SURVEY PROTOCOL FOR Bridgeoporus nobilissimus
(W.B. Cooke) Volk, Burdsall, & Ammirati

Version 3.0 – June 2008

Originally drafted May 1998 by Claire Hibler & Thomas O’Dell
Revised June 2008 by Terry Fennell & Kelli Van Norman

USDA Forest Service Region 6, Oregon and Washington
USDI Bureau of Land Management, Oregon and Washington
Revision Authors
TERRY FENNELL is a Botanist on the Cascades Resource Area of Salem District, USDI Bureau of Land Management, Salem, Oregon.

KELLI VAN NORMAN is an Inventory Coordinator, USDI Bureau of Land Management, Portland, Oregon.
TABLE OF CONTENTS

I. INTRODUCTION................................................................................................................... ...........................4

II. BACKGROUND ................................................................................................................................................4

III. ASPECTS OF *BRIDGEOPORUS NOBILISSIMUS* NATURAL HISTORY RELATED TO SURVEY METHODOLOGY ......................................................................................................................................................5
   A. *BRIDGEOPORUS NOBILISSIMUS* DESCRIPTION.....................................................................................................5
   B. RANGE, DISTRIBUTION, ABUNDANCE AND SPECIFIC HABITAT ASSOCIATIONS ................................................6

IV. INVENTORY METHODOLOGY.......................................................................................................... .....7
   A. SURVEY METHODS............................................................................................................................................... 7
      1. Pre-field Review .........................................................................................................................................7
      2. Field Survey...................................................................................................................................................... 7
         a) Intuitive Controlled Surveys................................................................................................... 8
         b) Complete Surveys.......................................................................................................................... 8
   B. EXTENT OF SURVEYS .......................................................................................................................................8
   C. TIMING OF SURVEYS ..............................................................................................................................................8
   D. DOCUMENTATION & DATA MANAGEMENT......................................................................................................9
   D. SURVEYOR QUALIFICATIONS ...........................................................................................................................9

V. REFERENCES..................................................................................................................... ............................10

II. GLOSSARY.......................................................................................................................................................11

APPENDIX A: *BRIDGEOPORUS NOBILISSIMUS* IDENTIFICATION VERIFICATION CONTACTS......12
APPENDIX B: CONK MORPHOLOGY ................................................................................................................13
APPENDIX C: RANGE AND DISTRIBUTION MAP......................................................................................................18
I. INTRODUCTION

The objective of this *Bridgeoporus nobilissimus* survey protocol is to provide biological and ecological information and to present methods to:

1) Conduct surveys to detect *Bridgeoporus nobilissimus* presence in suitable habitat with a reasonable level of confidence.
2) Document survey effort and *Bridgeoporus nobilissimus* conk sites.

The fungus *Bridgeoporus (=Oxyporus) nobilissimus* (W.B. Cooke) Volk, Burdsall & Ammirati is a perennial polypore, endemic to Washington and Oregon, that produces large basidiomata on the root crowns and trunks of large diameter live trees, snags, and stumps of the genus *Abies*. Synonyms for basidiomata are fruiting bodies, sporocarps, or conks.

This survey protocol is designed to provide a standardized approach to determine the presence/absence of *Bridgeoporus nobilissimus* fruiting bodies in suitable habitat. These protocols may be applied to project related ground-disturbing activities or to non-project related strategic surveys. These methods establish standards for consistently collecting and reporting field data for surveys and detection. The protocol is designed to detect *B. nobilissimus* with a reasonable level of confidence, but failure to detect a *B. nobilissimus* conk during surveys using these methods does not demonstrate the species’ absence. The exact probability of a false negative survey resulting from the use of this protocol can not be predicted at this time.

This document is intended for use by the Region 6 Forest Service (FS) and Oregon/Washington Bureau of Land Management (BLM). Field surveys for *Bridgeoporus nobilissimus* are not required under the BLM Manual 6840 Special Status Species policy or the FS Manual 2670 Sensitive Species policy. However, use of this survey protocol will ensure consistent data collection, consistent reporting between field units, and allow field units to conclude with a reasonable level of confidence that the species is not present when it is not located during surveys. In addition to determining presence/absence of *B. nobilissimus* conks, the survey protocol will assist the Agencies in species conservation and help to better understand its distribution, range, and habitat requirements. This protocol (Version 3.0) replaces Version 2.0.

II. BACKGROUND

*Bridgeoporus nobilissimus* is considered closely associated with late-successional true fir coniferous forests. The species was classified as a Survey and Manage Category A species under the Record of Decision (USDA and USDI January 2001). The Oregon Natural Heritage Information Center (ORNHIC) ranks *B. nobilissimus* as G2, which means globally rare, uncommon or threatened, but not immediately imperiled. Within Oregon, ORNHIC ranks the species as List 1 - S2S3, which means somewhere between imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (S2) and rare, uncommon or threatened, but not immediately imperiled (S3) (2007). The Washington Natural Heritage Program does not rank *B. nobilissimus* on their rare plant list. Additionally, *B.*
*nobilissimus* is considered Sensitive on the Oregon/Washington BLM Special Status List and the R6 Regional Forester’s Special Status Species List. These designations for *B. nobilissimus* reflect a high level of concern for the species’ conservation throughout its range.

### III. ASPECTS OF Bridgeoporus nobilissimus NATURAL HISTORY RELATED TO SURVEY METHODOLOGY

#### A. Bridgeoporus nobilissimus Description

*Bridgeoporus nobilissimus* (noble polypore) is a fungus that can produce conks of a massive size. It is unclear what drives *B. nobilissimus* to establish and produce conks. The conks are shaggy with an upper surface that is frequently covered with mosses, algae, lichens, and forest debris. The combination of morphological features that differentiate *B. nobilissimus* from other polypores likely to be encountered in *B. nobilissimus* habitat are the shaggy appearance of the pileal (upper) surface caused by a dense mat of white mycelial fibers and the alternating white and brown tube layers in the fruiting body. The conspicuous and often extremely large size and fuzzy upper surface of the perennial conk makes *B. nobilissimus* easily noticed and identifiable in the field, though not all *B. nobilissimus* conks are conspicuous and large.

Little is known about the autecology of *Bridgeoporus nobilissimus*, but it may be a parasite (brown rot) or saprobe on *Abies procera* and *A. amabilis* (Redberg et al. 2003). As a wood saprobe, *B. nobilissimus* probably does not extend much beyond the available substrate (tree, stump, snag, and roots). A case study identified *B. nobilissimus* DNA in the soil, only within five feet of an occupied stump (Gordon 2007). Further life history information is available in a *B. nobilissimus* Species Fact Sheet (Lebo 2007) available at [http://www.fs.fed.us/r6/sfnpw/issssp/species-index/flora-fungi.shtml](http://www.fs.fed.us/r6/sfnpw/issssp/species-index/flora-fungi.shtml).

Known *Bridgeoporus nobilissimus* sites are in a wide range of seral stages from 35-year-old plantations on the stumps of old-growth *Abies procera* and *A. amabilis*, to old-growth forests with large-diameter (109 - 208 cm [43 - 82 inch]) *A. procera* and *A. amabilis* trees. Conks are known to occur up to 122 centimeters (4 feet) off the ground on live trees, standing dead trees, snags, and stumps. They are also found on the ground growing from the root collars and root crowns within 2 meters (approximately 6 feet) of the base of the host (Cooke 1949). The fruiting body is characterized by a fibrous pileal surface with cracks and crevices from which vascular plants (e.g., *Oxalis* sp. and pteridophytes) and bryophytes often grow epiphytically (Redberg et al. 2003). The pileal surface is covered with a dense mat of white mycelial fibers in young basidiomata (fructing bodies), often somewhat agglutinated (adhering like gluten or glue) at the tips, which become darker with age, reaching several mm in length. These fibers often are green, due to associations with several species of algae, including *Coccomyxa* and *Charicium* species (Burdsall et al. 1996).

There are four general shapes for the fruiting bodies of *Bridgeoporus nobilissimus*, depending largely on their location on the host: (a) shelved, (b) conical, (c) “button”/round, and (d) vertical as modified by Cowden (2002)(see Appendix B: Conk Morphology). Shelved conks are usually large, have algal growth and litterfall accumulation on the pileal surface of the sporocarp, and are found on trees, snags, and stumps. Conical conks fruit on top and beside host stumps and have
algal growth and litterfall on the pileal surface of the sporocarp. Conical conks are characterized by a long stem protruding from deep within the host stump center or adjacent to the stump emerging from the root collar or root crown. Rounded conks are characterized as conks with an active pileal surface, but seldom acting as a secondary host to algae or mosses. Round conks do not appear to have an active hymenium (fertile surface). Vertical conks are very rare and are characterized by a vertical growth pattern from the host stump top downward. Vertical conks are creamy beige in color and have not been observed with an algal growth or litter present in the pileal surface. To Cowden’s list can be added a fifth descriptive conk type, dead (see Appendix B: Conk Morphology), in which the conk displays visible signs of deterioration, decline, and decomposition. Recognizing conks in a deteriorated state is equally important when attempting to determine the presence of *B. nobilissimus* within a survey area. Live conks at known sites range from a minimum (round conk) of 6.35 cm (2.5 inches) to a maximum (shelf conk) of 142 cm (4.6 feet) by 94 cm (3 feet).

**B. Range, Distribution, Abundance and Specific Habitat Associations**

*Bridgeoporus nobilissimus* is endemic to Oregon and Washington from the Olympic Mountains and western Cascade Range in northwest Washington (Olympic and Mt. Baker-Snoqualmie National Forests) to central western Oregon (Willamette National Forest) at elevations of 300-1,300 meters (1,000 to 4,300 feet) with one known site in the Oregon Coast Range (Mary’s Peak, Siuslaw National Forest) (Redberg et al. 2003, Cowden 2002) (see Appendix C, Range and Distribution Map). The lowest known site in Oregon is 850 meters (2,800 feet). As of April 2007, 104 sites (locations) with fewer than 20 populations of *B. nobilissimus* are known in the Pacific Northwest, the majority of which are within the Cascade Resource Area, BLM Salem District in Clackamas and Linn counties. Although conks have been found on all aspects, the majority of conks have been found between 180 and 360 degrees azimuth. No sites are currently known from the east slopes of the Cascade Range or south of Township 14 south, Willamette Meridian.

Potential suitable habitat for *Bridgeoporus nobilissimus* conks is characterized as mesic to wet microsites in forests of all seral stages with 36 inch or greater living or legacy material of the true fir species *Abies amabilis* and *A. procera*.

Associated tree species are typical of those found in the Pacific Silver Fir Zone and include: *Abies amabilis* (pacific silver fir), *A. procera* (noble fir), *Pseudotsuga menziesii* (Douglas-fir), *Thuja plicata* (western redcedar), and *Tsuga heterophylla* (western hemlock). Sites found in the mid to upper Western Hemlock Zone and the Pacific Silver Fir zone are characterized as cool and moist.

Dominant shrubs found at the sites include: *Gaultheria shallon* (salal), *Alnus sinuata* (Sitka alder), *Rhododendron macrophyllum* (rhododendron), and *Vaccinium alaskaense* (Alaska huckleberry).
IV. INVENTORY METHODOLOGY

A. Survey Methods

The majority of FS and BLM surveys for *Bridgeoporus nobilissimus* are expected to be conducted prior to ground-disturbing activities such as timber harvest and other activities that may disrupt stand conditions necessary for its survival. Other surveys may be conducted in potential habitat to determine presence/absence and to clarify distribution and habitat. For the purpose of this protocol, survey area for pre-disturbance surveys is defined as the area within and adjacent to a project area that could be impacted by direct or indirect impacts (see extent of surveys).

Surveys include a two step process of pre-field review and field survey. Field survey can be accomplished through either an intuitive-controlled survey or complete survey methodology.

1. Pre-field Review

The objective of the pre-field review is to determine if known sites are present in or in the vicinity of the proposed project area, and to determine if probable suitable habitat for *Bridgeoporus nobilissimus* exists in the proposed project area. Consult the Agency species occurrence databases, and other data sources if necessary, to determine if known sites occur in the area of interest. Evaluate available information (e.g., botany program records, predictive habitat models (see Lippert et al. 2006), individuals knowledgeable of the project area, and ecological requirements of *B. nobilissimus*) to determine if probable suitable habitat for *B. nobilissimus* exists in the proposed project area. When reviewing managed stands, check historic aerial photos or stand exam data to determine the presence or absence of large diameter *Abies* species. Delineate the areas of probable suitable habitat on topographic maps and aerial photos to be used during field surveys.

The pre-field review will identify reported sites of *Bridgeoporus nobilissimus* near the proposed project and identify areas of suitable habitat for this species in the survey area. Protocol surveys should only be conducted in suitable habitat. Documentation of the pre-field review will become part of the proposed project’s administrative record.

2. Field Survey

Field surveys consist of two types, Intuitive Controlled and Complete Surveys. The objective of the field survey is to document the presence/absence and location of *Bridgeoporus nobilissimus* conks within and adjacent to the proposed project area. Data will be collected for all required fields in agency databases (GeoBOB and NRIS TESP) for both surveys and occurrences to fully document where surveys were conducted, where populations occur, and to characterize habitat and ecological conditions. Complete survey and occurrence data are essential for refining our knowledge of the distribution and ecological requirements of *B. nobilissimus* throughout its range.
a) **Intuitive Controlled Surveys**

Intuitive-controlled surveys are particularly effective when performed over an area greater than one hectare (2.5 acres) that is not near a known *Bridgeoporus nobilissimus* population. Conduct the intuitive-controlled survey by traversing through and around the proposed project area, visiting areas delineated on the topographic map or aerial photos as probable habitat for *B. nobilissimus*. Search the survey area for the presence of the species by randomly inspecting potential host stumps, trees and snags, and delineate on the topographic map or aerial photo the extent of the field survey and route traversed. The survey route may be recorded with GPS and downloaded to a digital topographic map or aerial photo.

b) **Complete Surveys**

Complete surveys are the most effective method for determining the presence/absence of *Bridgeoporus nobilissimus* conks. This is the most appropriate method to use when surveying a project area that lies near a known *B. nobilissimus* population. Complete surveys are defined as a 100-percent visual examination of potential suitable host trees, snags and stumps in the survey area. When surveying, it is imperative that the surveyors inspect all surfaces and cavities of all potential hosts. Conks have been detected fruiting on all orientations of their host, and small newly formed conks may be easily overlooked. Search the survey area for the presence of the species, and delineate on the topographic map or aerial photo the aerial extent of the survey effort. An essential part of a complete survey is the marking of each potential host stump, tree, and snag inspected with flagging as an indication that it has been surveyed. This will assist the surveyor in determining that 100 percent of suitable substrates have been surveyed.

B. **Extent of Surveys**

The survey area for proposed projects will include the project area, which is defined as the area on the ground that may receive direct impacts as well as the area immediately adjacent to the proposed project that may receive indirect impacts (Chen et al. 1995, Harris 1994). Direct impacts are those which cause physical disturbance to any surface or substrate within any given area. Indirect impacts may include, but are not limited to, changes in the amount of sunlight reaching the forest floor and changes in microclimatic conditions (i.e., humidity, soil moisture and temperature, wind speed and direction). Areas subject to indirect impacts adjacent to the proposed project should be surveyed when the surveyor determines that the indirect impacts could affect the viability of *Bridgeoporus nobilissimus* outside the area of direct impacts.

C. **Timing of Surveys**

Timing is less restrictive for *Bridgeoporus nobilissimus* than for other fungi. Conks persist year-round and surveys may be conducted at any time of the year. However, conducting surveys during vascular plant growing season and snow-free periods facilitates safe and efficient field work, and enables accurate characterization of the vascular plant component of the habitat. Obtaining such habitat data will facilitate better management of the species and help narrow the scope of future survey activity.
**D. Documentation & Data Management**

Data collected during field surveys must be recorded and can be done on paper data forms or electronic data recorders. There are three general categories of information that are collected during BLM/FS species surveys: survey data (information characterizing the survey), detection data (information characterizing site occurrences), and supporting data (supporting information including photo vouchers - do not make specimen collections of the conk to voucher the site). All of the data collected during surveys must be entered into agency databases (GeoBOB and NRIS TESP) following agency guidance issued for each application, including entering negative survey information of areas surveyed where *Bridgeoporus nobilissimus* conks were not found. Vouchers, in this case photo vouchers, must be processed according to interagency special status species guidelines (i.e., expert verification).

If populations of *Bridgeoporus nobilissimus* are found, use GPS to collect geographic coordinates and mark the location of the population on a field map (e.g., 7.5 minute USGS topographic maps) and aerial photo. It is recommended that a separate map from the one that delineates the aerial extent of the field survey be used. Delineating the extent of the population on the maps or photos is valuable in relocating the population and developing a site management plan.

For surveys and occurrences of *Bridgeoporus nobilissimus* located on BLM lands, complete the GeoBOB Flora Survey and the GeoBOB Observation Forms. For surveys and occurrences located on national forest lands, complete the NRIS TES Plants Forms. Both the BLM and Forest Service data field forms are located at [http://www.fs.fed.us/r6/sfpnw/issssp/inventories/monitoring.shtml](http://www.fs.fed.us/r6/sfpnw/issssp/inventories/monitoring.shtml).

The hard copy file will include documentation of pre-field review, field survey data, field forms and field notes, maps/aerial photos of survey areas, and any other supporting documentation such as photo vouchers of conks.

Photograph *Bridgeoporus nobilissimus* conks in their natural habitat to document each occurrence. Do not physically collect voucher specimens. Verification data by individuals knowledgeable about *B. nobilissimus* is required for occurrences on BLM and national forest lands (see Appendix A for a list of contacts) and must be entered into the appropriate Agency corporate database (NRIS TES Plants or GeoBOB).

**D. Surveyor Qualifications**

Personnel conducting the survey protocol for *Bridgeoporus nobilissimus* require skill in the recognition and identification of *B. nobilissimus* conks and host species. In order to characterize habitat, it is highly desirable for personnel to be skilled in the identification of vascular plant species and plant communities for the geographical area of interest. Personnel need to be experienced in field techniques, including GPS, aerial photo and map interpretation, route finding, and ecological/floristic field observations to be able to document the location, ecological conditions, and habitats surveyed for and occupied by *B. nobilissimus*. 
V. REFERENCES


II. GLOSSARY

**Autecology** - species relation to its environment.

**Basidiomata** - fleshy, spore-producing structure of basidiomycete fungi.

**Commensal** - not competing while residing in or occupying the same area as another.

**Conk** - the shelf like fruiting body of certain wood-decaying fungi.

**Endophyte** - a plant living within another plant, usually as a parasite.

**Epiphytically** - a plant that grows above the ground, supported nonparasitically by another plant or object, and deriving its nutrients and water from rain, the air, dust, etc.

**Fruiting body** - a specialized spore-producing structure of a fungus.

**Agglutinated** - adhering like gluten or glue.

**Hymenial/Hymenium** - the spore-bearing layer of the fruiting body of certain fungi.

**Hyphal** - any of the threadlike filaments forming the mycelium of a fungus.

**Lignin** - the chief noncarbohydrate constituent of wood that binds to cellulose fibers and hardens and strengthens the cell walls.

**Morphology/Morphological** - the form and structure of an organism.

**Mutualistic** - an association between organisms of two different species in which each member benefits.

**Mycelial/Mycelium** - the mass of hyphae that form the vegetative part of a fungus.

**Parasite** - an organism that lives on or in another species.

**Pathogen** - an agent that causes infection or disease.

**Pileal/Pileus** – umbrella like fruiting structure forming the top of a stalked fleshy fungus.

**Polypore** - woody pore fungi having a spore-bearing surface.

**Saproobe** - an organism that derives its nourishment from nonliving or decaying organic matter.

**Sporocarp** - a multicellular structure in which spores form; a fruiting body.

**Substipitate** - Supported on a reduced stipe or having a false stipe (i.e. stem or stalk).
Appendix A: *Bridgeoporus nobilissimus* Identification Verification Contacts

Alice Smith, Botanist, Sweet Home Ranger District, Willamette National Forest. 541-367-5168.

Claire Hibler, Botanist, Salem District Office, Salem BLM. 503-375-5646.


Terry Fennell, Botanist, Cascade Resource Area, Salem BLM. 503-375-5646.
Appendix B: Conk Morphology

*All photos by Terry Fennell, Salem BLM, Cascade Resource Area Botanist

1. Conical
2. Shelved
3. Button / Round
4. Vertical
5. Dead
Appendix C: Range and Distribution Map