Baker River Project Terrestrial Working Group Analysis Species

Black-tailed Deer (*Odocoileus hemionus*)

Drafted by Sarie Nichol

**Habitat Type:** Shrub Species

**Species Biology and Population Status:**

- A member of the family Cervidae, Columbian and sitka black-tailed deer along with mule deer are recognized as a single species, however limited gene flow between populations since the Pleistocene era distinguishes them as subspecies (Kie and Czech 2000).
- The Columbian black-tailed deer is found near Rivers Inlet, British Columbia, where it intergrades imperceptibly with the sitka black-tailed deer, south through Washington, Oregon and into California. Longitudinally, it is distributed from the Pacific coast east through the Coast Range and along the west side of the Cascades where it meets the third subspecies rocky mountain mule deer (Bunnell 1990).
- The average life span of black-tailed deer in the wild varies depending on weather, habitat quality, predation and hunting pressure, however, few deer live beyond 10 years (Bunnell 1990).
- On the southern coast of British Columbia, adult females typically weigh between 35-45 kg, during summer and fall, but in areas of high quality habitat they can weigh as much as 60 kg. Males are significantly larger weighing between 50 to 110 kg. Black-tailed deer are heaviest during rutting season, but lose 20-25% of their peak fall weight over winter (Bunnell 1990).
- Dispersal movements, other than local and migratory movements, occur most frequently among black-tailed deer between 1-2 years of age (age at which sexual maturity is reached). On Vancouver Island and in western Washington, dispersal patterns, specifically directionality are influenced by topography and dispersal distances approximately average 12 to 15 km, for females and males respectively. Black-tailed deer are polygynous, and intrasexual competition for mates is the dominant force influencing dispersal. Intrasexual competition is particularly intense among males, thus explaining their greater dispersal distances (Bunnell and Harestad 1983).
- On Vancouver Island, blacktails breed from November to early December. Bucks will court females 2 to 3 days before mating and remain with her up to 4 days after. One buck is likely to breed with up to 3 or 4 does during a 28 day period. Gestation period is about 200 days, with many births occurring in the first half of June (Bunnell 1990).
• Black-tailed deer conception rate is highest among does 2 years and older (90-95%). In high quality habitats, average productivity is about 1.5 females/year (Bunnell 1990).
• Breeding by female fawns in black-tailed deer typically occurs in high quality habitats or under low population density. When populations reach moderate to high densities female fawns do not reach sexual maturity until one year of age, and produce offspring in their second year (McCullough 1997).
• Male and female black-tailed deer are sexually segregated in all seasons of the year, except during rutting season (Kie and Czech 2000).
• The social structure of black-tailed deer consists of small groups of females, comprised of 3 to 4 individuals, related by maternal descent, and solitary males or unrelated groups of males (Bunnell 1990, Kie and Czech 2000). In favorable habitats large feeding aggregations of males and females often form, although temporarily (Bunnell 1990).
• Females, although generally intolerant of yearlings (especially when nursing fawns), are often seen with female offspring of the previous year (Kie and Czech).
• Fawns spend most of their day hidden, while the dam forages and rests up to 500 m from her young. The dam returns to nurse three or four times a day. When food resources are spatially concentrated, fawns can be observed accompanying adult females to foraging sites (Kie and Czech 2000).
• Because black-tailed deer are consistently on the move and either live alone or in small groups there are no sharp boundaries between populations. As a result absolute abundance is not used to assess population size or patterns, but rather indices of abundance are used by wildlife managers to estimate population size and health (Bunnell 1990).
• State game agency census on black-tailed deer, suggest that populations have remained stable since about 1980 (Kie and Czech 2000). However, in many areas of western North America black-tailed deer populations are in decline. Predation by coyotes, cougars and wolves in certain areas and under certain conditions may be a significant mortality factor (Ballard et al 2001).
• A study conducted on Vancouver Island to assess mortality causes and survival estimates for adult female Columbian black-tailed deer found predation accounted for 61% of all deaths. Average annual survival was 74%. Management recommendations to help rebuild declining deer populations include the retention of old, intact low elevation forests, which provide shelter from severe weather and access to forage during winter, in effect reducing vulnerability to predation (McNay and Voller 1995).
• In the Klickitat Basin, Washington, the annual survival rate of black-tailed deer averaged 0.82, however, during severe winters dropped to 0.71 (McCorquodale 1999a).
• Mortality is highest among fawns (45-70% per year) and lowest among adult females (15-25%). Under favorable conditions populations can grow to over 25% per year or decline by as much as 40% per year when conditions are poor (Bunnell 1990).
• Causes of black-tailed deer mortality include hunting, nonhuman predation by coyotes, cougars, black bears, grizzly bears, bobcats, wolves and golden eagles, disease, starvation and accidents (Kie and Czech 2000).
• Hunting has had little effect on populations in coastal ecosystems where there is an abundance of security cover. However, where populations are in decline, over-harvesting can occur (Bunnell 1990).
• Black-tailed deer are also affected by bacterial diseases, including elaeophorosis, and setaria. In addition, numerous gastrointestinal parasites, lungworms, foot worms, eye worms, tapeworms, legworms, trematodes and botfly larvae parasitize black-tailed deer. In California, neoplastic disease (tumors) occurs among black-tailed deer (Kie and Czech 2000).
• A protocooperative association occurs between columbian black-tailed deer and scrub jays, whereby scrub jays pick ticks and perhaps other ectoparasites from the skin of deer (Isenhart and Desante 1985).
• The black-tailed deer is neither a state-listed species, state species for listing, nor is it a species of concern by priority habitat type in Washington State (WDFW 2000).

Habitat Requirements:

• With the exception of the arctic, tropics and xeric deserts, black-tailed deer have adapted to most environments in western North America (Kie and Czech 2000).
• Black-tailed deer occupy forested areas at all elevations. During summer some deer migrate into subalpine and alpine areas above forested ecosystems (Bunnell 1990).
• In southeast Alaska, migratory sitka black-tailed deer are found at higher elevations than resident deer during all seasons. In addition, all migratory and resident deer move to higher elevations during mild weather (Schoen and Kirchhoff 1985).
• Black-tailed deer thrive in habitats consisting of early to midseral vegetation. Areas affected by wildfire, prescribed burning and clearcut logging have increased forage production and generally benefit black-tailed deer. In many areas of their northern range, heavy snow during winter reduces the amount of available forage in open habitats and deer are dependent on older forests where tree canopy cover provides shelter from snow and access to understory forage (Kie and Czech 2000).
• In spruce forests of the north Pacific coast, the most abundant black-tailed deer forage is found in areas 5 to 10 years after a disturbance, such as logging (Kie and Czech 2000).
• Edge habitat is particularly important to black-tailed deer in intensively managed landscapes as it offers access to a variety of forage and cover. In unmanaged forests, edges are less important as the fine-grained interspersion of forage within cover areas provides ideal habitat for deer (Kremsater and Bunnell 1992).
• The best foraging habitats for black-tailed deer consists of a variety of abundant nutritious plant species that are spatially arranged so that access to forage does not occur at the expense of an increased risk of predation (Kie and Czech 2000).

• Severe weather, including heavy snow, high winds and low temperatures can lead to nutritional stress in black-tailed deer and thus greater susceptibility to predation, accidents and disease. High winds and low temperatures cause rapid convective heat loss and thus a greater demand for energy intake. Heavy snow covers many herbaceous plants and low shrubbery reducing the amount of available winter forage and movement through snow requires greater energy intensive activity (Kie and Czech 2000).

• Thermal stress in summer can also be an important factor influencing production and future survival in black-tailed deer. Rainfall, in particular, can pose major energetic costs for black-tailed deer in summer pelage. The authors of this study emphasis the importance of thermal cover in summer ranges of black-tailed deer (Parker 1988).

• Home range size of black-tailed deer is associated with sex, age, body mass, season, race, habitat, computational method, and other factors. The degree of landscape heterogeneity, including the variety of habitat patches, habitat patch shape and spatial arrangement and the contrast between adjacent patches, may also be important for determining home range size (Kie and Czech 2000).

• A study on the distribution and home range patterns of sitka black-tailed deer in southeast Alaska found that the mean summer and winter home range size was 79 ha for both male and female and migratory and resident deer. With few exceptions, black-tailed deer monitored in this study returned to the same summer and winter home ranges year after year (Schoen and Kirchhoff 1985).

• In southeast Alaska, where late seral habitat is required for overwinter survival of black-tailed deer and much of the available habitat is clearcut, annual home ranges average 198 ha (ranged between 24 to 599 ha). Within home ranges core areas of intense use overlapped among deer and averaged 45 ha and 32 ha, for summer and winter respectively (Yeo and Peek 1992).

• Black-tailed deer are often year-round residents in areas with abundant resources and mild climates. Many deer, however, are migratory, moving to high elevation montane ranges during the summer to feed on seasonally abundant herbaceous forage and retreating to lower elevation ranges in winter. Males disperse an average of 15.2 km and females move an average of 12 km to establish home ranges (Kie and Czech 2000).

• In the Klickitat Basin, Washington, the average distance between summer and winter ranges is ~28 km (McCorquodale 1999a).

• Adult females exhibit high site fidelity and facultative territoriality for nursing sites during consecutive years. Selection of nursing sites is related to forage resources. Other authors argue that no firm evidence suggests territoriality in adult females, as home ranges often overlap to some degree. In areas with abundant summer forage black-tailed deer display little agnostic behavior toward other deer following parturition (Kie and Czech 2000).

• In coastal British Columbia, black-tailed deer occupy forest stands of various seral stages, from new clearcuts to old growth forests. Type of habitat used
depends on season and climate. In areas with heavy snowfall, black-tailed deer inhabit old growth, as it provides greater densities of digestible dry matter and reduced snow depths. In areas with mild winter weather, clearcuts at shrub and conifer seral stages may provide optimum foraging habitat (Harestad 1985).

- In coastal British Columbia, black-tailed deer require winter ranges with abundant understory vegetation and arboreal lichens for forage, and overhead canopy and ground-level thickets for cover. Although many important winter habitat components occur only in old growth forests, the structure and composition of immature stands can be modified to meet many of the black-tailed deer’s habitat requirements. Reducing tree densities by thinning immature forests to make them patchier would produce more foraging areas in winter ranges of black-tailed deer (Nyberg et al 1986).

- Preferred black-tailed deer spring ranges occur in landscapes where topographic features reduce snowpacks and encourage early melt, among openings that encourage early growth of herbaceous forage and where cover is accessible from foraging areas (i.e. within 200 m). Ideal summer ranges occur where forage is abundant, especially highly digestible herbs and shrubs, and where patches of cover are interspersed among food (Bunnell 1990).

- In British Columbia, black-tailed deer prefer ridge tops, knolls, and topographic breaks to gully bottoms and dense stands of young trees (Kie and Czech 2000).

- In southeast Alaska, canopy cover and bunchberry dogwood cover are predictors of habitat selected by black-tailed deer in old growth western hemlock (Yeo and Peek 1992).

- A study in Colorado, found a high proportion young black-tailed deer (2-10 days old) occupying south-facing slopes with gentle terrain and a high variability of overstory and concealment cover. Areas with adequate cover not only provide access to forage but often help conceal deer from predators. Neonates also selected foraging sites containing highly digestible herbaceous vegetation rather than browse. Overall, the most important habitat components for neonates and lactating females include a suitable thermal environment for the young deer and forage to meet the nutritional demands of nursing females (Bowyer et al 1998).

- In the southern portion of their range in California, black-tailed deer typically occur in shrub-dominated habitat. Deer densities are highest in areas containing mixed species of shrubs with oak woodlands (Kie and Czech 2000).

- In the Klickitat Basin of Washington, black-tailed deer preferred an overstory dominated or codominated by Oregon white oak during winter. Winter home ranges often occurred in areas with less mixed-conifer cover type but showed some preference for mixed-conifer patches within home ranges. At mid-elevation, summer home ranges were concentrated in mature/old growth and younger closed-canopy conifer stands (McCorquodale 1999b).

- Distributional patterns of Black-tailed deer and White-tailed deer in southwestern Oregon demonstrate interspecific avoidance between these sympatric species. Black-tailed deer inhabit lowland habitats more often in environments supporting few white-tailed deer (Smith 1987).
- Black-tailed deer are strong swimmers, often crossing open bodies of water during migration. In southeast Alaska, black-tailed deer were recorded swimming across Fredrick Sound for distances greater than 22 km (Kie and Czech 2000).
- The risk of predation is lower in areas with abundant quality forage. Since it is socially unacceptable to practice lethal control of predator populations managing declining deer populations should involve improving habitat conditions such as hiding cover (Kie and Czech 2000).

**Food Resources and Foraging Behavior:**

- Black-tailed deer are small body ruminants and must feed on forages in which nutrients are concentrated and easy to digest (Kie and Czech 2000). As a result, black-tailed deer are selective in their feeding, preferring different parts of plants, and discriminating among and within species. In addition, forage preference varies by location and even in the same area during different seasons (Radwan and Crouch 1974).
- Black-tailed deer are browsers, particularly during winter when they rely on twigs and other parts of woody plants for forage. However, when nutritious, highly digestible forage is available, black-tailed deer will select these species in preference to browse species of lower digestibility (Kie and Czech 2000).
- A study of forage intake by black-tailed deer in southeast Alaska found that over 90% of active time was devoted to foraging. Active foraging was separated by ~2 minutes of non-foraging. Consumption rates varied with season, from 300 g of dry matter per day in winter to more than 1300 g/day during summer (Gillingham et al 1997).
- Black-tailed deer obtain of their water and all of their energy requirements from food. Throughout their range, digestible energy and nitrogen for building protein are often scarce enough during certain seasons to limit deer abundance. The chemical composition of most plants and the location of nutrients change throughout the growing season. During spring, the cell sap of newly grown plant material contains simple compounds that are easily digestible. As the season progresses plant tissues age, the proportion of available nitrogen decreases and the complexity of carbohydrates increase (i.e. from starch to cellulose). Nutrients are now stored in cell walls and lignin is added making plant material increasingly indigestible. At this stage, the amount and rate at which deer can extract calories decreases. In addition, some plants begin to build secondary compounds, such as tannins or other phenolics, further reducing the amount of energy available to deer (Bunnell 1990).
- Important forage plants for Columbian black-tailed deer in southern British Columbia vary with season. In winter, western red cedar, deer fern, bunchberry and the arboreal beard lichens provide highly digestible forage. Salal is also an important winter forage for black-tailed deer on the south coast. It is not very digestible when eaten alone, but when eaten with other plants, especially the beard lichen *Alectoria*, its digestibility increases. No one forage species provides high concentrations of crude proteins in the winter, however blueberries, deer
fern, sword fern and bunchberry provide at least some needed proteins to deer diets. In moderate and deep snowpack zones many forage species become inaccessible to deer. As a result the height of browse species, such as salal and huckleberry, is important in winter ranges. Where ground forages are buried by snow, litterfall is an important food source. Arboreal lichens, especially species Alectoria, Bryoria, and Usnea are often the most digestible litterfall. In areas with severe winters, the lower branches of Douglas-fir and western red cedar as well as arboreal lichens may be the only available food source. The amount of available, quality forage significantly increases during spring and summer, so the diet in any one area is seldom dominated by a few species. Pregnancy, lactation and the loss of weight over winter places high energetic and protein demands on deer and so the amount of high quality forage can be limiting. Most preferred spring and summer forages are above 50% digestibility. Bunchberry, Rubus spp., willow spp., bracken fern, fireweed and pearly everlasting are important forage plants for Columbian black-tailed deer during spring. In summer, salal, fireweed and pearly everlasting comprise a substantial portion of their diet (Bunnell 1990).

- Water requirements of black-tailed deer are greatest from late spring to early autumn when forages are relatively dry and warm temperatures increase sweating and panting. Female deer water requirements are greatest in late spring, with the demands of late pregnancy, and in the summer when lactating. In early spring deer obtain much of their water from succulent forage (Bunnell 1990).

### Habitat Alteration and the Effects of Human Disturbance:

- Harvesting low elevation forests can either benefit or limit deer populations, depending on seasonal use patterns and climate (Harestad 1985). Habitat models predict that in the black-tailed deer’s northern range (British Columbia and Alaska), reducing late seral habitat, will negatively impact deer populations, particularly in years of heavy snowfall (Fagen 1988). One author suggests retention of old growth forests in 40 ha areas, that approximate size of home ranges, will help maintain deer populations in managed forests (Yeo and Peek 1992).

- Large population decreases of sitka black-tailed deer in southeastern Alaska has been linked to the availability of digestible energy during winter. Low light levels in forests are associated with greater foliar concentrations of nitrogen, potassium, and phosphorus than in open clearcuts (Van Horne et al 1988). In addition, studies have found browse in old growth forests to have a greater proportion of leaves, to be more succulent and have a higher proportion of crude protein than browse in clearcuts (Happe et al 1990). Lower concentrations of nitrogen and higher concentrations of tannins reduce concentrations of digestible proteins by half in foliage found in clearcuts relative to those in forests (Van Horne et al 1988).

- Habitat loss resulting from economic development has clearly played a role in reducing black-tailed deer populations in the latter half of the twentieth century. In western North America, millions of hectares of deer habitat have been replaced
by reservoirs and roads. Black-tailed deer whose home ranges are within the vicinity of a road often become displaced as road use increases, especially during hunting season (Kie and Czech 2000).

- Increasing residential development throughout western North America has significantly reduced deer use in areas adjacent to structures. However, deer have become habituated to humans and in many areas are nuisances to homeowners, as they tend to feed on many ornamental plants (Kie and Czech 2000).
- Hunting is commonly used to regulate black-tailed deer populations. In such cases, a higher proportion of females are harvested to reduce the overall population (Kie and Czech 2000).
- Black-tailed deer are often in competition with livestock for food and water resources. Timing of livestock grazing is critical to black-tailed deer, particularly during fawning season. In addition, fence construction, water development, brush control and livestock herding activities can reduce access to forage and alter distribution patterns. When startled or chased deer jumping livestock fences can become entangled between the wires (Kie and Czech 2000).
- While well-planned timber management can restore or improve early seral stage forest habitats, poor management practices can seriously degrade black-tailed deer habitat. Altering early successional forests through artificial regeneration practices such as use of herbicides and planting seedlings shortens the time period over which these habitats are beneficial to deer (Kie and Czech 2000).
- In the black-tailed deer’s northern range, old growth environments provide high habitat diversity and excellent winter habitat conditions. Logging interrupts forest canopy cover and increases snow accumulations near the edge of openings. As a result, the increased browse production along clearcut edges may be unavailable for winter forage. In addition, increased blow-down along forest edges may impede travel, further reducing the amount of winter forage available to deer (Kirchhoff 1983).

**Studies Conducted in the Baker River Watershed:**

*** Local information still needs to be added. ***

**Literature Cited:**


_____. 2000. State listed species; State candidate species; Species of concern by priority habitat type. Olympia, WA. USA.


References:


