnlein 1983, Mastrogiuseppe 2000). Camas was also a focal resource at many of the significant historical events memorialized today by NEPE and BIHO. It was during the camas harvest at Weippe Prairie, a subunit of NEPE, that the Lewis and Clark Corps of Discovery first encountered the Nez Perce, and the battle at Big Hole occurred at a traditional Nez Perce camas lily harvesting campsite. It is also noteworthy that the botanical “type” specimen for the Camas genus as well as for camas lily itself was collected by the Lewis and Clark Expedition returning through the Weippe Prairie during the spring of 1806 (Gould 1942). Camas lily is therefore a central, important element of the cultural landscapes NEPE and BIHO seek to interpret for the public. The focal cultural resource status of camas is one of two driving rationales for establishing a camas lily monitoring program in the UCBN.

Camas lily, a facultative wetland species (Reed 1988), is also ecologically significant. It is strongly associated with seasonal wet prairie ecosystems of the interior Columbia Plateau, which are represented at Weippe Prairie and along the North Fork of the Big Hole River. The extent of the wet prairie ecosystem type has been drastically reduced in the Columbia Basin as a result of agricultural conversion, irrigation, and flood control development, and other land use practices, a pattern seen elsewhere (Dahl 1990; Taft and Haig 2003). Remaining wet prairies in the region are often structurally altered and compromised by non-native and woody native invasive species. The NPS-owned portions of Weippe Prairie and the Big Hole valley are no exception. Both sites have historic irrigation developments that have altered site hydrology, are infested by invasive weeds, and Weippe Prairie has also been used for intensive haying and grazing. Orange hawkweed, listed as a noxious plant in Idaho, and sulfur cinquefoil, an invasive species of concern to NEPE, are both present at Weippe Prairie and part of the focus of current park weed management. Despite the impacts of these anthropogenic stressors, such highly productive ecosystems exhibit a good potential for restoration (Taft and Haig 2003), and both sites continue to support a vigorous camas lily population.

Establishing a program to monitor the long-term trends in camas lily populations at Weippe Prairie and BIHO will provide important information to the parks for their adaptive management decisions and land health performance goals. Camas lily monitoring will be particularly important at Weippe Prairie because the site remains actively sprayed, mowed, and grazed; the impacts of which remain unknown. At BIHO, where the wetland ecosystem supporting camas lily is more intact and in a higher functioning condition, site management is less intense and camas lily monitoring will provide an invaluable indication of overall status and trend of wetland

condition over time. It will also provide information on the impacts of weed control efforts periodically made by BIHO staff in that wetland community.

Monitoring Questions and Objectives to be Addressed by the Protocol:

Monitoring questions addressed by this protocol include:

- Are the camas lily populations at NEPE and BIHO stable, declining, or increasing?
- What is the range of inter-annual variation in total stem density and flowering stem density observed at Weippe Prairie and along the Big Hole River at BIHO?
- What proportion of camas plants flower within a season, and what is the variation in that proportion?
- How does camas density respond to temporal variations in regional precipitation and temperature patterns?
- How does camas density respond to changes in specific management or restoration actions?

Monitoring objectives addressed by this protocol include:

- 1) Estimate the mean for stem and flowering stem densities (status) in the camas lily populations of Weippe Prairie and within the targeted portion of BIHO. **Justification.** *Camas lily population status estimates will inform near-term site management and will contribute to long-term trend detection. Camas lily abundance will be measured with stem density, the total number of plants and number of flowering plants. The number of plants, hence the number of camas lily bulbs, relates directly to the cultural importance of camas lily.*
- 2) Determine trends (net trend) in the densities of camas lily in Weippe Prairie and BIHO. **Justification:** *Net trend measures the total response or mean change and is an appropriate parameter for our objectives and for camas lily, a plant subject to high interannual variation in abundance. Long-term trend detection in camas lily, particularly the detection of downward trends, is of critical importance to park management of this fundamental park resource.*
- 3) Determine trends in the proportion of flowering to non-flowering camas lily plants, as a measure of population vigor, in Weippe Prairie and BIHO. **Justification:** *Flowering is a measure of population vigor, and, although camas lily reproduces asexually through bulb budding, it also invests a tremendous amount of energy into flowering and seed production. A number of issues justify monitoring of flowering rate trends, and include potential changes in phenology resulting from changing precipitation and soil moisture over time to competition from invasive plants and heavy graminoid thatch.*
- 4) Determine trends in frequency of occurrence of targeted invasive plant species. **Justification:** *Invasive plants pose the greatest threat to camas lily populations in NEPE and BIHO and include non-native exotic forbs as well as graminoids and secondary graminoid thatch depth. Monitoring these species will provide critical information to park resource managers and will contribute to the UCBN integrated invasive plant vital sign monitoring program.*

- 5) Determine the magnitude and direction of camas density response to measurable explanatory variables such as monthly mean precipitation, graminoid thatch depth, and specific management activities.

***Justification:** Articulating the relationship between camas density change and biophysical explanatory variables, some of which are stressors and other are management actions intended to benefit the resource, is important information to provide to park management. This will be conducted through modeling exercises. Our protocol will permit model-based relationships between camas lily abundance and these measurable drivers and stressors to be tested. Ultimately, these kinds of relationships, if present, will be directly relevant to management decisions, such as reintroduction of prescribed fire.*

Basic Approach:

No existing camas lily monitoring protocol is currently available for adoption from NPS or other relevant organizations. The UCBN camas lily monitoring protocol has been developed following NPS I&M standards as outlined by Oakley et al (2003). A probabilistic sampling design involving simple random sampling in each of five discrete camas lily populations within both parks has been developed that balances the need for maximum scope of inference and statistical power with logistical and financial efficiency. In particular, the design emphasizes rapid data collection in a large number of samples that produces simple and straightforward results directly applicable to status and trend detection and site management. In addition, the UCBN is incorporating camas lily monitoring into its “*citizen science*” program in which high school students and other volunteers directly participate in, and perhaps even sustain, field data collection. To that end, sampling methods that are effective toward meeting stated objectives but are as simple as possible and require minimal training have been selected. Required sample size for desired precision and power levels has been estimated *a priori* with data available from 2005 and 2006 field data collected at Weippe Prairie and BIHO. In accordance with management and monitoring objectives, minimizing the missed-change (type II) error has been emphasized and a higher false-change (type I) error rate tolerated. Our current sampling objective is to achieve at least 90% power to detect a 25% decline in estimates of camas lily abundance through the life of this monitoring program with a 10% false-change (type I) error rate. Thorough SOPs have been developed for all aspects of the monitoring program following recommendations in Oakley et al. (2003) and as demonstrated by other available peer-reviewed NPS I&M program protocols in order for the UCBN to implement and sustain long-term camas lily monitoring. The protocol has been submitted for peer review and copies can be obtained directly from the UCBN.

Principal Investigators and NPS Lead:

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Development Schedule, Budget, and Expected Interim Products:

The PI and NPS lead produced a draft monitoring protocol for field testing on June 12, 2006, which was revised following analysis of 2006 field data. A “pre-review” of the draft protocol was completed by Dr. Jeff Yeo, Idaho TNC, in September, 2006. The complete draft protocol was submitted for peer review through the NPW Pacific West Regional office in February 2007.

Field testing of the revised protocol (following reviewer's comments) will occur in May and June 2007. We will consider the 2007 field work as "implementation". We have budgeted \$19,150 for FY 2007 protocol implementation. Field testing has been accomplished through the UCBN citizen science VIP program in collaboration with the OMSI Salmon Camp program in June 2005 and 2006.

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