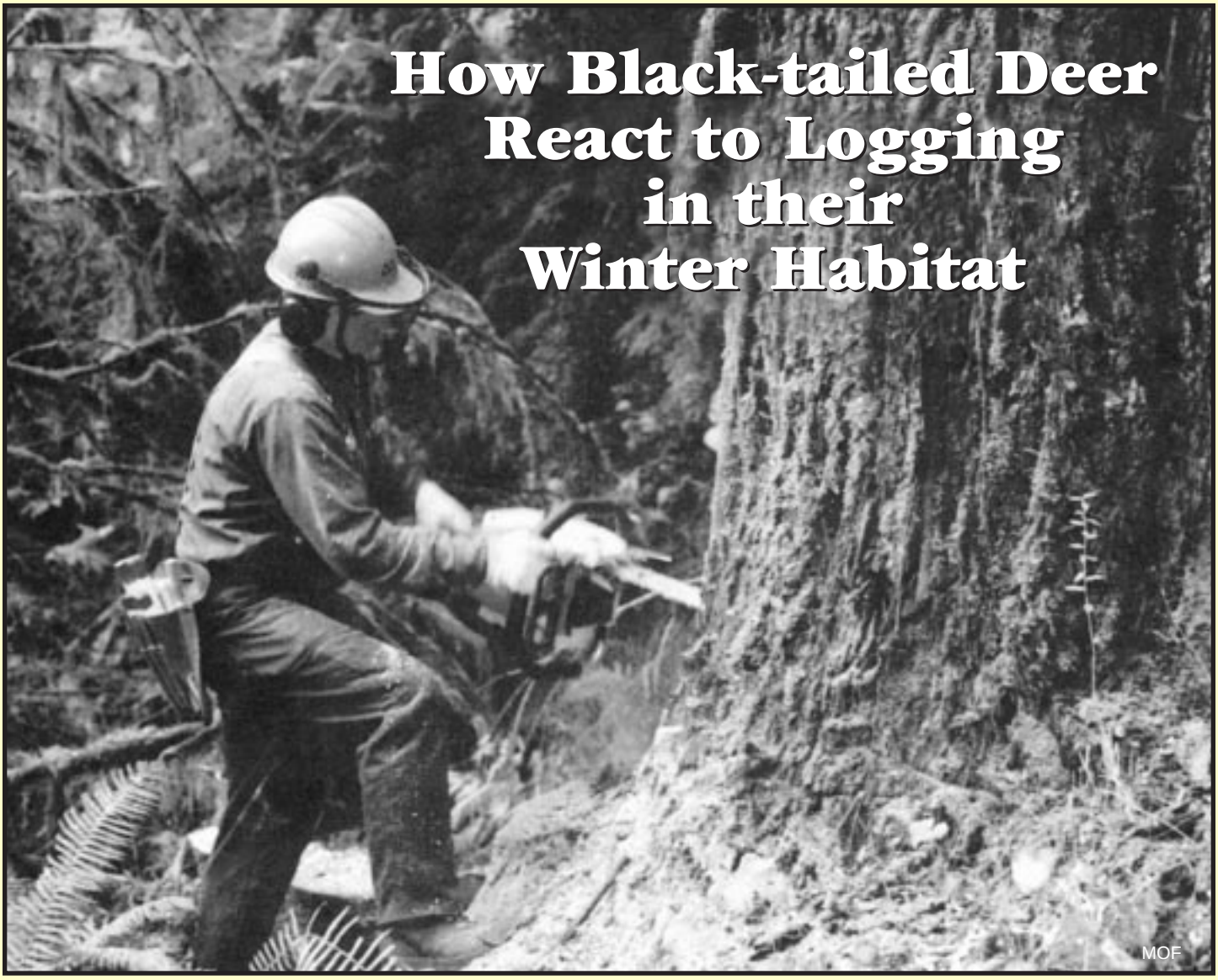
How Black-tailed Deer React to Logging in their Winter Habitat



Controlled Logging Tests Deer's Response

How would black-tailed deer react to clearcut logging of their winter range? Would they disperse freely to other areas to meet their winter-time needs or would they remain despite the extreme change in site conditions?

From 1988 to 1991, Scot McNay evaluated two large logging experiments on Vancouver Island that were designed to provide some answers to these questions. While a considerable body of anecdotal evidence existed about how deer respond to logging, there was very little "science" to explain their reactions.

The logging experiments were undertaken by the Integrated Wildlife—Intensive Forestry Research (IWIFR) program and were a component of a nine-year study of black-tailed deer. The program was a co-operative endeavour of the Ministry of Environment, Lands and Parks, the Ministry of Forests, and the University of British Columbia. Three forest companies aided in this effort: Canadian Forest Products, TimberWest Forest, and MacMillan Bloedel.

Deer populations on Vancouver Island had experienced rapid and unprecedented declines in the late 1960s and early 1970s. This program was initiated to investigate forestry practices that would maintain deer populations and to provide a sound basis for future wildlife and habitat management recommendations.

"My objective was to assess how individual black-tailed deer responded to controlled logging of old forests within their winter range," says McNay. Old forests, especially those at low elevations, appear to provide a special type of refuge for coastal deer—a preferred habitat during severe winter weather. By offering well-developed canopies that intercept snow, and an abundant source of arboreal forage, these forests allow deer to move

about and retrieve food efficiently.

Other components of the study revealed black-tailed deer to have strong family bonds. The deer also developed loyalties to specific sties based on the mother's range choices. These findings countered traditional theoretical views that deer would be free to choose the best habitats to enhance their chances of survival.

McNay believed that deer could be exposed to significant behavioural conflicts when faced with the loss of old forests on their winter ranges. They would be torn between their tendency for loyalty to the traditional winter range site and their preference for old forests. "I wanted to force a distinct and dramatic habitat change on individual deer," says McNay, explaining the experiment's rationale.

Forest Stands Selected in the Chemainus and Nimpkish Valleys

The IWIFR research team selected forest stands in the Chemainus and Nimpkish river valleys for the logging experiment. These stands had all the characteristics typical of high value winter habitat. Other stands of similar characteristics were still accessible (2–4 km away), but not directly adjacent to each logged stand.

Twenty female deer were radio collared in the two study areas. These deer were located every week for two or three winters between 1988 and 1991. Six deer in each study area (three treatment deer and three control deer) were monitored for all three years.

The Chemainus stand was logged in the summer of 1989 and the Nimpkish in the fall of 1990. By harvesting the cutblocks in successive years, the team had the opportunity to monitor deer in the Nimpkish study area for two years before logging, while Chemainus had two post-logging years of study.

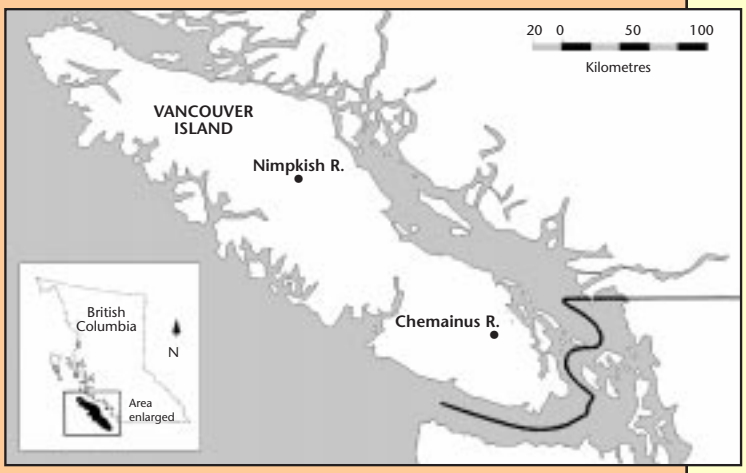
With their home ranges logged, the "treatment deer" would have to make a clear choice between staying on the harvested site or moving to a new site with the old-forest characteristics they prefer in winter months. To compare site loyalty and changes in winter range size, control deer were monitored close to each group of treatment deer (<2 km away). These were deer that used old forests during the same years, but in areas remote from the logging activity.

Stands Chosen for Study Represent Typical Winter Habitat

The IWIFR research team studied the responses of individual black-tailed deer to winter habitat logging in the Chemainus and Nimpkish river valleys. From a 1600-ha study area in each river valley, one stand of old forest was selected that was slated for harvesting 1–2 years after the study began in 1988. These stands met criteria for typical winter habitat and were isolated from similar stands.

Adjacent habitats consisted of young, 6–45-year-old Douglas-fir forests, recently logged areas, or remnant areas of old forest that were unsuitable for winter habitat because they were too high in elevation or had northern aspects. No habitat existed between the ages of 46 and 250 years old.

The 60-ha Chemainus River cutblock was scheduled for logging during the summer of 1989. Elevation in this southwest-oriented cutblock ranged from 800–1000 m. The site was dominated by Douglas-fir and western hemlock, with a minor component of western redcedar. Yellow-cedar occurred at higher elevations.

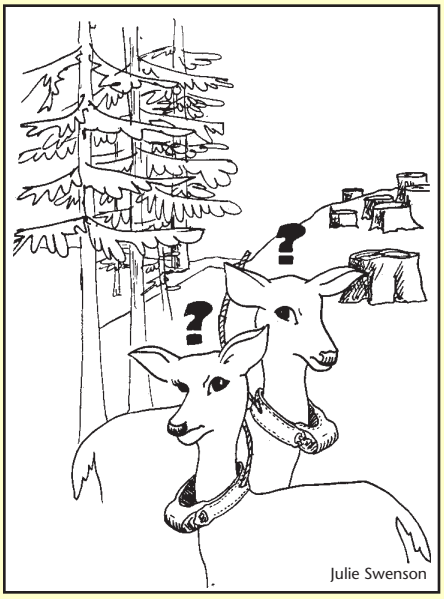


The 47-ha Nimpkish River cutblock was situated about 202 km northwest of the Chemainus River site. It was scheduled for logging during the fall of 1990. This cutblock ranged in elevation from 300–650 m and had a southeast aspect. Tree species composition was similar to the Chemainus River site.

Deer Remain Loyal to Logged Winter Ranges

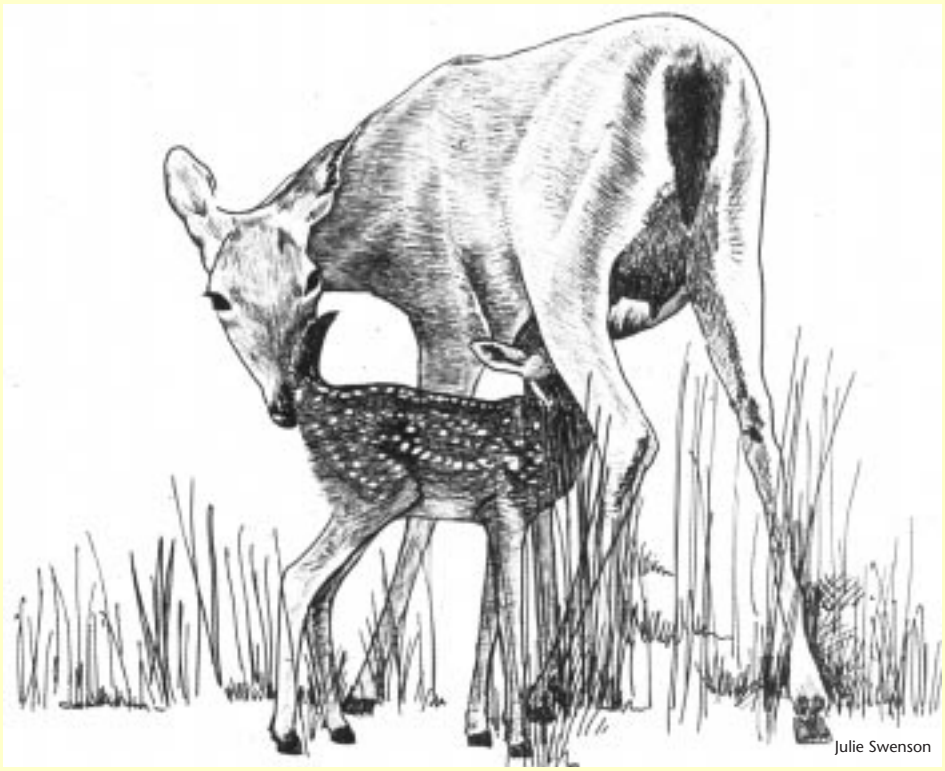
The IWIFR research team observed that use of low-elevation old forest, although steady in pre-disturbance years, was reduced considerably after logging even when this same type was available close by. McNay's preliminary conclusion is that loyalty to the actual range, rather than a preference for a particular type of winter habitat, dominates initial responses by deer to large, striking changes in habitat condition.

"We expected deer to make dispersal-type decisions when their winter ranges were essentially destroyed. This did not occur," say McNay. "Instead, the deer retained a strong loyalty to their winter ranges at both study areas with no indication that logging altered this attraction to sites."



With their home ranges logged, the "treatment deer" would have to make a clear choice between staying on the harvested site or moving to a new site.

McNay reasons that site loyalty may indicate a simple lag in decision-making; but rather than threatening deer survival, this lag may actually be beneficial. Deer are undoubtedly faced with new challenges in learning to adjust to the radically altered condition of their range. They need time to obtain enough information to evaluate the trade-offs provoked by these rapid habitat changes. Quick selections of new home ranges could ultimately decrease survival because of unknown hazards in unfamiliar areas.



Staying close to family seems to play a large role in the strategy for settling home ranges

"The old assumption about freedom of movement between habitats proved to be incorrect for our sample of deer," says McNay. "The deer we monitored failed to alter winter range sites to compensate for the reduced range quality caused by logging." Instead, the treatment deer in this IWIFR experiment simply increased their use of other habitats with a subtle shift in the boundaries of their winter range.

Site Loyalty May Endanger Migratory Deer Populations

A deer's loyalty to specific sites has important implications for wildlife management. Recent studies (see other brochures in this series on deer movements and habitat use) have pinpointed the significant role played by low-elevation old forests, particularly for migratory deer populations. These forests form an important component of their winter ranges. Yet in cases of continuous and contiguous logging, some deer are inevitably faced with no old forest to use.

The IWIFR research team found no migratory deer in or near young forests during periods of severe winter weather. McNay argues that this could occur only if:

- resident deer were superior competitors in the remaining young forests; or
- the offspring of migratory deer develop non-migratory tactics in managed forests.

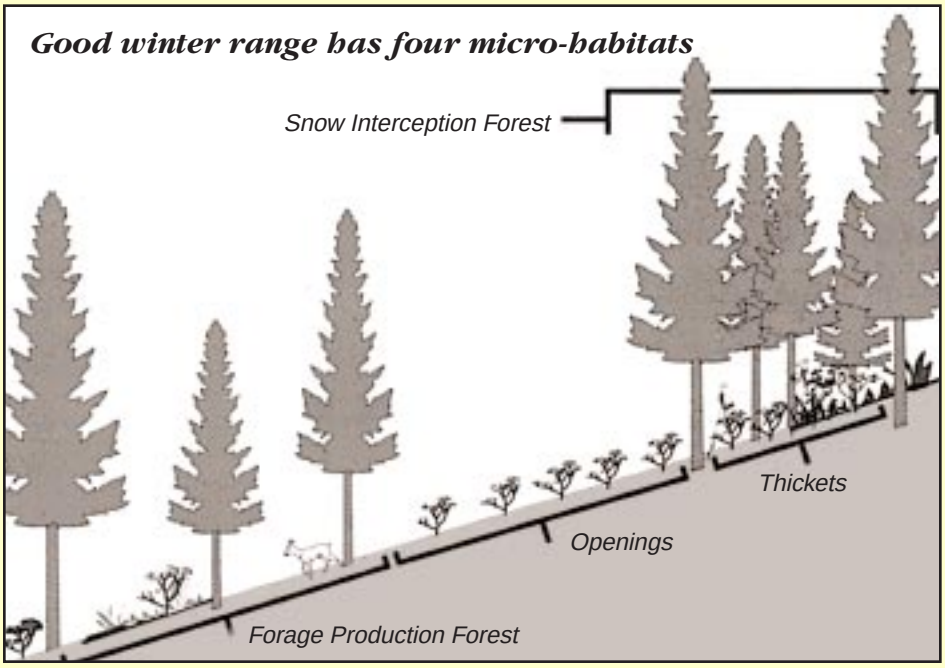
However, if the site loyalty observed was just a lag in decision making, McNay thinks that migratory deer may ultimately seek out old forests elsewhere by moving to new winter range sites. While the data from the logging experiments were insufficient to confirm these ideas, McNay notes that deer at Chemainus River eventually shifted their range boundaries

COASTAL BLACK-TAILED DEER STUDY

when low-elevation old forest was adjacent to the cutback.

Some deer (perhaps only migratory deer) may be able to make appropriate habitat adjustments when winter ranges are partially logged. From the research team's observations, McNay expects that the deer living in extensively modified areas would be mostly resident. In turn, this would mean that migratory deer are forced into increasingly smaller areas of old forests. "Where logging was carried out preferentially in areas of prime winter range, an increasing density of deer would occur in habitats of increasingly lower value. Based simply on carrying capacity theory, we would anticipate that migratory deer populations will decline," says McNay.

Juvenile spacing of young forest stands (above) can be used to retain forage production forests and to enhance snow interception forests as the stand ages (see below)



Site Loyalty Acts to Limit Habitat Choices

A deer's loyalty to specific sites also has important implications for habitat management. Based on the logging experiment and other components of their nine-year study of black-tailed deer, the IWIFR research team concluded that deer commit themselves early in life to specific tactics for seasonal range use and that altering this commitment is difficult at best. "Adaptation is limited to learning about new resource conditions within the established home range rather than about other, possibly better, habitats outside the historical home range," says McNay. Therefore, subsequent resource use decisions become increasingly more a function of habitat change than of habitat quality.

Management of young forests specifically to improve its suitability as winter habitat for deer may only benefit deer in the direct vicinity, at least initially. "When habitats are upgraded, managers may not see an immediate response," McNay explains. "This is not to say that such improvements are fruitless—deer simply take time to learn about them." McNay believes the important point is that habitat improvements may be most beneficial long after the initial management efforts, and would accrue to offspring and subsequent generations. The ultimate effects of any management action must, therefore, be judged over the long term.

References

McNay, R.S. 1995. The ecology of movements made by Columbian black-tailed deer. Univ. B.C., Vancouver, B.C. PhD thesis. 194 pp.

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Other brochures in this series deal with deer movement, habitat use, predator concerns, and habitat planning.

BRITISH COLUMBIA

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