Effectiveness of Canopy Gaps:

Creating Winter Forage for Sitka black-tail Deer

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This summer marked the first of a two-year study focused on monitoring the effectiveness of canopy gaps in creating winter forage for Sitka black-tail deer on Prince of Wales Island. Funded by a Collins Grant awarded to The Nature Conservancy, the project is a collaboration between The Nature Conservancy, the Thorne Bay Ranger District, and the Prince of Wales Tribal Enterprise Consortium, a tribally-owned corporation contracted to hire the field crew.

In the mid- to late-1980s small canopy gaps were implemented in 26- to 36-year-old young-growth stands on Prince of Wales Island. Estimates of the number of gaps installed range from 600 to as many as 900. Most of the gaps were created simply for application sake with no thought to future monitoring, so many sites lack location information. Designed to simulate natural wind disturbance, these openings were created with the goal of promoting forage species for Sitka black-tail deer on the island, in response to habitat capability declines over the past few decades. Logging practices in the 1950s-70s left much of the island's forests in even-aged management, which has resulted in the current state of dense**,** young-growth stands in closed canopy or understory stem exclusion condition. Very little light is able to penetrate the canopy to reach the forest floor, resulting in mortality of forage species and inability for reestablishment.

A similar study was conducted in the early 1990s, though preliminary findings were determined inconclusive. The author of that paper acknowledged the relatively short period of response time allowed between gap creation (1985-'87) and monitoring (1991-'92), and that gap sizes were sufficient to promote *Vaccinium spp.* (blueberry) regeneration (Demeo, 1994). In addition to having the benefit of increased response time, we have a refined focus of assessing the ability of canopy gaps to promote key winter forage species, including *Vaccinium spp.*, (blueberry) *Coptis asplenifolia,* (goldthread) *Cornus Canadensis,* (bunchberry) *Rubus pedatus,(five-leaved bramble)* and *Tiarella trifoliate (foam flower)*.

This summer we monitored 19 canopy gaps and adjacent young-growth plots in six areas on Prince of Wales Island, some thinned at the time of gap creation in the late 1980s, other sites un-thinned. Gap sizes ranged from about 40 feet to over 100 feet in diameter. Methods involved estimating percent cover of overstory and understory species, and assessing percent forage and conducting browse counts on *Vaccinium spp.* to determine utilization of the canopy gaps by Sitka black-tail deer. In addition, we took a series of canopy photos with a fisheye lens which, with the aid of light-analyzing software, will allow us to evaluate how much light is reaching the forest floor in both the canopy gap and young-growth sites. A good deal of time was spent this summer solidifying data collection and archival methods, as well as locating sites for next year's field season.

Unthinned young growth stand

Stand that has been thinned for winter forage

Some of our preliminary findings indicate that the most productive gaps for winter forage are on well-drained slopes and are in the range of 50-70 feet in diameter. We found that vegetation response tends to mimic the historical character of the stand. Many canopy gaps on the island were installed in wetter, less productive sites. We've seen that these sites tend to respond with a heavy presence of salmonberry (*Rubus spectabilus)*, skunk cabbage (*Lysichiton americanum)*, and lady fern *(Athyrium filix-femina),* species which do not contribute to deer winter forage needs. By categorizing sites based on plant associations we are able to identify which stands we expect to respond best to the small openings. The larger gaps (90 feet and larger in diameter) exhibit a heavier regeneration response by conifers, which shade out regenerating forage species, quickening the progression towards closed-canopy condition. Un-thinned young-growth stands provided the greatest contrast to canopy gaps, as these stands generally had no forage whatsoever.

At the conclusion of our two seasons of monitoring, Dr. Paul Alaback at the University of Montana will compare our data to data collected in the 1991-92 monitoring, as well as pre-treatment data collected in 1985, before the gaps were installed, where available, to track the response of the gaps over time. Our goal is to demonstrate that canopy gaps are an effective means of providing winter forage for Sitka black-tail deer, and to be able to identify the ideal site and size of gap for achieving this goal.

Canopy gap that emerges after thinning process.