A Proposal:
An examination of Lewis's woodpecker reproduction in the Frank Church Wilderness

Amber Lankford
College of Natural Resources
Department of Fish and Wildlife
9 February 2008

Abstract:

The Lewis's woodpecker (*Melanerpes lewis*), a species of special concern, typically breeds in burned pine or riparian areas. To my knowledge, no work has been done on this species in burned riparian wilderness. This study will examine the reproductive activity of Lewis's woodpeckers in the Frank Church Wilderness. The three main objectives of this study are 1) to calculate the feeding rate of Lewis's woodpeckers during the nesting period, 2) to determine reproductive success (i.e. the proportion of nests that produce at least one fledged young), and 3) to find the average number of fledglings produced per nest. Study areas will be located along riparian zones that have experienced a range of burn severities in cottonwood (*Populus* spp.) habitat. Collected data will be analyzed and compared with data from riparian zones within agricultural settings.

Introduction:

Lewis's woodpecker

The Lewis's woodpecker (*Melanerpes lewis*) is considered a species of special concern throughout its range (Gentry & Vierling 2007) and is listed as a species of greatest conservation need (SGCN) for the Idaho Department of Fish and Game's Comprehensive Wildlife Conservation Strategy (CWCS) plan (Idaho Department of Fish and Game 2005). Lewis's woodpeckers have been declining on national levels (Saab & Vierling 2001, Gentry & Vierling 2007), possibly due to loss of suitable habitat, pesticides, or competition for nest sites (Saab & Vierling 2001).

Lewis's woodpeckers breed in post-burn forests dominated by ponderosa pine (*Pinus ponderosa*) and riparian areas dominated by cottonwood (*Populus* spp.) (Vierling 1997, Linder & Anderson 1998, Saab & Vierling 2001, and Gentry & Vierling 2007). Lewis's woodpeckers are considered burn specialists for their use of snags in post-burn areas (Saab & Dudley 1998, Saab & Vierling 2001). Their skull is not adapted for drilling into hard woods, (Bock 1970, Vierling 1997) and as a result they use existing cavities, or excavate into dead or decaying wood (Vierling 1997, Gentry & Vierling 2004, Saab et al. 2004); for this reason, they are considered weak cavity excavators (Saab & Dudley 1998, Gentry &Vierling 2004, Saab et al. 2004). The rate at which cavities are reused is also quite high in Lewis's woodpeckers (Saab et al 2004).

Most woodpecker species are known for their wood boring habits, while the Lewis's woodpecker is a flycatcher. They may prefer burn areas for the increased arthropod populations due to more open canopy and greater shrub development (Linder & Anderson 1998, Saab et al. 2004, Saab et al. 2007). Open canopy also results in better perch sites, good visibility and foraging maneuverability (Linder & Anderson 1998, Saab & Vierling 2001). Nest predators, such as squirrels and snakes, are thought to be the main cause of nest failure in most studies (Saab & Vierling 2001, Saab et al. 2004, and Gentry & Vierling 2007). Decreased cover results in reduced predator populations, which generally increases reproductive success (Saab & Vierling 2001, Saab et al. 2004).

While breeding activities in riparian areas has been the focus of a number of studies (Vierling 1997, Saab & Vierling 2001), these riparian areas occurred in an agricultural matrix that was heavily influenced by flood control and pesticide/herbicide spraying. This human activity has likely had major impacts on the Lewis's woodpecker and their reproductive success

(Saab & Vierling 2001). These impacts include reduction in prey abundance, changes in predator community, alteration of nest site selection, and possible effects from pesticides (Saab & Vierling 2001). The Frank Church Wilderness presents an excellent opportunity to observe reproductive success with limited human impact. Information from this study can be used as a baseline for both past and future studies.

The focus of this project is to evaluate the reproductive activities of Lewis's woodpeckers in burned riparian habitat in a wilderness setting. I will address three main variables of these reproductive activities: feeding rate, productivity and nest success. Feeding rate is of the number of times in which parents visit the nest over a defined period of time. Productivity is the number of young to survive to fledging. Nest success is the proportion of nests that produce at least one fledgling.

Taylor Ranch

Taylor Ranch Wilderness Field Station is situated in the Frank Church Wilderness. It has a history of fires that provide a variety of burn severities across the landscape, creating excellent habitat for the Lewis's woodpecker. There has only been one other undergraduate study on Lewis's woodpecker in the Frank Church, and no studies have been conducted there on reproductive success.

Research Objectives and Hypothesis:

Hypotheses

Hypothesis 1: Feeding rates will be influenced by local vegetation characteristics.
Prediction:

1. Feeding rates will be positively correlated with shrub density within 11.3m of the nest tree, following BBIRD protocol (Martin et al. 1997).

Hypothesis 2: Reproductive success will be influenced by local vegetation characteristics.
Prediction:

1. Greater canopy cover and shrub density within 11.3m will result in lower reproductive success because of greater predator presence.

Hypothesis 3: Productivity will be influenced by local vegetation characteristics.
Predictions:

1. Lower densities of trees will positively influence productivity.
2. Higher densities of shrubs will positively influence productivity.

Research Objectives

1. To calculate the feeding rate of Lewis's woodpeckers during the nestling period.
2. To find the proportion of nests producing at least one fledged young.
3. To find the average number of fledglings produced per nest.
4. To measure vegetation characteristics that might be associated with objectives 1-3.

Methods:

To survey for nests, we will set up a minimum of 6 study sites along Big Creek and its tributaries. To limit spatial autocorrelation, we will place the sites along different tributaries to the greatest extent practicable. Each site will cover 1-2 hectares of riparian habitat with varying burn severities, with locations based on the likelihood of Lewis's woodpeckers nesting in the area. Using current vegetation maps, and the habitat preferences described by Dr. Saab and Dr.Vierling, we will choose sites with burnt cottonwood stands. There are existing data of nest locations around Taylor Ranch that will be provided by Jim and Holly Akenson, which we may make use of when placing these sites.

Once the nest sites are discovered, we will observe the behavior of the adults to help determine the progress of the nest. Incubation begins around May 30 and lasts for 6 to 7 days (Dudley & Saab 2003). During incubation, lasting 12 to 13 days, we will look for birds visiting cavities and switching off occasionally (Dudley & Saab 2003). During the nestling stage, lasting 28 to 34 days, we will look for adults carrying food back to cavities, switching much more frequently (Dudley & Saab 2003). We will visit nests every three days to record feeding rate. Each nest will be observed for one hour, and the feeding rate will be recorded as visits per minute. Due to time-of-day effects on feeding, we will stagger our monitoring so that each nest is monitored at different times throughout the day. Feeding rates were similarly recorded by Vierling (1997) in riparian zones within agricultural fields, and by Bock (1970) in oak woodlands. The nests will be watched until either the young have fledged or the nest has failed. To determine if nests have successfully fledged we will monitor for fledglings and locate them around the nest by sight and by increased calling. Fledglings stay around the nest site for 2 to 3 days and are very audible (Saab & Vierling 2001). During this period we will count the number of fledglings and note which nests did not produce any fledglings. Occasionally, multiple nests can be found in one tree (Vierling 1997) so it is likely that multiple breeding pairs will be found in smaller areas if a suitable nest tree is present (Vierling, pers. comm.)

Following the BBIRD protocol (Martin et al. 1997) we will use the nest tree as the center of our plot and collect vegetation data within 5 and 11.3 meter radii. These data will include total canopy cover, shrub density, and diameter at breast height. We will be recording the total number of attempted nests, the feeding rate, the number of nests that produced at least one fledged offspring, and the number of fledged offspring per nest. Vegetation data in the study areas will be collected according to the BBIRD protocol (Martin et al. 1997). Our hypotheses are all related to relationships between vegetation and feeding rates, reproductive success, and productivity. Lower densities of trees allow greater maneuverability possibly allowing for more efficient foraging (Saab & Dudley 1998). Increased shrub density within an 11.3m radius of the nest tree might provide more available food for arthropods, which the Lewis's woodpeckers feed on. A greater availability of food sources may lead to an increase in productivity. Decreased canopy cover as a result of burning positively correlates to decreased numbers of nest predators (Gentry & Vierling 2007); therefore lower canopy and shrub cover may result in an increase in productivity. The presence of predators will be determined by placing a track plate at the base of each nest tree. These plates will be checked and replaced every six days. These data will be analyzed with Minitab at the University of Idaho under the direction of Dr. Kerri Vierling.

Materials

Track plates
Camera
Densiometer
Flagging tape
GPS
Measuring tape
Clinometer
DBH caliper

Time Table: 11 weeks

Start: ~ 19 May
End: ~ August 4

Date	May	May 30	June 2	June 18	July 20	August 2
Nesting Periods	Courtship	Laying	Incubation	Nesting	Fledging	End fledging
Days	----------	6.5	13-14	28-34	51	----------

(Dudley & Saab 2003)

Budget:

Wages	**TOTAL**
541 hours X $4.45/ hour	$ 2,407.45
Flight	
($50 ticket + cost of flying in equipment) X 2 one-way flights	$ 130.00
Food	
~ $49/ week (cost of food+ 5% service charge + flight cost) X 11 weeks	$ 539.00
Rent**	
$15/day X 11 weeks	$ 1,155.00
Equipment	
Track Plates: $2.88/plate (full summer) X 40 possible nests	$ 115.20
	$ 4,346.65

*All other equipment provided by Dr. Kerri Vierling
**I will attempt to work off all or most of the rent

Hours to be worked:
476 field hours (8hrs/day for the first week, then 6hrs/day for the next 11 weeks)
65 lab/analysis hours (data entry, analysis, write-up)

Facilities / Advisor Assistance:

Facilities

University of Idaho Excel program: Minitab

ArcMap

Advisor Assistance

Dr. Kerri Vierling will provide field equipment for this project. She will be advising me during data analysis and review the write up for the final report.

Credentials:

Primary Researcher: Amber Lankford

Major: Wildlife Resources Major

GPA: 3.85

Year in school: sophomore

Graduation year: 2010

Previous Experience: Owl Research Institute

Supervisor: Denver Holt

Project: Locating nesting sites and banding barn owls in the Mission Valley, Montana

Advisor: Dr. Kerri Vierling

Curriculum vitae attached

Field Assistant: Tatiana Gettelman

Major: Conservation Biology

Year in school: junior

Graduation year: 2009

Conclusion:

As a species of greatest concern, it is vital to collect data on the reproductive success of Lewis's woodpeckers. Taylor Ranch provides an excellent opportunity to study this bird in an area with limited human impacts. Therefore, this data will be especially useful as a base line for comparison with studies in areas of greater human influence. This study focuses on three main factors of reproductive success. These factors are feeding rate, productivity and nest success. The data collected from this study will be hopefully combined with nest site selection data for Lewis's woodpeckers from a second study for a combined paper that will be submitted for publication.

Citations:

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