Planning for the long-term survival of the Myotis bat nursery colony at the TESC Organic Farm Farmhouse.

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For at least the past 20 years a colonny of 600-1000 female bats arrive each spring to The Evergreen State College Organic Farm to bear and raise their young[1]. For approximately four months each year, the exterior siding boards provide shelter for this cohesive group, or *maternity colony*, during its gestation, birthing, and then the nursing period. Two species of Myotis bats which occupy this site, Yuma Bats (*Myotis yumanensis*) and Little Brown Bats (*Myotis lucifugus*). This is one of only two Yuma Bat maternity colonies which have been found in Thurston County. It is in the Washington State Dept. of Fish and Wildlife (WDFW) wildlife occurrence database; bat maternity roosts are considered sensitive habitat and WDFW is currently making an effort to document the roost sites of communal bats and birds. This bat colony is known and generally appreciated by Organic Farm personnel, but has not been incorporated into the farm's management plans or procedures (such as farming practices). The need for conservation action has yet to be acknowledged or formalized at the college administrative or planning level, and has not been included in the campus planning or ecological monitoring processes. The college has largely ignored it, a strategy that has may have been adequate for the survival of this colony thus far. However, the "do nothing" approach will likely lead to the demise of the bat colony at this site, and likely in the foreseeable future.

This colony is important all on its own, as it is believed to be a regionally significant reproductive colony, providing a nursery for many of the bats in the area. Additionally, it could also provide academic opportunities at TESC for the study of bats, for small-mammal life history studies, and 'integrated pest management' strategies at the Organic Farm, and more. The purpose of this document to describe what is known about this particular colony and their particular life history

1 Personal communication with Susan Snaido, TESC farmhouse caretaker, ca. 1987-1988

strategies, to review the foreseeable risks to the colony, and to introduce the college community to some of the actions which will need to be taken to conserve this significant colony. I believe that immediate steps for conservation of this colony are not just justified, but necessary for the colony to survive the next five years.

The Farmhouse as 'bat house'

The bats at the farmhouse reside entirely outside of the vapor barrier of the structure's exterior. They use gaps approximately one-inch wide between the horizontal, overlapping siding boards (see graphic). The areas of use are evident from the guano that accumulates on the ledges of the window trim below roost areas, and on the south wall, on the wood deck below roost areas. The December, 2005, *Property Condition Assessment* performed by Marx/Okubo Associates , Inc, commissioned by the TESC facilities department, provides detailed building condition and maintenance needs data for the Organic Farm farmhouse. This report does not identify any issues with the vapor barrier under the cedar siding (the roost area), rates the thick cedar siding as servicable and in no need of repair or maintenance. It did not report any evidence of animal entry into the walls or bulding. The only recommendations relating to the siding was that the sealant (caulking) around the windows and other joints be replaced. Visual observations of the bats during maternity season have confirmed that they reside entirely on the outside of the habitable space.

The typical "recipes" for creating bat roost habitat (bat houses) for Myotis species such as these recommend south or sun-facing, vertical cavities of at least 18-inches, and other features that are simply nothing like the features that these bats appear to prefer in the Farmhouse. These bats are visible in the long shallow gaps behind the siding, and the majority are in the north wall during maternity season, never in direct sun. These discrepancy illustrates how little is understood about their behavior and roost requirements, and should forewarn of the challenges ahead in devising conservation management methods and policy. A "by the book" solution will not likely be a successful strategy for creating alternative roost habitat for this colony, if that approach is attemped.

General description of the colony

During May of 2005, Evergreen student Trisha Towanda, then a biology senior, studied emergence behavior of the farmhouse colony using an infrared video system. By reviewing tapes, she counted approximately 600 bats leaving the colony in the north wall area. Guano traces and visual observations show that these bats roost in the south wall as well, so the total population of adult female bats at the farmhouse colony is at least 600, and probably closer to 1,000. We know from observing other colonies in this region[2] that the young are born early in June, so this is our best estimate of a minimum population of adult bats roosting at the building, prior to the birth of the 2005 young. During the spring these colonies contain only adult female bats, most of which will have one young each year, so this estimate is close to one-half of the maximum population expected after the young are born in June.

The pups will spend 4 to 6 weeks in this natal roost, flightless, completely dependent on the milk and care from their mothers. During July, the pups will become mature enough to begin practice flights begin learning to forage for insects nearby the roost, then soon after begin accompanying the adults bats to more distant foraging areas, such as Capitol Lake. Throughout the summer both mothers and pups will continue to use the structure as a day roost, with a gradual population decline as the young become independent and some members of the colony will disperse throughout the region. For example, one radio-tagged bat in this area relocated 20 km from the Woodard Bay maternity roost to the Lake St. Clair area southwest of Lacey. This data is very limited, but more study during this period would likely show that this one individual did not disperse the maximum distance for these colonies.

Yuma Bats in western Washington

2 Based on census counts at the Woodard Bay colony, composed of the same 2 species, 2003–2007.

This colony is especially significant for Yuma Bats in south Puget Sound. Yuma Bats are usually, if not always, found in densely packed large colonies (Brigham and others, 1992; Evelyne and others, 2004), rather than found in more numerous smaller colonies like the similar Myotis species, the Little Brown Bat. Even though both species favor the same local open-water foraging locations such as Capitol Lake adjacent to downtown Olympia (Falxa, 2004; Towanda & Falxa, 2007). Yuma Bats form the largest colonies of any of the species in Washington state, yet very few maternity colonies are known west of the Cascades. The colony at the TESC Organic Farmhouse is only one of four in the Washington State Dept. of Fish & Wildlife (WDFW) database. While they may have the fewest quantity of colonies or maternity roosts, they conversely have the most populated colonies of any of our bats. An analogy might be that of our rural and city population distributions. Yuma Bats would be the downtown apartment dwellers, while Little Brown Bats would be analogous to the Tenino bats, with both groups commuting to the same state Capitol buildings for work.

Two important daily needs for reproductive Yuma bats are a secure roost to raise the flightless juveniles and reliable food resources within commuting distance. The long-term success of the TESC farmhouse colony indicates that these bats have found both these requirements, although we have discovered through radio-tracking bats at Capitol Lake (downtown Olympia) that these bats will forage at extraordinary distances from the roost, including Capitol Lake, Black Lake, and Summit Lake. One bat in spring of 2006 utilized all three of these lakes during a 10-day period, one night she went to Black Lake and Summit Lake both, a round trip of 32 km (20 miles), not including the many miles flown during the several hours of foraging.

This commuting behavior suggests that these bats are rather selective in roost structures, traveling far for feeding rather than locating roosts closer to food resources. This pattern is mirrored at the large Yuma colony at Woodard Bay Natural Resource Area, the other known Yuma Bat colony in the south Puget Sound area.

Little Brown Bats in western Washington

Little Brown Bats are also found roosting at the TESC Organic Farm farmhouse, in close proximity to the Yuma Bats. In this region they roost and forage in similar locations, and utilize many of the same food resources. Radio tracking bats in the south Puget Sound area has shown that the Little Brown Bats from the Organic Farm maternity colony regularly "commute" to Capitol Lake, Black Lake and sometimes to Summit Lake to feed. Little brown bats are often confused with Yuma Bats because of their very similar size, physical color and other features, as well as their habits of roosting and foraging side-by-side. It appears, however, that the roosting strategies for reproductive Little Brown Bats may be more flexible that for Yuma Bats, as they can "make do" with roosts accommodating as few as 40 bats, though they are more typically found in maternity roosts with 100-200 other female bats of their species. An estimated 30% of the bats in the large Yuma colonies are Little Brown Bats[3], indicating that a significant proportion of their local population may be associated with two large Yuma Bat maternity roosts.

Why the farmhouse?

The physical qualities of the structure:

macro: proximity to older; species-diverse forest; availability of nearby "alternate roosts"

micro: small gaps; long linear spans with room for clustering; height above ground; protected from weather

- minimal threat from humans, predators, and agricultural chemicals
- safe open area for young to learn to fly
- 'alternate roost ' structures nearby (Kifer barn, other out buildings locally,large decaying trees)

Threats to the colony

The most immediate threat to the survival of this colony would be the sudden loss of its historic roosting structure, the Farmhouse siding. If these bats returned form hibernation some spring to find

3 Based on acoustic (call) data collected as bats exit the colonies; G. Falxa, 2005-2007 (unpublished data)

the gaps between the cedar siding are gone, they would be seriously challenged to find a suitable alternate roost habitat in a time frame that would accommodate the tightly timed reproductive schedule to which they appear to be confined. If energy is wasted in searching for a location to house a large number of bats—and restricted to night-time searching—staying on a schedule that would assure the birth of the young in June would be compromised. The greatest challenge for the survival of a juvenile bat through its first year is the ability to accumulate enough fat to endure the first winter of hibernation. An even more serious disturbance would occur if work on the siding during the maternity season (roughly April – September) -- some (or many bats) would probably not survive the distrubance, especially if young were present, and the threat to the colony and social structure could be greater than the colony could endure long enought to locate a suitable replacement roost. This scenario could have happened in 2007 when TESC Facilities planned to replace the Farmhouse siding, apparently unaware of the implications to this maternity colony [4].

There is evidence that relatively minor human-generated disturbances can cause maternity colonies to be displaced. Documented disturbances of this type include harassment in the form of thrown objects, smoke from nearby fires, frequent, or overly-eager roost inspections, and the introduction of predators (such as possums and domestic cats). During July, 2006, sanding and painting of doors from the TESC dormitories was occurring in a nearby barn on campus property (the barn on the old Kifer place, on Simmons Rd NW). Radio-tracking of bats at Capitol Lake had shown that the roof of this barn is used as an "alternate roost" for the Organic Farm colony. This type of roost provides secondary and short-term housing for bats that normally roost in a nearby primary roost, such as the Farmhouse. The solvent-based products inside the enclosed barn (the workers were wearing respirators) may have had a detrimental impact on the 100 or so bats that were counted leaving the roof prior to the door-painting activity, but there was no way to evaluate this at the time. When approached with the information that bats roosted in building's roof, the crew doing the work responded favorably by installing a plastic sheeting barrier between the rafters and the roof area. In

4 Personal communtcation, 2006. Paul Smith, Director of TESC Facilities.

addition to trying to reduce the migration of the solvent fumes, they indicated a desire to reduce the effect of bat droppings on their handiwork.

These close calls will continue, and sooner or later there will be an event that will cause serious negative impact to the maternity colony. We have the capacity to better understand the implications of our actions, and to be better stewards to this sensitive wildlife phenomenon.

Beyond the Farmhouse

Unlike most of the mammal species on the campus, there is little information on the state of bats at TESC. Use of other natural and anthropomorphic structures by other bat species as well as this colony are certain, and inadvertent disturbances have no doubt already occurred. Additional challenges to these bat exist that are outside the control of The Evergreen State College, but add to the survival struggle of bats in our highly modified form the landscapes they evolved with. New diseases that affect bats (like 'white-nose syndrome') and the contimual removal of the roost structures bats use – natural (old snags, hollow trees) as well as old buildings are a few factors causing the declines in bat populations across North America. Locally, the proposal to convert Capitol Lake from fresh water to intertidal mudflats would eliminate the most important foraging area for Yuma Bats and Little Brown Bats in northern Thurston County.

So many bats use the lake as their primary feeding area that the lake has probably influenced the local distribution patterns for these bats, with several large colonies within commuting distance, such as this one at TESC. Unlike the large Woodard Bay maternity colony, bats from the TESC Organic Farm colony have been found foraging at Black Lake and Summit Lake, as well as Capitol Lake, making them a better-located colony to survive the loss of that important forage site. If so, that means the TESC Organic Farm colony may be the colony that would survive the lake conversion conversion. If managed in a manner that would best insure their survival, it might also be a maternity roost site that could absorb some of the potentially displaced bats from the Woodard Bay colony.

Radio tracking studies over the past 6 years has shown that there is no apparent suitable alternate foraging areas, a contrast to the TESC colony which has several adequate lakes withing its nightly commuting range..

The need for a conservation plan

+ do nothing (and lose the bat colony to one of the foreseeable threats)

+ preserve existing habitat and tolerate inconvenience (with education to minimize disturbance)

+ create alternate habitat appropriate for the needs of this colony

This large group behavior makes each colony more significant to the welfare of the species, as each eliminated colony affects a large number of reproductive bats.

Resources for planning process

+ resource list (started, at end of this document)

+ a few pertinent papers and guides

+ a list of failed and successful mitigations

+ a list of organizations which could assist in the process

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