VOLE MONITORING NETWORK

IS THE AMOUNT OF FEEDING DAMAGE RELATED TO POPULATION SIZE OF VOLES?

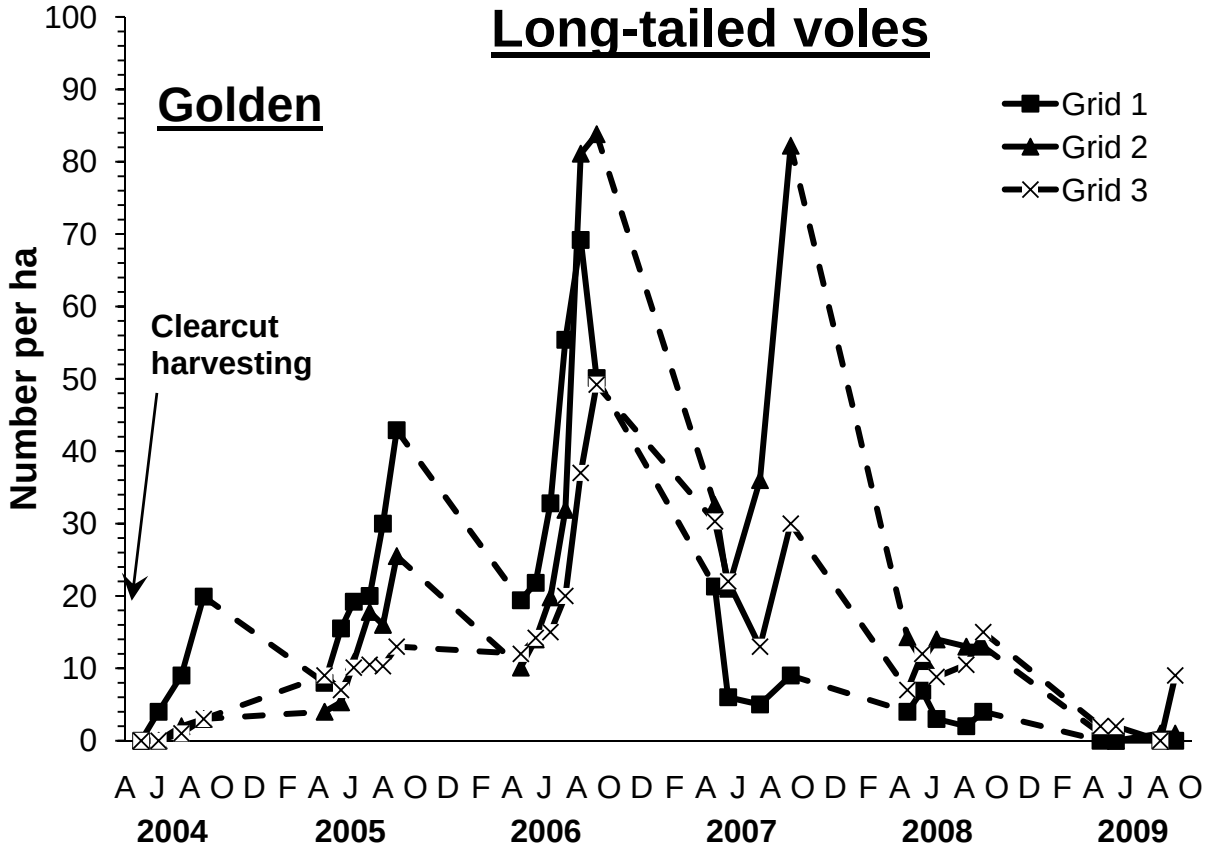
How many voles need to occur in a given plantation to create a serious damage problem? A risk rating for feeding damage to trees, based on an index-line or grid survey of voles, is derived from the significant positive relationship between percentage tree mortality and abundance of *Microtus* voles.

Number of voles/per ha	Risk of damage to trees
< 7	Low
7 – 34	Moderate
35 – 88	High
> 88	Very High

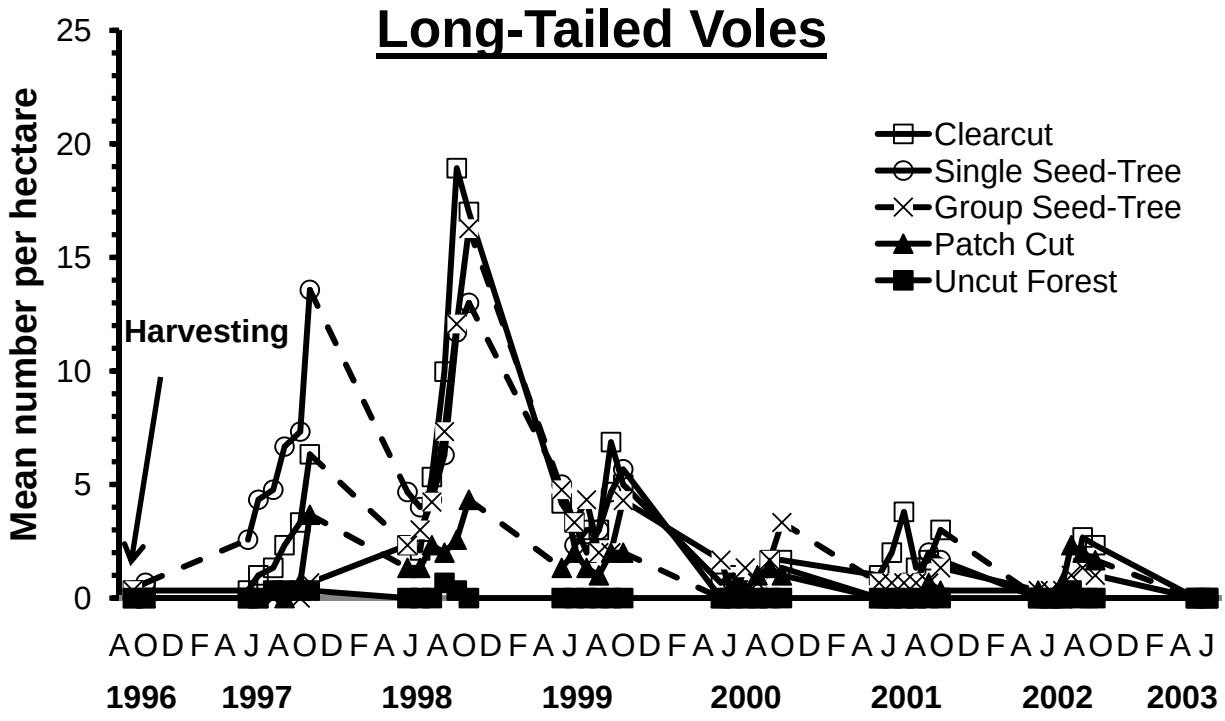
WHEN and WHERE WILL VOLE DAMAGE BE A PROBLEM?

Forest harvesting by clearcutting

Vole populations, near Golden B.C., were monitored for six years (2004-2009) since the time of clearcut harvesting to follow how these rodents respond to successional change and reach densities capable of serious feeding damage to newly planted trees. Populations of long-tailed voles were low in the first year after harvest with mean numbers < 5/ha. Mean numbers in the second post-harvest year reached 15/ha and had a strong annual cycle with up to 43 animals/ha in September. Annual maximum densities of 49-84 voles/ha were recorded in 2006, which seemed to be the peak populations on the three grids. However, in the fourth year (2007) since harvesting, numbers of long-tailed voles declined on two grids, with the third grid remaining high, reaching an annual maximum of 82/ha. This decline deepened in 2008 and voles disappeared on two of three grids in 2009. These maximum vole numbers were in the "high" risk of damage to trees.



Vole populations, near Summerland, B.C., were monitored for 8 years (1996-2003), on a gradient of clearcut to partial cutting treatments. A similar pattern was observed on clearcuts for both the long-tailed vole and meadow vole**: at 3 years post-harvest**, vole numbers peaked and then declined thereafter to low levels. These maximum vole numbers were in the "moderate" risk of damage to trees.


Long-Tailed Voles
Mean number per hectare
25
20
15
10
5
0
Harvesting
Clearcut
Single Seed-Tree
Group Seed-Tree
Patch Cut
Uncut Forest
A O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A O D F A J
1996
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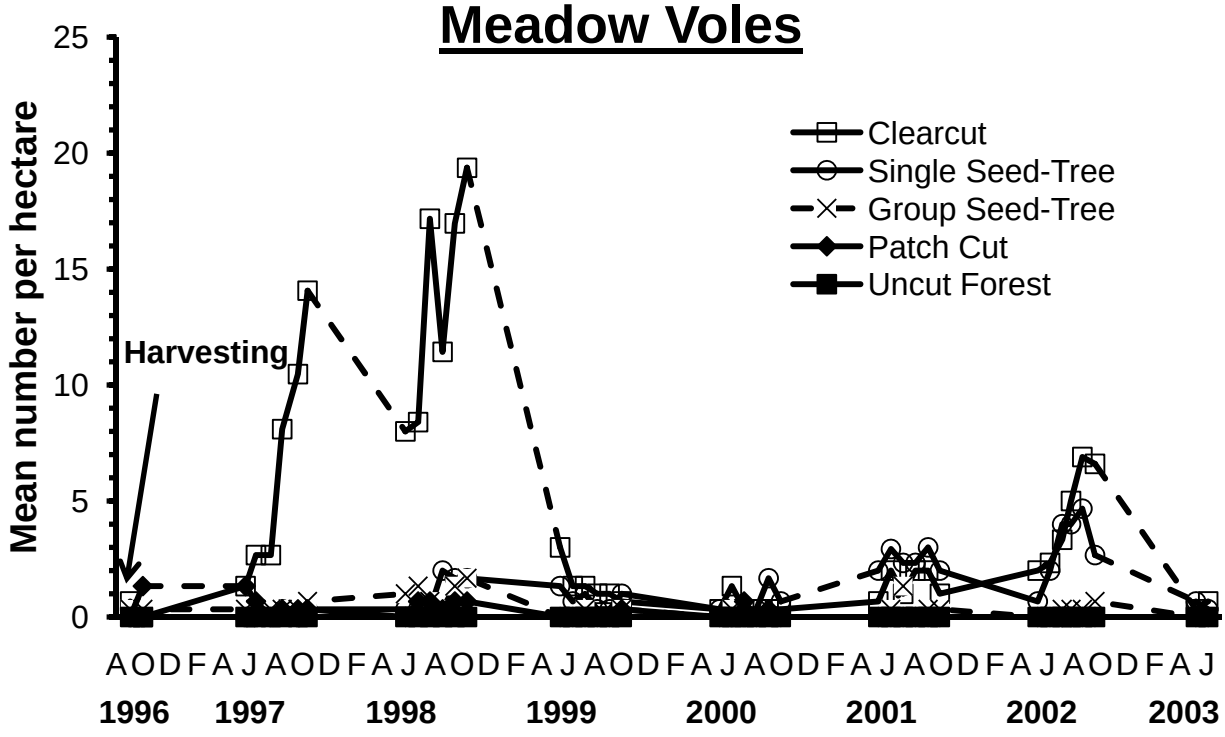
Meadow Voles
Mean number per hectare
25
20
15
10
5
0
Harvesting
Clearcut
Single Seed-Tree
Group Seed-Tree
Patch Cut
Uncut Forest
A O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A O D F A J
1996
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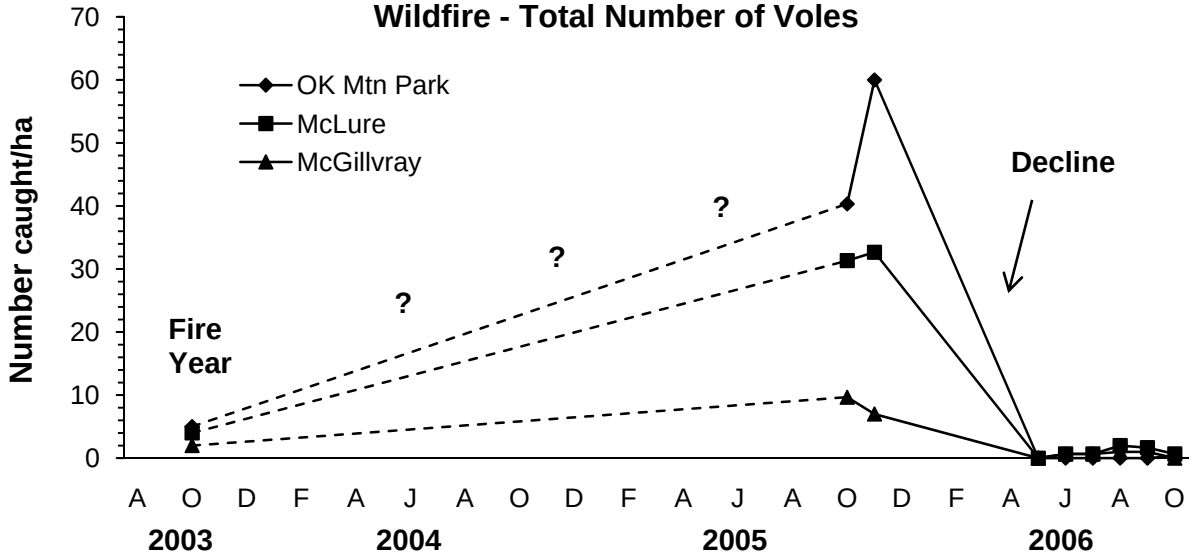
Wildfires

Following a fire year in 2003, meadow vole, montane vole, and long-tailed vole populations responded positively to post-fire habitat conditions reaching densities high enough for people to observe them, and spilling over into agricultural and residential areas of several communities during the summer and fall of 2005. The proximity of agricultural land and riparian vegetation in the Okanagan Valley may have provided source areas for populations of voles to colonize the burned-over forestland. There was serious feeding damage to seedlings in various plantations during the 2005-06 winter. Voles declined dramatically overwinter to numbers < 1/ha from peak populations (50-60/ha) the previous October 2005 at the McLure, MacGillvray, and OK Mtn Park fires. This high abundance of voles, occurring in the **second growing season after a wildfire**, has been observed in several locations throughout the southern interior during past fire events. This population peak tends to be independent of other fluctuations in vole numbers.



Wildfire and some types of prescribed burning may convert unavailable mineral nutrients into forms more available to plants. Decomposition of tree roots and greater availability of light, nutrients, and water in beetle-killed stands may also contribute to growth of understory vegetation. These processes may result in a flush of early-successional vegetation that has high forage quality for herbivores. Range seeding also adds several grasses and herbs to the plant community. Voles may thrive on the food and cover provided by this flush of vegetative growth.

Beetle-killed Stands

Our data from the Northern (NIFR) and Southern (SIFR) Interior Forest Regions of B.C. provide the first four years and the initial year, post-attack, respectively, of a monitoring program of voles and understory vegetation in beetle-attacked and susceptible pine stands. Changes in understory vegetation with the initial beetle-attack and subsequent mortality of overstory lodgepole pine trees may have profound effects on vole populations and potential damage to planted seedlings.

To date, mean numbers of *Microtus* voles (MV) and red-backed voles (RBV) in autumn, were **nil to low-moderate risk, for damaging seedlings, in beetle-killed and susceptible pine stands** in the two regions.

Project area	**Mean MV/ha**	**Mean RBV/ha**	**Risk Rating**
SIFR			
Penticton Creek	0	0	Nil
Kamloops	0.8	9.2	Low-Moderate
Summerland	0.1	1.2	Low
Kelowna	0.1	0.6	Nil
NIFR			
Dunkley	3.2	7.4	Low
Prince George	6.3	11.0	Low-Moderate
Vanderhoof	2.4	14.8	Low-Moderate

This successional change should be followed through time to determine how these voles respond to vegetation development in the understory. It is still unclear as to how often red-backed voles feed on planted trees.